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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

15 MAY 1985

14798
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TOWARDS THE FORMULATION OF TECHNICAL ASSISTANCE PROGRAMMES FOR THE DEVELOPMENT OF SELECTED ENGINEERING INDUSTRIES *

Report Prepared
For the United Nations Industrial Development Organization

By

Peter K. Manoranjan
UNIDO Consultant

* The views expressed and the material presented in this report are those of the author and do not necessarily reflect those of the UNIDO Secretariat.

CONTENTS

I. INTRODUCTION

The present report contains technical inputs directed towards the formulation of technical assistance programmes in the following fields/areas of the engineering industries. Some of these are apparently new areas, where technical assistance is being initiated. In several of the above, assistance has been requested by governments.

1) Mining and construction equipment industry.
2) Coal mining industry - mechanization.
3) Building construction equipment industry.
4) Fabricated metal products industry.
5) Electric power utility industry, computer systems in power systems operation.
6) Power generation equipment industry.
7) Operational reserach and systems analysis in transportation.

The report is presented in two parts. The first part contains a very brief overview based on some of the real situations that constitute, in general, the constraints to the development of these industries and tries to identify the essential inputs that could be imparted by way of technical assistance that would help ameliorate the problems and contribute to the achievement of the development objectives. The treatment, however, is not exhaustive but limited to serve the purpose of the subject report namely to provide the technical inputs towards the formulation of technical assistance programmes and to, more importantly, recommend specific project proposals within the scope and purview of the engineering activity. This is done in the part two of the report.

The second part consists of sets of project proposals under each industry or area of development. These project proposals are based on the objectives and constraints identified earlier. They are carefully structured so as to take into consideration commensurate skills, equipment and management and the aspect of technology, particularly that which is imbibed in the equipment. They also seek to strenghten the intra-sectoral linkages especially those of the component transactions and to promote a horizontal integration. To a larger extent the proposals are aimed at the medium sized manufacture and in keeping the investments low. Where the nature of the product dictates, larger size manufacturing establishments are kept in mind. In certain areas proposals deal with specific products that permit progressively increasing complexity of the product; as well as those that have a dynamic comparative advantage. However, it is noted that the products dealt with are only representative and not exhaustive. The functional purpose of the proposals runs through the spheres of institutional building, direct support, training and pilot production.in the first area, namely mining and construction. The rest of the areas deal only with pilot production since the format for other functions could be easily established based on the first. In view of this and since the proposals are made in a modular fashion, T.A programmes can be formulated from these proposals for any country according to the requirement and objective.

The format of the proposals is according to the latest UNDP guidelines and the UNIDO manual on project design (May 1984). The proposals do not include budgets so as to retain the flexibility to tailor them according to the specific needs of a country and the criteria of the source of funding. Several proposals contain the budgets as well, in cases where the above elements are already identified.

PART I

DEVELOPMENT CONSTRAINTS AND TECHNICAL ASSISTANCE NEEDS

PART I

DEVELOPMENT CONSTRAINTS AND TECHNICAL ASSISTANCE NEEDS

This part discusses very briefly the development constraints and the technical assistance needs in the selected branches of industry.

1. Mining and Construction equipment industry

The mining and construction equipment industry is in general concerned with the drilling, loading and transport equipment in the surface mining, underground mining and surface construction and underground construction and tunnelling. The equipment used for water well drilling is all included here. The general problems are presented below:

1.1 The development constraints

(i) Repair and maintenance capability

In the fast expanding mining and construction sectors, the machinery and equipment requirement is almost entirely met by imports. The lack of adequate repair and maintenance capability in the metalworking and engineering industries is resulting in major equipment breakdown problems leading to enormous production losses in the user industry sector and import of expensive services from outside and also quite often to permanent abandonment of costly equipment.

(ii) Spare part manufacturing capability

The lack of adequate spare part manufacturing capability in the metalworking and engineering industries is resulting in undue delays in servicing the equipment since delays, leading to extensive production losses in the user sectors as well as to expensive imports or alternatively to high inventories blocking capital involving foreign exchange in all cases, and in the event of inadequacy of such funds, resulting in permanent abondonment of the imported original equipment.

(iii) Component manufacturing capability

The machinery and equipment requirements as mentioned above are almost entirely met by imports forming a considerable portion of the total import bill and often it represents by value, the largest single item imported. The equipment involved is extremely complex. However, certain structural parts and non-integral sub-assemblies are relatively simple and can be manufactured. Since the manufacturing technology generally employed by the original equipment manufacturer in producing these parts is not so capital intensive, they car be produced by using simple labour intensive techniques with advantage and at comparable costs. However, such a manufacturing activity is not undertaken due to inadequate manufacturing capability.

(iv) Machinery manufacturing capability

In certain countries there exists considerable capability in the existing engineering industries identified in terms of products that are being produced by these various firms which products are technically and functionally similar to some of the sub-assemblies, sub-systems and auxiliaries of the mining and construction equipment. However, this capability is latent with reference to the objective of promoting the development of mining and construction equipment manufacturing industry and is not being harnessed in order to develop the industry.

1.2 The technical assistance needs

Corresponding to the various constraints mentioned above, the technical assistance needs could be identified as below.

(i) Strengthening repair and maintenance capability

Strengthening of the capability of the engineering industries in the repair and maintenance of the mining and construction equipment would enable the industries to effectively provide the services to the equipment user sectors and thereby contribute to the amelioration of the problem.

The repair and maintenance capability of the engineering industries is dependent on an adequate number of technicians with the required skills in maintenance and repair techniques, availability of appropriate machinery and personnel with organizational skills and systems capability.

A repair and mainten..ce demonstartion unit could be envisaged to provide the necessary hand-on-job demonstration in maintenance and repair techniques, selection and use of appropriate machinery and facilities and maintenance programming, scheduling, and systems in maintenance management, thereby providing the necessary inputs to cadres and incresae their capability in repair and maintenance.

The personnel thus equipped with the necessary skills and the acquired equipment and facilities, together with the management capability would be instrumental in performing the repair and maintenance of the drilling loading and transport equipment as used in the surface mining and construction, tunnelling, underground mining and construction, and water welldrilling etc.

(ii) Strengthening spare part manufacturing capability

Strengthening the capability of the engineering industries in the manufacture of selected types of spare parts, depending on their technical complexity and economic feasibility, for the mining and construction equipment would enable the industries to effectively provide the services to the equipment user sectors and thereby contribute to the amelioration of the problem.

The manufacturing capability of the engineering industries is dependent on adequate number of technicians with the necessary skills in manufacturing, the availability of the appropriate machinery and personnel with management skills and systems capability.

A production demonstration unit can be envisaged to provide the necessary hands-on-job activities in the manufacture of spare parts, including design/drafting, raw material selection, manufacturing processes, production machinery selection and opreation, basic production management, thereby providing the necessary inputs to cadres and increase their capability in the manufacture of spare parts.

The personnel so equipped and the facilities and machinery acquired together with the management capability would be instrumental in performing the manufacturing of the spare parts for drilling, loading and transport equipment used in mining and construction.

(iii) Providing support to existing firms to promote component manufacturing capability.

Providing direct support to an existing enterprise to increase its capability to introduce the new product, would enable it to manufacture selected parts and assemble the equipment (the rest of the equipment being imported in arrangement with the supplier of the original equipment). This would initiate the manufacturing capability in producing/assembling the selected mining and construction equipment, thereby achieving the objective.

An existing enterprise, that has been producing related or similar fabricated products or engaged in the repair or reconditioning of simpler mining and construction equipment or agricultural tractors and other machinery, is expected to possess certain basic manufacturing capability in metal fabrication. However, it would require increased capability in fabrication skills, techniques, machinery and processes, and management to udnertake the manufacture of the additional products that could be larger in size and more exacting in dimensions, etc.

The technical assistance to be provided to existing enterprises could include imparting of appropriate fabricating skills, techniques and processes as required for the manufacture of the selective parts and sub-assemblies such as frames, portal rigs, platforms, boom structures, rail-bound mine cars and other structurals.

The direct assistance mentioned above would provide this additional expertise that is needed to produce the structurals for mining and construction and other related equipment.

(iv) Developing machinery manufacturing capability

Organizing pilot production would enable the engineering firms to utilize their existing capabilities to produce components and sub-assemblies/sub-systems and other auxiliary equipment or modify the existing products to match the requirements of the mining and construction machinery and in the process acquire the engineering capability and place themselves well on the way to becoming established suppliers.

A pilot plant would put these components together to build the selected mining and construction equipment as its final products. Such a process could progressively establish the industry.

The activities of the pilot production plant can include design of the boom and carriage systems for the ground water investigation, water well drilling, surface and underground mining; identification of components and sub-assemblies/sub-systems that could be supplied by the local engineering firms, interaction with the firms to establish production of the identified components/systems and manufacture and procurement of other parts, and the assembly of the equipment in the pilot plant.

These activities would lead to certain operational results including development of engineering firms producing components and sub-assemblies/sub-systems for machinery; establishment of a system of sub-contarcting and supplies, establishment of the production of a higher end-product which was earlier not produced (strengthening capabilities, bringing them out to create new capabilities).

The existing engineering firms that have been hitherto producing various products such as hydraulic control elements, hydraulic cylinders, hoses, etc., pneumatic elements and systems, compressors and compressed air line systems, electrical items, carriage chassi, structural elements etc., although possessing the basic capabilities and ability to manufacture their own products which are often acquired from licensors of their respective products, generally lack the ability to apply the products or come out with new (but related products) to suit a specific purpose or equipment. To overcome this constraint it would require additional inputs in terms of design, adaptation, quality, certain high technologies, possibly additional production machinery and organizational skills.

The pilot production plant can provide and impart this additional expertise to the existing engineering firms and establish and develop the activity.

2. Coal mining industry-mechanization

The coal mine is a complex of access shafts and drifts leading to a network of underground roadways that service the coal faces where the actual mining is perormed. The construction and layout differ greatly depending on the geological conditions, including seam thickness, depth and the geological features. The equipment for drilling, loading and transportation should be selected to form an integrated system.

2.1. The development constraints

(i) The equipment in both development and production operations for drilling, loading and transportation covers a large variety in each type, from machinery as used in conventional to modern methods and within each method a wide range of size and capacity. As the equipment forms an integrated system, the constituent machinery ought to be mutually compatible for optimum efficiency. (Please see Appendix 1 for details of equipment).

(ii) Apart from the above, the seam thickness and depth determine the basic method of mining which in turn defines extraction machinery. In addition to the seam thickness and depth, the rock conditions and geological features have a bearing on the layout and construction of the shafts and drifts and the network of roadways, influencing the driving equipment.

(iii) The equipment involves large capital outlays and therefore, particular care should be exercised in the selection of equipment for mechanization and modernization to increase the productivity.

2.2. The Technical assistance needs

(i) The identification of the comprehensive mechanization of coal mining, in specific conditions of location and thickness of layers and geological features, to increase the productivity in mines where such mechanization is not existing, would need detailed study of the existing extraction systems and their productivity, in similar deposits and comparable geological features and the study of mechanization systems design and equipment selection.

ii) Over the decades, efficient systems have been developed in various parts of the world, with complete mechanization of the mining operations, some of them representing the most highly productive coal extraction systems in the world. For example, the longwall mining in Europe has been developed to a very high degree of mechanization and levels of productivity.

iii) The comprehensive mechanization of coal mining in specific conditions of location and thickness of layers and complex geological features would require careful consideration and analysis of the existing extraction systems for effective decision making. To meet this need a study tour can be proposed to expose the technical experts to an overview of the existing mechanization and their productivity levels, and fellowships to a mechanization centre to study the mechanization systems, thereby providing the inputs necessary for appropriate decision making and identification of the comprehensive mechanization that is required to realize the productivity goals.

iv) The visits to the mines employing similar methods and study of their operations in the conventional and continuous mining systems, the equipment and machinery used, the productivity levels etc; and the fellowships in a mechanization centre and the accompanying study of the extraction systems, mechanization systems design and equipment selection; would enable the technical experts to gain first hand information on the existing systems enabling them to identify the optimum comprehensive mechanization.

3. Building construction equipment industry

The equipment referred to here includes simpler structurals, wheel barrows, concrete mixers, low capacity building cranes etc.

3.1. The development constraints

(i) Manufacturing capability in the unorganized sector

The existing fabricated metal products industry, that is mostly in the unorganized and artisanal sector, is unable to adequately meet the demand of simple steel structurals, required in the growing building construction, due to lack of basic metal fabrication know-how, engineering and production methods and quality consciousness.

(ii) Manufacturing capability in the metal working industry

The demand for the building construction equipment is considerable and is on the increase. Some of the relatively simple equipment could be produced by the local metalworking and machinery industry. However, the industry is unable to do so due to a lack of the product and production know-how. Though some of the engineering firms are quite well equipped with the necessary plant and machinery and the basic engineering infrastructure is available, the lack of the above know-how is inhibiting their production capability and they are not able to diversify even in the face of a decline in demand for their traditional products. While the machinery might not lend itself as an independent product (product line) with economy of scale, unless the demand warrants it, it might well serve as an additional product to increase the capacity utilization.

3.2. The Technical assistance needs

With a view to overcome the constraints, the following needs and technical assistance can be identified.

(i) Strengthening the manufacturing capability in the un-organized sector:

The constraint could be overcome by organizing a pilot production plant to provide the basic know-how in manufacturing processes, as required in the fabrication of the structural elements required for building construction, the use of simple equipment, engineering techniques and to introduce simple production methods and procedures. The metalworking skills learnt, the equipment acquired and together with the procedures introduced, would impart the metal fabrication capability and would be instrumental in initiating the development of fabricated metal products industry.

The activities of the pilot plant could include metalworking operations such as machine cutting, hand forging, machining, welding, finishing and assembly; use of machinery, simple machine tools and other equipment for metal fabrication and employment of engineering techniques and production methods.

The above activities can lead to certain operational results including building up of cadres with metal fabrication process and production know-how, acquisition of certain equipment and machinery and the methods; and the formation of an organized manufacturing, that would contribute to the development of the metal fabrication capability, required to meet the demand for simple fabricated structural derived from the construction sector.

(ii) Strengthening the manufacturing capability in the metal working industry

Establishing the pilot production of simple machinery such as low capacity building cranes in an engineering firm, in addition to its existing product mix, would impart the requisite know-how and lead to the development of the manufacturing capability in the metalworking industry to produce simple building construction machinery and thereby initiating the development of that industry.

The manufacturing capability to produce the simple building construction machinery would involve the product know-how, the process know-how including the appropriate manufacturing processes and the machinery to be used, etc. The pilot manufacture of the concrete mixers, building cranes etc. in engineering firms engaged in similar manufacturing operations and posessing basic plant and machnery, would demonstrate to the industry the possibilities to undertake similar products, leading to the acquisition of the production capability to diversify into building construction machinery. (Jib cranes which are similar in construction are also suggested for manufacture. These are used in workshops for handling heavy components).

4. Fabricated metal products industry

The industry products include all general fabricated metal products covering a whole gamut of them from hardware items to standard parts and metal working hand tools, from components to containers and non-pressure vessels etc. Following are the development constraints and technical assistance needs of this industry.

4.1. Development constraints

(i) The general metal working industry, particularly the small and medium size firms, engaged in the manufacture of door fixturers, builders hardware standard parts, hand tools etc. is unable to meet the competition in the market and as a result is usually in a state of depression. This condition is an outcome of several real situations including, among others, the following:

- The imported products available in the market are of much higher quality and very competitive in price inspite of tariff protection;
- The user industries generally prefer to import these products;
- The variety and range of these products required by the user sectors is wide.

(ii) The above situations, however, are based on certain valid reasons, some of which can be summarised as follows:

- The products manufactured by the local engineering firms are of low quality;
- The prices of the locally produced items are higher than those of the imported ones.
- The range of the local products and the variants available are limited and do not match the needs.

(iii) These evidently are centred around and related to the major aspects of design, quality and productivity. However, to consider the engineering problems, they can be enumerated briefly as given below:

- The engineering firms have limited knowledge of the various products and variants within their product range and lack the design and adaptation capability.
- Lack of adequate process know-how and the ability to identify the appropriate manufacturing processes and set the operation lay-outs.

- Inadequate capability to employ more productive attachments, accessories and tooling, including jigs and fixtures as applicable to their products and adapted to their existing machinery.
- Lack of certain equipment and simple machinery.
- Inadequate inspection and quality control methods, procedures.

(iv) The general metal working industry in the absence of any appreciable manufacturing activity in the machinery industry, is mostly dependent upon the very limited demand for structurals and that for repair and maintenance services derived from the processing industry and the limited component demand from the automobile ancillary equipment industry. The frequent demand fluctuations particularly from the processing industry that is constrained to only primary processing, are adversely effecting the general metal working industry.

4.2. Technical assistance needs

4.2.1. General products

(i) A pilot production plant/line can be foreseen to provide the following essential inputs without burdening the small and medium size firms with high investment machinery.

- product know-how to enable the firm to react to the product demand and acquire the capability to design and adapt according to the need and be able to offer wider range of products;
- process know-how to impart the ability to design the manufacturing operations based on the plant and machinery available to be able to accept new products, diversify and meet the needs;
- production know-how to acquire the capability to come out with innovative more productive attachments, tooling, etc., in order to be able to produce the products within acceptable price ranges;
- quality control to gain the quality consciousness and introduce and implement the inspection and quality control methods and procedures;
- limited additional, but essential machinery and equipment.

(ii) The activities of the pilot production plant/line are expected to include identification of specification of products from among those in demand that could be produced by the plant; design of the product including detailed design of components; identification, modification of manufacturing processes and operations to suit the existing plant and machinery; design and manufacture of procurement of production attachments accessories, tooling, etc., for the manufacture of products and employment of new machinery, production methods and quality control procedures.

(iii) The above activities are expected to lead to certain operational results including building up of cadres with know-how in the areas of product design, product adaptation; manufacturing processes; engineering methods; production techniques; quality control; generation of new equipment; acquisition of additional machinery. These together, contribute to the establishment of the necessary manufacturing capability to enable the metal working firms to meet the demand for some of the products in the industry.

4.2.2. Export orientation

(iv) Exports being one of the possibilities to expand the final demand there seems to be a potential opportunity to partly orient the general metal working industry for the manufacture of such products, which area is being "vacated" in the world market, presenting a potential for acquiring a comparative advantage. The manufacturing operations required for the production of some of the products such as containers, non-pressure tanks, vessels, etc., are relatively labour intensive. However, certain technical inputs including product know-how and quality control, handling facilities, etc., are required.

A pilot production line can be proposed for an existing engineering firm to bring in the above know-how and be instrumental in building up the necessary capability initiating the process of development in the industry to promote it towards an export oriented industry thus ameliorating the said problem.

The activities involved in the pilot production of the containers and non-pressure vessels include product design, manufacturing operations involving cutting, machinery, welding, finishing, assembly (and testing where necessary), the use of machinery, production techniques, methods, etc.

The above activities are expected to lead to certain operational results including building up of cadres with know-how in the areas of design, process and production, acquisition of additional plant and machinery required in the production and the methods and organization, which, put together, contribute to the establishment of the necessary manufacturing capability to produce the containers and non-pressure vessels in the engineering firm, initiating the manufacture of products where a good potential for export exists.

5. Electric power utility industry - system operation

The industry emphasis is on economy of operation and investment and security and reliability in the electric power systems operations. The systems operations include systems operation, systems planning and systems design, involving computer applications.

5.1. Development constraints

(i) Power systems operation, planning and design capability

The effective formulation of future energy strategies for energy conservation and optimum utilization of the available resources, involves the ability for economic utilization of electric energy which is presently the established form of energy. All other resources, such as coal, oil, gas, hydro, nuclear, as well as the renewable ones being the input forms. The ever increasing demands on electric energy and the high rates of growth in its demand highten the need for such economic utilization. This requires a comprehensive understanding of the complex bulk power generation, transmission and distribution systems in order to realize the economy and reliability in their present operation and future planning.

5.2. Technical assistance needs

(i) Strengthening the power systems operation capability

There is a need to develop the systems capability at the energy control centre whose function is to control the operation of the national electric system so as to optimize economy and security. The operation of the system with optimum machine efficiencies, reducing the fuel consumption to minimize the cost of power; and to employ predictive programmes for probabilistic forecasts of system load in the near-term future to enable start-up and shut-down scheduling of generation units to optimize operating economy; and similarly the operation of the system using "state estimation" techniques that process the system data to project the probability of emergency in the near-term future to permit preventive action to optimize security, constitute the systems capability in operation, instrumental in optimizing the economy and security.

(ii) Promoting the power systems planning capability

Further, there is a need to develop certain capability in the area of planning, involving assessment of generating capacity required in the future; determination of the size, location and time of the new generating installations; the size and location of the interconnections and transmission lines and their voltage levels; the future operating costs and investment levels and the effects of new technologies, etc.; and the relevant programmes are all part of the systems planning capability, that is directed forwards achieving economy and reliability in generation and transmission in meeting the future needs.

The system planning capability would also imbibe that, which would be instrumental in identifying for optimum economy alternative sources of energy in the immediate peak-load, short and long term demands and needs. These would include standby power plants such as those with gas-turbine-driven generators (combustion turbines) using light oil, for "topping" or emergency peak loads at extremely short notices, hydro sources in the short and medium terms and nuclear and other sources such as wind and solar energy in the medium and long terms, thus meeting the future energy needs, with economy of operation and investment.

(iii) Developing the power systems design capability

The project is also expected to build up certain capability in the area of systems, design, including design of extra-high voltage systems; design considerations, such as line insulation levels, apparatus insulation levels, lightning arrester duties, etc.; design of circuit breakers and equipment under rapidly changing voltages and current; transmission line design including design of new lines; and the study of sub-synchronous resonance between the transmission network system and the generating machines, etc., which are the areas of design that would lead to the system design with stability and ensure reliability, thereby meeting the need of the project.

The above systems capability necessary for the operation of the electric power system with optimum economy and reliability; and the planning and design of the future generation, transmission and distribution systems would ensure the economy and reliability in expansion, production and investment.

6. Power generation equipment industry

The equipment presently dealt with is steam turbines for small and medium power stations. In general, more than 80 per cent of the electric power generated is produced by steam turbines.

6.1 Development constraints

In order to produce modern and efficient turbines, it requires commensurate design and manufacturing capability. Though certain countries are presently producing steam turbines, these are not of modern and efficient designs. The design and manufacturing capability are the constraints to develop modern, efficient turbine manufacture.

6.2 Technical assistance needs

To overcome the above constraints the following capabilities have to be strengthened:

(i) Turbine design capability

The overall efficiency of the steam turbines can be said to be constituted by the internal efficiency of the fluid-rotor transfer process, the mechanical efficiency relating rotor energy to shaft energy and the volumetric efficiency relating to leakage of fluid. The design capability needs therefore to be strengthened to be able to design the turbine cycles with high thermal efficiency, the blade system, speeds, pressures, etc. for high internal efficiency and the parts and construction for mechanical and volumetric efficiencies. It also involves the dynamic stability aspects such as vibration and resonance.

(ii) Turbine manufacturing capability

This would involve imparting additional know-how in the manufacturing processes, quality of machining, assembly, balancing and testing etc.

Providing direct support to engineering firms that are already engaged in the manufacture of steam turbines can impart the additional design and manufacturing know-how required for the production of modern efficient turbines.

7. Operational Research and Systems Analysis

The systems dealt with are transportation systems. The optimization of the flow, and minimization of costs, etc., are complex problems requiring capability in systems analysis and synthesis; finding application in all transportation systems. The development constraints and technical assistance needs are presented below:

7.1. Development constraints

The effective and efficient operation of transportation systems involves the optimum utilization of the resources available and it requires to optimize the flow while meeting the demand and minimizing the hold overs and costs of operation and including investments. This demands a strong capability in the systems analysis and synthesis together with the conceptual and methodological capability in the application of the relevant optimization theories and computer techniques. The lack of the systems capability is a constraint for the efficient operation of the transportation systems.

7.2. Technical assistance needs

There is a need to provide technical assistance to develop the systems capability to efficiently operate the transportation systems with optimum utilization of the wagons available, maximizing the freight haulage and to satisfy the demand and minimize the costs of operation. The technical assistance is required to strengthen the conceptual and methodological capability in the application of optimization theories and computer methods to the analysis and synthesis of the transportation systems.

APPENDIX

MACHINERY AND EQUIPMENT INVOLVED IN:

(i) SURFACE MINING AND CONSTRUCTION

(ii) UNDERGROUND MINING AND CONSTRUCTION

(iii) WATER WELL DRILLING

(iv) COAL MINING

COAL MINING EQUIPMENT

The modern coal mine is a large complex consisting of a carefully planned system of shafts and drifts that provides access to an extensive network of underground roadways which in turn services the coal faces where the coal is actually mined. The construction and layout of these elements differ greatly from mine to mine depending upon the geological conditions, namely the rock strength, thickness and depth of seams, gradients, faults etc. The methods of mining and the size (capacity) of the mines also differ.

Both the development of the mines and the production of coal involve a large variety of equipment for drilling, loading and transportation. The equipment in use for these operations, covers wide ranges of machinery in each type. The equipment for shaft sinking and drift driving ranges from the machinery used with drill/blast/load methods to the drill booms, heavy-duty track-mounted boom road headers together with the high powered dirt loading, high capacity bucket hoists, bucket loaders and continuous mobile chain or mono-rail belt conveyors etc for loading and transportation. Similarly, for underground roadway driving the equipment ranges from the machinery as used in drill/blast/load methods to road header methods or to full face tunnel borers. Within the conventional method, the equipment varies from simpler and smaller machines to complex, large capacity and fast machines. The equipment for coal mining as used in the two basic methods of 'longwall mining' used for thin, bedded deposits of uniform thickness in deep and multiple seams, the coal being extracted from a long straight, working face, largely praticed in Europe; and the 'room-and-pillar mining' adopted in thicker, flat seams and shallower depths with generally low fault intensity, the coal being extracted leaving sections of coal as pillars to provide the roof support, mostly practiced in the USA, Canada, South Africa, and Australia, involves special machines ranging from different forms of coal cutting ploughs to a wide ranging series of drum shearers, hydraulically operated supports and armoured flexible chain conveyors in the former method (longwall); and separate mobile coal cutters and loading and hualing machines or integrated cutting and loading machines and transport equipment in the latter method (room-and-pillar).

The equipment for drilling, loading and transportation ought to be compatible parts of an integrated system, as such, selection should be made for combined optimum efficiency.

LIST OF EQUIPMENT FOR SURFACE MINING AND CONSTRUCTION

I. DRILLING EQUIPMENT

1. Pneumatic Percussive Drilling Equipment.
   - 1.1. Rock drills for hand-held bench drilling
   - 1.2. Benchers, for anchoring to the rock
   - 1.3. Rock drills for mechanized low bench drilling, for mounting on crawler drills
   - 1.4. Heavy duty Rock drills for high benches.
   - 1.5. Rock drills for overburden drilling.
2. Hydraulic, Percussive Rock Drilling Equipment.
3. Wagon Drills
4. Crawler Drills for Pneumatic Percussive Drilling
5. Crawler Drills for Hydraulic Percussive Drilling
6. Rotary Percussive Drill Rigs, Crawler mounted.
7. Light construction equipment such as hand-held drills, pneumatic breakers and hydraulic rig-mounted breakers etc.

II. DRILL STEEL EQUIPMENT

1. Integral drill steel, shanks, extension rods, adapters, sleeves, couplings, etc.
2. Different types of Bits, including Drag Bits for rotary cutting and Roller Bits for rotary crushing.
3. Chisels.

III. AUXILARY EQUIPMENT

1. Compressed air equipment, including compressors, installation equipment, line equipment, pneumatic components and controls.
2. Hydraulic equipment, including pumps, motors, line equipment, and hydraulic components and controls.
3. Flushing Equipment.
4. Dust collection Equipment.
5. Diesel power units.

IV. <u>LOADING AND TRANSPORT EQUIPMENT</u>

1. Wheel loaders, crawler loaders

2. Shovel excavators

3. Bucket excavators

4. Trucks.

LIST OF EQUIPMENT FOR UNDERGROUND MINING AND CONSTRUCTION

I. TUNNELLING AND DRIFTING EQUIPMENT

1. Shield-driving equipment
2. Tunnel boring machines
3. Tunnel Drilling equipment
   - 3.1 Hand held rock drills, Pusher leg rock drills.
   - 3.2 Drill rigs, rubber-tyred, track-bound, rail-bound, portal rigs etc.
4. Loading and tarnsport equipment.
   - 4.1 Overhead loaders
   - 4.2 Digging arm laoders
   - 4.3 Load-haul- dump equipment
   - 4.4 Mine cars, cherry-picker devices, shuttle train cars with conveyers etc.
5. Drill steel equipment.

II. UNDERGROUND MINING EQUIPMENT

1. Drilling equipment (production drilling)
   - 1.1 Hand-held rock drills, pusherleg rock drills, hand-held stoper drills, etc.
   - 1.2 Mechanized drifting equipment
   - 1.3 Mechanized crawler drills
   - 1.4 Mechanized light wagon drills
   - 1.5 Bar and arm rigs
   - 1.6 Mechanized ring drills, fan drill rigs
2. Loading and Transport Equipment
   - 2.1 Overhead shovel laoders
   - 2.2 Digging arm loaders
   - 2.3 Load-haul-dump equipment
   - 2.4 Bucket loaders
   - 2.5 Transport vehicles, rail car equipment.
3. Drill steel equipment.

LIST OF EQUIPMENT FOR WATER WELL DRILLING

1. Air-driven, water well drilling rigs.

2. Hydraulic, water well drilling multiple rigs.

3. Hydraulic rotary drill rigs.

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PART II

SPECIFIC PROJECT CONCEPTS

AND PROPOSALS

MCE PP 1

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF MINING AND CONSTRUCTION EQUIPMENT INDUSTRY

PROJECT TITLE

HANDS-ON-JOB DEMONSTRATION UNIT FOR REPAIR AND MAINTENANCE OF SURFACE MINING AND CONSTRUCTION EQUIPMENT

NOTE: (i) "Demonstration Unit" consists of 'Diagnostics Wing', hands-on-job 'Demonstration Wing' and 'Instruction Wing'

(ii) "Surface Mining and Construction Equipment" includes: Rock Drilling Equipment, Loading and Transport Equipment.

PROPOSAL NO: 1

UNIDO

VIENNA

APRIL 1985

DEVELOPMENT OBJECTIVE

(i) To assist the metalworking and engineering industries to enable them to provide service to the mining and construction sectors.

(ii) To strengthen the capability of the engineering industries in the repair and maintenance of surface mining and construction equipment.

PROJECT OBJECTIVES

(i) To set up a repair and maintenance hands-on-job demonstration unit (surface mining and construction equipment).

(ii) To enable selected metalworking and engineering industries to effectively perform repair and maintenance of drilling, loading and transport equipment as used in the surface mining and construction; by the end of a three year period.

BACKGROUND AND JUSTIFICATION:

a) Development Hypothesis:

(i) In the fast expanding mining and construction sectors, the machinery and equipment requirement is almost entirely met by imports. The lack of adequate repair and maintenance capability in the metal working and engineering industries is resulting in major equipment breakdown problems leading to enormous production losses in the user industry sector and import of expensive services from outside and also quite often to permanent abandonment of costly equipment.

(ii) Strengthening the capability of the engineering industries in the repair and maintenance of the surface mining and construction equipment would enable the industries to effectively provide these services to the equipment user sectors and thereby contribute to the amelioration of the above problem.

b) Project Hypothesis

(i) The repair and maintenance demonstration unit envisaged is expected to provide the necessary hands-on-job demonstration over a period of three years, thereby providing the necessary inputs to cadres and increasing their capability, which is the output of this project.

(ii) The repair and maintenance capability of the metal working and engineering industries is dependent on an adequate number of technicians with the necessary skills in maintenance and repair techniques, appropriate machinery and facilities and personnel with required inputs in maintenance programming, scheduling and other maintenance management/organizational systems.

(iii) These personnel, equipped with the necessary skills, would be instrumental in performing the repair and maintenance of the drilling, loading and transport equipment as used in the surface-mining and construction, thereby achieving the project objectives.

PROJECT OUTPUTS:

The repair and maintenance demonstration unit shall, at the end of the three year period, consist of the following, in full capacity operation:

(a) Diaghostics and Programming Wing:

responsible for the following:

(i) Initial identification of the repair and maintenance needs in the equipment user industry sector;

(ii) initial identification of the problems and areas of assistance the engineering industries;

(iii) continuous diagnostic analysis;

(iv) programming and scheduling for demonstration and instruction wings;

(v) organization of maintenance systems in the user industry.

(b) Demonstration Wing:

responsible for hands-on-job demonstration - programme implementation; consisting of the following:

(i) welding shop;

(ii) machine shop;

(iii) heat treatment shop;

(iv) electrical shop;

(v) hydraulic and pneumatic assembly shop;

(vi) tool room;

(vii) vehicle inspection hall;

(viii) engine assembly room;

(ix) spare part and raw material store;

(x) workshop office room.

Programme Content:

Demonstration - programme consisting of:

(i) Programme for demonstration of basic manufacturing processes, for technicians;

(ii) Programme for demonstration of repair and maintenance techniques, for technicians and supervisory personnel.

(c) Instruction Wing:

responsible for course - programme implementation consisting of the following:

Facilities:

(i) Instruction rooms;

(ii) Audio-visual equipment;

(iii) Course material.

Programme content:

course - programme consisting of:

(i) Programme for instruction in surface mining and construction equipment: hydraulic and pneumatic systems etc; for technicians;

(ii) Programme for instruction in manufacturing processes and repair and maintenance techniques; for technicians and supervisory personnel;

(iii) Programme for instruction in maintenance programming and scheduling including preventive maintenance: for technicians and supervisory personnel:

(iv) Programme for instruction in maintenance management and systems; for supervisory and management personnel.

PROJECT ACTIVITIES:

The project and the counterpart staff shall carry out the following activities:

(a) Activities related to the output: 'Diagnostic and Programming Wing':

- (i) Visits to the mines and construction sites to identify the equipment used and the repair and maintenance needs;
- (ii) Visits to the engineering industries to identify the problems for effective repair and maintenance of the subject equipment and areas of assistance;
- (iii) Formulation of the overall programmes for the demonstration and instruction wings;
- (iv) Conducting diagnostic analysis on a regular basis and feed back:
- (v) Organization of maintenance programming and scheduling systems in the engineering industries.

(b) Activities related to the output - 'Demonstration Wing':

- (i) Identification of plant and machinery for the workshop, procurement action;
- (ii) Design of facilities, construction, installation of equipment, etc.;
- (iii) Conducting the programme for the demonstration of basic manufacturing processes, for technicians;
- (iv) Conducting the programme for demonstration of repair and maintenance techniques for technicians and supervisory personnel.

(c) Activities related to the output - 'Instruction Wing':

The activity in the following programmes would include class work, group discussions and seminars:

- (i) Conducting the programme for instruction in mining and construction equipment, with emphasis on the following topics:
  - surface mining and construction operations;
  - techniques for surface excavation for mining and construction: bench blasting, contour blasting, trenching, drilling, ignition systems, etc.;
  - methods of rock drilling, percussive drilling, rotary crushing, rotary cutting, rotary abrasive drilling, etc.:
  - machinery and equipment used, drilling equipment, drill steel equipment: auxiliary equipment including hydraulic, pneumatic, compressed air and prime mover equipment: loading and transport equipment (Annex 1).

(ii) conducting the programme for instruction in manufacturing processes and repair and maintenance techniques. Scope of the programme: instruction to repair and maintenance technicians:

- manufacturing processes: welding, machining, heat treatment, electroplating, etc.;
- welding techniques for repair and maintenance: building up of worn parts, hard surfacing: brazing and soldering: bronze welding, etc.;
- fault finding and trouble shooting procedures and repair and maintenance techniques for hydraulic, pneumatic, electrical, electronic and mechanical systems:
- repair and maintenance of drilling, loading and transport equipment.

(iii) Conducting the programme for instruction in maintenance programming and scheduling; and preventive maintenance. Scope of the programme: instruction to repair and maintenance, supervisory personnel; with emphasis on:

- simple maintenance programming and scheduling system: equipment data records, instruction cards and job specification sheets for maintenance, etc.:
- preventive maintenance systems and procedures: diaries, cards, filing and other recording systems.

(iv) Conducting programme for instruction in maintenance management and systems. Scope of the programme: instruction to repair and maintenance supervisory staff and management personnel, with emphasis on:

- maintenance management function, systems, control, measures, organization and maintenance procedures,etc.:
- cost control and inventory control in maintenance management.

LIST OF EQUIPMENT FOR SURFACE MINING AND CONSTRUCTION

I. DRILLING EQUIPMENT

1. Pneumatic Percussive Drilling Equipment.
   - 1.1. Rock drills for hand-held bench drilling
   - 1.2. Benchers, for anchoring to the rock
   - 1.3. Rock drills for mechanized low bench drilling, for mounting on crawler drills
   - 1.4. Heavy duty Rock drills for high benches.
   - 1.5. Rock drills for overburden drilling.
2. Hydraulic, Percussive Rock Drilling Equipment.
3. Wagon Drills
4. Crawler Drills for Pneumatic Percussive Drilling
5. Crawler Drills for Hydraulic Percussive Drilling
6. Rotary Percussive Drill Rigs, Crawler mounted.
7. Light construction equipment such as hand-held drills, pneumatic breakers and hydraulic rig-mounted breakers etc.

II. DRILL STEEL EQUIPMENT

1. Integral drill steel, shanks, extension rods, adapters, sleeves, couplings, etc.
2. Different types of Bits, including Drag Bits for rotary cutting and Roller Bits for rotary crushing.
3. Chisels.

III. AUXILARY EQUIPMENT

1. Compressed air equipment, including compressors, installation equipment, line equipment, pneumatic components and controls.
2. Hydraulic equipment, including pumps, motors, line equipment, and hydraulic components and controls.
3. Flushing Equipment.
4. Dust collection Equipment.
5. Diesel power units.

IV. LOADING AND TRANSPORT EQUIPMENT

1. Wheel loaders, crawler loaders

2. Shovel excavators

3. Bucket excavators

4. Trucks.

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF MINING AND CONSTRUCTION EQUIPMENT INDUSTRY

PROJECT TITLE

HANDS-ON-JOB DEMONSTRATION UNIT FOR REPAIR AND MAINTENANCE OF UNDERGROUND MINING AND CONSTRUCTION EQUIPMENT

NOTE: (i) "Demonstration Unit" consists of 'Diagnostics Wing', hand-on-job 'Demonstration Wing' and 'Instruction Wing'

(ii) "Surface Mining and Construction Equipment" includes: Rock Drilling Equipment, Loading and Transport Equipment.

PROPOSAL NO: 2

UNIDO
VIENNA

APRIL 1985

DEVELOPMENT OBJECTIVE

(i) To assist the metalworking and engineering industries to provide service to the mining and construction sectors.

(ii) To strengthen the capability of the engineering industries in the repair and maintenance of underground mining and construction equipment.

PROJECT OBJECTIVES

(i) To set up a repair and maintenance hands-on-job demonstration unit (underground mining and construction equipment).

(ii) To enable selected metal working and engineering industries to effectively perform repair and maintenance of tunnelling, drilling, loading and transport equipment used in underground mining and construction: by the end of a three year period.

BACKGROUND AND JUSTIFICATION

a) Development Hypothesis:

(i) In the fast expanding mining and construction sectors, the machinery and equipment requirement is almost entirely met by imports. The lack of adequate repair and maintenance capability in the metal working and engineering industries is resulting in major equipment break-down problems leading to enormous production losses in the user industry/sector and import of expensive services from outside and also quite often to permanent abandonment of the costly equipment.

(ii) Strengthening of the capability of the engineering industries in the repair and maintenance of the underground mining and construction equipment would enable the industries to effectively provide the services to the equipment user sectors and thereby contribute to the amelioration of the problem.

b) Project Hypothesis:

(i) The repair and maintenance demonstration unit envisaged is expected to provide the necessary hands-on-job demonstration in maintenance and repair techniques, selection and use of appropriate machinery and facilities and maintenance programming, scheduling, and systems in maintenance management, over a period of three years, thereby providing the necessary inputs to cadres and increase their capability in repair and maintenance which is the expected output of the project.

(ii) The repair and maintenance capability of the engineering industries is dependent on an adequate number of these technicians with the required skills in maintenance and repair techniques, availability of appropriate machinery and personnel with organizational skills and systems capability.

(iii) These personnel equipped with the necessary skills and the acquired equipment and facilities, together with the management capability would be instrumental in performing the repair and maintenance of the tunnelling, drilling, loading and transport equipment as used in the tunnelling, underground mining and construction, thereby achieving the project objectives.

PROJECT OUTPUTS:

The repair and maintenance demonstration unit shall, at the end of the three year period, consist of the following, in full capacity operation:

(a) Diagnostics and Programming Wing:

responsible for the following:

(i) Initial identification of the repair and maintenance needs, in the equipment user industry sector;

(ii) Initial identification of the problems and areas of assistance the engineering industries;

(iii) Continuous diagnostic analysis;

(iv) Programming and scheduling for demonstration and instruction wings;

(v) Organization of maintenance systems in the user industry.

(b) Demonstration Wing:

responsible for hands-on-job demonstration - programme implementation; consisting of the following:

Facilities:

repair and maintenance workshop with:

(i) welding shop;

(ii) machine shop;

(iii) heat treatment shop;

(iv) electrical shop;

(v) hydraulic and pneumatic assembly shop;

(vi) tool room;

(vii) vehicle inspection hall;

(viii) engine assembly room;

(ix) spare part and raw material store;

(x) workshop office room.

Programme content:

Demonstration - programme consisting of:

(i) Programme for demonstration of basic manufacturing processes, for technicians;

(ii) Programme for demonstration of repair and maintenance techniques, for technicians and supervisory personnel.

(c) Instruction Wing:

responsible for course - programme implementation consisting of the following:

(i) instruction rooms;

(ii) audio-visual equipment;

(iii) course material.

Programme content:

course - programme consisting of:

(i) programme for instruction in underground mining and construction equipment; hydraulic and pneumatic systems, etc; for technicians:

(ii) programme for instruction in manufacturing processes and repair and maintenance techniques; for technicians and supervisory personnel;

(iii) programme for instruction in maintenance programming and scheduling including preventive maintenance: for techniciancs and supervisory personnel:

(iv) programme for instruction in maintenance management and systems: for supervisory and management personnel.

PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities:

(a) Activities related to the output - 'Diagnostic and Programming Wing':

(i) Visits to the mines and construction sites to identify the equipment used and the repair and maintenance needs;

(ii) Visits to the engineering industries to identify the problems for effective repair and maintenance of the subject equipment and areas of assistance;

(iii) Formulation of the overall programmes for the demonstration and instruction wings;

(iv) Conducting diagnostic analysis on a regular basis and feed back;

(v) Organization of maintenance programming and scheduling systems in the engineering industries.

(b) Activities related to the output - 'Demonstration Wing':

(i) Identification of plant and machinery for the workshop, procurement action;

(ii) Design of facilities, construction, installation of equipment, etc.;

(iii) Conducting the programme for the demonstration of basic manufacturing processes; for technicians;

(iv) Conducting the programme for demonstration of repair and maintenance techniques for technicians and supervisory personnel.

(c) Activities related to the output - 'Instruction Wing':

(i) Conducting the programme for instruction in underground mining and construction equipment, with emphasis on the following topics:

- underground mining and construction operations;
- techniques for tunnel excavation in underground mining and construction, tunnelling methods including cut-and-cover, tunnel boring, soft rock tunnelling, etc.; drilling and blasting; drilling patterns, contour drilling, blasting and different methods of cuts and ignition systems, etc.;
- techniques for underground mining: room-and-pillar, sub-level stoping, shrinkage stoping, vertical retreat stoping, cut-and-fill mining, long wall mining, sub-level caving, block caving;
- methods of rock drilling, percussive drilling, rotary crushing, rotary cutting, rotary abrasive drilling, etc.;
- machinery and equipment used, drilling equipment, drill steel equipment; auxiliary equipment including hydraulic, pneumatic, compressed air and prime mover equipment; loading and transport equipment (Annex 1)

(ii) Conducting the programme for instruction in manufacturing processes and repair and maintenance techniques. Scope of the programme: instruction to repair and maintenance technicians and supervisory staff; with emphasis on the following topics:

- manufacturing processes: welding, machining, heat treatment, electroplating, etc.:
- welding techniques for repair and maintenance: building up of worn parts, hard surfacing; brazing and soldering; bronze welding, etc.:
- fault finding and trouble shooting procedures and repair and maintenance techniques for hydraulic, pneumatic, electrical, electronic and mechanical systems;
- repair and maintenance of drilling, loading and transport equipment.

(iii) Conducting the programme for instruction in maintenance programming and scheduling; and preventive maintenance. Scope of the programme: instruction to repair and maintenance supervisory personnel: with emphasis on:

- simple maintenance programming and scheduling systems: equipment data records, instruction cards and job specification sheets for maintenance etc.:
- preventive maintenance systems and procedures: diaries, card, filing and otherrecording systems.

(iv) Conducting programme for instruction in maintenance management and systems. Scope of the programme: instruction to repair and maintenance supervisory staff and management personnel; with emphasis on:

- maintenance management function systems, control measures, organization and maintenance procedures, etc.:
- cost control and inventory control in maintenance management.

LIST OF EQUIPMENT FOR UNDERGROUND MINING AND CONSTRUCTION

I. TUNNELLING AND DRIFTING EQUIPMENT

1. Shield-driving equipment
2. Tunnel boring machines
3. Tunnel Drilling equipment
   - 3.1 Hand held rock drills, Pusher leg rock drills.
   - 3.2 Drill rigs, rubber-tyred, track-bound, rail-bound, portal rigs etc.
4. Loading and tarnsport equipment.
   - 4.1 Overhead loaders
   - 4.2 Digging arm laoders
   - 4.3 Load-haul- dump equipment
   - 4.4 Mine cars, cherry-picker devices, shuttle train cars with conveyers etc.
5. Drill steel equipment.

II. UNDERGROUND MINING EQUIPMENT

1. Drilling equipment (production drilling)
   - 1.1 Hand-held rock drills, pusherleg rock drills, hand-held stoper drills, etc.
   - 1.2 Mechanized drifting equipment
   - 1.3 Mechanized crawler drills
   - 1.4 Mechanized light wagon drills
   - 1.5 Bar and arm rigs
   - 1.6 Mechanized ring drills, fan drill rigs
2. Loading and Transport Equipment
   - 2.1 Overhead shovel laoders
   - 2.2 Digging arm loaders
   - 2.3 Load-haul-dump equipment
   - 2.4 Bucket loaders
   - 2.5 Transport vehicles, rail car equipment.
3. Drill steel equipment.

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF MINING AND CONSTRUCTION EQUIPMENT INDUSTRY

PROJECT TITLE

HANDS-ON-JOB DEMONSTRATION UNIT FOR REPAIR AND MAINTENANCE OF WATER WELL DRILLING EQUIPMENT

NOTE: (i) "Demonstration Unit" consists of 'Diagnostic Wing', hands-on-job 'Demonstration Wing' and 'Instruction Wing'.

PROPOSAL NO: 3

UNIDO
VIENNA

APRIL 1985

DEVELOPMENT OBJECTIVE

(i) To assist the metalworking and engineering industries to enable them to provide service to the mining sector.

(ii) To strengthen the capability of the engineering industries in the repair and maintenance of water well drilling equipment.

PROJECT OBJECTIVES

(i) To set up a repair and maintenance hands-on-job demonstration unit (water well drilling equipment).

(ii) To enable selected metalworking and engineering industries to effectively perform repair and maintenance of water well drilling equipment; by the end of a two year period.

BACKGROUND AND JUSTIFICATION

a) Development Hypothesis:

(i) In the essential and fast expanding area of water well drilling, the machinery and equipment requirement is almost entirely met by imports. The lack of adequate repair and maintenance capability in the metal working and engineering industries is resulting in major equipment break-downs leading to import of expensive services, and also quite often to permanent abandonment of the costly equipment.

(ii) Strengthening of the capability of the engineering industries in the repair and maintenance of the water well drilling equipment would enable the industries to effectivley provide the services to the equipment users and thereby contribute to the amelioration of the problem.

b) Project Hypothesis:

(i) The repair and maintenance demonstration unit envisaged is expected to provide the necessary hands-on-job demonstration in maintenance and repair techniques, selection and use of appropriate machinery and facilities and maintenance programming, scheduling and maintenance management systems, over a period of two years, thereby providing the necessary inputs to cadres and increase their capability in repair and maintenance which is the expected output of the project.

(ii) The repair and maintenance capability of the engineering industries is dependent on an adequate number of such technicians with the necessary skills in the maintenance and repair techniques, availability of appropriate machinery and personnel with organizational skills and systems capability.

(iii) These personnel equipped with the necessary skills and the acquired machinery and facilities together with the management capability would be instrumental in performing the repair and maintenance of the water well drilling equipment, thereby achieving the project objectives.

PROJECT OUTPUTS:

The repair and maintenance demonstration unit shall, at the end of the three year period, consist of the following, in full capacity operation:

(a) Diagnostics and Programming Wing:

responsible for the following:

(i) Initial identification of the repair and maintenance needs in the equipment user industry sector;

(ii) initial identification of the problems and areas of assistance the engineering industries;

(iii) continuous diagnostic analysis;

(iv) programming and scheduling for demonstration and instruction wings;

(v) organization of maintenance systems in the user industry.

(b) Demonstration Wing:

responsible for hands-on-job demonstration - programme implementation; consisting of the following:

Facilities:

repair and maintenance workshop with:

(i) welding shop;

(ii) machine shop;

(iii) heat treatment shop;

(iv) electrical shop;

(v) hydraulic and pneumatic assembly shop;

(vi) tool room;

(vii) vehicle inspection hall;

(viii) engine assembly room;

(ix) spare part and raw material store;

(x) workshop office room.

Programme content:

demonstration - programme consisting of:

(i) programme for demonstration of basic manufacturing processes; for technicians;

(ii) programme for demonstration of repair and maintenance techniques; for technicians and supervisory personnel.

(c) Instruction Wing:

responsible for course - programme implementation consisting of the following:

Facilities:

(i) instruction rooms;

(ii) audio-visual equipment;

(iii) course material.

Programme content:

course - programme consisting of:

(i) programme for instruction in water well drilling equipment: hydraulic and pneumatic systems etc; for technicians;

(ii) programme for instruction in manufacturing process and repair and maintenance techniques; for technicians and supervisory personnel;

(iii) programme for instruction in maintenance programming and scheduling including preventive maintenance; for technicians and supervisory personnel;

(iv) programme for instruction in maintenance management and systems; for supervisory and management personnel.

PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities:

(a) Activities related to the output - 'Diagnostic and Programming Wing':

(i) Identification of the equipment used for water well drilling and the repair and maintenance needs;

(ii) Visits to the engineering industries to identify the problems for effective repair and maintenance of the subject equipment and areas of assistance;

(iii) Formulation of the overall programmes for the demonstration and instruction wings;

(iv) Conducting diagnostic analysis on a regular basis and feed back;

(v) Organization of maintenance programming and scheduling systems in the engineering industries.

(b) Activities related to the output - 'Demonstration Wing':

(i) Identification of plant and machinery for the workshop, procurement action;

(ii) Design of facilities, construction, installation of equipment, etc.;

(iii) Conducting the programme for the demonstration of basic manufacturing processes; for technicians;

(iv) Conducting the programme for demonstration of repair and maintenance techniques for technicians and supervisory personnel.

(c) Activities related to the output - 'Instruction Wing':

The activity in the following programmes would include class work, group discussions and seminars:

(i) Conducting the programme for instruction in water well drilling equipment with emphasis on the following topics:

- water well drilling operations;
- techniques for water well drilling: hard-rock wells, soil-covered hard-rock wells and soil wells;
- methods of rock drilling, percussive drilling, rotary crushing, rotary cutting, rotary abrasive drilling;
- machinery and equipment used, drilling equipment, drill steel equipment, auxiliary equipment, including hydraulic, pneumatic, compressed air and prime mover equipment, loading and transport equipment (Annex 1).

(ii) Conducting the programme for instruction in manufacturing processes and repair and maintenance techniques. Scope of the programme: instruction to repair and maintenance technicians and supervisory staff; with emphasis on the following topics:

- manufacturing processes: welding, machining, heat treatment, electroplating, etc.;
- welding techniques for repair and maintenance: building up of worn parts, hard surfacing: brazing and soldering: bronze welding, etc.:
- fault finding and trouble shooting procedures and repair and maintenance techniques for hydraulic, pneumatic, electrical, electronic and mechanical systems:
- repair and maintenance of drilling, water well drilling equipment.

(iii) Conducting the programme for instruction in maintenance programming and scheduling; and preventive maintenance. Scope of the programme: instruction to repair and maintenance supervisory personnel; with emphasis on:

- simple maintenance programming and scheduling systems: equipment data records, instruction cards and job specification sheets for maintenance, etc.;
- preventive maintenance systems and procedures: diaries, card, filing and other recording systems.

(iv) Conducting programme for instruction in maintenance management and systems. Scope of the programme: instruction to repair and maintenance supervisory staff and management personnel; with emphasis on:

- maintenance management function, systems, control measures, organization and maintenance procedures, etc.:
- cost control and inventory control in maintenance management.

LIST OF EQUIPMENT FOR WATER WELL DRILLING

1. Air-driven, water well drilling rigs.
2. Hydraulic, water well drilling multiple rigs.
3. Hydraulic rotary drill rigs.

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF MINING AND CONSTRUCTION EQUIPMENT INDUSTRY

PROJECT TITLE

PRODUCTION DEMONSTRATION UNIT FOR MANUFACTURE OF SPARE PARTS FOR MINING AND CONSTRUCTION EQUIPMENT

NOTE: (i) "Demonstration Unit", consists of 'Diagnostic Wing', hand-on-job 'Demonstration Wing' and 'Instruction Wing'.

(ii) "Mining and Construction Equipment" includes surface mining and construction equipment; underground mining and construction equipment and water well drilling equipment.

PROPOSAL NO: 4

UNIDO
VIENNA

APRIL 1985

DEVELOPMENT OBJECTIVE

(i) To assist the metalworking and engineering industries to enable them to provide service to the mining and consturction sector.

(ii) To strengthen the capability of the engineering industries in the manufacture of spare parts for the mining and construction equipment.

PROJECT OBJECTIVES

(i) To establish a unit for demonstration in spare parts manufacture (mining and construction equipment).

(ii) To enable selected metalworking and engineering industries to produce spare parts for drilling, loading and transport equipment used in mining and construction, by the end of a four year period.

BACKGROUND AND JUSTIFICATION

a) Development Hypothesis:

(i) In the fast expanding mining and construction sectors, the machinery and equipment requirement is almost entirely met by imports. The lack of adequate spare part manufacturing capability in the metal working and engineering industries is resulting in undue delays in servicing the equipment since all the spare parts are to be imported involving considerable delays, leading to extensive production losses in the user sectors as well as to expensive imports or alternatively to high inventories blocking capital involving foreign exchange in all cases, and in the event of inadequacy of such funds, resulting in permanent abondonment of the imported original equipment.

(ii) Strengthening the capability of the engineering industries in the manufacture of selected types of spare parts, depending on their technical complexity and economic feasibility, for the mining and construction equipment would enable the industries to effectively provide the services to the equipment user sectors and thereby contribute to the amelioration of the problem.

b) Project Hypothesis:

(i) The production demonstration unit envisaged is expected to provide the necessary hands-on-job activities in the manufacture of spare parts, including design/drafting, raw material selection, manufacturing processes, production machinery selection and operation, basic production management over a period of four years, thereby providing the necessary inputs to cadres and increase their capability in the manufacture of spare parts, which is the expected output of the project.

(ii) The manufacturing capability of the engineering industries is dependent on adequate number of such technicians with the necessary skills in manufacturing, the availability of the appropriate machinery and personnel with management skills and systems capability.

(iii) The personnel so equipped and the facilities and machinery acquired together with the management capability would be instrumental in performing the manufacturing of the spare parts for drilling, loading and transport equipment used in mining and construction, thereby achieving the project objectives.

PROJECT OUTPUTS:

The production demonstration unit for the manufacture of spare parts for the mining and construction equipment, at the end of the four year period, shall consist of the following, in full capacity operation:

(a) Diagnostic and Programming Wing:

responsible for the following:

(i) initial identification of the spare parts requirement and demand in the equipment user industry/ sector:

(ii) initial identification of the causes and reasons for unduly high consumption rates of spare parts if any:

(iii) initial identification of the manufacturing processes and production methods required for the spare parts manufacture and the available capability and capacity in the selected engineering industries including foundry and forge;

(iv) identification of spare parts for local manufacture;

(v) continuous diagnostic analysis of the consumption rates of spare parts;

(vi) programming and scheduling for the demonstration and instruction wings.

(b) Demonstration Wing:

responsible for hand-on-job demonstration for spare part manufacture: consisting of the following:

Facilities:

production workshop with:

(i) sheet metal and welding shop:

(ii) machine shop with small parts and heavy parts sections;

(iii) heat treatment shop;

(iv) tool room;

(v) hydraulic and pneumatic assembly room;

(vi) workshop office room;

(vii) design office.

Programme content:

production - demonstration programme shall consist of the following:

(i) programme for the demonstration of basic manufacturing processes for machine operators;

(ii) programme for the demonstration of production methods for supervisory personnel;

(iii) programme for the demonstration of design and drafting; and operation layouts and methods for engineering personnel.

(c) Instruction Wing:

This wing shall be responsible for the course and instruction programme consisting of the following:

Facilities:

(i) instruction rooms;

(ii) audio-visual equipment;

(iii) course material.

Programme content:

course - programme shall consist of:

(i) programme for instruction in mining and construction equipment, hydraulic and pneumatic systems; equipment use and optimum utilization; for technicians, machine operators;

(ii) programme for instruction in manufacturing processes, production methods for machine operators and supervisory personnel:

(iii) programme for instruction in spare part inventory control.

PROJECT ACTIVITIES

The project and counterpart staff shall carry out the following activities:

(a) Activities related to the output - 'Diagnostic and programming wing':

(i) Visits to the mines and construction sites to identify the spare part demand, the consumption rates and the type of the spare parts.

(ii) Visits to the mines and construction sites to explore and establish the reasons for unduly high consumption rates of specific spare parts; such as:

- lack or faulty preventive maintenance, repair and maintenance services or activity:
- overloading or overworking of machinery and equipment for various reasons;
- uneconomic utilization of equipment beyond the optimum life span.

(iii) Identification of the manufacturing processes involved in the spare parts manufacture: and the facilities and capabilities available in the engineering industries.

(iv) Based on the above to identify the spare parts that can be manufactured in the local engineering industries with assistance from the production demonstration unit.

(v) Conducting diagnostic analysis on a continuous basis to arrive at the consumption rates of the spare parts.

(vi) Formulation of the overall programmes for the demonstration wing and the instruction wing.

(b) Activities related to the output - 'Demonstration Wing':

(i) Identification of the plant and machinery for the workshop: procurement action;

(ii) Design of facilities, construction, installation of equipment, etc.;

(iii) Conducting the programme for the demonstration of the basic manufacturing processes, for machinists;

(iv) Conducting to programme for the demonstration of the production methods for supervisory staff;

(v) Conducting theprogramme for the demonstration of design of spare parts, drafting etc.; operation layouts, raw material selection, machine selection, etc.; to the draughtsmen and engineering personnel

(c) Activities related to the output - 'Instruction Wing':

(i) Conducting the programme for instruction in mining and construction equipment (Annexures 1). Optimum equipment utilization.

(ii) Conducting the programme for instruction in manufacturing processes, production methods and other engineering activities with emphasis on:

- design: mechanical, hydraulical, pneumatic, electrical systems as used in the subject equipment, basic concepts: drafting, dimensioning, etc.;
- process and methods planning: operation layouts, tools, jigs, fixtures, machine selection, etc.:
- manufacturing processes: foundry, forging, operations, sheet metal, welding, machining, heat treatment, assembly, etc.

(iii) Conducting the programme for instruction in production management, inventory control, etc.

LIST OF EQUIPMENT FOR SURFACE MINING AND CONSTRUCTION

I. DRILLING EQUIPMENT

1. Pneumatic Percussive Drilling Equipment.

   1.1. Rock drills for hand-held bench drilling
   1.2. Benchers, for anchoring to the rock
   1.3. Rock drills for mechanized low bench drilling, for mounting on crawler drills
   1.4. Heavy duty Rock drills for high benches.
   1.5. Rock drills for overburden drilling.

2. Hydraulic, Percussive Rock Drilling Equipment.

3. Wagon Drills

4. Crawler Drills for Pneumatic Percussive Drilling

5. Crawler Drills for Hydraulic Percussive Drilling

6. Rotary Percussive Drill Rigs, Crawler mounted.

7. Light construction equipment such as hand-held drills, pneumatic breakers and hydraulic rig-mounted breakers etc.

II. DRILL STEEL EQUIPMENT

1. Integral drill steel, shanks, extension rods, adapters, sleeves, couplings, etc.

2. Different types of Bits, including Drag Bits for rotary cutting and Roller Bits for rotary crushing.

3. Chisels.

III. AUXILARY EQUIPMENT

1. Compressed air equipment, including compressors, installation equipment, line equipment, pneumatic components and controls.

2. Hydraulic equipment, including pumps, motors, line equipment, and hydraulic components and controls.

3. Flushing Equipment.

4. Dust collection Equipment.

5. Diesel power units.

.../...

IV. <u>LOADING AND TRANSPORT EQUIPMENT</u>

1. Wheel loaders, crawler loaders

2. Shovel excavators

3. Bucket excavators

4. Trucks.

LIST OF EQUIPMENT FOR UNDERGROUND MINING AND CONSTRUCTION

I. TUNNELLING AND DRIFTING EQUIPMENT

1. Shield-driving equipment
2. Tunnel boring machines
3. Tunnel Drilling equipment
   - 3.1 Hand held rock drills, Pusher leg rock drills.
   - 3.2 Drill rigs, rubber-tyred, track-bound, rail-bound, portal rigs etc.
4. Loading and tarnsport equipment.
   - 4.1 Overhead loaders
   - 4.2 Digging arm laoders
   - 4.3 Load-haul- dump equipment
   - 4.4 Mine cars, cherry-picker devices, shuttle train cars with conveyers etc.
5. Drill steel equipment.

II. UNDERGROUND MINING EQUIPMENT

1. Drilling equipment (production drilling)
   - 1.1 Hand-held rock drills, pusherleg rock drills, hand-held stoper drills, etc.
   - 1.2 Mechanized drifting equipment
   - 1.3 Mechanized crawler drills
   - 1.4 Mechanized light wagon drills
   - 1.5 Bar and arm rigs
   - 1.6 Mechanized ring drills, fan drill rigs
2. Loading and Transport Equipment
   - 2.1 Overhead shovel laoders
   - 2.2 Digging arm loaders
   - 2.3 Load-haul-dump equipment
   - 2.4 Bucket loaders
   - 2.5 Transport vehicles, rail car equipment.
3. Drill steel equipment.

LIST OF EQUIPMENT FOR WATER WELL DRILLING

1. Air-driven, water well drilling rigs.
2. Hydraulic, water well drilling multiple rigs.
3. Hydraulic rotary drill rigs.

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF MINING AND CONSTRUCTION EQUIPMENT INDUSTRY

PROJECT TITLE

MANUFACTURE OF SELECTIVE STRUCTURAL SUB-ASSEMBLIES FOR LOADING AND TRANSPORT EQUIPMENT IN MINING AND CONSTRUCTION

NOTE: (i) 'Manufacturing' refers to that in an existing engineering enterprise, through direct support.

PROPOSAL NO: 5

UNIDO
VIENNA

APRIL 1985

DEVELOPMENT OBJECTIVE

(i) To promote the development of mining and construction equipment industry.

(ii) To initiate manufacturing capability in the existing metal-working and engineering industries for the local assembly production of selective mining and construction equipment.

PROJECT OBJECTIVES

(i) To provide direct support to an existing engineering enterprise to assemble/produce selective mining and construction equipment.

(ii) To assist the enterprise to produce selective structural sub-assemblies for loading and transport equipment used in mining and construction and for other similar machinery, by the end of a five year period.

BACKGROUND AND JUSTIFICATION

a) Development Hypothesis:

(i) In the fast expanding mining and construction sectors, the machinery and equipment requirements are almost entirely met by imports forming a considerable portion of the total import bill and often it represents by value, the largest single item imported. The equipment involved is extremely complex. However, certain structural parts and non-integral sub-assemblies are relatively simple and can be manufactured. Since the manufacturing technology generally employed by the original equipment manufacturer in producing these parts is not so capital intensive, they can be produced by using simple labour intensive techniques with advantage and at comparable costs.

(ii) Providing direct support to an existing enterprise to increase its capability to introduce the new product, would enable it to manufacture selected parts and assemble the equipment (the rest of the equipment being imported in arrangement with the supplier of the original equipment). This would initiate the manufacturing capability in producing/assembling the selected mining and construction equipment, thereby achieving the objective.

b) Project Hypothesis

(i) The assistance to be provided to the existing enterprise is expected to include imparting of appropriate fabricating skills, techniques and processes as required for the manufacture of the selective parts and sub-assemblies such as frames, portal rigs, platforms, boom structures, rail-bound mine cars and other structurals. The increased capability and the addition of products are the output of this project.

(ii) An existing enterprise, that has been producing related or similar fabricated products or engaged in the repair or reconditioning of simpler mining and construction equipment or agricultrual tractors and other machinery, is expected to possess certain basic manufacturing capability in metal fabrication. However, it would require increased capability in fabrication skills, techniques, machinery and processes, and management to undertake the manufacture of the additional products that could be larger in size and more exacting in dimensions, etc.

(iii) The direct assistance mentioned above would provide this additional expertise that is needed to produce the structurals for mining and construction and other related equipment, thereby achieving the project objectives by the end of a five year period.

PROJECT OUTPUTS:

The engineering industry receiving the direct support, at the end of the five year period, should be able to produce the following types of additional products:

(a) Drilling equipment[1/] parts/components/sub-assemblies:

(i) Selected structural parts such as water well drill rig structures;

(ii) selected parts/sub-assemblies of the boom system for drilling equipment in surface mining and construction;

(iii) selected parts in modular design for drill rigs in mechanized drilling equipment for tunnelling, drifting and underground production drilling. Assembly of parts and sub-assemblies for the above equipment.

(b) Loading and transport equipment[1/] parts/components/sub-assemblies/ sub-systems:

(i) Selected structural parts of overhead loaders, digging arm loaders, etc.;

(ii) mine cars, cherry picker structural parts, shuttle train cars and their conveyers, etc.

1/ Lists of equipment in Annexes 1, 2 and 3

PROJECT ACTIVITIES

The project and counterpart staff shall carry out the following activities:

(a) Activities related to output - 'Drilling equipment parts/components/sub-assemblies':

(i) Study of the equipment employed in the mining and construction sector or in water well drilling and equipment in largest demand.

(ii) Identification of parts that lend themselves for local fabrication with additional inputs in the existing enterprise.

(iii) Analysis of the manufacturing processes that would be required, the dimensional accuracies, quality control etc., for local fabrication/manufacture of the parts.

(iv) Identification of plant and machinery additionally required to undertake the local manufacture.

(v) Conducting programmes of instruction in manufacturing processes and production methods to machinists/operators.

(vi) Performing on-the-job instruction with demonstration in all manufacturing activities on the shop floor.

(b) Activities related to output - 'Loading and transport equipment parts/components, etc.':

Activities involved for additional products in loading and transport equipment are the same as in (a).

LIST OF EQUIPMENT FOR SURFACE MINING AND CONSTRUCTION

I. DRILLING EQUIPMENT

1. Pneumatic Percussive Drilling Equipment.
   - 1.1. Rock drills for hand-held bench drilling
   - 1.2. Benchers, for anchoring to the rock
   - 1.3. Rock drills for mechanized low bench drilling, for mounting on crawler drills
   - 1.4. Heavy duty Rock drills for high benches.
   - 1.5. Rock drills for overburden drilling.
2. Hydraulic, Percussive Rock Drilling Equipment.
3. Wagon Drills
4. Crawler Drills for Pneumatic Percussive Drilling
5. Crawler Drills for Hydraulic Percussive Drilling
6. Rotary Percussive Drill Rigs, Crawler mounted.
7. Light construction equipment such as hand-held drills, pneumatic breakers and hydraulic rig-mounted breakers etc.

II. DRILL STEEL EQUIPMENT

1. Integral drill steel, shanks, extension rods, adapters, sleeves, couplings, etc.
2. Different types of Bits, including Drag Bits for rotary cutting and Roller Bits for rotary crushing.
3. Chisels.

III. AUXILARY EQUIPMENT

1. Compressed air equipment, including compressors, installation equipment, line equipment, pneumatic components and controls.
2. Hydraulic equipment, including pumps, motors, line equipment, and hydraulic components and controls.
3. Flushing Equipment.
4. Dust collection Equipment.
5. Diesel power units.

IV. LOADING AND TRANSPORT EQUIPMENT

1. Wheel loaders, crawler loaders
2. Shovel excavators
3. Bucket excavators
4. Trucks.

LIST OF EQUIPMENT FOR UNDERGROUND MINING AND CONSTRUCTION

I. TUNNELLING AND DRIFTING EQUIPMENT

1. Shield-driving equipment
2. Tunnel boring machines
3. Tunnel Drilling equipment
   - 3.1 Hand held rock drills, Pusher leg rock drills.
   - 3.2 Drill rigs, rubber-tyred, track-bound, rail-bound, portal rigs etc.
4. Loading and tarnsport equipment.
   - 4.1 Overhead loaders
   - 4.2 Digging arm laoders
   - 4.3 Load-haul- dump equipment
   - 4.4 Mine cars, cherry-picker devices, shuttle train cars with conveyers etc.
5. Drill steel equipment.

II. UNDERGROUND MINING EQUIPMENT

1. Drilling equipment (production drilling)
   - 1.1 Hand-held rock drills, pusherleg rock drills, hand-held stoper drills, etc.
   - 1.2 Mechanized drifting equipment
   - 1.3 Mechanized crawler drills
   - 1.4 Mechanized light wagon drills
   - 1.5 Bar and arm rigs
   - 1.6 Mechanized ring drills, fan drill rigs
2. Loading and Transport Equipment
   - 2.1 Overhead shovel laoders
   - 2.2 Digging arm loaders
   - 2.3 Load-haul-dump equipment
   - 2.4 Bucket loaders
   - 2.5 Transport vehicles, rail car equipment.
3. Drill steel equipment.

LIST OF EQUIPMENT FOR WATER WELL DRILLING

1. Air-driven, water well drilling rigs.
2. Hydraulic, water well drilling multiple rigs.
3. Hydraulic rotary drill rigs.

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF MINING AND CONSTRUCTION EQUIPMENT INDUSTRY

PROJECT TITLE

PILOT PRODUCTION PLANT FOR MANUFACTURE OF SELECTED MINING AND CONSTRUCTION EQUIPMENT

NOTE: (i) "Pilot Production Plant" proposed is envisaged as a manufacturing facility producing a higher end-product with limited in-house (manufacturing) operations but maximum horizontal integration in the local engineering industry.

(ii) "Mining and Construction Equipment", emphasis is laid on rock drilling equipment, excluding the drill steel equipment.

PROPOSAL NO: 6

UNIDO
VIENNA

APRIL 1985

DEVELOPMENT OBJECTIVE

(i) To promote the development of mining and construction equipment manufacturing industry.

(ii) To develop manufacturing capability in the engineering industries to produce selective mining and construction equipment.

PROJECT OBJECTIVES

(i) To establish a pilot production plant for the manufacture of selective mining and construction equipment.

(ii) To establish design and manufacturing capability in the pilot plant to produce the boom and carriage systems in drilling equipment for ground investigation, water well drilling, surface and underground mining and construction; by the end of a five year period.

(iii) To enable selected engineering industries to adapt their products for supply as components and sub-assemblies/sub-systems to the pilot plant; by the end of a five year period.

BACKGROUND AND JUSTIFICATION

a) Development Hypothesis:

(i) In the fast expanding mining and construction sectors, the demand for equipment is extensive and is growing. However, it is almost entirely met by imports forming a considerable portion of the total import bill and often it represents, by value, the largest single item imported.

There exists, considerable capability in the local engineering industries, identified in terms of products that are being produced by these various firms, which products are technically and functionally similar to some of the sub-assemblies, sub-systems and auxiliaries of the mining and construction equipment. However, this capability is latent with reference to the objective of promoting the development of mining and construction equipment manufacturing industry and has to be harnessed in order to meet the objective.

(ii) The pilot production plant wich the project proposes, would enable the engineering firms to utilize their existing capabilities to produce components and sub-assemblies/sub-systems and other auxiliary equipment or modify the existing products to match the requirements of the mining and construction machinery and in the process acquire the engineering capability and place themselves well on the way to becoming established suppliers.

The pilot plant would put these components together to build the selected mining and construction equipment as its final products. This process would progressively establish the industry, fulfilling the objective.

b) Project Hypothesis

(i) The activities of the pilot production plant are expected to include design of the boom and carriage systems for the ground water investigation, water well drilling, surface and underground mining; identification of components and sub-assemblies/sub-systems that could be supplied by the local engineering firms, interaction with the firms to establish production of the identified components/systems and manufacture and procurement of other parts, and the assembly of the equipment in the pilot plant.

.../2

These activities are expected to lead to certain operational results including development of engineering firms producing components and sub-assemblies/sub-systems for machinery; establishment of a system of sub-contracting and supplies, establishment of the production of a higher end-product which was earlier not produced (strengthening capabilities, bringing them out to create new capabilities) which are the outputs of this project.

(ii) The existing engineering firms that have been hitherto producing various products such as hydraulic control elements, hydraulic cylinders, hoses, etc., pneumatic elements and systems, compressors and compressed air line systems, electrical items, carriage chassi, structural elements etc., although possessing the basic capabilities and ability to manufacture their own products which are often acquired from licensors of their respective products, generally lack the ability to apply the products or come out with new (but related products) to suit a specific purpose or equipment. To overcome this constraint it would require additional inputs in terms of design, adaptation, quality, certain high technologies, possibly additional production machinery and organizational skills.

(iii) The pilot production plant would provide and impart this additional expertise to the existing engineering firms and establish and develop the activity, thereby fulfilling the project objective, by the end of the five year period.

PROJECT OUTPUTS:

The envisaged pilot production plant is expected to produce certain operational results reflected in the following:

(a) Development of local engineering firms producing and supplying the following additional new products to the pilot plant manufacturing mining and construction equipment: 1/

(i) Hydraulic system components and control elements;

(ii) Pneumatic system components and control elements;

(iii) Electrical/electronic system components/elements;

(iv) Compressors and compressed air line components;

(v) Prime movers.

(b) Establishment of pilot production plant manufacturing following parts and sub-assemblies and procuring above components and assembling (together with the imported parts). The selected mining and construction equipment: 1/

(i) Structural sub-assemblies;

(ii) Auxiliary systems;

(iii) Assembly/production of final end products.

1/ Lists of various equipment in Annexes 1, 2 and 3

PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities:

(a) Activities related to output 'Development of local engineering firms':

(i) Study of equipment employed in the mining and construction sector and the equipment in largest demand.

(ii) Identification of equipment for local manufacture, parts/components for supply by local engineering firms, parts/components for manufacture by the pilot plant and those for import.

(iii) Interaction with the local firms and providing assistance in design modification/adaptation and manufacturing processes, machinery selection etc., to produce the new products which would be parts/components for the final end products of the pilot plant.

(iv) Providing on a continuous basis the above assistance in production of the new products.

(b) Activities related to output 'Establishment of a pilot production plant':

(i) Identification of parts/components for production in pilot plant.

(ii) Identification of plant and machinery required in the pilot plant; procurement and installation.

(iii) Establishing operating shops for sheet metal, welding, machining, and assembly and testing facilities.

(iv) Establishing a system of sub-contracting parts and assisting the sub-contractors to establish the products, providing on a continuous basis technical know-how in design, manufacture, quality control, production and testing of the parts/components.

(v) Manufacture of parts/components for the pilot plant and acceptance of sub-contracted parts, import of other parts/components and assembly of the final end-products.

LIST OF EQUIPMENT FOR SURFACE MINING AND CONSTRUCTION

I. DRILLING EQUIPMENT

1. Pneumatic Percussive Drilling Equipment.
   - 1.1. Rock drills for hand-held bench drilling
   - 1.2. Benchers, for anchoring to the rock
   - 1.3. Rock drills for mechanized low bench drilling, for mounting on crawler drills
   - 1.4. Heavy duty Rock drills for high benches.
   - 1.5. Rock drills for overburden drilling.
2. Hydraulic, Percussive Rock Drilling Equipment.
3. Wagon Drills
4. Crawler Drills for Pneumatic Percussive Drilling
5. Crawler Drills for Hydraulic Percussive Drilling
6. Rotary Percussive Drill Rigs, Crawler mounted.
7. Light construction equipment such as hand-held drills, pneumatic breakers and hydraulic rig-mounted breakers etc.

II. DRILL STEEL EQUIPMENT

1. Integral drill steel, shanks, extension rods, adapters, sleeves, couplings, etc.
2. Different types of Bits, including Drag Bits for rotary cutting and Roller Bits for rotary crushing.
3. Chisels.

III. AUXILARY EQUIPMENT

1. Compressed air equipment, including compressors, installation equipment, line equipment, pneumatic components and controls.
2. Hydraulic equipment, including pumps, motors, line equipment, and hydraulic components and controls.
3. Flushing Equipment.
4. Dust collection Equipment.
5. Diesel power units.

IV. LOADING AND TRANSPORT EQUIPMENT

1. Wheel loaders, crawler loaders
2. Shovel excavators
3. Bucket excavators
4. Trucks.

LIST OF EQUIPMENT FOR UNDERGROUND MINING AND CONSTRUCTION

I. TUNNELLING AND DRIFTING EQUIPMENT

1. Shield-driving equipment
2. Tunnel boring machines
3. Tunnel Drilling equipment
   - 3.1 Hand held rock drills, Pusher leg rock drills.
   - 3.2 Drill rigs, rubber-tyred, track-bound, rail-bound, portal rigs etc.
4. Loading and tarnsport equipment.
   - 4.1 Overhead loaders
   - 4.2 Digging arm laoders
   - 4.3 Load-haul- dump equipment
   - 4.4 Mine cars, cherry-picker devices, shuttle train cars with conveyers etc.
5. Drill steel equipment.

II. UNDERGROUND MINING EQUIPMENT

1. Drilling equipment (production drilling)
   - 1.1 Hand-held rock drills, pusherleg rock drills, hand-held stoper drills, etc.
   - 1.2 Mechanized drifting equipment
   - 1.3 Mechanized crawler drills
   - 1.4 Mechanized light wagon drills
   - 1.5 Bar and arm rigs
   - 1.6 Mechanized ring drills, fan drill rigs
2. Loading and Transport Equipment
   - 2.1 Overhead shovel laoders
   - 2.2 Digging arm loaders
   - 2.3 Load-haul-dump equipment
   - 2.4 Bucket loaders
   - 2.5 Transport vehicles, rail car equipment.
3. Drill steel equipment.

LIST OF EQUIPMENT FOR WATER WELL DRILLING

1. Air-driven, water well drilling rigs.
2. Hydraulic, water well drilling multiple rigs.
3. Hydraulic rotary drill rigs.

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL
FOR THE MECHANIZATION OF COAL MINING INDUSTRY

PROJECT TITLE

COMPREHENSIVE MECHANIZATION OF COAL MINING IN CONDITIONS OF SOFT AND THICK SEAMS AND COMPLEX GEOLOGICAL FEATURES - STUDY TOUR

PROPOSAL NO: 7

UNIDO, VIENNA 1985

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR FINANCING FROM THE UNIDF

PROJECT TITLE

COMPREHENSIVE MECHANIZATION OF COAL MINING
IN CONDITIONS OF SOFT AND THICK SEAMS AND COMPLEX
GEOLOGICAL FEATURES - STUDY TOUR

TOTAL COST:	US $	50,200
CONVERTIBLE:	US $	44,400
OVERHEADS:	US $	5,800

DETAILS OF BUDGET

a) Study tour for 5 officials over 4 weeks:

	US $
Travel	15,000
Perdiem 30 days a US $ 70	10,500
Sub total	25,500

b) Fellowship for 3 of the above officials, 3 months:

	US $
Travel (included above)	-
Perdiem 90 days a US $ 70	18,900
Sub total	18,900

TOTAL COST	44,400
OVERHEADS	5,800

TOTAL BUDGET INCLUDING OVERHEADS: 50,200

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PART A - BASIC DATA

COUNTRY	: Democratic People's Republic of Korea
PROJECT NUMBER	:
PROJECT TITLE	: Comprehensive Mechanization of Coal Minign in Conditions of Soft/Thick Layers - Study Tour
DURATION	: 4 months
SCHEDULED START	:
SCHEDULED COMPLETION	:
ORIGIN AND DATE OF OFFICIAL REQUEST	:
GOVERNMENT COUNTERPART AGENCY	: Ministry of Coal Mining Industry
UNIDO CONTRIBUTION	: US $ 50,200 (incl. 13% overhead charges)
GOVERNMENT CONTRIBUTION	:
CURRENCY REQUIRED FOR UNIDO INPUT	:
CONVERTIBLE	: US $ 50,200
OTHER	: NIL
UNIDO SUBSTANTIVE BACKSTOPPING BRANCH	: Engineering Industries Branch
PROGRAMME COMPONENT CODE	:

PART B - NARRATIVE

1. DEVELOPMENT OBJECTIVES

The development objectives are to increase the productivity of the coal mines up to 2.5 to 3 times the existing levels, and to introduce comprehensive mechanization in coal mining.

2. PROJECT OBJECTIVES

To identify the optimum mechanization system for coal mining in conditions of soft and thick layers and complex geological features.

To study and analyze the existing mining equipment and mechanization systems in operation in similar conditions in other countries and arrive at an optimum system of mechanization for local coal mining.

3. BACKGROUND AND JUSTIFICATION

a) Development Hypothesis

(i) The coal mine is a complex of access shafts and drifts leading to a network of underground roadways that service the coal faces where the actual mining is performed. The construction and layout differ greatly depending on the geological conditions, including seam thickness, depth and the geological features.

The equipment in both development and production operations for drilling, loading and transportation covers a large variety in each type, from machinery as used in conventional to modern methods and within each method a wide range of size and cpacity. As the equipment forms an integrated system, the constituent machinery ought to be mutually compatible for optimum efficiency. (Please see Appendix for details of equipment).

(ii) Apart from the above, the seam thickness and depth determine the basic method of mining which in turn definesthe extraction machinery.

In addition to the seam thickness and depth, the rock conditions and geological features have a bearing on the lay-out and construction of the shafts and drifts and the network of roadways, influencing the driving equipment.

(iii) Over the decades, efficient systems have been developed in various parts of the world, with complete mechanization of the mining operations, some of them representing the most highly productive coal extraction systems in the world. For example, the longwall mining in Europe has been developed to a very high degree of mechanization and levels of productivity.

The equipment involves large capital outlays and therefore, particular care should be exercised in the selection of equipment for mechanization and modernization to increase the productivity.

(iv) The comprehensive mechanization of coal mining in conditions of soft and thick layers and complex geological features as envisaged by the Government, would require careful consideration and analysis of the existing extraction systems for effective decision making. The study tour as proposed in the project would expose the technical experts to an overview of the existing mechanization and their productivity levels, thereby providing the inputs necessary for appropriate decision making and identification of the comprehensive mechanization that is required to realize the productivity goals.

b) Project Hypothesis

(i) The identification of the comprehensive mechanization of coal mining,in the conditions of soft and thick layers and complex geological features,to increase the productivity by 2.5 to 3 times in mines where such mechanization is not existing, would need detailed study of the existing extraction systems and their productivity, in similar deposits and comparable geological features and the study of mechanization systems design and equipment selection.

(ii) The visits to the mines employing similar methods and study of their operations in the conventional and continuous mining systems, the equipment and machinery used, the productivity levels etc; and the fellowships in a mechanization centre and the accompanying study of the extraction systems, mechanization systems design and equipment selection; which are the expected outputs of this project, would enable the technical experts to gain first hand information on the existing systems enabling them to identify the optimum comprehensive mechanization, thereby fulfilling the project objectives.

(iii) It is proposed for reasons of similarity of deposit features, to visit the coal mines in the south of Poland and to carry out the fellowship in the mechanization centre in Poland.

4. PROJECT OUTPUTS

(i) Study tour for two senior officials and three technical officials/experts covering visits to 2 to 3 coal mines over a period of 3 weeks and to a mechanization centre over 1 week.

(ii) Fellowships for three technical officials/experts at the mechanization centre, in the extraction and mechanization systems-design department, for a period of 3 months with appropriate visits to mines and original equipment manufacturers.

5. PROJECT ACTIVITIES

a) Activities related to the study tour:

(i) Visit to one fully mechanized coal mine, extracting coal from soft and thick layers, including study of the operations, equipment involved, systems employed and productivity.

(ii) Visit to one fully mechanized coal mine in conditions of complex geological features and study the mine layout, equipment involved both in development and production, systems etc.

b) Activities related to the fellowships

(i) Fellowship at a mechanization centre with study and discussions, emphasising on:

- coal mine mechanization
- mine development and production methods, systems design, productivity
- drilling, loading and transport equipment, selection of equipment for optimum efficiency
- utilization of equipment, economics.

(ii) Visits to coal mines, utilizing mechanized equipment, to study the operations in relation to the above topics.

(iii) Visits to original equipment manufacturers to study the equipment in relation to the topics of the fellowship study.

6. PROJECT INPUTS

UNIDO INPUTS	Total : US $	50,200
(i) BL 31-00 Fellowships, 9 m/m		18,900
(ii) BL 32-00 Study Tours, 5 m/m		10,500
Study Tour travel		15,000
(iii) BL 99-99 Project total		44,400
(iv) Overhead charges at 13 %		5,800
(v) Total allocation		50,200

7. EVALUATION

The evaluation shall be based on the substantive programme content of the study tours undertaken and fellowships executed.

8. FOLLOW-UP

Follow-up action foreseen is that of a large scale project of coal mine mechanization.

PART C - CLEARANCE AND APPROVAL

PROPOSAL SUBMITTED BY	: Engineering Industries Branch Division of Industrial Operations	Date:
CLEARED BY	: Mr. M. Delos, Head Engineering Industries Branch Division of Industrial Operations	Date:
	: Mr. A. Vassiliev, Director Division of Industrial Operations	Date:
APPROVED BY	: Programme Development and Evaluation Branch Division of Policy Co-ordination	Date:
CONVERTIBLE CURRENCY	: US $ 50,200 (Incl. 13% overheads)	
OTHER CURRENCY	: NIL	
SOURCE OF FUNDS	: UNIDF	
DATE PAD REQUESTED	:	

COAL MINING EQUIPMENT

The modern coal mine is a large complex consisting of a carefully planned system of shafts and drifts that provides access to an extensive network of underground roadways which in turn services the coal faces where the coal is actually mined. The construction and layout of these elements differ greatly from mine to mine depending upon the geological conditions, namely the rock strength, thickness and depth of seams, gradients, faults etc. The methods of mining and the size (capacity) of the mines also differ.

Both the development of the mines and the production of coal involve a large variety of equipment for drilling, loading and transportation. The equipment in use for these operations, covers wide ranges of machinery in each type. The equipment for shaft sinking and drift driving ranges from the machinery used with drill/blast/load methods to the drill booms, heavy-duty track-mounted boom road headers together with the high powered dirt loading, high capacity bucket hoists, bucket loaders and continuous mobile chain or mono-rail belt conveyors etc for loading and transportation. Similarly, for underground roadway driving the equipment ranges from the machinery as used in drill/blast/load methods to road header methods or to full face tunnel borers. Within the conventional method, the equipment varies from simpler and smaller machines to complex, large capacity and fast machines. The equipment for coal mining as used in the two basic methods of 'longwall mining' used for thin, bedded deposits of uniform thickness in deep and multiple seams, the coal being extracted from a long straight, working face, largely praticed in Europe; and the 'room-and-pillar mining' adopted in thicker, flat seams and shallower depths with generally low fault intensity, the coal being extracted leaving sections of coal as pillars to provide the roof support, mostly practiced in the USA, Canada, South Africa, and Australia, involves special machines ranging from different forms of coal cutting ploughs to a wide ranging series of drum shearers, hydraulically operated supports and armoured flexible chain conveyors in the former method (longwall); and separate mobile coal cutters and loading and hualing machines or integrated cutting and loading machines and transport equipment in the latter method (room-and-pillar).

The equipment for drilling, loading and transportation ought to be compatible parts of an integrated system, as such, selection should be made for combined optimum efficiency.

UNIDO

PROJECT BUDGET/REVISION

3. COUNTRY	4. PROJECT NUMBER AND AMENDMENT	5. SPECIFIC ACTIVITY
DEM. PEOP. REP. KOREA		

10. PROJECT TITLE COMPREHENSIVE MECHANIZATION OF COAL MINING IN CONDITIONS OF SOFT THICK LAYERS - STUDY TOUR

15. INTERNATIONAL EXPERTS (functional titles required except for line 11-50)	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. m/m	18. $	19. m/m	19. $	20. m/m	20. $
11-01										
02										
03										
04										
05										
06										
07										
08										
09										
10										
11										
12										
13										
14										
15										
16										
11-50 Short term consultants										
11-99 Sub-total—International experts[a]										

21. REMARKS

[a] If more than 16 experts are required check here ☐ and attach continuation sheet 1A. This sub-total *must* include all experts.

UNIDO

PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL		17. 1985		18.		19.		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
OPAS EXPERTS (functional titles required)										
12-01										
12-02										
12-03										
12-99 Sub-total—OPAS experts[b]										
ADMINISTRATIVE SUPPORT PERSONNEL										
13-00 Clerks, secretaries, drivers										
13-50 Freelance interpreters (non-UNDP projects)										
13-99 Sub-total—Administrative support personnel										
UN VOLUNTEERS (functional titles required)										
14-01										
14-02										
14-03										
14-04										
14-99 Sub-total—UN Volunteers[b]										
15-00 Project travel										
16-00 Other personnel costs (including UNIDO staff mission costs)										
NATIONAL EXPERTS (functional titles required)										
17-01										
17-02										
17-03										
17-04										
17-05										
17-99 Sub-total—National experts[b]										
19-99 TOTAL—PERSONNEL COMPONENT										

[b] If additional individual budget lines are required, check here ☐ and attach continuation sheet 1A. These sub-totals must include budget lines listed on page 1A.

Form FS 83/Rev.4 Add.1 (2.83)

UNIDO

PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. m/m	18. $	19. m/m	19. $	20. m/m	20. $
SUBCONTRACTS										
21-00 Subcontracts										
TRAINING										
31-00 Individual fellowships	9	18,900	9	18,900						
32-00 Study tours; ~~UNDP group training~~	5	25,500	5	25,500						
33-00 In-service training										
34-00 Non-UNDP group training										
35-00 Non-UNDP meetings										
39-99 TOTAL—TRAINING COMPONENT										
EQUIPMENT										
41-00 Expendable equipment										
42-00 Non-expendable equipment										
43-00 Premises										
49-99 TOTAL—EQUIPMENT COMPONENT										
MISCELLANEOUS										
51-00 Sundries										
55-00 Hospitality (non-UNDP projects)										
56-00 Support costs (CC and DC projects only)										
59-99 TOTAL—MISCELLANEOUS COMPONENT										
SURPLUS/DEFICIT										
81-00 Surplus/Deficit (ADM/FS use only)										
99-99 PROJECT TOTAL		44,400		44,400						
[c] COST SHARING (UNDP/IPF projects only)										
[c] NET UNDP CONTRIBUTION										

[c] For information only — *not* for PAD input

	Total $	1985 $
Overhead charges at 13 %	5,800	5,800
TOTAL UNIDF contribution	50,200	50,200

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE DEVELOPMENT GLASS WORKING INDUSTRY

PROJECT TITLE

MANUFACTURE OF SIMPLE GLASS PRODUCTS FOR
INDUSTRIAL LABORATORIES AND EDUCATIONAL
INSTITUTIONS HANDS-ON-JOB DEMONSTRATION UNIT

Note: Glass Products: Limited to simple tube and rod glass products
and thermometers.

PROPOSAL NO.: 8

UNIDO 18 APRIL 1985

1. DEVELOPMENT OBJECTIVE

i) To initiate the development of glass working industry.

ii) To develop manufacturing capability to produce simple glass products.

2. PROJECT OBJECTIVES

i) To assist the glass working industry to produce simple glass products for industrial laboratories and educational purposes.

ii) To establish a "Production Demonstration Unit" for the manufacture of simple rod and tube products including thermometers.

3. BACKGROUND AND JUSTIFICATION

a) Development Hypothesis:

Due to limited manufacturing activity in the glass working industry and also due to the inadequate quality of the local glass products, the bulk of the glass products required by the industrial laboratories and educational institutions is imported. Some of these products are relatively simple and can be manufactured in small low-investment facilities with simple equipment and tools. employing labour intensive methods that require certain basic minimum skills.

Strengthening manufacturing capability in the area of glass working for simple products, using glass rod and tube stock and improving the quality of the products would enable the existing enterprises engaged in manufacture of similar products to acquire the additional skills, the manufacturing techniques for quality products. thereby initiating the development of the local glass industry.

b) Project Hypothesis:

The production of glass products, such as thermometers, other tube products and rod products, required in the industrial laboratories and educational insitituteions, involve relatively simple manufacturing processes, simple equipment and tools. However, certain specific skills and manufacturing knowhow is involved in the production of the glass articles and to achieve the quality as required by the above users.

The hands-on-job production demonstration unit as proposed in the project would identify these requirements in the local industry and demonstrate the manufacturing processes with the necessary quality control and provide the technical know-how to the manufacturing enterprises to enable them to produce the required products at the quality needed, thereby contributing to the development objective.

4. PROJECT OUTPUTS

The production demonstration unit at the end of the two year period shall consist of the following in full capacity operation, for ten technicians to be engaged in hands-on-job activity.

A. Facilities:

Workshop for glass working demonstration with the following sections:

i) Workshop section for tube and rod products (for 5 technicians at a time):

Tube products:

- products made by simple forming;
- products made by simple forming and with graduations, division and other markings:
- products with different closing elements, cocks, etc.

Rod products:

- stirrer rods
- stoppers
- cocks, etc.

ii) Workshop section for thermometers (for 5 technicians at a time):

Thermometers:

- engraved stem thermometers:
- bulb thermometer

The equipment required for the workshop is shown in Annex I, and the utilities requirements in Annes II.

B. Programme content:

The demonstration unit shall have the following programmes:

i) Programme for the demonstration of basic manufacturing processes.

ii) Programme for the demonstration of thermometer manufacture.

iii) Programme for the instruction in manufacturing processes. production methods, quality control, etc.

5. PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities:

a) Activities relating to "Workshop section for tube and rod products":

i) Identification of plant and machinery for the section of workshop, procurement action.

ii) Design of workshop facilities, construction, installation of equipment, etc.

iii) Conducting the programme for the demonstration of manufacturing processes, emphasising on:

- cutting, on machines with diamond tipped discs, drawing and ripping above flame,
- heating, blow torch heating,
- hot preforming,
- spiral forming,
- thinning,
- upsetting,
- bulb blowing,
- cone and bowl forming,
- flanging,
- flashing off,
- drawing of tip,
- sizing,
- nipping off,
- sealing off,etc.
- assembling and soldering,
- annealing,
- grinding.

b) Activities related to "Workshop section for thermometer manufacture":

i) Identification of equipment, disign and construction of facilities and installation as in a).

ii) Conducting the programme for the demonstration of thermometer manufacture.

The different related products viz the alcohol thermometers, mercury filled thermometers, other thermometers for various uses, hygrometers for milk density, etc. all can be grouped into the two groups: engraved stem thermometers and bulb thermometers [as mentioned in 4 ii)] based on the processing operations used in the production.

- the manufacturing of different elements:
- assembly:
- final control.

ANNEX I

EQUIPMENT LIST FOR GLASS WORKSHOP

A) EQUIPMENT FOR TUBE AND ROD PRODUCTS SECTION:

Item	Quantity
1. Blow torches	8
2. Cutting machine with stand	
3. Grinding machines with rinse tank	2
4. Grinding machine with vertical spindle	1
5. Various tools, instruments:	
5. 1. carbon plates with handles	set
5. 2. carbon cones for cock casing	set
5. 3. flanging tools	set
5. 4. creasing tools	set
5. 5. tungstun needles with handles	set
5. 6. case making tools, manual	set
5. 7. plug tools, with carbon insert	set
5. 8. plug tools, table model	set
5. 9. solid and blowin plug tools	set
5.10. spiral bending tools	set
5.11. code casing tools	set
5.12. cock plug tools	set
5.13. cock plug head forming tools	set
5.14. grinding cones	set
5.15. grinding plates	set
5.16. sleeves with rubber plugs	set
5.17. chucks, collets, etc.	set
5.18. forceps tongs	set
5.19. calipers, measuring tapes, etc.	set
5.20. stress tester	1
6. Work benches, chairs	set
7. Tube sacks, tool cabinets, storage sacks, etc.	set
8. Mounted oxygen, gas supply units	1.1
9. Compressed air supply unit	1
10. Pipe fittings, etc.	set

B. EQUIPMENT FOR THERMOMETER SHOP:

1. Table blow torches for thermometer	5
2. Precision graduation machine	1
3. Standard scales	set
4. Cutting machine for glass with cutting discs	1
5. Thermostat, thermometers	1
6. Glass cylinder with vacuum pump	1
7. Enclosures with hood (for flourine, mercury)	1
8. Bunsen burners for LPG	2
9. Various tools, instruments:	
9.1. tweezers straight, formed	set
9.2. hand glass cutters	set
9.3. dividing needles	set
10. Work benches, tables, rocks, cabinets, etc.	sets

WORKSHOP SPACE AND UTILITIES REQUIRED

A) TUBE AND ROD SECTION:

Item	Quantity
1. Floor area about $200m^2$. x 4 meters head room	
2. Electric power requirement	3kw
3. LP gas, 0.05 bar, 4 m^3/hr	$35m^3$/day
4. Oxygen, 5 - 10 bar, $8m^3$/hr	$75m^3$/day
5. Compressed air, 5 - 10 bar, $6m^3$/hr	$50m^3$/day
6. Water, 6 bar, $0.15m^3$/hr	$1.5m^3$/day

B) THERMOMETER SECTION:

1. Floor area about $150m^2$. x 4m head room	
2. Electricity	8kw
3. LP gas, 0.01 - 0.15 bar	$42m^3$/day
4. Oxygen, 1 - 1.5 bar	$80m^3$/day
5. Compressed air, 1 - 1.5 bar	$150m^3$/day
6. Water, 6 bar	$1m^3$/day

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF BUILDING CONSTRUCTION EQUIPMENT INDUSTRY

PROJECT TITLE

PILOT PRODUCTION OF WHEEL BARROWS FOR BUILDING CONSTRUCTION

NOTE: 'Pilot Production'refers to one in an existing engineering firm.

PROPOSAL NO. 9

UNIDO
VIENNA

APRIL 1985

1. DEVELOPMENT OBJECTIVES

(i) To initiate the development of building construction equipment industry.

(ii) To develop manufacturing capability in the metalworking industry to produce simple building construction machinery.

2. PROJECT OBJECTIVES

(i) To enable the metalworking industry to acquire the necessary production capability and diversify into building construction machinery.

(ii) To establish the pilot production of wheel barrows in an existing engineering firm as an additional product (in its product-mix).

3. BACKGROUND AND JUSTIFICATION

(a) Development Hypothesis

The demand for the building construction equipment is considerable and is on the increase. Some of the relatively simpler equipment could be produced by the local metalworking and machinery industry. However, the industry is unable to do so due to lack of the product and production know-how. Though some of the engineering firms are quite well equipped with the necessary plant and machinery and the basic engineering infrastructure is available, the lack of the above know-how is inhibiting their production capability and they are not able to diversify even in the face of a decline in demand for their traditional products. While the machinery might not lend itself as an independent product (product line) with economy of scale, unless the demand warrants it, it might well serve as an additional product to increase the capacity utilization.

Establishing the pilot production of simple equipment items, such as wheel barrows in an engineering firm, in addition to its existing product mix, would impart the requisite know-how and lead to the development of the manufacturing capability in the metalworking industry to produce simple building construction machinery and thereby initiating the development of that industry thus fulfilling the development objective.

(b) Project Hypothesis

The manufacturing capability to produce the simple building construction equipment would involve the product know-how, the process know-how including the appropriate manufacturing processes and the machinery to be used, etc. The pilot manufacture of the wheel barrows in an engineering firm engaged in similar manufacturing operations and posessing basic plant and machinery, would demonstrate to the industry the possibilities to undertake similar products, which operational result is the expected output of the pilot manufacture, leading to the acquisition of the production capability to diversify into building construction equipment, thus meeting the project objective.

4. PROJECT OUTPUTS

The envisaged pilot production of wheel barrows is expected to produce the following operational results reflected in the outcome of the sub-items given below.

(a) Establishment of pilot production and upgrading manufacturing capability of the engineering firm to produce wheel barrows.

(i) Design of the wheel barrow version required;
(ii) Engineering methods inlcuding operation layouts; machine tools, jigs, fixtures and tools selection, etc.;
(iii) Manufacturing processes covering, sheet metal working including shearing, bending, rimming, welding, etc.; and other machining processes;
(iv) Production organization, flow of materials, layout, etc.

(b) Development of local engineering firms producing and supplying the following items to the above firm manufacturing wheel barrows.

(i) Rubber tyres or tube tyres (if used);
(ii) Standard parts and supply of other bought out items such as screws, nuts, washers, split pins, etc.

5. PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities:

(a) Activities related to the output 'Establishment of Pilot Production'

(i) Design/design adaptation of wheel barrows, different sizes, etc; detailed design and drafting;
(ii) Preparation or operation layouts selection of machine tools, jig and fixtures and cutting tools;
(iii) Selection of components for pilot production in the plant; identification of parts for sub-contracting;
(iv) Identification of machine tools and other factory equipment additionally required, procurement and installation (Annex 1 - indicative list of equipment);
(v) Establishment of the production of parts in the plant, establishment of production of parts in the sub-contractors' firms, acceptance test, etc;
(vi) Rationalize the shop layout and material flow, etc; organization of the shops, tool cribs, etc;

(b) Activities related to output 'Development of local engineering firms'

(i) Identification of local engineering firms as sub-contractors;
(ii) Identification of additional machinery and other facilities required by the firms;
(iii) Establishment of production of parts in the firms;
(iv) Establish a system of sub-contracting, acceptance testing, quality control, etc.

INDICATIVE LIST OF EQUIPMENT REQUIRED FOR THE PRODUCTION OF WHEEL BARROWS

Equipment for production of 60,000 wheel barrows per annum on a 2 shift basis with 50 workers.

Item	Quantity
1. Table shears, sheet 6.3 mm, 2000 mm width	1
2. Hand shears, length of cut 300 mm	1
3. Circular saw, dia 360 mm	1
4. Eccentric press, 1 ton capacity	1
5. Eccentric press, 3 ton capacity	1
6. Crimping machine, overhang 400 mm	1
7. Pipe bending machine, dia of pipe 50 mm, wall thickness of pipe 3.5 mm	1
8. Pillar drill, dia 20 mm	1
9. Bench drill, dia 20 mm	1
10. Spot welder, foot control	1
11. Rotary welders	2
12. Hand screw press 1 ton, for assy	1
13. Hydraulic press 1 ton, for assy	1
14. Pedestal grinder	1
15. Painting booth, water screen, spray guns, etc.	1

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF BUILDING CONSTRUCTION EQUIPMENT INDUSTRY

PROJECT TITLE

PILOT PRODUCTION OF LOW CAPACITY MOBILE CONCRETE MIXERS

NOTE: 'Pilot Production' refers to one in an existing engineering firm.

PROPOSAL NO: 10

UNIDO
VIENNA

APRIL 1985

1. DEVELOPMENT OBJECTIVES

(i) To initiate the development of building construction equipment industry.

(ii) To develop manufacturing capability in the metalworking industry to produce simple building construction machinery.

2. PROJECT OBJECTIVES

(i) To enable the metalworking industry to acquire the necessary production capability and diversify into building construction machinery.

(ii) To establish the pilot production of concrete mixers in an existing engineering firm as an additional product (in its product-mix).

3. BACKGROUND AND JUSTIFICATION

(a) Development Hypothesis

The demand for the building construction equipment is considerable and is on the increase. Some of the relatively simpler equipment could be produced by the local metalworking and machinery industry. However, the industry is unable to do so due to a lack of the product and production know-how. Though some of the engineering firms are quite well equipped with the necessary plant and machinery and the basic engineering infrastructure is available, the lack of the above know-how is inhibiting their production capability and they are not able to diversify even in the face of a decline in demand for their traditional products. While the machinery might not lend itself as an independent product (product line) with economy of scale, unless the demand warrants it, it might well serve as an additional product to increase the capacity utilization.

Establishing the pilot production of simple machinery such as concrete mixers in an engineering firm, in addition to its existing product mix, would impart the requisite know-how and lead to the development of the manufacturing capability in the metalworking industry to produce simple building construction machinery and thereby initiating the development of that industry thus fulfilling the development objective.

(b) Project Hypothesis

The manufacturing capability to produce the simple building construction machinery would involve the product know-how, the process know-how including the appropriate manufacturing processes and the machinery to be used, etc. The pilot manufacture of the concrete mixers in an engineering firm engaged in similar manufacturing operations and posessing basic plant and machinery, would demonstrate to the industry the possibilities to undertake similar products, which operational result is the expected output of the pilot manufacture, leading to the acquisition of the production capability to diversify into building construction machinery, thus meeting the project objective.

4. PROJECT OUTPUTS

The envisaged pilot production of concrete mixers is expected to produce the following operational results reflected in the outcome of the sub-items given below.

(a) Establishment of pilot production and upgrading manufacturing capability of the engineering firm to produce concrete mixers.

(i) Design of low capacity grivity mixers.

(ii) Engineering methods including operation layouts: machine tools, jigs, fixtures and tools selection, etc.

(iii) Manufacturing processes covering, sheet metal working including shearing, bending, rimming, welding, etc: worm and worm gear cutting: other machining processes including boring, grinding, etc.

(iv) Production organization, flow of materials, layout, etc.

(b) Development of local engineering firms producing and supplying the following items to the above firm manufacturing concrete mixers.

(i) Castings for gears, precision cast gears, etc.

(ii) Electrical motors, control elements, etc.

(iii) Standard parts and supply of other bought out items including wheel tyres.

5. PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities.

(a) Activities related to the output 'Establishment of Pilot Production'

(i) Design/design adaptation of concrete mixers, different sizes, etc.: detailed design and drafting (Annex 1: typical specifications).

(ii) Preparation of operation layouts selection of machine tools, jig and fixtures and cutting tools.

(iii) Selection of components for pilot production in the plant; identification of parts for sub-contracting.

(iv) Identification of machine tools and other factory equipment additionally required, procurement and installation (Annex 2: indicative list of equipment).

(v) Establishment of the production of parts in the plant, establishment of production of parts in the sub-contractors' firms, acceptance test etc.

(vi) Rationalize the shop layout and material flow, etc; organization of the shops, tool cribs, etc (Typical layout: Annex 4).

(b) <u>Activities related to output 'Development of local engineering firms'</u>

(i) Identification of local engineering firms as sub-contractors.

(ii) Identification of additional machinery and other facilities required by the firms.

(iii) Establishment of production of parts in the firms.

(iv) Establish a system of sub-contracting, acceptance testing, quality control, etc.

TYPICAL SPECIFICATION OF A LOW CAPACITY CONCRETE MIXER

Low capacity, mobile, gravity, concrete and mortar mixer of 125 dm^3 capacity.

(i) Effective volume of drums 215 dm^3

(ii) Mixture capacity, m^3 per hour

no. of operators	concrete	mortar
2	2.85	1.71
1	2.14	1.42

(iii) Mixing cycle, seconds

no. of operators	concrete	mortar
2	120 sec.	200 sec.
1	160 sec.	240 sec.

(iv) Drum rotation; .... 25 r.p.m.

(v) Power .... 1.1 KW

INDICATIVE LIST OF EQUIPMENT REQUIRED FOR THE PRODUCTION OF CONCRETE MIXERS

(in the plant for pilot production

Indicative list of plant and machinery and factory equipment required for a production of 2000 mixers per annum.

Item	Quantity
1. Material Preparation	
1.1. Circular saw, dia 810 mm	1
1.2. Table shears, sheet 6.3 mm, 3200 mm width	1
1.3. Circular shears, sheet 6.3 mm	1
1.4. Shearing machine	1
2. Press shop	
2.1. Eccentric press 2,500 KN	1
2.2. Eccentric press 1,600 KN	1
2.3. Press brake, sheet 6.3 mm, 2000 mm width	1
2.4. Roll-bending machine, sheet 12 mm, 2000 mm width	1
2.5. Sheet rimming machine, sheet 2.5 mm	1
2.6. Hydraulic ram for assembly, 400 mm	1
3. Welding shop	
3.1. Complete sets for welding in CO_2	2
3.2. Silicon rectifier welder	1
4. Machine shop	
4.1. Horizontal knee-type milling machine, table 320 x 1250 mm	1
4.2. Centre lathe, dia overbed 380 mm, centre dist. 750 mm	1
4.3. Centre lathe, dia overbed 500 mm, centre dist. 1000 mm	1
4.4. Pillar drill, dia 32 mm	1
4.5. Radial drill, dia 50 mm	1
4.6. Horizontal boring machine, spindle dia 63 mm, table 800 x 800 mm	1
4.7. Slotting machine, stroke 200 mm	1
4.8. Gear hobbing machine, module 7	1

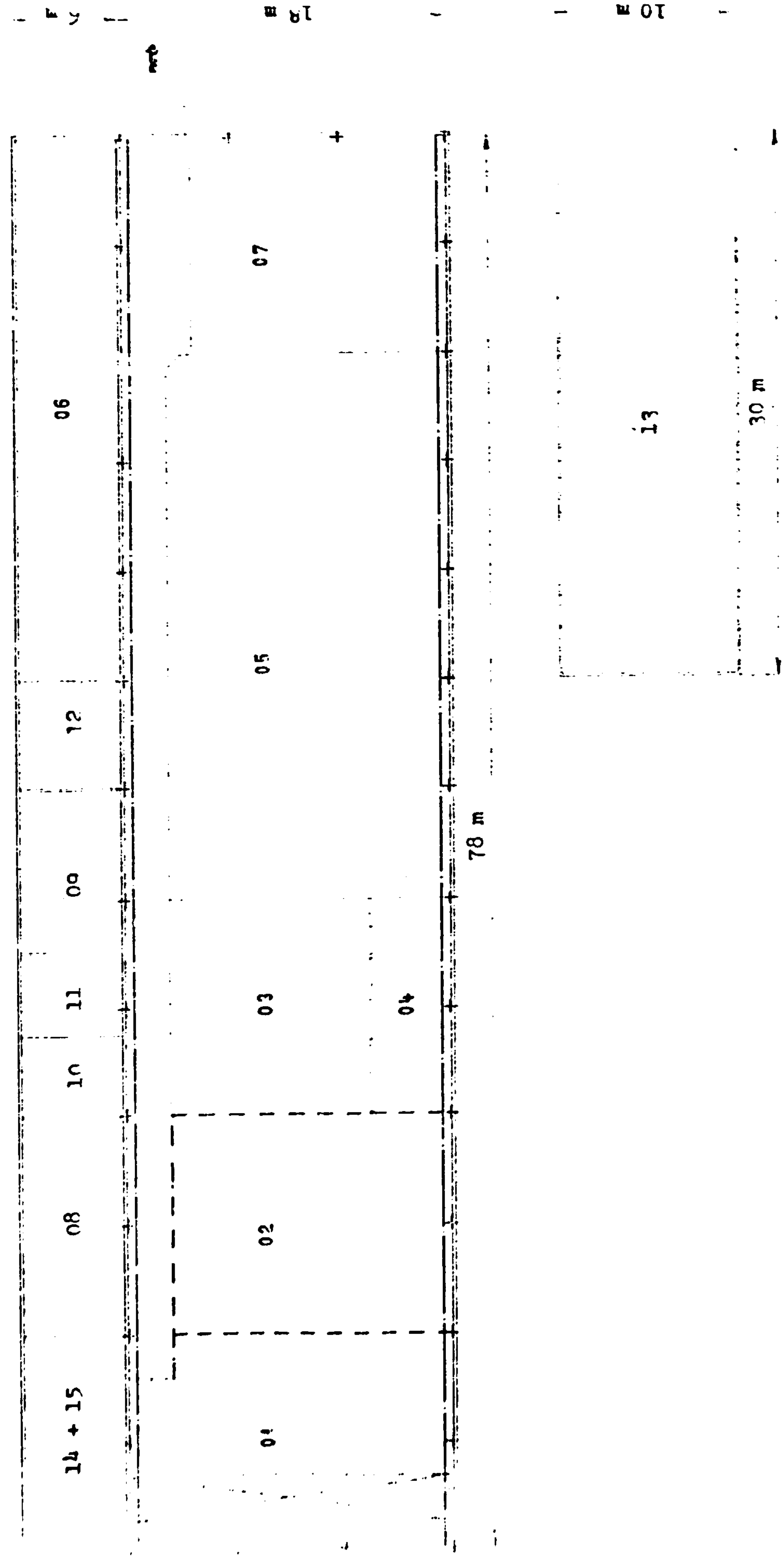
4.9.	Special machine for machining worm teeth	1
4.10.	Cylindrical grinding machine dia 160 mm 250 mm length	1
4.11.	Pedestal grinders, wheel dia 200 mm	2
5.	Tool grinding	
5.1.	Universal tool grinding machine, dia max. 280 mm, wheel dia 175 mm	1
5.2.	Grinding machine for saw cutters	1
5.3.	Two-wheel bench grinders, wheel dia 150 mm	1
6.	Factory equipment	
6.1.	Overhead crane 5 t	1
6.2.	Compressor	
6.3.	Welding tables with exhaust, assembly tables, fitters' tables, etc.	
6.4.	Painting shop/booth with water curtain, spray sets, etc.	

FLOOR SPACE AND UTILITIES FOR THE PRODUCTION OF CONCRETE MIXERS

1.	Production shop floor area	1,700 m^2
2.	Utilities	
2.1.	Electric energy	300 KW
2.2.	Compressed air, o.7	70 m^3/hr

TYPICAL PLANT LAYOUT
(Pilot production of concrete mixers)

ANNEX 4
sheet 1/2



ANNEX 4
sheet 2/2

LEGEND TO LAYOUT

01	Store of raw material
02	Material preparation
03	Press shop
04	Welding shop
05	Machine shop
06	Painting shop
07	Assembly and despatch
08	Intermediate storage
09	Tool crib
10	Tool grinding shop
11	Maintenance and grinding of press tool
12	Switch board
13	Finished product store
14	Social provision
15	Plant offices

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF BUILDING CONSTRUCTION EQUIPMENT INDUSTRY

PROJECT TITLE

PILOT PRODUCTION OF LOW CAPACITY BUILDING CRANES

NOTE: (i) 'Pilot Production' refers to one in an existing engineering firm.

(ii) Product includes jib cranes in addition to building cranes

PROPOSAL NO: 11

UNIDO
VIENNA

APRIL 1985

1. DEVELOPMENT OBJECTIVES

(i) To initiate the development of building construction equipment industry.

(ii) To develop manufacturing capability in the metalworking industry to produce simple building construction machinery.

2. PROJECT OBJECTIVES

(i) To enable the metalworking industry to acquire the necessary production capability and diversify into building construction machinery.

(ii) To establish the pilot production of building cranes in an existing engineering firm as an additional product (in its product-mix).

3. BACKGROUND AND JUSTIFICATION

(a) Development Hypothesis

The demand for the building construction equipment is considerable and is on the increase. Some of the relatively simple equipment could be produced by the local metalworking and machinery industry. However, the industry is unable to do so due to a lack of the product and production know-how. Though some of the engineering firms are quite well equipped with the necessary plant and machinery and the basic engineering infrastructure is available, the lack of the above know-how is inhibiting their production capability and they are not able to diversify even in the face of a decline in demand for their traditional products. While the machinery might not lend itself as an independent product (product line) with economy of scale, unless the demand warrants it, it might well serve as an additional product to increase the capacity utilization.

Establishing the pilot production of simple machinery such as low capacity building cranes in an engineering firm, in addition to its existing product mix, would impart the requisite know-how and lead to the development of the manufacturing capability in the metalworking industry to produce simple building construction machinery and thereby initiating the development of that industry thus fulfilling the development objective.

(b) Project Hypothesis

The manufacturing capability to produce the simple building construction machinery would involve the product know-how, the process know-how including the appropriate manufacturing processes and the machinery to be used, etc. The pilot manufacture of the building cranes in an engineering firm engaged in similar manufacturing operations and posessing basic plant and machinery, would demonstrate to the industry the possibilities to undertake similar products, which operational result is the expected output of the pilot manufacture, leading to the acquisition of the production capability to diversify into building construction machinery, thus meeting the project objective. (Jib cranes which are similar in construction are also suggested for manufacture. These are used in workshops for handling heavy components).

4. PROJECT OUTPUTS

The envisaged pilot production of jib cranes and building cranes (low capacity) is expected to produce the following operational results reflected in the outcome of the sub-items given below.

(a) Establishment of pilot production and upgrading manufacturing capability of the engineering firm to produce jib and building cranes (low capacity).

(i) Design of low capacity building cranes, jib cranes:
(ii) Engineering methods including operation layouts; machine tools, jigs, fixtures and tools selection, etc.;
(iii) Manufacturing processes covering, sheet metalworking, welding, etc.; gear cutting: other machining processes:
(iv) Production organization, flow of materials, layout, etc.

(b) Development of local engineering firms producing and supplying the following items to the above firms manufacturing cranes.

(i) Gear, transmissions:
(ii) Electrical motors, control elements, etc;
(iii) Hoists;
(iv) Standard parts and supply of other bought out items.

5. PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities:

(a) Activities related to the output 'Establishment of Pilot Production'

(i) Design/design adaptation of concrete mixers, different sizes, etc; detailed design and drafting (Annex 1, typical specifications);

(ii) Preparation of operation layouts selection of machine tools, jigs and fixtures and cutting tools;

(iii) Selection of components for pilot production in the plant; identification of parts for sub-contracting;

(iv) Identification of machine tools and other factory equipment additionally required, procurement and installation (Annex 2, indicative list of equipment);

(v) Establishment of the production of parts in the plant, establishment of production of parts in the sub-contractors firms, acceptance test, etc;

(vi) Rationalize the shop layout and material flow, etc; organization of the shops, tool cribs, etc; (typical layout, Annex 3);

(b) <u>Activities related to output 'Development of local engineering firms'</u>

(i) Identification of local engineering firms as sub-contractors:

(ii) Identification of additional machinery and other facilities required by the firms:

(iii) Establishment of production of parts in the firms:

(iv) Establish a system of sub-contracting, acceptance testing, quality control, etc.

Typical Specifications of Jib and Building Cranes

1. **Jib Crane**

Hoisting capacity (max.)	10 KN
Jib length	3 m
Slewing angle	100°
Electric or hand-driven hoist	

2. **Building Crane**

Hoisting capcity (max.)	6 KN
Lifting height	10 m
Radius of crane's jib	6 m
Electric motor	1.5 KW
Slewing angle	360°

Indicative List of Equipment for Production of Building Cranes and Jib Cranes

Production of the following on a one shift basis with a total direct (productive) work force of 25

1.	Hand bracket jib cranes	500
2.	Electric-driven jib cranes	500
3.	Low capacity building cranes	200

	item	quantity
1.	Machine Shop	
1.1.	Hacksaw dia 120 mm stroke 140 mm	1
1.2.	Centre lathe, spindle bore 56 mm, swingover slide 300 mm, centre dist. 2000 mm	1
1.3.	Knee type universal milling machine table 300 x 1200 mm	1
1.4.	Radial drilling machine, dia 40 mm, arm 1.25 m	1
1.5.	Bench drill, dia 16 mm	1
1.6.	Pedastal grinder, wheel dia 400 mm	1
1.7.	Guillotine shear, thickness 8 mm length 2.5 m, travel 100 mm	1
2.	Welding Shop	
2.1.	Rectifier welding set, 315 A	2
2.2.	Semi-automatic welding machine, 50-315 A	3
3.	Tool Grinding	
3.1.	Universal tool and cutter grinder	1
3.2.	Bench grinder, wheel dia 200 mm	1
4.	Factory Equipment	
4.1.	Welding benches, fitters and assembly benches with vices, etc;	
4.2.	Overhead electric crane, jib cranes;	
4.3.	Fork lift truck, pallets, etc;	
4.4.	Compressor, compressed air line equipment;	
4.5.	Spray painting guns, enclosures, etc;	

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF FABRICATED METAL PRODUCTS INDUSTRY

PROJECT TITLE

PRODUCTION OF SIMPLE STEEL STRUCTURALS FOR BUILDING CONSTRUCTION - PILOT PLANT

NOTE: 'Steel structurals' cover those made of steel sections: grills, gates, fencing, etc.

PROPOSAL NO: 12

UNIDO
VIENNA

APRIL 1985

1. DEVELOPMENT OBJECTIVES

(i) To initiate the development of fabricated metal products industry.

(ii) To develop metalworking industry to cater to the needs of building construction.

(iii) To establish organized manufacturing in the unorganized and artisanal sector.

2. PROJECT OBJECTIVES

(i) To establish a pilot production plant to manufacture simple steel structurals such as grills, gates, fencing elements, etc, used in the building construction.

(ii) To develop capability in the areas of basic manufacturing processes and fabricating techniques.

(iii) To introduce simple procedures and production methods; by the end of a two year period.

3. BACKGROUND AND JUSTIFICATION

(a) Development Hypothesis:

(i) The existing fabricated metal products industry, that is mostly in the unorganized and artisanal sector, is unable to adequately meet the demand of simple steel structurals, required in the growing building construction, due to lack of basic metal fabrication know-how, engineering and production methods and quality consciousness.

(ii) The envisaged pilot production plant is expected to provide the basic know-how in manufacturing processes, as required in the fabrication of the structural elements required for building construction, the use of simple equipment, engineering techniques and would introduce simple production methods and procedures. The metalworking skills learnt, the equipment acquired and together with the procedures introduced, would impart the metal fabrication capability and would be instrumental in initiating the development of fabricated metal products industry, thus contributing to the development objective.

(b) Project Hypothesis:

The activities of the pilot plant are expected to include metal-working operations such as machine cutting, hand forging, machining, welding, finishing and assembly; use of machinery, simple machine tools and other equipment for metal fabrication and employment of engineering techniques and production methods.

The above activities are expected to lead to certain operational results including building up of cadres with metal fabrication process and production know-how, acquisition of certain equipment and machinery and the methods; and the formation of an organized manufacturing, which are all the outputs of the project.

These outputs together contribute to the development of the metal fabrication capability by the end of a two year period, thus fulfilling the project objective.

4. PROJECT OUTPUTS

The envisaged pilot plant, at the end of the two year period is expected to produce the following operational results reflected in the items mentioned below.

(a) Acquisition of metal fabrication know-how, reflected in the production of grills, gates, fencings, etc, by the pilot plant by the end of a two year period.

(b) Acquisition of the equipment and methods in the pilot plant reflected in the realization of the full capacity production of the fabricated metal products of acceptable quality.

5. PROJECT ACTIVITIES

The project staff and the counterpart staff shall carry out the following activities:

(a) Activities related to output 'Acquisition of metal fabrication know-how'

Establishment of the fabrication operations and processes, viz, cutting, hand forging, machining, welding, finishing and assembly, etc, as required in the production of grills, gates and fencing elements (list of typical products: Annex 1, list of operations: Annex 2).

(b) Activities related to output 'Acquisition of equipment and methods'

(i) Identification, procurement and installation of the equipment; instruction to operators, utilization of machinery (indicative list of equipment: Annex 3).

(ii) Introduction of engineering techniques and production methods and establishment of organized production of the fabricated metal products

LIST OF TYPICAL PRODUCTS: FABRICATED STRUCTURAL PRODUCTS FOR BUILDING CONSTRUCTION

1. Balcony and window grills up to 3 m x 3 m
2. Gates, turngates, frames, etc, up to 3 m x 3 m
3. Fencing elements, fence frames, etc;
4. Cages made of steel wire, steel sections and galvanized wire net, etc;
5. Screens for aggregate, for screening building materials, up to 2 m x 2 m.

LIST OF OPERATIONS/MANUFACTURING PROCESSES FOR FABRICATED STRUCTURAL PRODUCTS FOR BUILDING CONSTRUCTION

1. Cutting shop
   - material preparation, marking-off
   - cutting-off by machine hack-saw, shears
   - cutting sheet, 1-4 mm, hand lever shears

2. Hand forging
   - hand smithy
   - bending of elements, use of templates, brake press

3. Machine shop
   - drilling, bench drill, column drill
   - drilling, lathe

4. Welding
   - electrical welding
   - spot welding
   - gas welding

5. Finishing
   - fitting, deburring, etc
   - grinding, portable hand grinder
   - derusting, wire brushes
   - painting

INDICATIVE LIST OF EQUIPMENT

FABRICATED STRUCTURAL PRODUCTS FOR BUILDING CONSTRUCTION

	Item	Quantity
1.	General Purpose shears 5.5 KW	1
2.	Machine hack-saw 1.5 KW	1
3.	Hand lever shears	1
4.	Hand operated brake press 2 T	1
5.	Forge hearth, with blower	1
6.	Column drill, dia 32 mm, 2 KW	1
7.	Bench drill, dia 15 mm, 0.6 KW	1
8.	Bending machine, 3.0 KW	1
9.	Spot welding machine, 11.5 KW	1
10.	Oxy-acetylene gas welding set	1
11.	Pedestal grinder, wheel dia 350 mm, 218 KW	2
12.	Centre lathe, max. turn. dia 250 mm, max. turn. length 500 mm, 3.0 KW	1
13.	Flexible shaft grinder, whell dia 30 mm, 0.5 KW	2
14.	Angular portable grinder, disc dia 175 mm, 0.9 KW	2

Above equipment for production of 250 tons of fabricated steel product per annum, with about 20 direct workers on single shift basis, over a production area of 300 m^2, installed equipment power 53 KW.

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

14798
(3 of 4)

PROJECT PROPOSAL

for the

DEVELOPMENT OF FABRICATED METAL PRODUCTS INDUSTRY

PROJECT TITLE

PRODUCTION OF STEEL CONTAINERS AND NON-PRESSURE TANKS/VESSELS PILOT PRODUCTION LINE

Note: i) Products include:

- containers, cabins, ets.
- non-pressure tanks, vessels, etc.
- garage doors, panels, service modules, etc.

ii) Pilot production refers to one in an existing metal working firm.

PROPOSAL NO. 13

UNIDO, VIENNA

APRIL 1985

1. DEVELOPMENT OBJECTIVE

i) to initiate the development of fabricated metal products industry;

ii) to develop metal working industry producing containers and non-pressure tanks and vessels.

2. PROJECT OBJECTIVES

i) to establish a pilot production line in an existing engineering firm, engaged in general metal fabrication, for the manufacture of containers and non-pressure tanks and vessels;

ii) to develop manufacturing capability in the metal working industry to produce containers and non-pressure vessels and tanks by the end of a three year period.

3. BACKGROUND AND JUSTIFICATION

a) Development Hypothesis

i) The general metal working industry in the absence of any appreciable manufacturing activity in the machinery industry, is mostly dependent upon the very limited demand for structurals and that for repair and maintenance services derived from the processing industry and the limited component demand from the automobile ancillary equipment industry. The frequent demand fluctuations particularly from the processing industry that is constrained to only primary processing, are adversely effecting the general metal working industry.

ii) Exports being one of the possibilities to expand the final demand there seems to be a potential opportunity to partly orient the general metal working industry for the manufacture of containers and non-pressure vessels, which area is being "vacated" and appears to be presenting a potential for acquiring a comparative advantage.

iii) The manufacturing operations required for the production of the containers, non-pressure tanks, vessels, etc. are relatively labour intensive. However, certain technical inputs including product know-how, process know-how and quality control, handling facilities, etc. are required.

iv) The pilot production line proposed in the project for an existing engineering firm would bring in the above know-how and be instrumental in building up the necessary capability initiating the process of development in the industry to promote it towards and expert oriented industry thus ameliorating the said problem and contributing to the achievement of the development objective.

b) Project Hypothesis

i) The activities involved in the pilot production of the containers and non-pressure vessels include product design, manufacturing operations involving cutting, machinery, welding, finishing, assembly (and testing where necessary), the use of machinery, production techniques, methods, etc.

ii) The above activities are expected to lead to certain operational results including building up of cadres with know-how in the areas of design, process and production, acquisition of additional plant and machinery required in the production and the methods and organization, which are all the expected outputs of the project.

iii) These outputs, put together, contribute to the establishment of the necessary manufacturing capability to produce the containers and non-pressure vessels in the engineering firm by the end of a three year period, which meets the project objective.

4. PROJECT OUTPUTS

The proposed pilot production line is expected to produce the following operational results reflected in the items presented below each.

a) Acquisition of fabrication know-how, for the production of

i) simple containers, transport containers

ii) non-pressure tanks for storage

iii) non-pressure vessels for storage, transportation

b) Acquisition of equipment and production methods reflected in the realization of installed capacity and the quality of the product that is achieved over a period of three years.

5. PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities:

a) Activities related to output "Acquisition of fabrication know-how"

i) Identification of the products and designing of the products, detailed design of components, etc.

ii) Establishment of metal fabrication processes and operations, viz sheetmetal working, machining, welding, finishing, assembly, listing, etc. jigs and fixtures, etc.
(list of typical products Annex I, list of operation Annex II)

b) Activities related to output "Acquisition of Equipment and methods"

i) Identification, procurement, installation of additional equipment required, instruction to operators, machine utilization, etc.
(indicative list of equipment Annex III)

ii) Introduction of appropriate handling techniques, fabrication techniques, production methods, etc.

LIST OF TYPICAL PRODUCTS

1) Containers, up to size 6m x 3m x 4m.
2) Non-pressure tanks, stationary, for transportation of fluids.
3) Non-pressure vessels, storage, for transportation etc.
4) Garage doors, up to 6m x 4m
5) Wall panels, frames, etc.
6) Service cabins, out door cabins, etc.

LIST OF MANUFACTURING OPERATION/PROCESSES

1) Cutting
   - hand cutting
   - gas cutting
   - machine cutting

2) Preparation
   - straightening, bending
   - laying out
   - cutting

3) Machinery
   - drilling, hand, attachable, etc.
   - threading
   - milling

4) Fastening
   - riveting

5) Welding
   - gas welding
   - electrical welding
   - spot welding

6) Finishing
   - filling, deburring, etc.
   - grinding, portable grinders
   - painting

INDICATIVE LIST OF EQUIPMENT/CONTAINERS, NON-PRESSURE VESSELS, ETC/

Item	Quantity
1. Centre lathe, max workpiece dim. dia 500 mm length 1000 mm, with special accessories	1
2. Universal milling machine, table 250 mm x 800 mm	1
3. Surface grinder, max grind. dim. 600 x 250	1
4. Bench drill, dia 10 mm	2
5. Beam attachable drills, dia 20 mm	2
6. Radial drill, dia 40 mm	1
7. Cutting-off machine, max dia. 300 mm	1
8. Universal shears for cutting sections, sheet 13 mm, flats 80 x 20 mm, sounds 38 mm, angles 100 x 12 mm	1
9. Profile bending press, length of edge 2000 mm sheet thickness 4 mm	1
10. Guillotine shears, cutting length 2 500 mm sheet thickness 8 mm	1
11. Roll bending machine, max sheet thickness 1.25 mm, length of sheet 1 250 mm	1
12. Bench tapping machine, dia 5 mm	1
13. Pipe threading machine, up to dia 4"	1
14. Pedestal grinder, with dia 300 mm	1
15. Portable hydraulic tube bender, up to dia 2"	1
16. Welding rectifier	1
17. Welding transformer 19 KVA, 50 A to 300 A	1
18. Spot welder, sheet 3.5 mm	1
19. Acetylene generator, 2 000 lt/hr	1
20. Gas cylinders, with carriage	1
21. Portable forge with fan	1

22. Work benches, welding benches, etc.

23. Compressor unit

24. Painting equipment

Floor Area: about 500m^2 production area

Utilities: electric power installed approx 140 KW

compressed air 1m^3/hr

acetylene 1m^3/hr

water 2.0m^3/day

Employment: about 20 direct production workers

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL
FOR THE
DEVELOPMENT OF FABRICATED METAL PRODUCTS INDUSTRY

PROJECT TITLE

DOOR FIXTURES - IMPROVEMENT OF QUALITY AND PRODUCTIVITY - PILOT MANUFACTURE

Note: "Pilot manufacture" refers to a pilot production line in an existing engineering firm engaged in the production of builder's hardware.

PROPOSAL NO: 14

UNIDO, VIENNA　　　　　　　　APRIL 1985

1. DEVELOPMENT OBJECTIVE

(i) To promote the development of the fabricated metal products industry.

(ii) To strengthen the manufacturing capability of the general metal working industry in the small and medium size enterprises engaged in the component and part manufacture.

2. PROJECT OBJECTIVES

(i) To establish a pilot production line for the manufacture of the following items in a medium sized engineering enterprise engaged in the production of builders hardware.

1. Door locks
2. Door handles
3. Door hinges

(ii) To strengthen the manufacturing capability in terms of product know-how, manufacturing processes, production techniques and methods in the general metal working industry.

(iii) To enable metal working firms to expand their product range and diversify into such products as to meet the demand in the local industry by the end of a three year period.

3. BACKGROUND AND JUSTIFICATION

a) Development Hypothesis

(i) The general metal working industry, particularly the small and medium size firms, engaged in the manufacture of door fixtures and builders hardware is unable to meet the competition in the market and as a result is in a state of depression. This condition is an outcome of several real situations including, among others, the following:

- The imported products available in the market are of much higher quality and very competitive in price inspite of tariff protection;

- The variety and range of these products as required by the user sector is wide.

(ii) The above situations, however, are based on certain valid reasons, some of which can be summarised as follows:
- The door fixtures and other builders hardware manufactured by the local engineering firms are of low quality;
- The prices of the locally produced items are higher than those of the imported ones.
- The range of the local products and the variants available are limited and do not match the needs.

(ii) These evidently are centred around and related to the major aspects of design, quality and productivity. However, to consider the engineering problems, they can be enumerated briefly as given below:
- The engineering firms have limited knowledge of the various products and variants within their product range and lack the design and adaptation capability.
- Lack of adequate process know-how and the ability to identify the appropriate manufacturing processes and set the operation lay-outs.
- Inadequate capability to employ more productive attachments, accessories and tooling, including jigs and fixtures as applicable to their products and adapted to their existing machinery.
- Lack of certain equipment and simple machinery.
- Inadequate inspection and quality control methods, procedures.

(iv) The envisaged pilot production plant/line is expected to provide the following essential inputs without burdening the small and medium size firms with high investment machinery.
- Product know-how to enable the firm to react to the product demand and acquire the capability to design and adapt according to the need and be able to offer wider range of products.
- Process know-how to impart the ability to design the manufacturing operations based on the plant and machinery available to be able to accept new products, diversify and meet the needs.

- Production know-how to acquire the capability to come out with innovative more productive attachments, tooling, etc. in order to be able to produce the products within acceptable price ranges.
- Quality control to gain the quality consciousness and introduce and implement the inspection and quality control methods and procedures.
- Limited additional, but essential machinery and equipment.

The above skills generated, equipment acquired and created together with the methods ingested in the process of the establishment of the pilot production would initiate the development of the fabricated metal products industry thus contributing to the development objective.

b) Project Hypothesis

(i) The activities of the pilot production plant/line are expected to include identification of specification of products from among those in demand that could be produced by the plant; design of the product including detailed design of components; identification, modification of manufacturing processes and operations to suit the existing plant and machiner; design and manufacture or procurement of production attachments accessories, tooling, etc. for the manufacture of the products and employment of new machinery production methods and quality control procedures.

(ii) The above activities are expected to lead to certain operational results including building up of cadres with know-how in the areas of product design, product adaptation; manufacturing processes; engineering methods; production techniques; quality control; generation of new equipment; acquisition of additional machinery which are all the expected outputs of the project.

(iii) These outputs put together contribute to the establishment of the necessary manufacturing capability to enable the metal working firms to meet the demand for some of the products in the industry by the end of a three year period thus fulfilling the project objective.

4. PROJECT OUTPUTS

The proposed pilot production line is expected to produce the following operational results reflected in the items presented below:

a) acquisition of product and product design know-how reflected in the additional products:
   (i) door fixtures
   (ii) window fixtures
   (iii) other builders hardware items
b) Acquisition of production know-how, reflected in the establishment of production for the following additional products at acceptable cost and quality.
   (i) door locks
   (ii) door handles
   (iii) door hinges, lathces, bolts, etc.
c) Generation and acquisition of new productive attachments and additional plant and machinery relfected in the realization of the planned production over the period of three years.

5. PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities:

a) Activities related to the output: "Acquisition of product and product design know-how"
   (i) Identification of the products, parts and components from among those that are required by the local building construction and those that can be manufactured in the pilot plant within the area of door and window fixtures namely locks, handles, hinges, latches, etc. (List of typical products, Annex 1)
   (ii) Design analysis of the product, design, adaptation to suit the plant and machinery existing in the plant and that envisaged for the pilot plant.

(iii) Detailed component design and drafting.

(iv) Design of special attachments, accessories, jigs and fixtures and tooling.

b) Activities related to output: "Acquisition of production know-how"

(i) Identification of the manufacturing processes, preparation of the process and operation lay-outs. (List of operations, Annex 2). The diecasting and electroplating operations are proposed for sub-contracting.

(ii) Identification of accessories, attachments, jigs, fixtures and special tooling that could be used in conjunction with the existing machinery and that which has been planned for addition.

(iii) Procurement and installation of additional machinery manufacture in the plant or buying out of the special gadgets and tooling.

(iv) Establishment of the manufacturing processes, engineering methods, production operations and quality control procedures for the manufacture of door (and window) locks, handles, latches, hinges, etc.

(v) Cost analysis and possible reduction in production costs, introduction of some value engineering concepts if necessary.

c) Activities related to the output:"Generation and acquisition of new productive attachments"

(i) Identification of attachments, jigs and fixtures and special tooling to improve the productivity.

(ii) Manufacture in the plant or procurement of the above equipment.

(iii) Installation or putting into production of the special equipment.
(Indicative list of equipment, Annex 3)

LIST OF TYPICAL PRODUCTS

DOOR FIXTURES

1. Door handles, with round plates/brackets in aluminium alloy (die cast).
2. Door handles with oblong plates/brackets in aluminium alloy (die cast).
3. Door mortise keyless or bolt-pawl locks in steel.
4. Door hinges, left and right, zinc plated or browned in steel sheet and rounds.
5. Door bolts, different types, zinc plated or browned, in steel sheet and strips.

ANNEX 2

LIST OF PRODUCTION OPERATIONS

Manufacture of door locks, handles, hinges, etc.

1. Metal forming
   - 1.1 Precutting of raw materials
   - 1.2 Blanking
   - 1.3 Stamping
   - 1.4 Drawing
   - 1.5 Piercing
   - 1.6 Bending, etc.

2. Machining
   - 2.1 Drilling
   - 2.2 Milling

3. Die casting
   - 3.1 Die casting of door handles, bracket plates, etc. involves metal melting in electrical resistance, crucible furnaces and casting in a die casting machine using dies.

4. Electroplating
   - 4.1 Nickel plating
   - 4.2 Zinc plating
   - 4.3 Chromium plating
   - 4.4 Anodizing (of aluminium)
   - 4.5 browning, blackening

5. Assembly
   - 5.1 Reveting
   - 5.2 Pressure welding
   - 5.3 Final assembly

NOTE: Die casting and electroplating operations are proposed for sub-contracting.

INDICATIVE LIST OF EQUIPMENT

For the production of about 200 tons per annum of door handles, locks, hinges, etc. with about 30 total direct production workers in a single shift basis.

Item		Quantity
1.	**Metal forming and machining**	
1.1	Guillotine shears, sheet 2.5 mm	1
1.2	C-frame eccentric press, 100 ton	2
1.3	C-frame eccentric press, 63 ton	1
1.4	Friction screw press, 150 ton	1
1.5	Feed reels for steel strips	2
1.6	Pillar drill, dia 25 mm	4
1.7	Swiss type screw cutting machine, bar dia 16 mm	2
1.8	Barrel tumbling machine	1
1.9	Circular saw, cutter dia 600 mm	1
2.	**Assembly**	
2.1	Hydraulic press for assembly operations 25 ton	1
2.2	Press brake 10 ton	2
2.3	Bench drill, dia 15 mm	7
2.4	Vertical tapping machine	3
2.5	Spot welder, 3.5-3.5 mm	1
2.6	Pedestal grinder	1

Utilities

Installed power about 100 kw.

compressed air, 6 bar

Indicative List of Special Tooling

1. Blanking dies
2. Stamping dies
3. Bending tools
4. Assembly fixtures
5. Welding fixtures
6. Die casting dies

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF FABRICATED METAL PRODUCTS INDUSTRY

PROJECT TITLE

FURNITURE METAL FIXTURES - IMPROVEMENT OF QUALITY AND PRODUCTIVITY - PILOT MANUFACTURE

PROPOSAL NO: 15

UNIDO
VIENNA

APRIL 1985

1. DEVELOPMENT OBJECTIVE

(i) To promote the development of the fabricated metal products industry.

(ii) To strengthen the manufacturing capability of the general metal working industry in the small and medium size enterprises engaged in the components and part manufacture.

2. PROJECT OBJECTIVES

(i) To establish a pilot production line for the manufacture of the following items in a medium sized engineering firm engaged in the production of furniture hardware:

1. Continuous hinges;
2. Fast joint hinges;
3. Double acting short, strap and angle hinges.

(ii) To strengthen the manufacturing capability in terms of product know-how, manufacturing processes, production techniques and methods, in the general metalworking industry.

(iii) To enable metalworking firms to expand their product range and diversify into such products as to meet the demand in the local industry, by the end of a three year period.

3. BACKGROUND AND JUSTIFICATION

(a) Development Hypothesis

(i) The general metalworking industry, particularly the small and medium size firms, engaged in the manufacture of hardware is unable to meet the competition in the market and as a result is in a state of depression. This condition is an outcome of several real situations including, among others, the following:

- the imported products available in the market are of much higher quality and very competitive in price inspite of tariff protection;
- the variety and range of these products as required by the user sector is wide.

(ii) The above situations, however, are based on certain valid reasons, some of which can be surmised as under:

- the hardware items manufactured by the local engineering firms are of low quality;
- the prices of the locally produced parts are higher than those of the imported ones:
- the range of the local products and the variants available are limited and do not match the needs.

(iii) These evidently are centred around and related to the major aspects of design, quality and productivity. However, to consider the engineering problems, they can be enumerated briefly as given below:

- the engineering firms have limited knowledge of the various products and variants within their product range and lack the design and adaptation capability;
- lack of adequate process know-how and the ability to identify the appropriate manufacturing processes and set the operation layouts;
- inadequate capability to employ more productive attachments, accessories and tooling including jigs and fixtures as applicable to their products and adapted to their existing machinery;
- lack of certain equipment and simple machinery;
- inadequate inspection and quality control methods, procedures, etc.

(iv) The envisaged pilot production plant/line is expected to provide the following essential inputs, without burdening the small and medium size firms with high investment machinery:

- product know-how, to enable the firm to react to the product demand and acquire the capability to design and adapt according to the need and be able to offer wider range of products;
- process know-how, to impart the ability to design the manufacturing operations based on the plant and machinery available to be able to accept new products, diversify and meet the needs;
- Production know-how, to acquire the capability to come out with innovative more productive attachments, tooling, etc.; in order to be able to produce the products within acceptable price ranges;
- Quality control to gain the quality consciousness and introduce and implement the inspection and quality control methods and procedures;
- Limited additional, but essential, machinery and equipment.

The above skills generated, equipment acquired and created together with the methods ingested in the process of the establishment of the pilot production would initiate the development of the fabricated metal products industry, thus contributing to the development objective.

(b) Project Hypothesis:

(i) The activities of the pilot production plant/line are expected to include identification of specifications of products from among those in demand and that could be produced by the plant; design of the product including detailed design of components; identification, modification of manufacturing processes and operations to suit the existing plant and machinery: design and manufacture or procurement of production attachments,accessories,tooling, etc.; for the manufacture of the products and employment of new machinery production methods and quality control procedures.

(ii) The above activities are expected to lead to certain operational results including building up of cadres with know-how in the areas of product design, product adaptation: manufacturing processes; engineering methods: production techniques: quality control: generation of new equipment, acquisition of additional machinery which are all the expected outputs of the project.

(iii) These outputs put together contribute to the establishment of the necessary manufacturing capability to enable the metalworking firms to meet the demand for some of the products in the industry by the end of a three year period thus fulfilling the project objective.

4. PROJECT OUTPUTS

The proposed pilot production line is expected to produce the following operational results reflected in the items presented below each:

(a) Acqisition of product and product design know-how of various furniture hardware items.

(b) Acquisition of production know-how, reflected in the establishment of production for the following additional products, at acceptable cost and quality:

1) Continuous hinges;
2) Fast joint hinges;
3) Double acting hinges.

(c) Generation and acquisition of new productive attachments and additional plant and machinery, reflected in the realization of the planned production on the period of three years.

5. PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities:

(a) Activities related to the output 'Acquisition of product and product design know-how'

(i) Identification of the products, parts and components from among those that are required by the local furniture industries and those that can be manufactured in the pilot plant, within the area of hinges for furniture.(List of typical products - Annex 1).

(ii) Design analysis of the product,design, adaptation to suit the plant and machinery existing in the plant and that envisaged for the pilot line.

(iii) Detailed component design and drafting.

(iv) Design of special attachments, accessories, jigs and fixtures and tooling.

(b) Activities related to output 'Acquisition of production know-how'

(i) Identification of the manufacturing processes, preparation of the process and operation layouts (list of operations - Annex 2). Electroplating is recommended for sub-contracting.

(ii) Identification fo accessories, attachments, jigs, fixtures and special tooling that could be used in conjunction with the existing machinery and that which has been planned for addition;

(iii) Procurement and installation of additional machinery, manufacture in the plant or buying out of the special gadgets and tooling (indicative list of equipment - Annex 3);

(iv) Establishment of the manufacturing processes, engineering methods, production operations and quality control procedures for the manufacture of furniture hinges of various design and sizes;

(v) Cost analysis and possible reduction in production costs, introduction of some value engineering concepts if necessary.

(c) Activities related to the output 'Generation and acquisition of new productive attachments/equipment'

(i) Identification of attachments, jigs and fixtures and special tooling to improve the productivity:

(ii) Manufacture in the plant or procurement of the above equipment;

(iii) Installation or putting into production of the special equipment.

LIST OF TYPICAL PRODUCTS

FURNITURE FIXTURES

1. Continuous hinges, brassed steel strip;
2. General purpose, fast joint hinges, brassed steel strip;
3. Short, fast joint hinges, brassed steel strip;
4. Straight, pin-type hinges, brassed steel strip;
5. Ornamental furniture hinges;
6. Ornamental furniture plates;
7. Double acting strap hinges;
8. Double acting short hinges;
9. Double acting angle hinges.

LIST OF PRODUCTION OPERATIONS

1. Cutting on a guillotine shear;
2. Die shearing, blanking, bending and sizing on eccentric presses;
3. Wire heading and blocking;
4. Machining;
5. Cleaning and trimming;
6. Electroplating

Note: Electroplating is proposed for sub-contracting.

INDICATIVE LIST OF EQUIPMENT

For the production up to about 400 tons per year furniture hinges, with about 30 direct production employees on a single shift basis.

	Item	Quantity
1.	Stamping shop	
1.1.	Eccentric press, 16 T, table 450 x 400 mm	2
1.2.	Eccentric press, 63 T, table 800 x 500 mm	1
1.3.	Automatic lathe, for dia up to 10 mm	1
1.4.	Bench drills	2
1.5.	Radial riveter	1
1.6.	Guillotine shear, sheet thickness 4 mm, 2000 mm long	1
1.7.	Tumbling machine	1
1.8.	Pedestal grinder, wheel dia 300 mm	1
2.	Electroplating shop	
2.1.	Degreasing unit	1
2.2.	Vibrator for burr removing	1
2.3.	Drying centrifuge	1
2.4.	Grinding and polishing machine	1
2.5.	Electroplating unit	1
3.	Special tooling	
3.1.	Blanking dies	
3.2.	Flanging and bending fixtures	
3.3.	Stamping dies	
3.4.	Piercing dies	
3.5.	Drill jigs	

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF FABRICATED METAL PRODUCTS INDUSTRY

PROJECT TITLE

PRODUCTION OF BENCH VICES AND MANDREL PRESSES PILOT PRODUCTION LINE

Note: (i) Pilot Production refers to one in an existing engineering firm producing machine shop equipment items.

(ii) Products include Bench Vices and Mandrel Presses in the 1st stage and can be expanded to Machine Vices in the 2nd stage.

PROPOSAL NO: 16

UNIDO, Vienna

May 1985

1. DEVELOPMENT OBJECTIVE

(i) To promote the development of the fabricated metal products industry.

(ii) To strengthen the manufacturing capability of the general metal working industry in the medium size enterprises.

2. PROJECT OBJECTIVES

(i) To establish a pilot production line for the manufacture of bench vices for the metal working industry in a medium-sized engineering enterprise and improve over its existing quality and productivity.

(ii) To strengthen the manufacturing capability in terms of product know-how, manufacturing processes, production techniques and methods, in the general metal working industry.

(iii) To enable metal working firms to expand their product range and diversify into such products as to meet the demand in the local industry, by the end of a three-year period.

3. BACKGROUND AND JUSTIFICATION

A. Development Hypothesis

(i) The general metal working industry, particularly the medium-size firms, engaged in the manufacture of fabricated metal products, is unable to meet the competition in the market and as a result is in a state of depression. This condition is an outcome of several real situations, including among others, the following:

- The metal working industry prefers to import most of the products.

- The imported products available in the market are of much higher quality and very competitive in price inspite of tariff protection.

- The variety and range of these products as required by the user industries is wide.

(ii) The above situations. however, are based on certain valid reasons, some of which can be surmised as under:

- The products manufactured by the local engineering firms are of low quality.

- The prices of the locally produced products are higher than those of the imported ones.

.../...

- The range of the local products and the variants available are limited and do not match the needs.

(iii) These are evidently centred around and related to the major aspects of design, quality and productivity. However, to consider the engineering problems, they can be enumerated briefly as given below:

- The engineering firms have limited knowledge of the various products and variants within their product range and lack the design and adaptation capability.

- Lack of adequate process know-how and the ability to identify the appropriate manufacturing processes and set the operation layouts.

- Inadequate capability to employ more productive attachments, accessories and toolings, including jigs and fixtures as applicable to their products and adapted to their existing machinery.

- Lack of certain equipment and simple machinery.

- Inadequate inspection and quality control methods, procedures, etc.

(iv) The envisaged pilot production plant/line is expected to provide the following essential inputs, without burdening the medium-sized firms with high investment machinery.

- Product know-how, to enable the firm to react to the product demand and acquire the capability to design and adapt according to the need and be able to offer wider range of products.

- Process know-how, to impart the ability to design the manufacturing operations based on the plant and machinery available to be able to accept new products, diversity and meet the needs.

- Production know-how, to acquire the capability to come out with innovative, more productive attachments, tooling, etc., in order to be able to produce the products within acceptable price ranges.

- Quality control, to gain the quality consciousness and introduce and implement the inspection and quality control methods and procedures.

- Limited additional, but essential, machinery and equipment.

.../...

The above skills generated equipment acquired and created, together with the methods ingested in the process of the establishment of the pilot production would initiate the development of the fabricated metal products industry, thus contributing to the development objective.

B. Project Hypothesis

(i) The activities of the pilot production plant/line are expected to include identification of specifications of products from among those in demand that could be produced by the plant; design of the product, including detailed design of components; identification, modification of manufacturing processes and operations to suit the existing plant and machinery; design and manufacture or procurement of production attachments, accessories, tooling, etc. for the manufacture of the products and employment of new machinery, production methods and quality control procedures.

(ii) The above activities are expected to lead to certain operational results, including building up of cadres with know-how in the areas of product design, product adaptation, manufacturing processes, engineering methods, production techniques, quality control, generation of new equipment, acquisition of additional machinery which are all the expected outputs of the project.

(iii) These outputs put together contribute to the establishment of the necessary manufacturing capability to enable the metal working firms to meet the demand for some of the products in the industry by the end of a three-year period, thus fulfilling the project objective.

4. PROJECT OUTPUTS

The proposed pilot production line is expected to produce the following operational results reflected in the items presented below each:

A. Acquisition of product and product design know-how, reflected in the additional products:

(i) Fixed bench vices
(ii) Portable bench vices
(iii) Pipe vices
(iv) Mandrel presses

B. Acquisition of production know-how reflected in the establishment of production for the above additional products, at acceptable cost and quality.

.../...

C. Generation and acquisition of new productive attachments and additional plant and machinery, reflected in the realization of the planned production over the period of three years.

5. PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities:

A. Activities related to the output: Acquisition of product and product design know-how:

(i) Identification of the products, from among those that are required by the local industries, and those that can be manufactured in the pilot plant, within the area of metal working shop equipment such as vices for fitting operations, pipe vices and mandrel presses, etc. (List of typical products, Annex 1)

(ii) Design analysis of the product, design adaptation to suit the plant and machinery existing in the plant and that envisaged for the pilot line.

(iii) Detailed component design and drafting.

(iv) Design of special attachements, accessories, jigs and fixtures and tooling.

B. Activities related to output: Acquisition of production know-how:

(i) Identification of the manufacturing processes, preparation of the process and operation lay outs. (List of operations, Annex 2).

(ii) Identification of accessories, attachments, jigs, fixtures and special tooling that could be used in conjunction with the existing machinery and that which has been planned for addition.

(iii) Procurement and installation of additional machinery, manufacture in the plant or buying out of the special gadgets and tooling. (Indicative list of equipment, Annex 3).

(iv) Establishment of the manufacturing processes, engineering methods production operations and quality control procedures for the manufacture of fitters bench vices, pipe vices and mandrel presses for assembly operations.

(v) Cost analysis and possible reduction in production costs, introduction of some value engineering concepts if necessary.

.../...

C. <u>Activities related to the output: Generation and acquisition of new productive attachments/equipment</u>

(i) Identification of attachments, jigs and fixtures and and special tooling to improve the productivity.

(ii) Manufacture in the plant or procurement of the above equipment.

(iii) Installation or putting into production of the special equipment.

Annex 1

LIST OF TYPICAL PRODUCTS

STAGE I

1. Bench Vices, Fixed

   1.1 With movable rear jaw, max. dist. bet. jaws: 80 to 150 mm
   1.2 With movable front jaw, max. dist. bet. jaws: 80 to 150 mm
   1.3 Swivel type, with movable front jaw, max. dist. bet. jaws: 80 to 150 mm

2. Bench vices, Portable

   2.1 With movable rear jaw, max. dist. bet. jaws: 50 to 100 mm (max. weight: 2.5 to 10.5 kg.)
   2.2 Swivel type with movable front jaw, max. dist. bet. jaws: 63 to 125 mm (max. weight 5 to 18 kg.)

3. Pipe vices, Fixed

   Frame type pipe vice, max. dia. 50 mm to 100 mm, min. dia. 10 to 20 mm

4. Mandrel Presses (Manual)

   Hand-operated mandrel press, capacity 2 tons; working height 250 mm.

STAGE II

5. Machine vices.

POSSIBLE ADDITIONAL PRODUCTS:

6. Bearing Pullers.
7. Screw clamps, etc.

Annex 2

LIST OF TYPICAL MANUFACTURING OPERATIONS

PRODUCTION OF BENCH VICES AND HAND MANDREL PRESSES

A. Machining

1. Turning
2. Drilling
3. Reaming
4. Threading
5. Milling
6. Grinding
7. Rack and pinion cutting

Most of the machining operations to be done in jigs.

B. Heat treatment for jaw inserts.

Note: Grey iron castings for the vice bodies are expected to be procured by sub-contracting arrangements.

Annex 3

INDICATIVE LIST OF EQUIPMENT FOR THE PRODUCTION OF BENCH VICES AND MANDREL PRESSES

ITEM	QUANTITY
1. Machine shop	
1.1 Centre Lathe, max. dia 500 mm., length 750	8
1.2 Universal milling machine, table 400 mm x 2000 mm	4
1.3 Vertical milling machine, table 300 x 1600 mm	5
1.4 Pillar Drill, dia. 32 mm	1
1.5 Pillar Drill, dia. 16	2
1.6 Vertical Tapping machine, tapping dia. 4 mm	1
1.7 Horizontal surface grinder, max. grinding dimensions, 100 x 300 mm	1
1.8 Pedestal Grinder, max. whl. dia 350 mm	1
1.9 Universal shear, sheet 13 mm, flats 20 x 80 mm, sounds dia. 38 mm	1
1.10 Machine saw, max. dia. 300 mm	1
1.11 Circular saw, max. dia. 150 mm	1
2. Heat treatment	
2.1 Resistance furnace, max. dimensions 300 x 250 x 650 mm.	1
3. Tooling (special)	
3.1 Lathe fixtures	
3.2 Drill jigs	
3.3 Milling fixtures and jigs	

The above equipment is indicated for a typical production of 15 to 18,00 vices per year, with a total direct productive work force of 25, on a single shift basis. Installed power: 200 KW, production area 400 sq.m.

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF FABRICATED METAL PRODUCTS INDUSTRY

PROJECT TITLE

PRODUCTION OF ADJUSTABLE SPANNERS AND PIPE TONGS - PILOT PRODUCTION LINE

NOTE: Pilot Production: refers one in an existing engineering firm engaged in the manufacture of metalworking hand tools.

PROPOSAL NO: 17

UNIDO
VIENNA

1985

1. DEVELOPMENT OBJECTIVE

(i) To promote the development of the fabricated metal products industry.

(ii) To strengthen the manufacturing capability of the general metal working industry in the medium size enterprises engaged in the manufacture of metalworking hand tools.

2. PROJECT OBJECTIVES

(i) To establish a pilot production line for the manufacture of adjustable spanners and pipe tongs and wrenches in a medium size engineering firm engaged in the manufacture of metal-working hand tools and to improve over the existing quality and productivity.

(ii) To strengthen the manufacturing capability in terms of product know-how, manufacturing processes, production techniques and methods, in the general metalworking industry.

(iii) To enable metalworking firms to expand their product range and diversify into such products as to meet the demand in the local industry, by the end of a three year period.

3. BACKGROUND AND JUSTIFICATION

(a) Development Hypothesis

(i) The general metalworking industry, particularly the medium size firms, engaged in the manufacture of fabricated metal products, hand tools and other equipment, is unable to meet the competition in the market and as a result is in a state of depression. This condition is an outcome of several real situations including, among other, the following:

- the metalworking industry prefers to import the products:
- the imported products available in the market are of much higher quality and very competitive in price inspite of tariff protection;
- the variety and range of these products as required by the user industries is wide.

(ii) The above situations,however, are based on certain valid reasons, some of which can be surmised as under:

- the products manufactured by the local engineering firms are of low quality;
- the prices of the locally produced products are higher than those of the imported ones;
- the range of the local products and the variants available are limited and do not match the needs.

(iii) These evidently are centred around and related to the major aspects of design, quality and productivity. However, to consider the engineering problems, they can be enumerated briefly as given below:

- the engineering firms have limited knowledge of the various products and variants within their product range and lack the design and adaptation capability;
- lack of adequate process know-how and the ability to identify the appropriate manufacturing processes and set the operation layouts;
- inadequate capability to employ more productive attachments, accessories and toolings including jigs and fixtures as applicable to their products and adapted to their existing machinery;
- lack of certain equipment and simple machinery;
- inadequate inspection and quality control methods, procedures, etc.

(iv) The envisaged pilot production plant/line is expected to provide the following essential inputs, without burdening the medium size firms with high investment machinery:

- product know-how, to enable the firm to react to the product demand and acquire the capability to design and adapt according to the need and be able to offer wider range of products;
- process know-how, to impart the ability to design the manufacturing operations based on the plant and machinery available to be able to accept new products, diversify and meet the needs;
- production know-how, to acquire the capability to come out with innovative more productive attachments, tooling, etc.; in order to be able to produce the products within acceptable price ranges;
- quality control, to gain the quality consciousness and introduce and implement the inspection and quality control methods and procedures;
- limited additional, but essential, machinery and equipment.

The above skills generated, equipment acquired and created together with the methods ingested in the process of the establishment of the pilot production would initiate the development of the fabricated metal products industry, thus contributing to the development objective.

(b) Project Hypothesis

(i) The activities of the pilot production plant/line are expected to include identification of specifications of products from among those in demand that could be produced by the plant; design of the product including detailed design of components; identification, modification of manufacturing processes and operations to suit the existing plant and machinery; design and manufacture or procurement of production attachments accessories tooling, etc., for the manufacture of the products and employment of new machinery production methods and quality control procedures.

(ii) The above activities are expected to lead to certain operational results including building up of cadres with know-how in the areas of product design, product adaptation, manufacturing processes, engineering methods, production techniques, quality control, generation of new equipment, acquisition of additional machinery which are all the expected outputs of the project.

(iii) These outputs put together contribute to the establishment of the necessary manufacturing capability to enable the metalworking firms to meet the demand for some of the products in the industry by the end of a three year period thus fulfilling the project objective.

4. PROJECT OUTPUTS

The proposed pilot production line is expected to produce the following operational results reflected in the items presented below each:

(a) Acquisition of product and product design know-how, reflected in the additional products:

  (i) adjustable spanners;

  (ii) various pipe tongs, pipe wrenches.

(b) Acquisition of production know-how, reflected in the establishment of production for the above additional products, at acceptable cost and quality.

(c) Generation and acquisition of new productive attachments and additional plant and machinery, reflected in the realization of the planned production on the period of three years.

5. PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities:

(a) Activities related to the output 'Acqisition of product and product design know-how':

(i) Identification of the products from among those that are required by the local industries, and those that can be manufactured in the pilot plant, within the area of metalworking hand tools such as adjustable spanners, pipe tongs, pipe wrenches,etc.; (List of typical products, Annex 1).

(ii) Design analysis of the product, design adaptation to suit the plant and machinery existing in the plant and that envisaged for the pilot line.

(iii) Detailed component design and drafting.

(iv) Design of special attachments, accessories, jigs and fixtures and tooling.

(b) Activities related to output 'Acquisition of production know-how':

(i) Identification of the manufacturing processes, preparation of the process and operation layouts.
(List of operation, Annex 2)

(ii) Identification of accessories, attachments, jigs, fixtures and special tooling that could be used in conjunction with the existing machinery and that which has been planned for addition.

(iii) Procurement and installation of additional machinery, manufacture in the plant or buying out of the special gadgets and tooling (Indicative list of equipment, Annex 3).

(iv) Establishment of the manufacturing processes, engineering methods, production operations and quality control procedures for the manufacture of adjustable spanners, pipe tongs and pipe wrenches.

(v) Cost analysis and possible reduction in production costs, introduction of some value engineering concepts if necessary.

(c) Activities related to the output: 'Generation and acquisition of new productive attachments/equipment':

(i) Identification of attachments, jigs and fixtures and special tooling to improve the productivity.

(ii) Manufacture in the plant or procurement of the above equipment.

(iii) Installation or putting into production of the special equipment.

LIST OF TYPICAL PRODUCTS

ADJUSTABLE SPANNERS AND PIPE TONGS

1. Bulldog adjustable spanner with taper grip, size 27 mm
2. Double adjustable spanner, size 46 mm
3. Slip joint angular pipe tongs
4. Slip joint offset pipe tongs
5. Heavy pipe tongs
6. Pipe wrench with hand rod.

LIST OF TYPICAL MANUFACTURING OPERATIONS

1. Cutting of metals on general purpose shears, tooled for handling round bars, flats, plates;
2. Preliminary die shearing of blanks on eccentric gap press for further die forging:
3. Heating in gas furnace;
4. Die forging in drop hammer using multiple impression dies:
5. Flash trimming on eccentric gap press using blanking dies:
6. Annealing in chamber resistance furnace;
7. Tumbling in tumbling barrel;
8. Removal of remainder of flash on pedestal grinders;
9. Piercing on eccentric gap press using piercing dies:
10. Straightening on eccentric gap press;
11. Milling of jaw teeth;
12. Heating in chamber furnaces and quenching of jaws in water and grips in air stream;
13. Tempering in chamber furnaces;
14. Grinding and polishing of jaws on pedestal polishing machine:
15. Manual assembly;
16. Washing and dip painting;
17. Drying of lacquer in chamber dryers;
18. Preservation by dipping in appropriate media.

INDICATIVE LIST OF EQUIPMENT FOR MANUFACTURE OF ADJUSTABLE SPANNERS AND PIPE TONGS

Item		Quantity
1.	**Metal forming**	
1.1.	General purpose shear	1
1.2.	Eccentric gap press, capacity 100 tons	2
1.3.	Drop hammer (air, steam), striking power about 20 kg; ram stroke 750 mm	1
1.4.	Gas or oil fired furnace, chamber size 400 x 750 x 250 mm, rated temp. 1000°C	1
2.	**Machining**	
2.1.	Universal milling machine, table 315 x 1250 mm	3
2.2.	Knee-type milling machine, 315 x 1250 mm	2
2.3.	Centre lathe, turing dia 140 mm, length 500 mm	5
2.4.	Bench drill, max. dia 16 mm	2
2.5.	Pedetal grinder-polisher, wheel dia 400 mm	3
3.	**Heat treatment**	
3.1.	Chamber resistance furnace, chamber size 750 x 550 x 1200 mm; max. charge 500 kg; rated temp. 1000°C	2
3.2.	Oil-water quench tank, cap. $2m^3$	1
4.	**Surface finish**	
4.1.	Dip painting tank	
4.2.	Electric dryer	
4.3.	Dip washer, dryer	
4.4.	Tumbling barrel, charge 1000 kg	

Above plant and machinery indicated for production of about 100,000 pieces per annum of the spanners and tongs, etc (approx. weight 150 tons) with about 25 direct workers, on a single shift basis. Production area 500 sqm, installed power 240 KW.

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF FABRICATED METAL PRODUCTS INDUSTRY

PROJECT TITLE

PILOT PRODUCTION OF FLAT SPANNERS, COMBINATION PLIERS AND PINCERS

- IMPROVEMENT OF PRODUCTIVITY

NOTE: 'Pilot Production' refers to one in an existing engineering firm engaged in the manufacture of metalworking hand tools, to increase the plant productivity two fold.

Proposal No: 18

UNIDO
VIENNA

APRIL 1985

1. DEVELOPMENT OBJECTIVE

(i) To promote the development of the fabricated metal products industry.

(ii) To strengthen the manufacturing capability of the general metalworking industry in the medium size enterprises engaged in the manufacture of metalworking hand tools.

2. PROJECT OBJECTIVES

(i) To establish a pilot production line for the manufacture of spanners, pliers and pincers, etc., as additional new products in an engineering firm engaged in the manufacture of metal-working hand tools.

(ii) To strengthen the manufacturing capability in terms of product know-how, manufacturing processes, production techniques and methods; and to increase the plant level productivity by two folds.

(iii) To improve the quality of the existing products.

(iv) To achieve the above in a period of four years.

3. BACKGROUND AND JUSTIFICATION

(a) Development Hypothesis

(i) The general metalworking industry, particularly the medium size firms, engaged in the manufacture of fabricated metal products is unable to meet the competition in the market and as a result is in a state of depression. This condition is an outcome of several real situations including, among others, the following:

- the metalworking industry prefers to import the products;
- the imported products available in the market are of much higher quality and very competitive in price inspite of tariff protection;
- the variety and range of these products as required by the user industries is wide.

(ii) The above situations, however, are based on certain valid reasons, some of which can be surmised as under:

- the products manufactured by the local engineering firms are of low quality;
- the prices of the locally produced products are higher than those of the imported ones;
- the range of the local products and the variants available are limited and do not match the needs.

(iii) These evidently are centred around and related to the major aspects of design, quality and productivity. However, to consider the engineering problems, they can be enumerated briefly as given below:

- the engineering firms have limited knowledge of the various products and variants within their product range and lack the design and adaptation capability;
- lack of adequate process know-how and the ability to identify the appropriate manufacturing processes and set the operation layouts·
- inadequate capability to employ more productive attachments, accessories and toolings including jigs and fixtures as applicable to their products and adapted to their existing machinery:
- lack of certain equipment and simple machinery:
- inadequate inspection and quality control methods, proc dures, etc.

(iv) The envisaged pilot production line is expected to provide the following essential inputs without burdening the medium sized firms with high investment special machinery:

- product know-how for additional products to enable the firm to react to the product demand and acquire the capability to design and adapt according to the need and be able to offer new and wider range of products;
- process know-how, to impart the ability to design the manufacturing operations based on the plant and machinery available to be able to accept new products, diversify and meet the needs;
- production know-how, to acquire the capability to come out with innovative more productive attachments, tooling, etc, to improve the productivity and increase the production output, to realize scale of economy to be able to produce the products within acceptable price ranges:
- quality control, to gain the quality consciousness and introduce and implement the inspection and quality control methods and procedures:
- additional, essential machinery and equipment.

The above skills generated, equipment acquired and created together with the methods ingested in the process of the establishment of the pilot production would initiate the development of the fabricated metal products industry, thus contributing to the development objective.

(b) Project Hypothesis

(i) The activities of the pilot production line are expected to include identification of specifications of new additional products from among those in demand and that could be produced by the plant; design of the product including detailed design of components; identification, modification of manufacturing processes and operations to suit the existing plant and machinery; design and manufacture or procurement of production attachments, accessories tooling, etc, for the manufacture of the products and employment of new machinery, production methods and quality control procedures.

(ii) The above activities are expected to lead to certain operational results including new additional products, improved productivity and increased output, apart from building up of cadres with know-how in the areas of product design, product adaptation: manufacturing processes; engineering methods: production techniques: quality control; generation of new equipment, acquisition of additional machinery which are all the expected outputs of the project.

(iii) These outputs put together contribute to the establishment of the necessary manufacturing capability to enable the metalworking firms to increasingly meet the demand for additional products in the industry and improve the productivity by the end of a four year period thus fulfilling the project objective.

4. PROJECT OUTPUTS

The proposed pilot production line is expected to produce the following operational results reflected in the items presented below each:

(a) Acquisition of product and product design know-how, reflected in the additional new products:

(i) Flat spanners·

(ii) Combination pliers;

(iii) Pincers for drawing nails

in the engineering firm presently producing similar metalworking hand tools.

(b) Acquisition of production know-how and manufacturing capability reflected in:

(i) Increased production of each of the products three times the previous output in quantity for both new and existing products;

(ii) Improved productivity per employee by two folds;

(c) Generation and acquisition of new productive attachments, special tooling and additional plant and machinery, reflected in the realization of the planned production.

(d) To achieve the above over a period of four years.

5. PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities:

(a) Activities related to the output 'Acquisition of product and product design know-how:

(i) Identification of the products, from among those that are required by the local industries and those that can be manufactured in the pilot plant, within the area of metalworking hand tools such as falt spanners, combination pliers and pincers (for nails), etc.
(List of typical products, Annex 1)

(ii) Design analysis of the product, design adaptation to suit the plant and machinery existing in the plant and that envisaged for the pilot line.

(iii) Detailed component design and drafting.

(iv) Design of special attachments, accessories, jigs and fixtures and tooling.

(b) Activities related to output 'Acquisition of production know-how:

(i) Identification of the manufacturing processes, preparation of the process and operation layouts (list of operations, Annex 2).

(ii) Identification of accessories, attachments, jigs, fixtures and special tooling that could be used in conjunction with the existing machinery and that which has been planned for addition to increase the output three times the previous level in terms of quantities of each of the products.

(iii) Procurement and installation of additional machinery, manufacture in the plant or buying out of the special gadgets and tooling.
(Indicative list of equipment. Annex 3).

(iv) Establishment of the manufacturing processes, engineering methods, production operations and quality control procedures for the manufacture of the flat spanners, combination pliers and pincers and to increase the productivity per employee two times over the period of four years.

(v) Cost analysis and possible reduction in production costs, introduction of some value engineering concepts if necessary, to realize competitive prices.

(c) Activities related to the output 'Generation and acquisition of new productive attachments/equipment':

(i) Identification of attachments, jigs and fixtures and special tooling to improve the productivity two fold.

(ii) Manufacture in the plant procurement of the above equipment.

(iii) Installation or putting into production of the special equipment.

LIST OF TYPICAL PRODUCTS

1. 10 piece flat spanner set; range: 6x7 to 25x27;
2. Combination pliers;
3. Pincers for nails.

Possible additional products

1. Fitters' hammer heads;
2. Cold chisel (for metal working);
3. Punches (for metalworking), etc.

LIST OF MANUFACTURING OPERATIONS MANUFACTURE OF SPANNERS, PLIERS, PINCERS

1. Flat spanners

- cutting of bar or blanking/eccentric press, cutting off or blanking die;
- heating/oil fired chamber furnace;
- die forging/drop forging hammer, anvils or die;
- trimming/eccentric press, trimming die;
- cleaning/tumbling barrel;
- heating/oil fired furnace;
- straightening and marking/friction press, straightening die;
- grinding of residual flash/pedestal grinder;
- normalizing/electric soaking furnace;
- cleaning/tumbling barrel;
- milling of grip openings on both ends/horizontal milling machine, jigs, special milling cutter;
- grinding/pedestal grinder;
- hardening/electr. chamber furnace;
- tempering/electr. soaking furnace;
- straightening/bench work grinder;
- grinding of side surfaces/pedestal grinder/surface grinder;
- cleaning/tumbling barrel;
- finish grinding of grip openings/bench grinder;
- lackering/painting section.

2. Combination pliers

- blanking/eccentr. press, blanking die;
- heating/oil fired chamber furnace;
- drop forging/drop forging hammer, die;
- trimming of flash/eccentr. press, trimming die;
- annealing/electr. furnace;
- cleaning/tumbling barrel;
- sizing/friction press, sizing die;
- straightening/friction press straightening die;

- drilling of hole/bench drill, open drill jig:
- milling of inner profile/hor. mill. machine; special cutter;
- milling of outer profile/hor. mill. machine: special cutter;
- boring of the joint seat/boring machine/jig;
- deburring, assembly/assembly section;
- countersinking of both ends of hole/bench drill, drill jig:
- reaming of hole/bench drill:
- riveting/riveting press;
- stab milling/horizontal mill. machine, special cutter;
- dead-hole drilling/pillar drill; drill jig;
- milling of the cutting edges inner profile/pillar drill, special milling cutter and a quick acting vice;
- milling of the cutting edges outer profile/pillar drill, special milling cutter, quick acting vice;
- grinding of side cutting grooves/abrasive wheel cutting of machine;
- hardening/electr. chamber furnace;
- tempering/electr. soaking furnace;
- cleaning/pedestal grinder, wire brush wheel;
- grinding of cutting edge/bench grinder;
- finish grinding/double wheel grinder;
- polishing/double wheel grinder;
- washing, lackering, rust preventive coating, packing;

3. Pincers (for nails)

- blanking/eccentr. press, blanking die;
- heating/oil fired chamber furnace;
- drop forging/drop forging hammer, die;
- trimming/eccentr. press, trimming die;
- annealing/electr. soaking furnace;
- cleaning/tumbling barrel;
- straightening/friction press, sizing die;
- drilling of the rivet hole and inside deburring/bench drill, open drill jig;
- riveting/friction press, jig;
- milling of jaw faces/hor. milling mach.; jig; cutter;

- milling of jaw edges in two positions/hor. mill mach., jig, slitting cutter;
- hardening/induction furnace;
- tempering/electr. soaking furnace;
- grinding of cutting edges and jaw surfaces/double wheel grinder;
- polishing/double wheel grinder;
- lacquering, anti-rust coat, packing.

INDICATIVE LIST OF EQUIPMENT FOR PRODUCTION OF SPANNERS, COMBINATION PLIERS AND PINCERS

For the production of 100,000 pieces of each per year (100,000 spanner sets with 10 spanners in each set), with 50 direct workers, on two shift basis.

	Item	Quantity
1.	**Cutting off, forming**	
1.1.	Circular saw, max. work dia 150 mm	1
1.2.	Eccentric press, 100 tons capacity	1
1.3.	Eccentric press, 160 tons	1
1.4.	Friction press, 100 tons	1
1.5.	Crank press, 250 T	1
1.6.	Pneumatic forging hammer, impact force, 160 tons	1
1.7.	Pneumatic forging hammer, impact force, 100 tons	1
1.8.	Steam and air power drop forging hammer, impact force 1600 tons	1
1.9.	Oil fired chamber furnaces	4
2.	**Machining**	
2.1.	Horizontal milling machine, table 3200 x 1600	3
2.2.	Centre lathe, centre lt. 200 mm, swing 400 mm, centre dist. 1000 mm	1
2.3.	Centre lathe, centre lt. 175, swing 350 mm, centre dist. 600 mm	1
2.4.	Pillar drill, dia 25 mm	1
2.5.	Bench drill, dia 16 mm	1
2.6.	Double wheel grinder, whl. dia 400	5
2.7.	Bench grinder	1
3.	**Heat treatment**	
3.1.	Induction hardening equipment	1
3.2.	Electric soaking furnace	1
3.3.	Electric chamber furnace	1
3.4.	Quenching tank for oil and water hardening	1

4. Other equipment

4.1.	Riveting press (for pliers)	1
4.2.	Tumbling barrel	1

5. Special tooling (for 1 year)

5.1.	Flat spanners	
5.1.1.	Round bar cutting off die	2
5.1.2.	Forging anvils	5
5.1.3.	Blanking	
	- bed	1
	- punch	3
	- bolster	3
5.1.4.	Dr[illegible] forging die	25
5.1.5.	Flash trimming	
	- bed	1
	- punch	25
	- bolster	25
5.1.6.	Straightener	5
5.1.7.	Milling fixture	2
5.1.8.	Milling cutters	20
5.2.	Combination pliers	
5.2.1.	Blanking	
	- bed	1
	- punch	5
	- bolster	5
5.2.2.	Drop forging die	25
5.2.3.	Gauge set for drop forging	2
5.2.4.	Flash trimming	
	- bed	1
	- punch	20
	- bolster	15
5.2.5.	Sizing device	4
5.2.6.	Straightener	4
5.2.7.	Open drill jig	3
5.2.8.	Milling cutter, inner profile	20
5.2.9.	Fixture for milling inner profile	6

5.2.10.	Milling cutter, outer profile	10
5.2.11.	Fixture for milling outer profile	6
5.2.12.	Jig for boring	2
5.2.13.	Spot drill jig	3
5.2.14.	Riveting bolster and punch	10
5.2.15.	Fixture for slab milling	6
5.2.16.	Fixture for dead hole milling	6
5.2.17.	Fixture for inner cutting edges profile	6
5.2.18.	Fixture for outer cutting edges profile	6
5.2.19.	Milling cutters for above	8

5.3. <u>Pincers</u>

5.3.1.	Blanking	
	- bed	1
	- bolster	4
	- punch	4
5.3.2.	Drop forging die	35
5.3.3.	Gauge set for drop forging	2
5.3.4.	Flash trimming	
	- bed	1
	- bolster	25
	- punch	25
5.3.5.	Straightener	5
5.3.6.	Sizing device	5
5.3.7.	Open drill jig	3
5.3.8.	Riveting	
	- bed	1
	- punch	8
5.3.9.	Face milling fixture	2
5.3.10.	Cutter for face milling	2

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE DEVELOPMENT OF ELECTRIC ENERGY SYSTEMS ENGINEERING

IN THE UTILITY INDUSTRY

PROJECT TITLE

ELECTRIC POWER SYSTEMS OPERATION TO OPTIMIZE ECONOMY AND SECURITY

NOTE: "Systems operations" denotes that with computer energy control centre.

PROPOSAL NO: 19

UNIDO, VIENNA

MAY 1985

A. DEVELOPMENT OBJECTIVES

(i) To lay the foundation and develop the capability for the formulation of future energy strategies to meet the increasing demands of electric energy with optimum utilization of the input energy forms from the available resources.

(ii) To develop a comprehensive understanding and systems capability in the electric power industry for the long range conceptual planning, design and operation of the national power system with optimization of economy and security.

B. PROJECT OBJECTIVE

(i) To develop the systems analysis and synthesis capability and the related digital, analog and hybrid computer techniques at the central energy control centre with telecontrol for the operation of the national electric system with optimum economy and reliability.

C BACKGROUND AND JUSTIFICATION

i) Development Hypothesis:

The effective formulation of future energy strategies for energy conservation and optimum utilization of the available resources, involves the ability for economic utilization of electric energy which is presently the established form of energy. All other resources, such as coal, oil, gas, hydro, nuclear, as well as the renewable ones being the input forms. The ever increasing demands on electric energy and the high rates of growth in this demand highten the need for such economic utilization. This requires a comprehensive understanding of the complex bulk power generation, transmission and distribution systems in order to realise the economy and reliability in their present operation and future planning.

The project is expected to develop the systems capability necessary for the operation of the electric power system with optimum economy and reliability; thus fulfilling the development objective.

ii) Project Hypothesis:

(i) The project is expected to develop the systems capability at the computerized energy control centre whose function is to control the operation of the national electric system so as to optimize economy and security. The operation of the system with optimum machine efficiencies. reducing the fuel consumption to minimize the cost of power; and to employ predictive programmes for probabilistic forecasts of system load in the near-term futur to enable start-up and shut-down scheduling of generation units to optimize operating economy; and similarly the operation of the system using "state estimation" techniques that process the system data to project the probability of emergency in the near-term future to permit preventive action to optimize security, constitute the systems capability in operation which is an expected output of the project, instrumental in optimizing the economy and security, thus achieving the project objective.

D. OUTPUTS

The following are the expected outputs of the project in terms of capabilitites that are reflected in certain programmes mentioned below under each capability.

Power Systems operation capability

The systems operation capability includes the analytical techniques and automation technology to improve the system operation in terms of operations planning involving problems of next hour, day and month, etc; operations control involving second by second real time actions; operations accounting and review involving post-fact evaluations and post-disturbance analysis.

(i) Programmes for calculating line losses, machine efficiencies and fuel costs.

(ii) Predictive programmes for forecasting system load.

(iii) Programmes for accounting and billing.

(iv) System security procedures, programmes and application of computer status monitoring of system information and display, contingency evaluation for system emergency and alert, restoration strategy formulation and automatic control execution.

(v) Predictive programmes to project emergency in near-time and long term future.

E. PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following a^tivities: in actual operations.

Activities related to the output - 'Power Systems Operation Capability'

(i) calculation of line losses, machine efficiencies and fuel costs; compilation of data on generation, hourly system loads, weather conditions etc.,

(ii) forecasting hourly system load for several days into future based on the past data and weather-load correlations;

(iii) preparation of schedules for unit commitment, start-up and shut-down etc. for optimization of economy;

(iv) operations accounting for billing,

(v) maintaining and improving operation reliability, application of security procedures, application of computers and telemetric equipment;

(vi) processing of system data to predict emergencies in the near- and long-term future; undertaking preventive action;

(vii) conducting two special courses on systems economic operation and reliability;

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL
FOR THE DEVELOPMENT OF ELECTRIC ENERGY SYSTEMS ENGINEERING
IN THE UTILITY INDUSTRY

PROJECT TITLE
ELECTRIC POWER SYSTEMS OPERATIONS AND PLANNING
TO OPTIMIZE ECONOMY AND SECURITY

NOTE: "Economy" includes economy of operation and investment.

PROPOSAL NO: 20

UNIDO, VIENNA MAY 1985

A. DEVELOPMENT OBJECTIVES

(i) To lay the foundation and develop the capability for the formulation of future energy strategies to meet the increasing demands of electric energy with optimum utilization of the input energy forms from the available resources.

(ii) To develop a comprehensive understanding and systems capability in the electric power industry for the long range conceptual planning, design and operation of the national power system with optimization of economy and security.

B. PROJECT OBJECTIVES

(i) To develop the systems analysis and synthesis capability and the related digital, analog and hybrid computer techniques at the central energy control centre with telecontrol for the operation of the national electric system with optimum economy and reliability.

(ii) To strengthen the systems planning capability in the bulk power generation, transmission and distribution to meet the future needs with economy of operation and investment.

C. BACKGROUND AND JUSTIFICATION

i) Development Hypothesis:

The effective formulation of future energy strategies for energy conservation and optimum utilization of the available resources, involves the ability for economic utilization of electric energy which is presently the established form of energy. All other resources, such as coal, oil, gas, hydro, nuclear, as well as the renewable ones being the input forms. The ever increasing demands on electric energy and the high rates of growth in this demand highten the need for such economic utilization. This requires a comprehensive understanding of the complex bulk power generation, transmission and distribution systems in order to realise the economy and reliability in their present operation and future planning.

The project is expected to develop the systems capability necessary for the operation of the electric power system with optimum economy and reliability; and the planning of the future generation, transmission and distribution systems for economy and reliability in expansion, production and investment: thus fulfilling the development objective.

ii) Project Hypothesis:

(i) The project is expected to develop the systems capability at the computerized energy control centre whose function is to control the operation of the national electric system so as to optimize economy and security. The operation of the system with optimum machine efficiencies, reducing the fuel consumption to minimize the cost of power; and to employ predictive programmes for probabilistic forecasts of system load in the near-term futur to enable start-up and shut-down scheduling of generation units to optimize operating economy; and similarly the operation of the system using "state estimation" techniques that process the system data to project the probability of emergency in the near-term future to permit preventive action to optimize security, constitute the systems capability in operation which is an expected output of the project, instrumental in optimizing the economy and security, thus achieving the project objective.

(ii) Further the project is expected to develop certain capability in the area of planning, involving assessment of generating capacity required in the future: determination of the size, location and time of the new generating installations: the size and location of the interconnections and transmission lines and their voltage levels: the future operating costs and investment levels and the effects of new technologies, etc.: and the relevant programmes are part of the systems planning capability, which is the expected project output. That is directed forwards achieving economy and reliability in generation and transmission in meeting the future needs, thus meeting the project objective.

(iii) The systems planning capability would imbibe that which would be instrumental in identifying for optimum economy alternative sources of energy in the immediate peak-load, short and long term demands and needs. These would include standby power plants such as those with gas-turbine-driven generators (combustion turbines) using light oil, for "topping" or emergency peak loads at extremely short notices, hydro sources in the short and medium terms and nuclear and other sources such as wind and solar energy in the medium and long terms. This would fulfil the project objectives in meeting the future energy needs with economy of operation and investment.

D. OUTPUTS

The following are the expected outputs of the project in terms of capabilities that are reflected in certain programmes mentioned below under each capability.

1. Power Systems operation capability

The systems operation capability includes the analytical techniques and automation technology to improve the system operation in terms of operations planning involving problems of next hour, day and month etc; operations control involving second by second real time actions; operations accounting and review involving post-fact evaluations and post-disturbance analysis.

(i) Programmes for calculating line losses, machine efficiencies and fuel costs.

(ii) Predictive programmes for forecasting system load.

(iii) Programmes for accounting and billing.

(iv) System security procedures, programmes and application of computer status monitoring of system information and display, contingency evaluation for system emergency and alert, restoration strategy formulation and automatic control execution.

(v) Predictive programmes to project emergency in near-term and long term future.

2. <u>Power Systems Planning Capability</u>

The systems planning capability includes the generation planning involving expansion to determine the time, size and location of additional generation units; production costing and investment costing and similarly the transmission planning covering transmission expansion to determine the time, size and location of new lines in network and the voltage level etc.; system performance and stability checks; and system behaviour analysis.

i) Load shape modelling programmes for tabulation of daily peak loads through the year.

ii) Generation expansion programmes for probabilistic simulation to determine the time, size and location of new generation units.

iii) Production costing progarmmes to simulate the operation of the future systems to determine the operating costs.

iv) Investment cost programme to determine investment costs.

v) Transmission expansion programmes to determine the time, size and location of new transmission lines.

vi) Performance and stability programmes to check adequacy of planned networks/systems.

vii) Long-term dynamic simulation programmes for system behaviour analysis to evaluate preventive measures under conditions of overloading.

E. PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities: in actual operations.

1. Activities related to the output - 'Power Systems Operation Capability'

   (i) calculation of line losses, machine efficiencies and fuel costs; compilation of data on generation, hourly system loads, weather conditions etc.,

   (ii) forecasting hourly system load for several days into future based on the past data and weather-load correlations;

   (iii) preparation of schedules for unit commitment, start-up and shut-down etc. for optimization of economy;

   (iv) operations accounting for billing,

   (v) maintaining and improving operation reliability, application of security procedures, application of computers and telemetric equipment;

   (vi) processing of system data to predict emergencies in the near- and long-term future; undertaking preventive action;

   (vii) conducting two special courses on systems economic operation and reliability;

2. <u>Activities related to the output: 'Power Systems Planning Capability'</u>

(i) data preparation and load shape modelling for projecting daily peak loads;

(ii) preparation of data on generation and load analysis of system reserves, and probabilistic simulation to determine the size of new generation to meet the load; calculation of loss of load probability etc.,

(iii) data preparation and computation of production costs for future systems, by simulation of the daily minimum cost economic operation of the system;

(iv) planning transmission systems required for future expansions, evaluation of investment costs etc.,

(v) evaluation of system performance and stability, adequacy of planned networks/systems;

(vi) analysis of system behaviour to evaluate preventive measures under conditions of overloading;

(vii) conducting a special course on systems planning.

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL
FOR THE DEVELOPMENT OF ELECTRIC ENERGY SYSTEMS ENGINEERING IN THE UTILITY INDUSTRY

PROJECT TITLE
ELECTRIC POWER SYSTEMS ENGINEERING TO OPTIMIZE ECONOMY AND SECURITY

NOTE: 'systems engineering' includes operation, planning and design

PROPOSAL NO: 21

UNIDO, VIENNA

MAY 1985

A. DEVELOPMENT OBJECTIVES

(i) To lay the foundation and develop the capability for the formulation of future energy strategies to meet the increasing demands of electric energy with optimum utilization of the input energy forms from the available resources.

(ii) To develop a comprehensive understanding and systems capability in the electric power industry for the long range conceptual planning, design and operation of the national power system with optimization of economy and security.

B. PROJECT OBJECTIVES

(i) To develop the systems analysis and synthesis capability and the related digital, analog and hybrid computer techniques at the central energy control centre with telecontrol for the operation of the national electric system with optimum economy and reliability.

(ii) To strengthen the systems planning capability in the bulk power generation, transmission and distribution to meet the future needs with economy of operation and investment.

(iii) To build up the systems design capability to enable optimum design of transmission line and elements for system stability, protection, etc.

C. BACKGROUND AND JUSTIFICATION

i) Development Hypothesis:

The effective formulation of future energy strategies for energy conservation and optimum utilization of the available resources, involves the ability for economic utilization of electric energy which is presently the established form of energy. All other resources, such as coal, oil, gas, hydro, nuclear, as well as the renewable ones being the input forms. The ever increasing demands on electric energy and the high rates of growth in this demand highten the need for such economic utilization. This requires a comprehensive understanding of the complex bulk power generation, transmission and distribution systems in order to realise the economy and reliability in their present operation and future planning.

The project is expected to develop the systems capability necessary for the operation of the electric power system with optimum economy and reliability; and the planning and design of the future generation, transmission and distribution systems for economy and reliability in expansion, production and investment: thus fulfilling the development objective.

ii) Project Hypothesis:

(i) The project is expected to develop the systems capability at the computerized energy control centre whose function is to control the operation of the national electric system so as to optimize economy and security. The operation of the system with optimum machine efficiencies. reducing the fuel consumption to minimize the cost of power; and to employ predictive programmes for probabilistic forecasts of system load in the near-term futur to enable start-up and shut-down scheduling of generation units to optimize operating economy; and similarly the operation of the system using "state estimation" techniques that process the system data to project the probability of emergency in the near-term future to permit preventive action to optimize security, constitute the systems capability in operation which is an expected output of the project, instrumental in optimizing the economy and security, thus achieving the project objective.

(ii) Further the project is expected to develop certain capability in the area of planning, involving assessment of generating capacity required in the future: determination of the size, location and time of the new generating installations: the size and location of the interconnections and transmission lines and their voltage levels: the future operating costs and investment levels and the effects of new technologies, etc.; and the relevant programmes are part of the systems planning capability, which is the expected project output. That is directed forwards achieving economy and reliability in generation and transmission in meeting the future needs, thus meeting the project objective.

(iii) The project is also expected to build up certain capability in the area of systems, design, including design of extra-high voltage systems; design considerations, such as line insulation levels, apparatus insulation levels, lightning arrester duties, etc.; design of circuit breakers and equipment under rapidly changing voltages and current; transmission line design including design of new lines; and the study of sub-synchronous resonance between the transmission net-work system and the generating machines, etc., which is an output of the project that would lead to the system design with stability and ensure reliability, thereby realizing the project objective.

IV) The systems planning capability would imbibe that which would be instrumental in identifying for optimum economy alternative sources of energy in the immediate peak-load, short and long term demands and needs. These would include standby power plants such as those with gas-turbine-driven generators (combustion turbines) using light oil, for "topping" or emergency peak loads at extremely short notices, hydro sources in the short and medium terms and nuclear and other sources such as wind and solar energy in the medium and long terms. This would fulfil the project objectives in meeting the future energy needs with economy of operation and investment.

D. OUTPUTS

The following are the expected outputs of the project in terms of capabilities that are reflected in certain programmes mentioned below under each capability.

1. Power Systems operation capability

The systems operation capability includes the analytical techniques and automation technology to improve the system operation in terms of operations planning involving problems of next hour, day and month etc; operations control involving second by second real time actions; operations accounting and review involving post-fact evaluations and post-disturbance analysis.

(i) Programmes for calculating line losses, machine efficiencies and fuel costs.

(ii) Predictive programmes for forecasting system load.

(iii) Programmes for accounting and billing.

(iv) System security procedures, programmes and application of computer status monitoring of system information and display, contingency evaluation for system emergency and alert, restoration strategy formulation and automatic control execution.

(v) Predictive programmes to project emergency in near-term and long term future.

2. Power Systems Planning Capability

The systems planning capability includes the generation planning involving expansion to determine the time, size and location of additional generation units; production costing and investment costing and similarly the transmission planning covering transmission expansion to determine the time, size and location of new lines in network and the voltage level etc.; system performance and stability checks; and system behaviour analysis.

i) Load shape modelling programmes for tabulation of daily peak loads through the year.

ii) Generation expansion programmes for probabilistic simulation to determine the time, size and location of new generation units.

iii) Production costing progarmmes to simulate the operation of the future systems to determine the operating costs.

iv) Investment cost programme to determine investment costs.

v) Transmission expansion programmes to determine the time, size and location of new transmission lines.

vi) Performance and stability programmes to check adequacy of planned networks/systems.

vii) Long-term dynamic simulation programmes for system behaviour analysis to evaluate preventive measures under conditions of overloading.

3. Power Systems Design Capability

The systems design capability would cover such aspects as study of transient and harmonic over-voltages from switching operations; their predictin etc. for guidance on design considerations related to line insulation levels, lightning arrester duties, apparatus insulation levels, circuit breaker behaviour etc; transmission line design in consideration of various environmental phenomena; analysis of system dynamics in conjunction with high frequency components; analysis of interactions between generating machines and transmission systems over a large range of frequency for study of sub-synchronous resonance and torsional instability in the turbine-generator shaft, leading to design of power filters to block the electrical frequencies corresponding to torsional resonance frequencies.

i) Programmes for simulation of transients in the study of the behaviour of equipment under rapid changes of voltage and current.

ii) Programmes for study of stress criteria of line insulation, environmental considerations of line design.

iii) Programmes to analyse interactions between generating machine system and transmission system for sub-synchronous resonance, etc.

E. PROJECT ACTIVITIES

The project and the counterpart staff shall carry out the following activities: in actual operations.

1. Activities related to the output - 'Power Systems Operation Capability'

(i) calculation of line losses, machine efficiencies and fuel costs; compilation of data on generation, hourly system loads, weather conditions etc.,

(ii) forecasting hourly system load for several days into future based on the past data and weather-load correlations;

(iii) preparation of schedules for unit commitment, start-up and shut-down etc. for optimization of economy;

(iv) operations accounting for billing,

(v) maintaining and improving operation reliability, application of security procedures, application of computers and telemetric equipment;

(vi) processing of system data to predict emergencies in the near- and long-term future; undertaking preventive action;

(vii) conducting two special courses on systems economic operation and reliability;

2. <u>Activities related to the output: 'Power Systems Planning Capability'</u>

(i) data preparation and load shape modelling for projecting daily peak loads;

(ii) preparation of data on generation and load analysis of system reserves, and probabilistic simulation to determine the size of new generation to meet the load; calculation of loss of load probability etc.,

(iii) data preparation and computation of production costs for future systems, by simulation of the daily minimum cost economic operation of the system;

(iv) planning transmission systems required for future expansions, evaluation of investment costs etc.,

(v) evaluation of system performance and stability, adequacy of planned networks/systems;

(vi) analysis of system behaviour to evaluate preventive measures under conditions of overloading;

(vii) conducting a special course on systems planning.

3. <u>Activities related to output: 'Power Systems Design Capability'</u>

(i) simulation of transients and study of the behaviour of equipment;

(ii) transmission line design;

(iii) study of sub-synchronous resonance;

(iv) design of protection systems etc.,

(v) conducting a special course programme on systems design.

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

14798

(4 of 4)

PROJECT PROPOSAL

FOR THE DEVELOPMENT OF ELECTRIC ENERGY SYSTEMS ENGINEERING

IN THE UTILITY INDUSTRY

PROJECT TITLE

ELECTRIC POWER SYSTEMS OPERATIONS TO OPTIMIZE ECONOMY AND SECURITY

NOTE:

(i) 'Systems Operation' denotes that with computer energy control centre

(ii) 'Operations' include systems operation, systems planning and systems design

PROPOSAL NO: 22

UNIDO, VIENNA

MAY 1985

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

Title: Electric Power Systems Operation to Optimize Economy and Security

Country: Dem. Rep. of Korea

Project Number:

Duration: Stage I: 6 months
Stage II: 1 year

Primary Function: Direct Support

Secondary Function: Institutional Development

Sector (Govt. class.): Direct support to strengthen capability in electrical systems design, planning and operation

(UNDP class. and code):

Sub-sector(Govt. class.):

(UNDP class. and code):

Government Implementing Agency: Ministry of Electric Power Industry

Exeucting Agency: UNIDO (IO/ENG)

Estimated Starting Date:

Government Inputs:

UNDP Inputs:

Stage I, Preparatory Assistance US$ 75,0
Stage II US$475,0

Signed:

on behalf of the Government — Date

on behalf of UNIDO — Date

on behalf of UNDP — Date

PART II

THE PROJECT

A. DEVELOPMENT OBJECTIVES

(i) To lay the foundation and develop the capability for the formulation of future energy strategies to meet the increasing demands of electric energy with optimum utilization of the input energy forms from the available resources.

(ii) To develop a comprehensive understanding and systems c pability in the electric power industry for the long range conceptual planning, design and operation of the national power system with optimization of economy and security.

B. PROJECT OBJECTIVES

STAGE I

(i) To provide preparatory assistance to identify the specific needs in the development of power systems capability based on the actual national electric power system and its future expansion plans and requirements and in relation to the computer and telemetric supervisory equipment envisaged.

(ii) To provide an exposure to the senior officials responsible for the future operation of the system, to study the existing power systems operation in other countries.

(iii) To equip engineers and specialists with adequate basic technical know-how before commencing actual system operations for smooth transition into stage II activity of the project.

STAGE II

(i) To develop the systems analysis and synthesis capability and the related digital, analog and hybrid computer techniques at the central energy control centre with telecontrol for the operation of the national electric system with optimum economy and reliability.

(ii) To strengthen the systems planning capability in the bulk power generation, transmission and distribution to meet the future needs with economy of operation and investment.

(iii) To build up the systems design capability to enable optimum design of transmission line and elements for system stability, protection, etc.

C SPECIAL CONSIDERATIONS

i) It is the objective of the Government to explore ways and means to utilize the available energy resources with optimum economy.

ii) Action has been initiated for the procurement and installation of computers in the central energy control centre and telemetric control equipment at all levels of the interconnected regional networks of the national grid and the former are expected to be put into operation from the second quarter of 1985.

D BACKGROUND AND JUSTIFICATION

i) Development Hy. iesis:

The effective formulation of future energy strategies for energy conservation and optimum utilization of the available resources, involves the ability for economic utilization of electric energy which is presently the established form of energy. All other resources, such as coal, oil, gas, hydro, nuclear, as well as the renewable ones being the input forms. The ever increasing demands on electric energy and the high rates of growth in this demand highten the need for such economic utilization. This requires a comprehensive understanding of the complex bulk power generation, transmission and distribution systems in order to realise the economy and reliability in their present operation and future planning.

The project is expected to develop the systems capability necessary for the operation of the electric power system with optimum economy and reliability: and the planning and design of the future generation, transmission and distribution systems for economy and reliability in expansion, production and investment: thus fulfilling the development objective.

ii) <u>Project Hypothesis</u>:

(i) The project is expected to develop the systems capability at the computerized energy control centre whose function is to control the operation of the national electric system so as to optimize economy and security. The operation of the system with optimum machine efficiencies. reducing the fuel consumption to minimize the cost of power; and to employ predictive programmes for probabilistic forecasts of system load in the near-term futur to enable start-up and shut-down scheduling of generation units to optimize operating economy: and similarly the operation of the system using "state estimation" techniques that process the system data to project the probability of emergency in the near-term future to permit preventive action to optimize security, constitute the systems capability in operation which is an expected output of the project, instrumental in optimizing the economy and security, thus achieving the project objective.

(ii) Further the project is expected to develop certain capability in the area of planning, involving assessment of generating capacity required in the future: determination of the size, location and time of the new generating installations: the size and location of the interconnections and transmission lines and their voltage levels: the future operating costs and investment levels and the effects of new technologies, etc.: and the relevant programmes are part of the systems planning capability, which is the expected project output. That is directed forwards achieving economy and reliability in generation and transmission in meeting the future needs, thus meeting the project objective.

(iii) The project is also expected to build up certain capability in the area of systems, design, including design of extra-high voltage systems; design considerations, such as line insulation levels, apparatus insulation levels, lightning arrester duties, etc.; design of circuit breakers and equipment under rapidly changing voltages and current; transmission line design including design of new lines; and the study of sub-synchronous resonance between the transmission net-work system and the generating machines, etc., which is an output of the project that would lead to the system design with stability and ensure reliability, thereby realizing the project objective.

(iv) As up-to-date computer equipment is being installed in the central energy control centre and regional control points to provide the operations control functions of economic dispatch and load frequency control. The same computers would also be used on a time-sharing basis to undertake operations planning, accounting and review activity. The computers would also perform the supervisory function. Sophisticated telemetric equipment is also being installed in the control centres and principal power stations and sub-stations for remote supervisory control. In the process of installation and initial running-in during the project activity the personal cadres would be equipped with the necessary know-how for future operations. This would contribute to the achievement of the project objectives.

V) The systems planning capability would imbibe that which would be instrumental in identifying for optimum economy alternative sources of energy in the immediate peak-load, short and long term demands and needs. These would include standby power plants such as those with gas-turbine-driven generators (combustion turbines) using light oil, for "topping" or emergency peak loads at extremely short notices, hydro sources in the short and medium terms and nuclear and other sources such as wind and solar energy in the medium and long terms. This would fulfil the project objectives in meeting the future energy needs with economy of operation and investment.

E. PROJECT OUTPUTS

STAGE I

The following are the expected outputs of the project in the preparatory phase of the project:

1. A report on the existing power system, present operations, specific needs of the central energy control centre, capability requirements in terms of systems operation, planning and design and in reference to the related techniques and automation technology involving computers and telemetric equipment that has been planned.

2. A study tour for two senior officials to two countries with advanced energy systems operations for a period of 1 month.

3. Fellowships for four engineers/specialists in one of the above countries, at the central energy control centre and the telemetric control equipment installations for a period of 4 months each.

STAGE II (OUTPUTS)

The following are the expected outputs of the project in terms of capabilities that are reflected in certain programmes mentioned below under each capability.

1. Power Systems operation capability

The systems operation capability includes the analytical techniques and automation technology to improve the system operation in terms of operations planning involving problems of next hour, day and month etc; operations control involving second by second real time actions; operations accounting and review involving post-fact evaluations and post-disturbance analysis.

(i) Programmes for calculating line losses, machine efficiencies and fuel costs.

(ii) Predictive programmes for forecasting system load.

(iii) Programmes for accounting and billing.

(iv) System security procedures, programmes and application of computer status monitoring of system information and display, contingency evaluation for system emergency and alert, restoration strategy formulation and automatic control execution.

(v) Predictive programmes to project emergency in near-term and long term future.

2. <u>Power Systems Planning Capability</u>

The systems planning capability includes the generation planning involving expansion to determine the time, size and location of additional generation units; production costing and investment costing and similarly the transmission planning covering transmission expansion to determine the time, size and location of new lines in network and the voltage level etc.; system performance and stability checks; and system behaviour analysis.

i) Load shape modelling programmes for tabulation of daily peak loads through the year.

ii) Generation expansion programmes for probabilistic simulation to determine the time, size and location of new generation units.

iii) Production costing progarmmes to simulate the operation of the future systems to determine the operating costs.

iv) Investment cost programme to determine investment costs.

v) Transmission expansion programmes to determine the time, size and location of new transmission lines.

vi) Performance and stability programmes to check adequacy of planned networks/systems.

vii) Long-term dynamic simulation programmes for system behaviour analysis to evaluate preventive measures under conditions of overloading.

3. <u>Power Systems Design Capability</u>

The systems design capability would cover such aspects as study of transient and harmonic over-voltages from switching operations; their predictin etc. for guidance on design considerations related to line insulation levels, lightning arrester duties, apparatus insulation levels, circuit breaker behaviour etc; transmission line design in consideration of various environmental phenomena; analysis of system dynamics in conjunction with high frequency components; analysis of interactions between generating machines and transmission systems over a large range of frequency for study of sub-synchronous resonance and torsional instability in the turbine-generator shaft, leading to design of power filters to block the electrical frequencies corresponding to torsional resonance frequencies.

i) Programmes for simulation of transients in the study of the behaviour of equipment under rapid changes of voltage and current.

ii) Programmes for study of stress criteria of line insulation, environmental considerations of line design.

iii) Programmes to analyse interactions between generating machine system and transmission system for sub-synchronous resonance, etc.

F. PROJECT ACTIVITIES

STAGE I

1. Activities related to output 'Report' on the existing power system, operations and needs

The project team of consultants shall, over a period of 2 months, prepare a report based on and including the following:

i) study of the existing power system and its operation;

ii) system operation with computer and telemetric equipment at the energy control centre, regional centres, power stations, sub-stations etc.,

iii) systems operation, planning and design needs and identification of the required programmes, procedures and methodologies;

iv) identification of the elements of the study tour and fellowships including institutions;

v) recommendations on the stage II project specifics: and implementation programme, additional equipment required etc.,

2. Activities related to the output: 'Study Tour'

The study tour programme shall cover the broad orientation as below:

i) overall power systems operations, economy and security aspects; management etc.,

ii) future expansion programmes and investment aspects, energy resources;

iii) impact of new technologies.

3. Activities related to the output: 'Fellowships'

The fellowships for the specialists and engineers shall, in general be concerned with the following areas, to be detailed and elaborated by the consultants and on their recommendations,

i) energy control centre operations;

ii) power stations, sub-stations, transmission networks, etc.,

iii) the computer and telemetric equipment, utilization etc.,

iv) programmes for system operation, planning and design etc., STAGE II

(PROJECT ACTIVITIES)

The project and the counterpart staff shall carry out the following activities: in actual operations.

1. Activities related to the output - 'Power Systems Operation Capability'

(i) calculation of line losses, machine efficiencies and fuel costs; compilation of data on generation, hourly system loads, weather conditions etc.,

(ii) forecasting hourly system load for several days into future based on the past data and weather-load correlations;

(iii) preparation of schedules for unit commitment, start-up and shut-down etc. for optimization of economy;

(iv) operations accounting for billing,

(v) maintaining and improving operation reliability, application of security procedures, application of computers and telemetric equipment;

(vi) processing of system data to predict emergencies in the near- and long-term future; undertaking preventive action;

(vii) conducting two special courses on systems economic operation and reliability;

2. Activities related to the output: 'Power Systems Planning Capability'

(i) data preparation and load shape modelling for projecting daily peak loads;

(ii) preparation of data on generation and load analysis of system reserves, and probabilistic simulation to determine the size of new generation to meet the load; calculation of loss of load probability etc.,

(iii) data preparation and computation of production costs for future systems, by simulation of the daily minimum cost economic operation of the system;

(iv) planning transmission systems required for future expansions, evaluation of investment costs etc.,

(v) evaluation of system performance and stability, adequacy of planned networks/systems;

(vi) analysis of system behaviour to evaluate preventive measures under conditions of overloading;

(vii) conducting a special course on systems planning.

3. Activities related to output: 'Power Systems Design Capability'

(i) simulation of transients and study of the behaviour of equipment;

(ii) transmission line design;

(iii) study of sub-synchronous resonance;

(iv) design of protection systems etc.,

(v) conducting a special course programme on systems design.

G. INPUTS/UNDP

STAGE I: Preparatory Assistance, Duration 6 months

		man/months
(i)	Consultant, power systems operation	2 m/m
(ii)	Consultant, computer systems engineering	2 m/m
(iii)	Study tour, two officials at 1 month each	2 m/m
(iv)	Fellowships, four specialists at 4 months each	16 m/m

STAGE II:

(i) Experts

4 experts, one each in the following fields (areas); for 1 year — 48 m/m

- power systems operation and control
- power systems planning and development
- power systems engineering and design
- computer applications to power system operation and telemetry

(ii) Consultants

4 consultants, one each in the following areas for 2 months each at various times over the project duration — 8 m/m

- network analysis
- machine - network stability
- system protection
- telemetric supervisory systems

The above areas to be more specifically identified in the stage I of the project.

(iii) Equipment

The major equipment consisting of the computers in the energy control centre and the telemetric equipment at all levels is provided by the Government. Certain additional equipment is foreseen to supplement the above for effective implementation of the project activities. These would include, tentatively, items such as display terminals, printers and plotters, analog computer consoles etc. to be specified in detail during the preparatory assistance phase of the project (stage I). To meet the equipment component a provision is made to the extent of US $ 80,000.

UNIDO

PAGE

PROJECT BUDGET/REVISION

3. COUNTRY	4. PROJECT NUMBER AND AMENDMENT	5. SPECIFIC ACTIVITY
DRK		

10. PROJECT TITLE
Electrical Power Systems Operaton to Optimize Economy and Security - Stage I

15. INTERNATIONAL EXPERTS (functional titles required except for line 11-50)	16. TOTAL		17. 1985		18.		19.		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
11-01										
02										
03										
04										
05										
06										
07										
08										
09										
10										
11										
12										
13										
14										
15										
16										
11-50 Short term consultants	4	26,200	4	26,200						
11-99 Sub-total—International experts[a]	4	26,200	4	26,200						

21. REMARKS

[a] If more than 16 experts are required check here ☐ and attach continuation sheet 1A. This sub-total *must* include all experts.

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PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL		17. 1985		18.		19.		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
OPAS EXPERTS (functional titles required)										
12-01										
12-02										
12-03										
12-99 Sub-total—OPAS experts[b]										
ADMINISTRATIVE SUPPORT PERSONNEL										
13-00 Clerks, secretaries, drivers										
13-50 Freelance interpreters (non-UNDP projects)										
13-99 Sub-total—Administrative support personnel										
UN VOLUNTEERS (functional titles required)										
14-01										
14-02										
14-03										
14-04										
14-99 Sub-total—UN Volunteers[b]										
15-00 Project travel										
16-00 Other personnel costs (including UNIDO staff mission costs)										
NATIONAL EXPERTS (functional titles required)										
17-01										
17-02										
17-03										
17-04										
17-05										
17-99 Sub-total—National experts[b]										
19-99 TOTAL—PERSONNEL COMPONENT	4	26,200	4	26,200						

[b] If additional individual budget lines are required, check here ☐ and attach continuation sheet 1A. These sub-totals must include budget lines listed on page 1A.

UNIDO **PROJECT BUDGET/REVISION**

4. PROJECT NUMBER	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. m/m	18. $	19. m/m	19. $	20. m/m	20. $
SUBCONTRACTS										
21-00 Subcontracts										
TRAINING										
31-00 Individual fellowships	16	37,600	16	37,600						
32-00 Study tours; UNDP group training	2	10,200	2	10,200						
33-00 In-service training										
34-00 Non-UNDP group training										
35-00 Non-UNDP meetings										
39-99 TOTAL—TRAINING COMPONENT		47,800		47,800						
EQUIPMENT										
41-00 Expendable equipment										
42-00 Non-expendable equipment										
43-00 Premises										
49-99 TOTAL—EQUIPMENT COMPONENT										
MISCELLANEOUS										
51-00 Sundries		1,000		1,000						
55-00 Hospitality (non-UNDP projects)										
56-00 Support costs (CC and DC projects only)										
59-99 TOTAL—MISCELLANEOUS COMPONENT										
SURPLUS/DEFICIT										
81-00 Surplus/Deficit (ADM/FS use only)										
99-99 PROJECT TOTAL		75,000		75,000						
[c] COST SHARING (UNDP/IPF projects only)										
[c] NET UNDP CONTRIBUTION										

[c] For information only — *not* for PAD input

UNIDO

PROJECT BUDGET/REVISION

3. COUNTRY	4. PROJECT NUMBER AND AMENDMENT	5. SPECIFIC ACTIVITY
DPK		

10. PROJECT TITLE
Electric Power Systems Operation to Optimize Economy and Security - Stage II

15. INTERNATIONAL EXPERTS (functional titles required except for line 11-50)	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. 1986 m/m	18. 1986 $	19. m/m	19. $	20. m/m	20. $
11-01 Power systems operation and control	12	82,200			12	82,200				
02 Power systems planning and dev.	12	82,200			12	82,200				
03 Power systems eng. and design	12	82,200			12	82,200				
04 Computer applications	12	82,200			12	82,200				
05										
06										
07										
08										
09										
10										
11										
12										
13										
14										
15										
16										
11-50 Short term consultants	8	54,800			8	54,800				
11-99 Sub-total—International experts[a]	56	383,600			56	383,600				

21. REMARKS

[a] If more than 16 experts are required check here ☐ and attach continuation sheet 1A. This sub-total *must* include all experts.

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PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL		17. 1985		18. 1986		19.		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
OPAS EXPERTS (functional titles required)										
12-01										
12-02										
12-03										
12-99 Sub-total—OPAS experts[b]										
ADMINISTRATIVE SUPPORT PERSONNEL										
13-00 Clerks, secretaries, drivers										
13-50 Freelance interpreters (non-UNDP projects)										
13-99 Sub-total—Administrative support personnel										
UN VOLUNTEERS (functional titles required)										
14-01										
14-02										
14-03										
14-04										
14-99 Sub-total—UN Volunteers[b]										
15-00 Project travel										
16-00 Other personnel costs (including UNIDO staff mission costs)										
NATIONAL EXPERTS (functional titles required)										
17-01										
17-02										
17-03										
17-04										
17-05										
17-99 Sub-total—National experts[b]	56	383,600			56	383,600				
19-99 TOTAL—PERSONNEL COMPONENT										

[b] If additional individual budget lines are required, check here ☐ and attach continuation sheet 1A. These sub-totals must include budget lines listed on page 1A.

4. PROJECT NUMBER	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. 1986 m/m	18. 1986 $	19. m/m	19. $	20. m/m	20. $
SUBCONTRACTS										
21-00 Subcontracts										
TRAINING										
31-00 Individual fellowships										
32-00 Study tours; UNDP group training										
33-00 In-service training										
34-00 Non-UNDP group training										
35-00 Non-UNDP meetings										
39-99 TOTAL–TRAINING COMPONENT										
EQUIPMENT										
41-00 Expendable equipment		4,000				4,000				
42-00 Non-expendable equipment		80,000				80,000				
43-00 Premises										
49-99 TOTAL–EQUIPMENT COMPONENT		80,000				80,000				
MISCELLANEOUS										
51-00 Sundries		7,400				7,400				
55-00 Hospitality (non-UNDP projects)										
56-00 Support costs (CC and DC projects only)										
59-99 TOTAL–MISCELLANEOUS COMPONENT		7,400				7,400				
SURPLUS/DEFICIT										
81-00 Surplus/Deficit (ADM/FS use only)										
99-99 PROJECT TOTAL		475,000				475,000				
[c] COST SHARING (UNDP/IPF projects only)										
[c] NET UNDP CONTRIBUTION		475,000				475,000				

[c] For information only – *not* for PAD input

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

Title:	Modern Steam Turbines for Small and Medium Power Stations
Country:	Democratic Republic of Korea
Duration:	1 year
Primary Function:	
Secondary Function:	Institutional Development
Sector (Govt. class):	
UNDP classification and code:	
Government Implementing Agency:	Ministry of Electric Power Industry
Executing Agency:	UNIDO (IO/ENG)
Estimated Starting Date:	
Government Inputs:	
UNDP Inputs:	US $450,000

A DEVELOPMENT OBJECTIVES

i) To develop the power generation equipment manufacturing industry and in particular that producing steam turbines for small and medium electric power stations.

ii) To promote the exports of steam turbines for small and medium electric power stations to developing countries.

B PROJECT OBJECTIVES

i) To strengthen the design capability of the existing turbine manufacturing industry to enable it to design modern and high efficiency steam turbines in the range of 30 to 1000 kw for the small and medium power stations.

ii) To strengthen the manufacturing capability of the turbine industry to produce the turbines employing modern manufacturing technology, at acceptable quality and competitive costs.

C BACKGROUND AND JUSTIFICATION

i) Development Hypothesis

In general, more than 80% of the electric power generated is produced by steam turbines. The majority of these are on steam supplied from boilers using fossil fuels (coal, oil and gas). The development of the power generation equipment industry which is presently producing steam turbines that are not very efficient and modern, would involve upgrading the design and manufacturing capability of the industry in order to enable it to design and produce efficient modern steam turbines. The proposed project has its objectives to strengthen the design and manufacturing capabilities, which when realized would achieve the develoment objective.

The export of the steam turbines to developing countries would require production of efficient and modern steam turbines in the ranges envisaged at competitive prices and at comparable quality. This would require appropriate design and production know-how. The subject project foresees to strengthen theses two capabilities that would enable the realization of the development objective.

ii) Project Hypothesis

The overall efficiency of steam turbines can be said to be constituted by the internal efficiency of the fluid-rotor transfer process, the mechanical efficiency relating rotor energy to shaft energy and the volumetric efficiency relating to leakage of fluid. The increased design capabilities reflected in the modern design of the turbine including the type, power range, steam pressure, thermodynamic cycles, the vane design, rotor and shell design, materials, sealing, vibration, etc. and the manufacturing capability in terms of the processes, quality of machining, assembly, balancing and testing etc. would be instrumental in bringing out modern efficient designs and enable the production of such turbines at comparable quality and competitive costs, thus meeting the project objectives.

D. PROJECT OUTPUT

The project is expected to result in the following capabilities as outputs, reflected in the items presented below each.

i) Turbine Design Capability

- capability to design the turbine cycles with high thermal efficiency within the range proposed;
- capability to design turbines with high internal efficiency;
- capability to design turbine parts including blades, rotor, casing sealing, bearings, bolts, governers, etc., materials, construction, etc., using computer aided design (CAD) where necessary;
- considerations related to speed, weight and cost, etc.
- representative designs of steam turbines, in the range and capacities required, approved for prototype manufacture.

ii) Turbine Manufacturing Capability

- capability to manufacture the blades, rotor, shell and other parts at the required quality;
- capability to assemble, including dynamic balancing, etc.
- capability for testing the turbines;
- representative prototype turbines manufactured and selected designs released for production.

E. PROJECT ACTIVITIES

The project and counterpart staff shall carry out the following activities:

i) Activities related to output "Design capability"

- Turbine thermal cycle, heat balance calculations, data for determining cycle components, performance criteria, etc.

- Aerodynamic design of blades for highest efficiencies, modern concepts for loss-free fluid flow and the three dimensional design, reduction of centrifugal forces: steam velocities, rotative speeds, internal efficiency use of CAD (computer aided design) methods for above.
- Design of turbine parts: blades, their profiles, change of section configuration along length, blade frequencies and vibration, frequency margin from running-speeds, steam forces and other stimuli, resonance, fatigue failure, etc., materials, strength/weight ratio consideration, erosion resistance, heat-treatment/stellite shielding, etc.: design of rotor forging, materials, bearings, shaft-bearing vibrations, etc.: design of bearings, bolts, shell, sealing, etc.
- speed, weight and cost considerations.
- Design of two prototype turbines in the range and capacities required.

ii) Activities related to output "Manufacturing capability"

- Identification of parts for manufacturing and the production equipment required, its procurement and installation.
- Manufacture of turbine blades, use of special equipment.
- Establishment of supply/manufacture of rotor forgings, machining, balancing, etc.
- Establishment of supply of castings for shell: its machining, etc.
- Establishment of supply of standard parts such as fasteners, pins, etc. and other bought out items like seals, packings, etc.
- Assembly of two prototype turbines, their testing, feed back for design modification/alteration, preparation to release for production.

F PROJECT INPUTS

i) Experts

2 Experts, one each in the following fields for 2 years: 48 m/m

- steam turbine design
- steam turbine manufacture

ii) Consultants

4 Consultants, one each in the following areas, for 3 months each, a various times during the project duration: 12 m/m

- turbine thermal cycles
- aerodynamic design of turbine blades
- vibrations in turbines
- materials for turbine blades, rotor and shell.

UNIDO

PROJECT BUDGET/REVISION

3. COUNTRY	4. PROJECT NUMBER AND AMENDMENT	5. SPECIFIC ACTIVITY
Dem. Rep. of Korea		

10. PROJECT TITLE

Modern Steam Turbines for Small and Medium Power Stations

15. INTERNATIONAL EXPERTS (functional titles required except for line 11-50)	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. 1986 m/m	18. 1986 $	19. 1987 m/m	19. 1987 $	20. m/m	20. $
11-01 Steam Turbine Design	24	167,300	2	13,100	12	82,000	10	72,000		
02 Steam Turbine Manufacture	24	167,300	2	13,100	12	82,000	10	72,000		
03										
04										
05										
06										
07										
08										
09										
10										
11										
12										
13										
14										
15										
16										
11-50 Short term consultants	12	83,600			8	54,800	4	28,800		
11-99 Sub-total—International experts[a]	60	418,200	4	26,200	32	[illegible]	24	172,800		

21. REMARKS

[a] If more than 16 experts are required check here ☐ and attach continuation sheet 1A. This sub-total *must* include all experts.

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UNIDO

PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. 1986 m/m	18. 1986 $	19. 1987 m/m	19. 1987 $	20. m/m	20. $
OPAS EXPERTS (functional titles required)										
12-01										
12-02										
12-03										
12-99 Sub-total—OPAS experts[b]										
ADMINISTRATIVE SUPPORT PERSONNEL										
13-00 Clerks, secretaries, drivers										
13-50 Freelance interpreters (non-UNDP projects)										
13-99 Sub-total—Administrative support personnel										
UN VOLUNTEERS (functional titles required)										
14-01										
14-02										
14-03										
14-04										
14-99 Sub-total—UN Volunteers[b]										
15-00 Project travel										
16-00 Other personnel costs (including UNIDO staff mission costs)										
NATIONAL EXPERTS (functional titles required)										
17-01										
17-02										
17-03										
17-04										
17-05										
17-99 Sub-total—National experts[b]										
19-99 TOTAL—PERSONNEL COMPONENT	60	418,200	4	26,200	32	219,200	24	172,800		

[b] If additional individual budget lines are required, check here ☐ and attach continuation sheet 1A. These sub-totals must include budget lines listed on page 1A.

UNIDO

PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. 1986 m/m	18. 1986 $	19. 1987 m/m	19. 1987 $	20 m/m	20 $
SUBCONTRACTS										
21-00 Subcontracts										
TRAINING										
31-00 Individual fellowships										
32-00 Study tours; UNDP group training										
33-00 In-service training										
34-00 Non-UNDP group training										
35-00 Non-UNDP meetings										
39-99 TOTAL—TRAINING COMPONENT										
EQUIPMENT										
41-00 Expendable equipment										
42-00 Non-expendable equipment		30,000				30,000				
43-00 Premises										
49-99 TOTAL—EQUIPMENT COMPONENT		30,000				30,000				
MISCELLANEOUS										
51-00 Sundries		1,800				1,800				
55-00 Hospitality (non-UNDP projects)										
56-00 Support costs (CC and DC projects only)										
59-99 TOTAL—MISCELLANEOUS COMPONENT		1,800				1,800				
SURPLUS/DEFICIT										
81-00 Surplus/Deficit (ADM/FS use only)										
99-99 PROJECT TOTAL		450,000				450,000				
[c] COST SHARING (UNDP/IPF projects only)										
[c] NET UNDP CONTRIBUTION										

[c] For information only — *not* for PAD input

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF SYSTEMS ENGINEERING IN TRANSPORTATION

PROJECT TITLE

SYSTEMS CAPABILITY IN THE OPERATION OF NATIONAL RAIL-WAY FREIGHT SYSTEMS

PROPOSAL No.: 24

UNIDO, VIENNA

MAY 1985

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

TITLE:	Systems Capability in the Operation of National Railway Freight Systems.
COUNTRY:	Democratic Republic of Korea
DURATION:	4 months
PRIMARY FUNCTION:	
SECONDARY FUNCTION:	Institutional Development
SECTOR (GOVT.CLASS.):	
UNDP CLASSIFICATION AND CODE:	
GOVERNMENT IMPLEMENTING AGENCY:	Ministry of Railways
EXECUTING AGENCY:	UNIDO (IO/ENG)
ESTIMATED STARTING DATE:	
GOVERNMENT INPUTS:	
UNDP INPUTS:	US$ 87.000

A. DEVELOPMENT OBJECTIVE

(i) To lay the foundation and develop the capability in the areas of operations research, systems analysis and systems engineering.

(ii) To strengthen the conceptual and methodological capability in the application of optimization theories and computer methods to the analyses ans sysnthesis of the transportation systems.

B. PROJECT OBJECTIVES

(i) To develop the systems analysis and synthesis capability and the related computer techniques in the operation of the national railway freight system.

(ii) To operate the freight system to optimize the utilization of the wagons and maximize the haulage and demand satisfaction and minimize the costs. The haulage is required to be raised by 30 percent from the existing level.

C. BACKGROUND AND JUSTIFICATION

(i) Development Hypothesis:

The effective and efficient operation of transportation systems involves the optimum utilization of the resources available and it requires to optimize the flow while meeting the demand and minimizing the hold overs and costs of operation and including investments. This demands a strong capability in the systems analysis and synthesis together with the conceptual and methodological capability in the application of the relevant optimization theories and computer techniques. The project is expected to develop these capabilities thus meeting the development objective.

(ii) Project Hypothesis:

The project is expected to develop the systems capability to operate the national railway freight system with optimum utilization of the wagons available, maximizing the freight haulage and to satisfy the demand and minimize the costs of operation. These are the expected outputs of the project, instrumental in the development of the systems capability to efficiently operate the freight system thus meeting the project objective.

D. PROJECT OUTPUTS

The following are the expected outputs of the project in terms of capabilities that are reflected in the optimality of the functions presented below.

(i) Increase in the freight haulage, to the extent of upto 30 percent over the existing level.

(ii) Optimum utilization of railway wagons.

(iii) Optimum satisfaction of demand of goods at destinations with minimum hold overs.

(iv) Minimization of cost of operation.

E. PROJECT ACTIVITIES

The project and the counterpart staff shall undertake and carry out the following activities:

(i) statement of the problem.

(ii) Formualtion of the mathematical model.

(iii) Design of the system.

(iv) Solution of the problem with necessary programmes and computer application.

(v) Special courses in modern theories of optimization, types of systems, concepts of models, stationary and dynamic modes, general models, application to problems in transportation, networks of stochastic flows, net-works of queues etc., computer applications and programmes.

F. PROJECT INPUTS

1. Experts:

Two experts in the following fields / areas, over a period of 4 months each — 8 mm

(i) operational research and systems analysis, design of transportation systems.

(ii) computer applications for transportation system design.

2. Consultant

One consultant in the following area for 2 months 2 mm

(i) stochastic processes

UNIDO

PROJECT BUDGET/REVISION

3. COUNTRY	4. PROJECT NUMBER AND AMENDMENT	5. SPECIFIC ACTIVITY
DEM.REP.OF KOREA		

PROJECT TITLE

SYSTEMS CAPABILITY IN THE OPERATION OF NATIONAL RAILWAY FREIGHT SYSTEM.

15. INTERNATIONAL EXPERTS (functional titles required except for line 11-50)	16. TOTAL		17. 1985		18.		19.		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
11-01 Operational Research & Systems Analys.	4	26,200	4	26,200						
02 Computer Applications in Trans. Syst.	4	26,200	4	26,200						
03										
04										
05										
06										
07										
08										
09										
10										
11										
12										
13										
14										
15										
16										
11-50 Short term consultants	2	13,100	2	13,100						
11-99 Sub-total—International experts[a]	10	65,500	10	65,500						

21. REMARKS

[a] If more than 16 experts are required check here ☐ and attach continuation sheet 1A. This sub-total *must* include all experts.

Form FS 83 Rev 4 (2 83) Part 1

UNIDO

PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. m/m	18. $	19. m/m	19. $	20. m/m	20. $
OPAS EXPERTS (functional titles required)										
12-01										
12-02										
12-03										
12-99 Sub-total–OPAS experts[b]										
ADMINISTRATIVE SUPPORT PERSONNEL										
13-00 Clerks, secretaries, drivers										
13-50 Freelance interpreters (non-UNDP projects)										
13-99 Sub-total–Administrative support personnel										
UN VOLUNTEERS (functional titles required)										
14-01										
14-02										
14-03										
14-04										
14-99 Sub-total–UN Volunteers[b]										
15-00 Project travel										
16-00 Other personnel costs (including UNIDO staff mission costs)										
NATIONAL EXPERTS (functional titles required)										
17-01										
17-02										
17-03										
17-04										
17-05										
17-99 Sub-total–National experts[b]										
19-99 TOTAL–PERSONNEL COMPONENT	10	65,500	10	65,500						

[b] If additional individual budget lines are required, check here ☐ and attach continuation sheet 1A. These sub-totals must include budget lines listed on page 1A.

UNIDO

PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. m/m	18. $	19. m/m	19. $	20. m/m	20. $
SUBCONTRACTS										
21-00 Subcontracts										
TRAINING										
31-00 Individual fellowships										
32-00 Study tours; UNDP group training										
33-00 In-service training										
34-00 Non-UNDP group training										
35-00 Non-UNDP meetings										
39-99 TOTAL—TRAINING COMPONENT										
EQUIPMENT										
41-00 Expendable equipment										
42-00 Non-expendable equipment		20,000		20,000						
43-00 Premises										
49-99 TOTAL—EQUIPMENT COMPONENT		20,000		20,000						
MISCELLANEOUS										
51-00 Sundries		1,500		1,500						
55-00 Hospitality (non-UNDP projects)										
56-00 Support costs (CC and DC projects only)										
59-99 TOTAL—MISCELLANEOUS COMPONENT		1,500		1,500						
SURPLUS/DEFICIT										
81-00 Surplus/Deficit (ADM/FS use only)										
99-99 PROJECT TOTAL		87,000		87,000						
[c] COST SHARING (UNDP/IPF projects only)										
[c] NET UNDP CONTRIBUTION		87,000		87,000						

[c] For information only — *not* for PAD input

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF METAL WORKING AND MACHINERY INDUSTRY

PROJECT TITLE

ASSISTANCE TO PROTOTYPE WORKSHOP AT SOCIETE IVOIRIENNE

DE TECHNOLOGIE TROPICALE

PROPOSAL NO. 25

UNIDO

VIENNA

MAY 1985

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

PART A - BASIC DATA

COUNTRY:	IVORY COAST
PROJECT NUMBER:	
PROJECT TITLE:	Assistance in Prototype Manufacture - Société Ivoirienne De Technologie Tropicale
SCHEDULED START:	
SCHEDULED COMPLETION:	
ORIGIN AND DATE OF OFFICIAL REQUEST:	Letter dated 12 April 1985 from the Ministry of Rural Development of the Ivory Coast
UNIDO CONTRIBUTION:	US$ 75,000
GOVERNMENT CONTRIBUTION:	In kind
CURRENCY REQUIRED:	
FOR UNIDO INPUT:	
CONVERTIBLE:	US$ 75,000
UNIDO SUBSTANTIVE BACKSTOPPING SECTION:	Engineering Industries Branch
PROGRAMME COMPONENT CODE:	31.9.B.

PART B - NARRATIVE

1. DEVELOPMENT OBJECTIVES

(i) To develop the manufacturing capability of the machinery industry.

(ii) To strengthen the capability to fabricate prototype equipment.

2. PROJECT OBJECTIVES

(i) To strengthen the manufacturing capability of the prototype workshop at the Société Ivoirienne de Technologie Tropicale (SITT).

(ii) To provide assistance to the prototype workshop in terms of equipping the cadres with appropriate skills and establishing the manufacturing operations.

3. SPECIAL CONSIDERATIONS

(i) Agro products processing and the manufacture of machinery required for the above is on high priority.

(ii) There is an urgent need to provide immediate assistance in the area of manufacture of prototype equipment.

(iii) Equipment up to a maximum of US$ 30,000 for demonstration purposes is considered for provision, as an exceptional case.

(iv) In view of the time required for the skill development a duration of 6 months is foreseen.

4. BACKGROUND AND JUSTIFICATION

(i) Development Hypothesis

The prototype workshop, for effective manufacture of prototype equipment, would require good manufacturing capability. The manufacturing capability is constituted by skilled cadres and appropriate equipment, and the organizational methods, etc. The project has its objectives, essentially to train the personnel imparting the necessary skills and establish the manufacturing operations, thus meeting the development objectives.

(ii) Project Hypothesis

The project is expected to provide the necessary hands-on-job activity in the manufacturing processes and fabrication methods, as required in the prototype manufacture over a period of 6 months, thereby providing the manufacturing capability in terms of skills which is an expected output of this project.

The prototype manufacturing capability is dependent upon an adequate number of technicians with the necessary skills; and appropriate machinery and facilities for the production of the prototype equipment. It also requires personnel equipped with the necessary methods and organizational know-how.

The personnel thus equipped with the necessary skills, the machinery and facilities established and together with the organizational know-how which are all the expected outputs of the project, would be instrumental in developing the manufacturing capability of the prototype workshop thus meeting the project objective.

5. PROJECT OUTPUTS

The following are the expected outputs of the project, in which the manufacturing capability is reflected:

(i) An adequate number of technicians and other cadres equipped with the necessary skills,for the manufacture of prototype equipment, including manufacturing processes, such as sheet metal fabrication, welding, machining, assembly, etc.

(ii) The prototype workshop with the appropriate equipment and facilities and effectively established manufacturing operations, including organization of raw materials, tooling, etc.

6. PROJECT ACTIVITIES

The project expert together with the counterpart staff shall carry out the following activities:

(i) Activities related to output: 'Cadres equipped with skills'

- training the workers, supervisors and other cadres in the manufacturing processes such as sheet metal work, welding, machining and assembly, inspection and quality control, etc.;
- training a few technicians in the preparation of operation layouts for the manufacture of components of prototype equipment in the shop including machine andtool selection, raw material size selection, sequence of operations, etc.;

(ii) Activities related to the output: 'Workshop equipped with machinery and facilities and established manufacturing operations'

- Identification of the additional machine tools and other equipment and tooling, their specification etc, required for the prototype workshop;
- Procurement, acceptance and installation of the equipment in the prototype shop and inspection, etc;
- Organization of raw material stores, tool crib, test floor, etc;
- Establishing the fabrication, machining and assembly operations.

7. PROJECT INPUTS:

(i) Government/SITT Inputs

- Provision of raw material stock;
- Provision of tools as required;
- Office space with office equipment;
- Local transportation.

(ii) UNIDO Inputs

	US$
- International expert	
Mechanical engineer, specialist in machine tools, with extensive experience in prototype manufacture and management of a workshop, including organizing training, 6 m/m (4 m/m in 1985 at US$ 7,350 and 2 m/m in 1986 at US$ 7,700)	44,800
- Equipment	
Selected machines and other equipment, tooling, workshop hand tools, etc.	30,000
- Final report	200
TOTAL INPUTS	75,000

8. PROPOSED EVALUATION

The evaluation of the project will be carried out by the Government and UNIDO in terms of the manufacturing capability that is acquired by the workshop, reflected in the fabrication of the prototype equipment.

9. ENVISAGED FOLLOW UP

No follow up activity is foreseen.

10. PROJECT WORKPLAN

A tentative workplan will be discussed and prepared by the expert during briefing at UNIDO which will be confirmed within two weeks after commencing duty at Port-Bouet.

PART C - CLEARANCE AND APPROVAL

PROPOSAL SUBMITTED BY:	M. Delos, Head IO/ENG	Date:
CLEARED BY:	A.A. Vassiliev Director, IO	Date:
APPROVED BY:	Mr. A. Hacini Director, PC	Date:

CONVERTIBLE CURRENCY:

OTHER:

SOURCE OF FUNDS:

DATE PAD REQUESTED:

UNIDO

PROJECT BUDGET/REVISION

3 COUNTRY	4. PROJECT NUMBER AND AMENDMENT	5. SPECIFIC ACTIVITY
Ivory Coast		31.9.B.

10 PROJECT TITLE
Assistance to Prototype Workshop at Société Ivoirienne de Technologie Tropicale

15. INTERNATIONAL EXPERTS (functional titles required except for line 11-50)	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. 1986 m/m	18. 1986 $	19. m/m	19. $	20. m/m	20. $
11-01 Prototype Manufacture	6	44,800	4	29,400	2	15,400				
02										
03										
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09										
10										
11										
12										
13										
14										
15										
16										
11-50 Short term consultants										
11-99 Sub-total—International experts[a]	6	44,800	4	29,400	2	15,400				

21 REMARKS

[a] If more than 16 experts are required check here ☐ and attach continuation sheet 1A. This sub-total *must* include all experts.

UNIDO

PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. 1986 m/m	18. 1986 $	19. m/m	19. $	20. m/m	20. $
OPAS EXPERTS (functional titles required)										
12-01										
12-02										
12-03										
12-99 Sub-total—OPAS experts[b]										
ADMINISTRATIVE SUPPORT PERSONNEL										
13-00 Clerks, secretaries, drivers										
13-50 Freelance interpreters (non-UNDP projects)										
13-99 Sub-total—Administrative support personnel										
UN VOLUNTEERS (functional titles required)										
14-01										
14-02										
14-03										
14-04										
14-99 Sub-total—UN Volunteers[b]										
15-00 Project travel										
16-00 Other personnel costs (including UNIDO staff mission costs)										
NATIONAL EXPERTS (functional titles required)										
17-01										
17-02										
17-03										
17-04										
17-05										
17-99 Sub-total—National experts[b]										
19-99 TOTAL—PERSONNEL COMPONENT	6	44,800	4	29,400	2	15,400				

[b] If additional individual budget lines are required, check here ☐ and attach continuation sheet 1A. These sub-totals must include budget lines listed on page 1A.

UNIDO

PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL m/m	$	17. 1985 m/m	$	18. 1986 m/m	$	19. m/m	$	20. m/m	$
SUBCONTRACTS										
21-00 Subcontracts										
TRAINING										
31-00 Individual fellowships										
32-00 Study tours; UNDP group training										
33-00 In-service training										
34-00 Non-UNDP group training										
35-00 Non-UNDP meetings										
39-99 TOTAL–TRAINING COMPONENT										
EQUIPMENT										
41-00 Expendable equipment										
42-00 Non-expendable equipment				30,000						
43-00 Premises										
49-99 TOTAL–EQUIPMENT COMPONENT				30,000						
MISCELLANEOUS										
51-00 Sundries						200				
55-00 Hospitality (non-UNDP projects)										
56-00 Support costs (CC and DC projects only)										
59-99 TOTAL–MISCELLANEOUS COMPONENT						200				
SURPLUS/DEFICIT										
81-00 Surplus/Deficit (ADM/FS use only)										
99-99 PROJECT TOTAL		75,000		59,400		15,600				
[c] COST SHARING (UNDP/IPF projects only)										
[c] NET UNDP CONTRIBUTION		75,000		59,400		15,600				

[c] For information only – *not* for PAD input

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF MACHINERY INDUSTRIES

PROJECT TITLE

PREPARATORY ASSISTANCE IN THE DEVELOPMENT OF LOCAL DESIGN CAPABILITY FOR PROGRESSIVE MANUFACTURE OF SELECTED CAPITAL GOODS

PROPOSAL NO. 26

UNIDO
VIENNA

MAY 1985

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

PART A - BASIC DATA

COUNTRY	The Republic of Cameroon
PROJECT TITLE	Preparatory Assistance in the Development of Local Design Capability for Progressive Local Manufacture of Selected Capital Goods
PROJECT DURATION:	3 months
PROJECT NUMBER:	
SCHEDULED START:	September 1985
SCHEDULED COMPLETION:	
ORIGIN AND DATE OF OFFICIAL REQUEST:	
GOVERNMENT COUNTERPART AGENCY:	Ecole Supérieure des Sciences Economiques et Commerciales de Douala (ESSEC)
UNIDO CONTRIBUTION:	
GOVERNMENT CONTRIBUTION:	In kind
CURRENCY REQUIRED:	
FOR UNIDO INPUT:	
CONVERTIBLE:	US$ 50,000
OTHER:	
UNIDO SUBSTANTIVE BACKSTOPPING SECTION:	Engineering Industries Branch
PROGRAMME COMPONENT CODE:	31.9.A.

PART B - NARRATIVE

1. Objectives

Development Objective

To assist the Republic of Cameroon in the development and strengthening of local design and manufacturing capability in the Capital Goods Sector with a view to achieve accelerated self-reliance.

Project Objective

- To assist the "Ecole Supérieure des Sciences Economiques et Commerciales de Douala (ESSEC)" and/or similar institutions such as the National Centre for Studies and Experimentation in Agricultural Mechanization (CENEEMA) in identifying existing designs of selected capital goods for local design/adaptation.
- To draw up a programme to train local engineers and engineers from subregion in the design of selected capital goods.
- To assess the existing prototype manufacturing capability and identify the assistance required to strengthen it.
- To identify manufacturing establishments where the machinery of approved designs can be manufactured.

2. Special Consideration

- The project is expected to provide preparatory assistance to identify the needs in terms of design and manufacturing capability in the capital goods sector, in preparation of a project fully in line with the programme of the Industrial Development Decade prepared jointly by the Economic Commission for Africa, the O.A.U. and UNIDO. Which also supports the Lagos Plan of Action to assist in the acceleration of self-reliant and self-sustained industrialization of Africa.
- The assistance is an ad-hoc assignment of high-level experts whose services are urgently required to advise on the formulation and other specific questions related to the preparation and implementation of an industrial project in the area of development and strenghtening of local design capability for the progressive local manufacture of selected capital goods.
- The above assistance is in accordance with the criteria made under the provisions of the Special Industrial Services,

3. Background and Justification

UNIDO is assisting the African Region through the "Ecole Supérieure des Sciences Economiques et Commerciales de Douala" in Cameroon in training and upgrading of skills in production engineering and production management.

The purpose of this important regional programme is to improve production processes and production technology.

It has become, however, obvious that there is a need to supplement the above mentioned programme through a progressive programme which will strengthen the indigenous design capability, reinforce existing prototype manufacturing capacity and transfer of proven design to existing industrial manufacturing enterprises for the benefit of the African subregion.

There are a great number of existing metalworking manufacturing units in the region which work far below capacity. In order to augment utilization of installed capacity and expand it in the future, improved product quality and diversification of production programmes are essential inputs to overcome this severe short-coming. The programme will strengthen the indigenous design capability and contribute to the diversification of production programmes and to the progressive increase of the local manufacturing content and thus reducing imported equipment and machinery.

In order to effectively formulate the project to implement the above, preparatory assistance is needed to identify the various elements. The present project is directed towards this purpose.

4. Project Outputs

Phase I - Preparatory Assistance Phase

As a result of an assessment carried out by two UNIDO consultants, an adviser from ARCEDEM (Regional African Design Institute in Nigeria) and a UNIDO staff mission to Cameroon followed by a mission of a Government official from Cameroon to UNIDO to finalize the Phase II project,the following outputs are expected:

- Identified institution/institutions in Cameroon most suitable for development of the programme.
- Capital goods identified which are most suitable for design adaptation and local manufacture.
- Assessment of existing prototype manufacturing capability and specification of additional input requirements in terms of equipment, manpower and training.
- Assessment of local and subregional training needs for the design development programme.
- Integrated three year implementation programme with detailed specifications for all inputs and outputs.

5. Project Activities

(i) Field study of the existing institutions and suitable products and for the assessment existing design and manufacturing capabilities, over a period of 1 1/2 months.

(ii) Identification of institutions for programme development, selection of suitable products for design adaptation and assessment of existing capabilities and identification of technical assistance needs.

(iii) Preparation of the programme for the implementation of the technical assistance over a period of 1 month (including item ii).

(iv) Finalization of the report with Government representative (2 weeks).

6. Project Inputs

(a) Government Inputs

Counterpart staff including administrative support services, physical facilities (buildings and equipment). Operational expenses including travel expenses within the country.

(b) UNIDO Inputs

The expert services are recommended for subcontracting

		US$
(i)	Cost of subcontract for the services of design and production engineer, including home office support	45,000
(ii)	Government official mission to Vienna	2,000
(iii)	Adviser from ARCEDEM	1,000
(iv)	UNIDO staff mission	2,000
	TOTAL	50,000

7. Proposed Evaluation

The evaluation of the report will be carried out by the Government and UNIDO. Based on this assessment of the scope of the second phase of the project will be determined.

8. Envisaged Follow-up

A technical assistance project is foreseen for the development of local design capability for progressive manufacture of selected capital goods. The project will be formulated based on the recommendations of the present project report.

9. Project Workplan

A detailed workplan will be prepared by the leader of the subcontractor's expert team at UNIDO.

PART C - CLEARANCE AND APPROVAL

PROPOSAL SUBMITTED BY:	M. Delos, Head Engineering Industries Branch	Date:
PREPARED BY:		
CLEARED BY:	A.A. Vassiliev, Director Division of Industrial Operations	Date:
APPROVED BY:	S. Ndam, Chief, IDDA	Date
	A. Hacini, Director Division of Policy Co-ordination	Date:

Convertible Currency: US$ 50,000

Other:

Source of Funds: SIS

Date PAD Requested:

UNIDO

PROJECT BUDGET/REVISION

3. COUNTRY	4. PROJECT NUMBER AND AMENDMENT	5. SPECIFIC ACTIVITY
Rep. of Cameroon		31.9.A.

10. PROJECT TITLE
Preparatory Assistance in the Development of Local Design Capability for Progressive Local Manufacture of Selected Capital Goods

15. INTERNATIONAL EXPERTS (functional titles required except for line 11-50)	16. TOTAL		17. 1985		18.		19.		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
11-01										
02										
03										
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08										
09										
10										
11										
12										
13										
14										
15										
16										
11-50 Short term consultants										
11-99 Sub-total—International experts[a]										

21. REMARKS

[a] If more than 16 experts are required check here ☐ and attach continuation sheet 1A. This sub-total *must* include all experts.

UNIDO

PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. m/m	18. $	19. m/m	19. $	20. m/m	20. $
OPAS EXPERTS (functional titles required)										
12-01										
12-02										
12-03										
12-99 Sub-total – OPAS experts[b]										
ADMINISTRATIVE SUPPORT PERSONNEL										
13-00 Clerks, secretaries, drivers										
13-50 Freelance interpreters (non-UNDP projects)										
13-99 Sub-total – Administrative support personnel										
UN VOLUNTEERS (functional titles required)										
14-01										
14-02										
14-03										
14-04										
14-99 Sub-total – UN Volunteers[b]										
15-00 Project travel										
16-00 Other personnel costs (including UNIDO staff mission costs)		2,000		2,000						
NATIONAL EXPERTS (functional titles required)										
17-01 Government expert/official		2,000		2,000						
17-02 Adviser from ARCEDEM		1,000		1,000						
17-03										
17-04										
17-05										
17-99 Sub-total – National experts[b]										
19-99 TOTAL – PERSONNEL COMPONENT		5,000		5,000						

[b] If additional individual budget lines are required, check here ☐ and attach continuation sheet 1A. These sub-totals must include budget lines listed on page 1A.

Form FS.83/Rev.4/Add.1 (2.83)

UNIDO

PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. m/m	18. $	19. m/m	19. $	20. m/m	20. $
SUBCONTRACTS										
21-00 Subcontracts		45,000		45,000						
TRAINING										
31-00 Individual fellowships										
32-00 Study tours; UNDP group training										
33-00 In-service training										
34-00 Non-UNDP group training										
35-00 Non-UNDP meetings										
39-99 TOTAL—TRAINING COMPONENT										
EQUIPMENT										
41-00 Expendable equipment										
42-00 Non-expendable equipment										
43-00 Premises										
49-99 TOTAL—EQUIPMENT COMPONENT										
MISCELLANEOUS										
51-00 Sundries										
55-00 Hospitality (non-UNDP projects)										
56-00 Support costs (CC and DC projects only)										
59-99 TOTAL—MISCELLANEOUS COMPONENT										
SURPLUS/DEFICIT										
81-00 Surplus/Deficit (ADM/FS use only)										
99-99 PROJECT TOTAL		50,000		50,000						
[c] COST SHARING (UNDP/IPF projects only)										
[c] NET UNDP CONTRIBUTION										

[c] For information only — *not* for PAD input

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF METAL WORKING INDUSTRY

PROJECT TITLE

ASSISTANCE IN THE REPAIR AND MAINTENANCE OF WATER REGULATORS

PROPOSAL NO. 27

UNIDO
VIENNA

MAY 1985

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

PART A - BASIC DATA

COUNTRY/REGION:	Somalia
PROJECT NUMBER:	
PROJECT TITLE:	Assistance in repair and maintenance of water regulators
DURATION:	3 months
SCHEDULED START:	IV Quarter 1985
SCHEDULED COMPLETION:	
ORIGIN AND DATE OF OFFICIAL REQUEST:	Government letter to Resident Representative 31 March 1985
GOVERNMENT COUNTERPART AGENCY:	Ministry of Industry through Foundry and Mechanical Workshop
UNIDO CONTRIBUTION:	US$ 75,000
GOVERNMENT CONTRIBUTION:	In kind
CURRENCY REQUIRED FOR UNIDO INPUT:	
CONVERTIBLE:	US$ 75,000
OTHER:	
UNIDO SUBSTANTIVE BACKSTOPPING SECTION:	Engineering Industries Branch
PROGRAMME COMPONENT CODE:	31.9.B.

PART B - NARRATIVE

1. OBJECTIVES OF THE PROJECT

A. Development Objectives

(i) To provide appropriate industrial inputs to agricultural development in order to increase agricultural production and labour productivity.

(ii) To increase the capability of local industries for the future manufacture of new water regulation equipment included in the irrigation development plan.

B. Immediate Objectives

(i) To upgrade the repair and maintenance capabilities of local engineers and technicians in the repair and maintenance of water regulators.

(ii) Upgrading the manufacturing capability of the Foundry and Mechanical Workshop to enable them to produce the water regulation equipment.

2. SPECIAL CONSIDERATION

(i) Irrigation is on high priority.

(ii) Somalia has limited experience in the water distribution system.

(iii) There is an urgent need to provide immediate assistance in the areas of repair and maintenance of the water regulation equipment.

(iv) Equipment up to a maximum of $ 30,000 for demonstration purposes is considered for provision, as an exceptional case.

3. BACKGROUND AND JUSTIFICATION

- In Somalia there are more than 8 million hectares of cultivable land and only less than one million are utilized.
- Irrigated agricultural areas from Juba and Shebelle rivers, the only source, account for 30 percent only of agricultural products while the remaining 70 percent come from rainfed areas.
- Agricultural export is in second place to livestock in the national economy.
- Land and water department which is part of the Ministry of Agriculture, plans the construction, operation and repair and maintenance of all water regulators in the irrigation network.
- Lack of well planned irrigation systems and bad water management led to the poor distribution of water resources and resulted, among other things, in very low crop yields.
- Various seasonal streams flood the valleys and join the ocean without proper control.

- During the last decade, Somalia suffered drought which caused casualities in live stock, natural grazing and crop failure. This resulted in heavy financial losses and the country had to import 30 percent of its needs of grain. Self-sufficiency plans were set back. This situation could be remedied through joint efforts of the Government and the farmers to raise production to meet the needs of a rapidly increasing population.
- A few years back some foreign contractors tried to execute a project for repair and construction of water regulators but did not succeed because of lack of foreign currency, delay of the project start, high operation cost and the technology adopted was not transferred to the locals.
- The National Farm Machinery and Agricultural Services Agency (ONAT) have been making some water regulators and irrigation gates for some years now. They still do whenever contracted for it. They do very little repair and maintenance work.
- The Foundry and Mechanical Workshop was the only unit that did some good repair work on these regulators and are still doing so, inspite of all the technical and financial difficulties they are facing. They lack technical skills and practical experience and field repair equipment as the foundry is located in Mogadiscio which is at least 60 km from the nearest irrigation project.
- The agricultural development plan includes the following three irrigation projects:

  (a) The Balad flood irrigation project on Shebella River has been completed and is in operation.

  (b) The first phase of Fanole Dam and Juba River has been completed and the second phase is on the way.

  (c) The Bardere Dam (Juba River) feasibility study was completed and soon the project implementation will start.

These three projects will add more burden on the foundry for repair and maintenance of water regulators. The problem is going to be greater, and sincere and serious measures must be undertaken to equip the Foundry and Mechanical Workshop to cope with the increasing need for repair and maintenance of these water regulators. If this is neglected the consequences can be damaging to the irrigated agricultural sub-sector.

4. <u>PROJECT OUTPUTS</u>

(a) Equip and organize a unit for repair and maintenance of water regulators in the irrigated projects.

(b) Well trained cadres and field technicians able to ensure repair and maintenance of water regulators.

5. PROJECT ACTIVITIES

The project and counterpart staff shall carry out the following activities:

(i) Procurement and installation of equipment.

(ii) Organization of study tours and fellowships including the programme.

(iii) Demonstration of methods, techniques and processes as required for repair and maintenance of water regulators.

(iv) Demonstration of manufacturing processes such as sheet metal fabrication, welding, etc., and quality control for manufacture of water regulators.

6. PROJECT INPUTS

(a) Expert in manufacture of water regulators 3 m/m

(b) Study tour 2 m/m (2 engineers, 1 month each)

(c) Fellowships 8 m/m (4 technicians, 2 months each)

For study tour and fellowships it is recommended to send participants to Sudan and/or Egypt. Both countries have extensive and long experience in irrigation works, manufacture and repair of water regulators and other water control measures.

(d) Equipment (see annex I)

Government Inputs

(a) Counterpart staff

(b) Industrial and administrative premises

(c) Miscellaneous operating costs

(d) Material and components for repair and maintenance of water regulators

(e) Office equipment and supplies

7. PROPOSED EVALUATION

An evaluation mission could be sent from the headquarters before completion of the project. The evaluation would be in terms of repair and maintenance capability acquired by the workshop, reflected in the actual equipment repaired and maintained.

8. ENVISAGED FOLLOW UP

No follow up is envisaged.

9. PROJECT WORKPLAN

A detailed workplan and programme will be prepared by the expert during the first 2 weeks in the field.

10. PROJECT BUDGET

The project budget is given in annex II.

PART C - CLEARANCE AND APPROVAL

PROPOSAL SUBMITTED BY:	M. Delos, Head IO/ENG	Date:
CLEARED BY:	A.A. Vassiliev Director, DIO	Date:
	S. Ndam, Chief Co-ordination Unit for IDDA	Date:
APPROVED BY:	A. Hacini Director, DPC	Date:

ANNEX - I

SOMALIA:

Proposed Machinery and Equipment

EXPENDABLE			
1	2	3	4
ITEM	DESCRIPTION	No.	EST. COST C/F US $
1.	Mechanics Assorted Tools, Spanners, Files, Vices, Hack Saw, chisels, etc	4 sets	400
2.	Drills - BSS and Metric	5 Doz.	500
3.	Grinding Discs 6 in dia	6	100
4.	Grinding Discs 12 in dia	12	300
	Sub total US Dollars	$	1,300
	Sub Total non- expandable Equipment		26,300
	Total Equipment	$	27,600
	Miscellaneous and spare parts		2,400
	Grand Total US Dollars	$	30,000

ANNEX - I

SOMALIA: Assistance in Repair and Maintenance of Water Regulators.

Proposed Machinery and Equipment

NON-EXPENDABLE			
1	2	3	4
ITEM	DESCRIPTION	NO.	EST. COST C/F US $
1	Arc welding unit with all standard equipment and accessories	2	1,200
2	Gas welding and cutting unit with 2 empty oxygen cylinders and 2 acetylene set of torches, ganges, hores, etc.	2	2,400
3	Portable Diesel engine generator and accessories	1	10,000
4	Pick up car tobe used as mobile workshop	1	8,000
5	Hand Electric Drill gun 1/2 H.P. with standard equipment and accessories	2	1,000
6	Hand Electric grinder 6in- Portable with accessories	2	600
7	Metal folding work tables	2	120
8	Power reciprocating saw 1/4 in	1	700
9	Blacksmith tools-set,anvils, electric hearth and hood etc.	1 set	1,500
10	Pedestal grinder, double ended 12 in wheels	1	800
	Sub Total Non-Expandable	US $	26,300

UNIDO

PROJECT BUDGET/REVISION

ANNEX II

3. COUNTRY	4. PROJECT NUMBER AND AMENDMENT	5. SPECIFIC ACTIVITY
Somalia		31.9.B

10. PROJECT TITLE
Assistance in Repair and Maintenance of Water Regulators

15. INTERNATIONAL EXPERTS (functional titles required except for line 11-50)	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. m/m	18. $	19. m/m	19. $	20. m/m	20. $
11-01 Manufacture of Water Regulators	3	23,250	3	23,250						
02										
03										
04										
05										
06										
07										
08										
09										
10										
11										
12										
13										
14										
15										
16										
11-50 Short term consultants										
11-99 Sub-total—International experts[a]	3	23,250	3	23,250						

21. REMARKS

[a] If more than 16 experts are required check here ☐ and attach continuation sheet 1A. This sub-total *must* include all experts.

Form FS 83/Rev.4 (2.83) Part 1

UNIDO

PROJECT BUDGET/REVISION

PROJECT NUMBER	16. TOTAL		17. 1985		18.		19.		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
OPAS EXPERTS (functional titles required)										
12-01										
12-02										
12-03										
12-99 Sub-total—OPAS experts[b]										
ADMINISTRATIVE SUPPORT PERSONNEL										
13-00 Clerks, secretaries, drivers										
13-50 Freelance interpreters (non-UNDP projects)										
13-99 Sub-total—Administrative support personnel										
UN VOLUNTEERS (functional titles required)										
14-01										
14-02										
14-03										
14-04										
14-99 Sub-total—UN Volunteers[b]										
15-00 Project travel		750		750						
16-00 Other personnel costs (including UNIDO staff mission costs)										
NATIONAL EXPERTS (functional titles required)										
17-01										
17-02										
17-03										
17-04										
17-05										
17-99 Sub-total—National experts[b]										
19-99 TOTAL—PERSONNEL COMPONENT	3	24,000	3	24,000						

[b] If additional individual budget lines are required, check here ☐ and attach continuation sheet 1A. These sub-totals must include budget lines listed on page 1A.

Form FS 83 Rev 4 Add 1 (2-83)

UNIDO

PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL		17. 1985		18.		19.		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
SUBCONTRACTS										
21-00 Subcontracts										
TRAINING										
31-00 Individual fellowships	8	16,800	8	16,800						
32-00 Study tours; UNDP group training	2	4,200	2	4,200						
33-00 In-service training										
34-00 Non-UNDP group training										
35-00 Non-UNDP meetings										
39-99 TOTAL–TRAINING COMPONENT	12	21,000	12	21,000						
EQUIPMENT										
41-00 Expendable equipment		3,700		3,700						
42-00 Non-expendable equipment		26,300		26,300						
43-00 Premises										
49-99 TOTAL–EQUIPMENT COMPONENT		30,000		30,000						
MISCELLANEOUS										
51-00 Sundries										
55-00 Hospitality (non-UNDP projects)										
56-00 Support costs (CC and DC projects only)										
59-99 TOTAL–MISCELLANEOUS COMPONENT										
SURPLUS/DEFICIT										
81-00 Surplus/Deficit (ADM/FS use only)										
99-99 PROJECT TOTAL										
[c] COST SHARING (UNDP/IPF projects only)										
[c] NET UNDP CONTRIBUTION		75,000		75,000						

[c] For information only – *not* for PAD input

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF METAL WORKING INDUSTRY

PROJECT TITLE

ASSISTANCE TO METAL WORKING INSTITUTE OF TABRIZ

PROPOSAL NO. 28

UNIDO

VIENNA

MAY 1985

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PREPARATORY ASSISTANCE DOCUMENT

Title: Preparatory Assistance to Metalworking Institute of Tabriz

Country: Islamic Republic of Iran

Number:

Primary Function: Direct support

Duration: 6 months

Secondary Function: Institution Building

Sector: (Govt. Class.): Metalworking industry

(UNDP class. and code): 3530 Industrial services and institutions
3521 Manufacturing industries

Sub-sector: (Govt. class.):

(UNDP class. and code):

Government Implementing Agency: Ministry of Heavy Industry, IDRO

Executing Agency: UNIDO (IO/ENG)

Estimated Starting Date:

Government Inputs: In kind

UNDP Inputs: US $ 110,000

Approved:

Resident Representative on behalf of the United Nations Development Programme

Date:

PART I LEGAL CONTEXT

This project shall be the instrument (therein referred to as a plan of operation) envisaged in article I, paragraph 7 of the Agreement between the Government of Iran and the United Nations Development Programme signed by the parties on 6 October 1959.

PART II THE PROJECT

A. DEVELOPMENT OBJECTIVES

(i) To promote the development of fabricated metal products and machinery industries towards achieving a higher degree of self-reliance in the sector.

(ii) To strengthen the manufacturing capability of the general metalworking and machinery industries.

B. PROJECT OBJECTIVES

(i) To assist the Industrial Development and Renovation Organization (IDRO) to assess the existing manufacturing capability of the metalworking and machinery industries and analyse their needs for strengthening this capability.

(ii) To identify the activities of the Metalworking Institute of Tabriz to meet the above needs and to provide the required industrial services and training to strengthen the manufacturing capability of the industries in terms of engineering design, tool engineering, manufacturing processes, production know-how, etc.

C. SPECIAL CONSIDERATIONS

(i) The Government of Islamic Republic of Iran has placed a high priority on achieving an increased degree of self-reliance in the industry.

(ii) The increased self-reliance in automotive and other transport equipment industries and the basic machine tool and other machinery industries is directly related to improved intra- and inter-industry linkages both in capital equipment and component transactions with the metalworking and machinery industries and within the latter, which is dependent on its manufacturing capability.

(iii) The present project has its objective to provide preparatory assistance to identify the needs as to in what areas and how to provide these inputs into the metalworking and machinery industries at the grass root level so as to realize the self-reliance in the said industries.

D. BACKGROUND AND JUSTIFICATION

In the public sector, under the Industrial Development and Renovation Organization (IDRO) there are about 110 factories (employing about 17,000 people) out of which 25-30 units are in the automotive sector, 15 - 20 in the machine building, 30 - 35 in the general metalworking and metallurgical sectors and the rest in other related areas.

As Tabriz is an important centre for industrial activities, the Government had established a metalworking institute. The buildings and some physical facilities are ready, but a work programme is yet to be elaborated.

(i) Development Hypothesis

To increase the self-reliance in the fabricated metal products and machinery industries, it involves strengthening the manufacturing capability of the industry enabling it to produce the necessary components, sub-assemblies, systems and higher end-products including machinery etc. for supply within the industry and to meet the derived demand from other metal-working and non-metal working industries, at competitive prices and comparable quality so as to meet the needs of the user sectors. This would demand strengthening of the manufacturing capability in terms of engineering design, productivity and quality.

The project has its objective to provide preparatory assistance to identify the needs and the technical assistance required which is aimed at strengthening the manufacturing capability that would contribute to the development objective.

(ii) Project Hypothesis

The project is expected to provide assistance in assessing the existing level of manufacturing capability, the present manufacturing operations and future potential, in the identification of the needs of the industry in terms of products required, the problem areas, etc., and to specify the areas where the manufacturing capability in terms of product design, tool design, manufacturing processes, production techniques, etc., is inadequate, and to arrive at the required activities of the metal working institute to provide the necessary training and services in the above areas; thus contributing to the achievement of the project objective.

E. PROJECT OUTPUTS

The expected outputs of the project are:

(i) Products and manufacturing operations of the metal working and machinery industries identified (including future potential products for indigenous manufacture).

(ii) Assessment of the existing manufacturing capability in the industry, together with identified areas where the capability is inadequate in relation to existing operations as well as future products foreseen.

(iii) Needs specified in terms of training, and technical services that could be provided by the metal working institute of Tabriz to the industrial establishments in order to overcome the capability constraints.

(iv) Study tour for two senior officials for two months each.

(v) Programme of activity for the metal working institute of Tabriz, in the specific areas identified.

(vi) Detailed inputs in terms of facilities identified for provision to the institute comprising of the equipment, instrumentation, etc.

F. PROJECT ACTIVITIES

The project staff together with the counterpart staff shall carry out the following activities:

(i) Activities related to output 'Products and Manufacturing Operations':

- field survey of the existing manufacturing operations and products;
- examination of the imported products;
- identification of products for import substitution.

(ii) Activities related to output 'Assessment of Existing Manufacturing Capability':

- field study of selected manufacturing establishments;
- assessment of the existing manufacturing capability in terms of skills, equipment, management, etc.;
- identification of areas of expertise required, with reference to additional products of potential .

(iii) Activities related to 'Needs of Training and Services':

- identification of areas of assistance to industrial establishments in terms of training and services.

(iv) Activities related to 'Study Tour':

- a study tour to be undertaken by two senior officials for a period of two months to visit 4-5 developing and industrialized countries and UNIDO projects to secure information and exchange experience.

(v) Activities related to 'Programme of Activity':

- formulation of programmes of activity for the metal working institute including those for:
  - initial identification of needs/activities;
  - continuous diagnostic analysis;
  - programming and scheduling of demonstration, instruction, etc.;
  - activities related to product design, manufacturing processes, operation layouts, methods, production techniques, tools, jigs and fixtures, materials, inspection and quality control, etc.

(vi) Activities related to 'Inputs and Facilities':

- identification of physical facilities, equipment, etc.;
- identification of personnel requirement.

G. PROJECT INPUTS

(a) Government Inputs

Counterpart staff including administrative support services, physical facilities, operational expenses including internal travel within the country.

(b) UNDP Inputs

The expert services are foreseen for subcontracting

		m/m	US$
(i)	Cost of subcontract for the services of experts in the areas:		
	- production engineering	3	25,650
	- design and development	3	25,650
	- industrial training	3	25,650
	Home office work (1 month)		15,050
	Subtotal		92,000
(ii)	Study tour (2 officials, 2 months each)	4	17,000
(iii)	Miscellaneous		1,000
	TOTAL INPUTS		110,000

H. PREPARATION OF THE WORKPLAN

The workplan shall be prepared by the leader of the team of experts in consultation with and in UNIDO.

I. PREPARATION OF THE FRAMEWORK FOR EFFECTIVE PARTICIPATION OF NATIONAL AND INTERNATIONAL STAFF

All activities necessary to produce the expected outputs shall be jointly carried out by the national and the international staff. The respective roles of the members shall be determined by the respective leaders in mutual consultation at the beginning of the project and set out in a Framework for Effective Participation of National and International Staff in the Project.

J. DEVELOPMENT SUPPORT COMMUNICATION

All periodic consultative meetings, meetings with industry representatives, and internal informal discussions shall be conducted in accordance with the agreed established procedures.

K. INSTITUTIONAL FRAMEWORK

(i) A Technical Working Group consisting of representatives, from the Ministry of Heavy Industry, automotive group, national project director, UNIDO/UNDP team leader and UNDP representative shall be constituted to review and advise on all technical matters and overall progress of the project and report to the Project Management Committee.

(ii) A Project Management Committee shall be established consisting of senior representatives from the Ministry of Heavy Industries, IDRO, etc, and national project director, UNIDO/ UNDP team leader to coordinate and take action on all policy matters and assist in the effective implementation of the project to realize the project objectives.

L. PRE-REQUISITE

As the industrial survey activity is of importance to the project, the visits to individual establishments may be effectively co-ordinated.

M. FUTURE UNDP ASSISTANCE

This shall be assessed on the basis of the recommendations of the analysis as presented in the report. The future assistance is foreseen in the area of establishing the metal working institute of Tabriz, as a continuation of this preparatory assistance.

PART III : SCHEDULES OF MONITORING, EVALUATION AND REPORTS

A. TECHNICAL REVIEWS

The project will be subject to periodic technical review in accordance with the policies and procedures established by UNDP for monitoring the project.

B. EVALUATION

The project will be subject to evaluation, in accordance with the policies and procedures established for the purpose by UNDP.

C. REPORTS

The draft of the final report shall be prepared by the international staff in accordance with the established rules and terms of reference.

A N N E X I

PROJECT BUDGET

Budget covering UNDP contribution is presented in Annex I.

UNIDO

PROJECT BUDGET/REVISION

A N N E X I

3. COUNTRY	4. PROJECT NUMBER AND AMENDMENT	5. SPECIFIC ACTIVITY
ISLAMIC REP. IRAN		

10. PROJECT TITLE

PREPARATORY ASSISTANCE TO METAL WORKING INSTITUTE OF TABRIZ

15. INTERNATIONAL EXPERTS (functional titles required except for line 11-50)	16. TOTAL		17. 1985		18.		19.		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
11-01										
02										
03										
04										
05										
06										
07										
08										
09										
10										
11										
12										
13										
14										
15										
16										
11-50 Short term consultants										
11-99 Sub-total—International experts*										

21. REMARKS

* If more than 16 experts are required check here ☐ and attach continuation sheet 1A. This sub-total *must* include all experts.

UNIDO

PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL		17. 1985		18.		19.		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
OPAS EXPERTS (functional titles required)										
12-01										
12-02										
12-03										
12-99 Sub-total—OPAS experts[b]										
ADMINISTRATIVE SUPPORT PERSONNEL										
13-00 Clerks, secretaries, drivers										
13-50 Freelance interpreters (non-UNDP projects)										
13-99 Sub-total—Administrative support personnel										
UN VOLUNTEERS (functional titles required)										
14-01										
14-02										
14-03										
14-04										
14-99 Sub-total—UN Volunteers[b]										
15-00 Project travel										
16-00 Other personnel costs (including UNIDO staff mission costs)										
NATIONAL EXPERTS (functional titles required)										
17-01										
17-02										
17-03										
17-04										
17-05										
17-99 Sub-total—National experts[b]										
19-99 TOTAL—PERSONNEL COMPONENT										

[b] If additional individual budget lines are required, check here ☐ and attach continuation sheet 1A. These sub-totals must include budget lines listed on page 1A.

UNIDO

PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. m/m	18. $	19. m/m	19. $	20. m/m	20. $
SUBCONTRACTS										
21-00 Subcontracts		92,000		92,000						
TRAINING										
31-00 Individual fellowships										
32-00 Study tours; UNDP group training	4	17,000	4	17,000						
33-00 In-service training										
34-00 Non-UNDP group training										
35-00 Non-UNDP meetings										
39-99 TOTAL–TRAINING COMPONENT	4	17,000	4	17,000						
EQUIPMENT										
41-00 Expendable equipment										
42-00 Non-expendable equipment										
43-00 Premises										
49-99 TOTAL–EQUIPMENT COMPONENT										
MISCELLANEOUS										
51-00 Sundries		1,000		1,000						
55-00 Hospitality (non-UNDP projects)										
56-00 Support costs (CC and DC projects only)										
59-99 TOTAL–MISCELLANEOUS COMPONENT		1,000		1,000						
SURPLUS/DEFICIT										
81-00 Surplus/Deficit (ADM/FS use only)										
99-99 PROJECT TOTAL		110,000		110,000						
[c] COST SHARING (UNDP/IPF projects only)										
[c] NET UNDP CONTRIBUTION		110,000		110,000						

[c] For information only – *not* for PAD input

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PROJECT PROPOSAL

FOR THE

DEVELOPMENT OF AUTOMOTIVE INDUSTRY

PROJECT TITLE

ASSISTANCE TO AUTOMOTIVE INDUSTRIES GROUP - IRAN

PROPOSAL NO. 29

UNIDO
VIENNA

MAY 1985

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

PREPARATORY ASSISTANCE DOCUMENT

Title: Preparatory Assistance to Automotive Industries Group

Country: Islamic Republic of Iran

Number:

Duration: 6 months

Primary Function:

Secondary Function:

Sector (Govt. Class): Automotive Industry

(UNDP Class. and Code):

Sub-sector: (Govt. Class.)

(UNDP Class. and Code):

Government Implementing Agency: Ministry of Heavy Industry: Industrial Development and Renovation Organization (IDRO)

Executing Agency: United Nations Industrial Development Organization

Estimated Starting Date:

Government Inputs: In kind

UNDP Inputs: US $ 122,000

Approved:

Resident Representative on behalf of the United Nations Development Programme

Date:

PART I: LEGAL CONTEXT

This project shall be the instrument (therein referred to as a plan of operation) envisaged in article I, paragraph 7 of the Agreement between the Government of Iran and the United Nations Development Programme signed by the parties on 6 October 1959.

PART II: THE PROJECT

A. DEVELOPMENT OBJECTIVES

(i) To promote the development of automotive industry to achieve a higher degree of self-reliance in the sector.

(ii) To strengthen the manufacturing capability in the automotive industry, in particular heavy duty components in the production plants and component production in the ancillary industry.

B. PROJECT OBJECTIVES:

(i) To assist the Industrial Development and Renovation Organization (IDRO) to assess the existing capability in the automotive industry and analyse their problems in relation to production of heavy duty components in the plants and auxiliary components in the ancillary units and identify their needs for strengthening the manufacturing capability.

(ii) To draw up a programme of activity to meet the above needs to develop the production of engines, gear box and axles and other components;

(iii) To chart out the activities for an automotive testing and R + D facility aimed at providing assistance to the industry for accelerated development.

C. SPECIAL CONSIDERATIONS:

(i) The Government of Islamic Republic of Iran has placed a high priority on achieving increased self-sufficiency in the automotive industry.

(ii) The engines and transmission elements including gear box and axles are at present critical items.

(iii) The present project has its objective to provide preparatory assistance to undertake an in-depth analysis of the main problems of the automotive industry so as to identify a course of action for accelerated amelioration of the constraints and identify the technical assistance needs to be provided through an industrial project.

D. BACKGROUND AND JUSTIFICATION

Under the 'Automotive Industries Group' of the Industrial Development and Renovation Organization (IDRO) there are several plants producing passenger cars, pick-up vehicles, mini-buses, motor cycles, including plants for power trains, axles, frames/chassis. Apart from these there are private components manufacturing establishments in the ancillary industry. IDRO is also considering establishment of plants for engines, gear box and automotive axles. The industry faces many problems related to quality, cost of production,design and testing. There is an urgent need to identify the problems, critical constraints and to embark on a programme of accelerated development to realize the goals of self-reliance in the automotive industry.

(i) Development Hypothesis

To increase the self-reliance in the automotive industry it involves strengthening of the manufacturing capability of the plants producing the major heavy duty items including engines, transmissions, axles etc. as well as the capability of the establishments producing components in the ancillary industry, enabling them to produce the products at competitive prices and comparable quality. This would require strengthening of capability of the industry in terms of design of the components, production techniques, methods, quality control, etc. and the physical production facilities with the appropriate plant and machinery and testing facilities with the necessary equipment. However, it needs an initial in-depth assessment of the existing capability and an analysis of the problems and constraints; and identification of the areas of needs of technical assistance and the activities and mode of implementation of the provision of such assistance. The present project has this as its objective which would lead to the realization of the development objective.

(ii) Project Hypothesis

The project is expected to provide assistance in assessing the existing manufacturing capability of the automotive industry in terms of production of heavy duty items including the engines, gear box and axles as well as ancillary components and to clearly identify the problems and capability constraints in terms of design, manufacturing processes, production techniques, quality control, cost of production etc., and to arrive at the required programme of action to overcome these constraints and ameliorate the problems together with establishment of physical facilities such as for testing, R and D, and training etc. The assessment, analysis and identified areas for technical assistance, which are the expected outputs of the project would be instrumental in achieving the project objective of the preparatory assistance aimed at a technical assistance industrial project for accelerated development of automotive industry.

E PROJECT OUTPUTS

The expected outputs of the project are:

(i) Existing products of the automotive industry, imports, potential products for indigenous production identified, future demand, approximate investments etc. Existing manufacturing operations in the plants producing heavy duty components and ancillary establishments identified, existing industrial infrastructure analysed.

(ii) Existing manufacturing capability assessed, together with clearly identified areas where capability is inadequate in relation to existing products and those foreseen for future production.

(iii) Needs specified in terms of capability and physical facilities including those for production, design, testing and R and D to overcome the constraints.

(iv) Study tour for four senior officials for two months each.

(v) Programme of action formulated for assisting/establishing plants for the production of heavy duty items, namely engines, gear boxes, axles etc. and assisting the ancillary automotive industry.

(vi) Programme of activity drawn-up for testing and R and D facilities, design and production training facilities as identified and foreseen.

(vii) Advice and assistance to plant management on immediate production, testing and R and D problems.

(viii) Detailed inputs for facilities identified in terms of personnel, equipment and future programmes.

F PROJECT ACTIVITIES

The project staff together with the counterpart staff shall carry out the following activities:

(i) Activities related to output: 'Products and manufacturing Operations'

- field survey of existing plants and establishments and identification of products and manufacturing operations.
- analysis of domestic production, present imports, projection of future demand.
- examination of imported products and identification of parts for import substitution.
- identification of products, their volume for domestic production, and approximate investments.
- Identification of existing and additional industrial infrastructure.

(ii) Activities related to output: 'Assessment of existing manufacturing capability'

- field study of selected manufacturing plants and establishments.
- assessment of the existing manufacturing capability in terms of skills, equipment, management etc.,
- identification of the problems and areas of capability where additional expertise is required in relation to both existing products and future products foreseen.

(iii) Activities related to output: 'Needs of capability and facilities'

- identification of areas of technical assistance to automotive plants and ancillary units in terms of training and services and other direct support.
- identification of facilities for continuous service to the manufacturing establishments in the areas of testing, R and D; design and production training etc.

(iv) Activities related to output: 'Study Tour'

- organizing a study tour for four senior officials responsible for the production and performance of the automotive plants for two months each; to visit plants similar to those envisaged and UNIDO projects and study their operations in 4 to 5 countries; identification of the plants etc.

(v) Activities related to output: 'Programme of Action'

- formulation of a programme of action for the establishment of the production of heavy duty items such as engines, gear box, axles etc., in the automotive plants/new plants.

(vi) Activities related to output: 'Programme of Activity for facilities'

- drawing up of a programme of activity for the testing and R and D facility, design and production training facility etc. including those for

- initial identification of needs/activities.

- continuous diagnostic analysis.

- programming and scheduling of demonstration, instruction etc.

(vii) Activities related to 'Advice and Assistance to the plant management'

- Pinpoint actual production problems.

- Advise on immediate and long-term solutions for the above.

- Assist in testing and R and D problems.

(viii) Activities, related to output: Inputs for Facilities

- identification of physical facilities, equipment etc.
- identification of personnel requirements.

G. PROJECT INPUTS

a) Government Inputs

Counterpart staff including administrative support services, physical facilities, operational expenses including internal travel within the country.

b) UNIDO Inputs

The expert services are foreseen for sub-contracting

		m/m	US$
i)	cost of sub-contract for the services of experts in the areas:		
	- automotive engine production	3	25,650
	- gear and gearbox production	3	25,650
	- Axle production	3	25,650
	Home office work (1 month)		15,050
	Sub-total, sub-contract		92,000
ii)	Study Tour (4 officials, 2 months each)	8	28,000
iii)	Miscellaneous		2,000
	Total Inputs		122,000

H. PREPARATION OF THE WORKPLAN

The workplan shall be prepared by the leader of the team of experts in consultation with and in UNIDO.

I. PREPARATION OF THE FRAMEWORK FOR EFFECTIVE PARTICIPATION OF NATIONAL AND INTERNATIONAL STAFF

All activities necessary to produce the expected outputs shall be jointly carried out by the national and the international staff. The respective roles of the members shall be determined by the respective leaders in mutual consultation at the beginning of the project and set out in a Framework for Effective Participation of National and International staff in the Project.

J. DEVELOPMENT SUPPORT COMMUNICATION

All periodic consultative meetings, meetings with industry representatives and internal informal discussions shall be conducted in accordance with the agreed established procedures.

K. INSTITUTIONAL FRAMEWORK

i) A Technical Working Group consisting of representatives from the Ministry of Heavy Industry, Automotive group, national project director, UNIDO/UNDP team leader and UNDP representative shall be constituted to review and advise on all technical matters and overall progress of the project and report to the Project Management Committee.

ii) A Project Management Committee shall be established consisting of senior representatives from the Ministry of Heavy Industries, IDRO, etc. and National Project Director, UNIDO/UNDP Team Leader to coordinate and take action on all policy matters and assist in the effective implementation of the project to realize the project objectives.

L. PRE-REQUISITE

As the industrial survey activity is of importance to the project, the visits to indivudual establishments may be effectively co-ordinated.

M. FUTURE UNDP ASSISTANCE

This shall be assessed on the basis of the recommendations of the analysis as presented in the report. The future assistance is foreseen in the area of strengthening existing automotive plants and/or establishing new ones; as well as assisting ancillary industry and establishing service facilities, as a continuation of this preparatory assistance.

PART III: SCHEDULES OF MONITORING, EVALUATION AND REPORTS

A. TECHNICAL REVIEWS

The project will be subject to periodic technical review in accordance with the policies and procedures established by UNDP for monitoring the project.

B. EVALUATION

The project will be subject to evaluation, in accordance with the policies and procedures established for the purpose by UNDP.

C. REQPORTS

The draft of the final report shall be prepared by the sub-contractor staff in accordance with the established rules and terms of reference.

ANNEX I

PROJECT BUDGET

Budget covering UNDP contribution is presented

in Annex I

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PROJECT BUDGET/REVISION

3. COUNTRY	4. PROJECT NUMBER AND AMENDMENT	5. SPECIFIC ACTIVITY
Islamic Rep.of Iran		

Annex I

10. PROJECT TITLE

Preparatory Assistance to Automotive Industries Group

15. INTERNATIONAL EXPERTS (functional titles required except for line 11-50)	16. TOTAL		17. 1985		18.		19.		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
11-01										
02										
03										
04										
05										
06										
07										
08										
09										
10										
11										
12										
13										
14										
15										
16										
11-50 Short term consultants										
11-99 Sub-total—International experts*										

21. REMARKS

* If more than 16 experts are required check here ☐ and attach continuation sheet 1A. This sub-total *must* include all experts.

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PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL		17. 1985		18.		19.		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
OPAS EXPERTS (functional titles required)										
12-01										
12-02										
12-03										
12-99 Sub-total–OPAS experts[b]										
ADMINISTRATIVE SUPPORT PERSONNEL										
13-00 Clerks, secretaries, drivers										
13-50 Freelance interpreters (non-UNDP projects)										
13-99 Sub-total–Administrative support personnel										
UN VOLUNTEERS (functional titles required)										
14-01										
14-02										
14-03										
14-04										
14-99 Sub-total–UN Volunteers[b]										
15-00 Project travel										
16-00 Other personnel costs (including UNIDO staff mission costs)										
NATIONAL EXPERTS (functional titles required)										
17-01										
17-02										
17-03										
17-04										
17-05										
17-99 Sub-total–National experts[b]										
19-99 TOTAL–PERSONNEL COMPONENT										

[b] If additional individual budget lines are required, check here ☐ and attach continuation sheet 1A. These sub-totals must include budget lines listed on page 1A.

UNIDO

PROJECT BUDGET/REVISION

4. PROJECT NUMBER	16. TOTAL m/m	16. TOTAL $	17. 1985 m/m	17. 1985 $	18. m/m	18. $	19. m/m	19. $	20. m/m	20. $
SUBCONTRACTS										
21-00 Subcontracts		92,000		92,000						
TRAINING										
31-00 Individual fellowships										
32-00 Study tours; UNDP group training	8	28,000	8	28,000						
33-00 In-service training										
34-00 Non-UNDP group training										
35-00 Non-UNDP meetings										
39-99 TOTAL—TRAINING COMPONENT	8	28,000	8	28,000						
EQUIPMENT										
41-00 Expendable equipment										
42-00 Non-expendable equipment										
43-00 Premises										
49-99 TOTAL—EQUIPMENT COMPONENT										
MISCELLANEOUS										
51-00 Sundries		2,000		2,000						
55-00 Hospitality (non-UNDP projects)										
56-00 Support costs (CC and DC projects only)										
59-99 TOTAL—MISCELLANEOUS COMPONENT		2,000		2,000						
SURPLUS/DEFICIT										
81-00 Surplus/Deficit (ADM/FS use only)										
99-99 PROJECT TOTAL		122,000		122,000						
[c] COST SHARING (UNDP/IPF projects only)										
[c] NET UNDP CONTRIBUTION		122,000		122,000						

[c] For information only — *not* for PAD input