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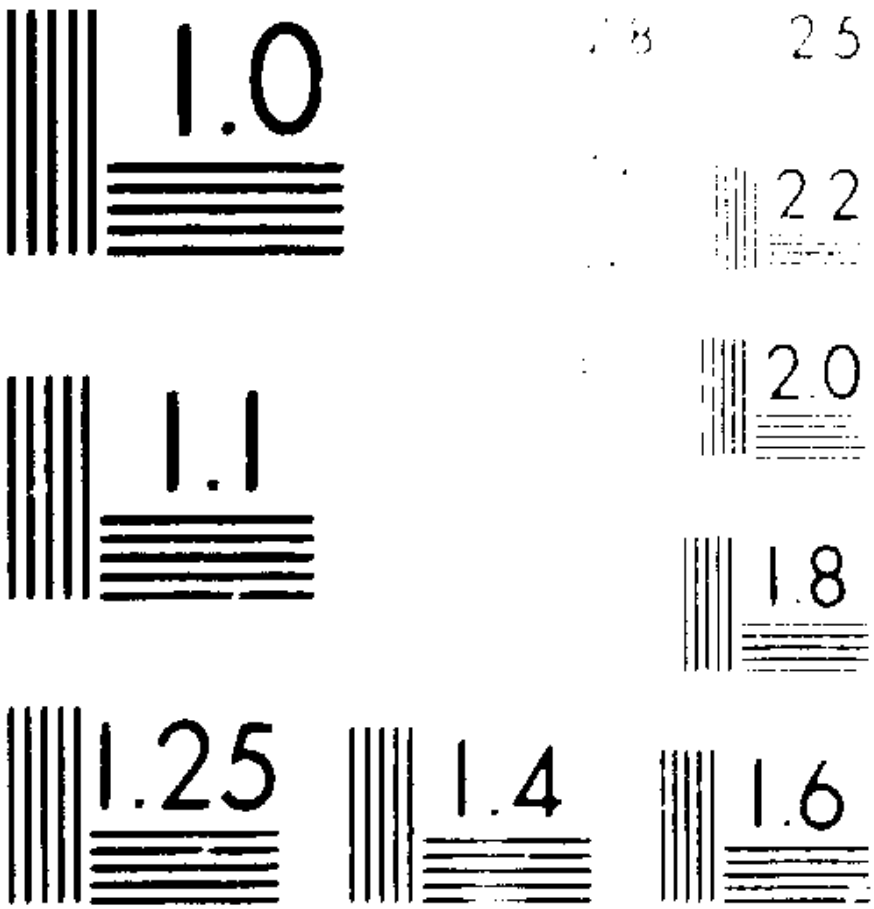
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F I N A L R E P O R T

Vietnam.

REPAIR AND MAINTENANCE OF PUBLIC TRANSPORT VEHICLES IN HO CHI MINH CITY

PROJECT No. DP/VIE/80/055

The views expressed in this report are those of the contractor and do not necessarily reflect the views of UNIDO

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CZECHOSLOVAKIA

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I N T R O D U C T I O N

The present report concerns the work of the mission of Czechoslovak experts P. Dvořáček M. Sc. and A. Straževský M. Sc. from Polytechna/INPRO in Vietnam from 28th April till 1st June 1982. The members of the mission worked within the UNIDO Project No. P82/06-DP/VIE/80/055 "Repair and Maintenance of Public Transport Vehicles in Ho Chi Minh City.

The work schedule of the mission in Vietnam was prepared by the Ministry of Transportation and Communication which has its headquarters in Hanoi and whose representatives were the chief partners of the mission during its activities, as well as in the course of the concluding discussions.

The mission was also in close contacts with the UNDP office in Hanoi and consulted them on all important matters. The report contains information collected and evaluated by the mission and investigates the possibilities to improve the work of repair and maintenance workshops, to train local staff and to provide facilities for training in production of spare parts for Ho Chi Minh City.

The mission activities and the findings were aimed at the most appropriate use of the UNDP contribution and improvement of the present situation particularly in training of Vietnamese staff, training facilities and suplementary production and renovation of spare parts for public transport means of Ho Chi Minh City.

Ho Chi Minh City is the most populated area of Vietnam. Its population amounts to 3,5 million, out of 55,600.000 inhabitants of Vietnam. The problem with public transportation in Ho Chi Minh City is the most acute one. The public transport system is supposed to handle one million passengers per day to the distance of about 30 kms, with a need for buses of the utmost importance. Most of public transport means are out of operation. The main reason for this situation is the lack of adequate qualified personnel, the lack of training facilities and snare parts for the different types of the vehicles.
The population is not evenly distributed all over the Country. In Ho Chi Minh City the density of the population exceeds 1000 inhabitants/km^2. The growth of the population is estimated at 2.5 - 2.6% per year.

The work of the mission in the Socialist Republic of Vietnam was divided into two periods. In the first period the mission was in Hanoi and discussed the essential questions and the work programme with the Ministry of Transportation and Communication - the counterpart Agency. During this time the mission also visited the Research Institute for Science and Technology and maintenance and repair plants and factories for the manufacture of spare parts both for public transport vehicles and civil engineering equipment. Some of these factories manufacture spare parts for Ho Chi Minh City and for Vietnam as well.

In the second period the mission visited similar plants and factories in Ho Chi Minh City. The mission was aimed at collecting the data about maintenance and repair and production of spare parts for the public transport and civil engineering means in Ho Chi Minh City.

The mission prepared recommendations and a project document. The list of persons met during the mission is enclosed in Annex No. 7.

1. WORK IN HANOI

1.1. Visit to the Ministry of Transportation and Communication

The entire transport in Vietnam is centrally managed and controlled by the Ministry of Transportation and Communication which is responsible for automobile, railway, river and sea transportation. It also takes care of building and reconstruction of roads, bridges, railway, river and sea harbours, research, mechanization and maintenance and repair of all transport means.

The Ministry is divided into 3 Departments:

The 1st Department controls transportation in the individual provinces

The 2nd Department is responsible for general policy of all transportation in the Socialist Republic of Vietnam

The 3rd Department is responsible for the mechanization and technical development of transport means and maintenance both for public and civil engineering equipment.

The 1st Department - controls 68 small repair shops with total number of 15 000 employees, out of which 1 500 are graduate engineers. These repair shops carry out routine maintenance and repairs of vehicles.
The total number of equipment is approx. 3 000 pcs with value of production of roughly 40 million Dong per year.

The 2nd Department - controls 29 works, out of which:

5 works for railway transport
3 works for automobile transport
5 works for sea transport
4 works for river transport
12 works for the manufacture of civil engineering equipment.

Total number of employees 39 000,
out of which 1 900 graduate engineers.
Total number of equipment 3 000 pcs.
Value of production is approx. 80 million Dong per year.

The 3rd Department - controls 11 repair factories and 1 research institute in relation to the manufacture of spare parts.
The factories are as follows:

5 works for repair of ships
5 works for repair of automobiles
1 work for repair of civil engineering equipment.

Total number of employees is approx. 11 000,
total number of equipment is approx. 3 000 pcs,
the yearly production amounts to approx. 100 million Dong.

The manufacture of spare parts for public transport vehicles and civil engineering equipment began in 1954 under the guidance of the Ministry of Heavy Industry.

The mission had technical discussions particularly with the Mechanical Engineering 3rd Department which is responsible for production of spare parts in the Ministry and related to the factories in Ho Chi Minh City. During these discussions the representatives of the State Planning Committee were present. It was understood out of the discussions that there is an acute need for rehabilitation of the existing facilities, training of the personnel and production of spare parts locally due to financial restraints in purchase of these parts abroad.
Coordination actions with other Ministries were also envisaged by the Ministry in securing the better level of maintaining of the existing transport fleet.

The mission visited 5 works for the repair and maintenance and manufacture of spare parts for vehicles and civil engineering equipment and the Research Institute for Science and Technology in Hanoi, and 4 works in Ho Chi Minh City.

1.2. Research Institute for Science and Technology in Transportation in Hanoi

The Institute was founded in 1979 and is controlled directly by the Ministry of Transportation and Communication.
The main tasks of the Research Institute are planning and design of spare parts for all types of vehicles which are at present in operation in the country. This concerns mostly in providing documentation or manuals of a specific type of components as the basis for further preparation of working drawings.

Among these components are the following:

- engine as a whole
- fuel system incl. the fuel injection pumps
- gear boxes and differential gears
- axles and Cardan shaft etc.

The Institute works on the following major types of vehicles:

- trucks and buses of DESOTO, INTERNATIONAL, REO makes with carrying capacity of 3.5 and 7 t;
- light trucks of TOYOTA, LAMBRO 550 makes ;
- medium trucks GALION 50 and 70 HP ;
- civil engineering machines such as CATERPILLAR - D4, D7, D9 and KOMASU.

The Institute has no large experience in this complex of problems. This Institute is not involved in production of spare parts in automotive engineering.

1.3. Factory NGO - ZA - TY

Production programme : Manufacture of spare parts for automobile engines /8 types of internal combustion engines and 4 types of Diesel engines/.

Plant area : 15 000 m^2
Number of employees : 1 200
Production output : Previously - 100 t spare parts per year
Now - 500 t which cost approx. 14 million Dong per year.

This factory is one of the largest factories which manufacture spare parts for transport vehicles for both North and South Vietnam. It combines several workshops.

The Works is 20 years old. Production targets have been increased 6-times since period 1975. At present the Works is in reconstruction. It is Government's intention to build 3 new workshops for the manufacture of gear boxes, drive shafts and an electromechanical department for the repair of electric instruments. The Works has 150 machine tools of old types in a very bad technical condition. It cooperates with 6 factories that provide the manufacture of semi-products such as castings, forgings, nuts, bolts, packings, etc.
They specialize in the manufacture of spare parts for automobile workshops already for 13 years. The quality of the products does not attain the required standard at present. It is the intention to replace within 5 years the major part of the machinery park by machines of a more modern type which would guarantee better quality and more effective production.

The factory has also its apprentice training centre with a capacity of 100 apprentices. The level of training is very low.
The Factory is divided into 6 main production workshops for:

- machining and production of slide bearings;
- production of antifriction bearings;
- manufacture of gear boxes;
- manufacture of automobile and railway shafts;
- foundry products centrifugal casting of non-ferrous metals;
- heat treatment of components - hardening.

The Works manufactures the following spare parts:

- gears up to module 6
- piston rings
- pistons (as semi-products)

- worm steering for ZIL 150 trucks
- bronze-lined divided bearing of connecting rods
- piston pin bearings
- railway journals
- flanges for railway shafts dia 180 mm
- bronze bushings
- knuckle and crosshead pins
- half-axles for medium micro-buses
- cardan shafts for GAZ 69
- milling cutters up to dia 100 mm
- front steering bridge
- certain antifriction bearing types
- turning tools.

Capacity of the factory hardly covers the urgent needs of Hanoi area. The quality of these spare parts needs to be considerably improved. The factory has the greatest difficulties with the manufacture of connectingrod bearings and piston rings. In connecting-rod bearings the main problem lies in the lack of cohesion between the base and cast material.

For reasons of lower production costs the connecting-rod bearings are being lined with lead instead of bronze. The production is at present 10 000 pcs per year. They are planning to increase production to 200 000 pcs per year by 1985.
The piston ring production technology is highly obsolete, especially in heat treatment. The piston rings are cut off on a lathe from a cast iron tube as a semiproduct. This is followed by grinding of the surface, heat treatment and grinding of the oil passage. The factory produces 20 000 pcs per year. After the modernization of the machinery park and the introduction of a more modern technology, a production of up to 100 000 pcs per year is planned.

The Factory Management requires assistance in solving the following problems:

1. Introduction of modern piston ring production technology, including heat treatment.
2. Solving of the problem of an adequate joining of the base and cast materials for connecting-rod bearings and the introduction of up-to-date production technology.
3. Equipment of the shops with inspection measuring instruments in metric execution.
4. Training of local staff in production of major spare parts both in quantitative and qualitative forms.

1.4. Automotive Repair Factory CHOA - BINH

Production programme:	Repairs of trucks, trailers, buses, manufacture and repairs of wheel disks, roller bearings and spare parts for trucks.
Number of employees:	approx. 1 000
Plant area:	50 000 m2 with the possibility of expansion by 20 000 m2.
Production capacity:	Repair of 600 trucks, 200 buses and 700 trailers with a load-carrying capacity of 3 t per year, overhauls of ZIL 169 type trucks with a load-carrying capacity of 5 t.

The factory handles the manufacture of medium size pontoons and adapts trucks for fording.

In order to improve the quality of production and diversify assortment of spare parts the factory badly needs the following equipment:

- Modern equipment for the manufacture of roller bearings including grinding of rollers dia 12-14 mm, length 15-20 mm
- Manual spot welding machines
- Post-repair inspection equipment for brakes testing
- High-frequency hardening equipment for hardening of half-axle ends (dia 50-100 mm)
- 5 pcs pulley blocks of 1 to 2 ton lifting capacity
- 3 pcs hydraulic jacks of 4 to 10 ton carrying capacity
- Inspection equipment for engine compression test
- Gear milling machine up to a module of 4-6
- Universal tool grinding machine
- 6 pcs manual drilling machines up to dia 13 mm
- Equipment for repair of components by surfacing
- Equipment for the manufacture of porcelain coatings for spark plugs
- Inspection measuring instruments
- Cutting tools (for lathes, milling machines, drilling machines, grinding machines)
- Air-less spray gun
- Hot-air degreasing machine

No permenent training is introduced in the factory.

1.5. Repair Factory for Road-Building and Civil Engineering Equipment

Production programme:	Manufacture of road rollers and their overhauls, manufacture of spare parts for various civil engineering equipment
Number of employees:	350
Plant area:	20 000 m2
Production capacity:	Manufacture of 50 new road rollers per year, repairs of 150 road rollers per year

The Factory was built in 1956 and at the present time all workshops are being reconstructed. The factory has their own Diesel-electric power plant with a capacity of 150 kW, a small grey cast-iron foundry with furnace capacity of 3,5 tons, a mechanical shop with 45 machine tools (lathes, drilling machines, milling machines, planers, slotting machines, cylindrical g ing machines for crankshafts and rolls).

The manufacture of gears creates a great problem. Gears are made on shaping machine and finished by manual filing (gears with a module 16-20).
By 1985 the factory is to start the production of mobile cranes with a lifting capacity of 5 t.

The factory needs the following equipment:

- Slotting machine for spur gears up to module 16
- 2 pcs horizontal milling machines
- Centreless grinding machine

1.6. Automobile Repair Factory "3rd February"

Production programme :
- Overhauls of passenger cars and light automobiles of types Volga, Moskwitch, Lada, VAZ 469, GAZ 69
- Manufacture of spare parts
- Manufacture of rubber gaskets
- Manufacture of fuel injection nozzles
- Manufacture of electric contacts, ignition starter switches, rear-view mirrors, horns.

Number of employees : 700

Plant area : 20 000 m^2

Production capacity :
- Overhauls of 500 cars per year
- Electric contacts - 50 000 pcs per year
- Fuel injection nozzles - 5 000 pcs per year

The factory was built in 1966 and since that time every year the reconstruction and modernization of the individual operations are carried out. The factory is not satisfied with technology of repairs and their quality. In order to improve the current situation, the following requirements for equipment were voiced:

- Heat treatment facilities for fuel injection nozzles
- Equipment for inspection and adjustment of fuel injection nozzles complete pumps /12 cylinders/

- Grinding machine for crankshafts /length 1.2 m/
- Workshop inspection and measuring instruments in metric execution
- Airless spray gun
- Drawing documentation for the type PRAGA V 3 S fuel injection nozzles.

The level of production is close to satisfactory. The factory produces spare parts only for Hanoi.

1.7. Factory CH-410

Production programme : Manufacture of spare parts for automobiles and tractors.
Manufacture of joints for caterpillar tractors.
Manufacture of bolts, nuts, spanners, etc.

Number of employees : 300

Plant area : 50 000 m^2

Production capacity : 400 t of spare parts per year which amounts to approx. 2 million Dong.
The planned production is 1 500 t per year.

The factory was built in 1967. The present production programme was introduced in 1975. The present production process is divided into three production parts:
- Assembly and dismantling of caterpiller tractor

- Manufacture of new spare parts (machining shop)
- Forge (manufacture of semi-products-forgings).

The manufacture of spare parts is not up to the required technical standards. The factory wants to improve its production with the following machines:

- Eccentric press 400 t - for forge
- Tool milling machine (table clamping surface 800x400)
- Hand grinding machine with flexible shaft for grinding out moulds and with a set of grinding tools
- Turret lathe tools
- Set of spare test specimens /balls for Brinell hardness tester and a diamond with a holder for type TK 15 hardness tester .

The factory has introduced preventive maintenance scheme. It is equipped on satisfactory level, but there is no specialization. The production is oriented for Hanoi area.

2. Work in Ho Chi Minh City

The second period of the mission work was mainly concetrated on identifications of needs and requirements and collecting of necessary data on repairs of public transport vehicles and civil engineering equipment, manufacture of spare parts and developing of proposals for improvement of the present situation.
The following major enterprises were visited namely:

a/ Municipal Transportation Authority of Ho Chi Minh City

b/ No. 1 Automobile Repair Works

c/ The CTHD No. 1 Corporative Enterprise for manufacture of buses and repair of engines

d/ Repair and Service Centre for civil engineering equipment

e/ No. 4 Repair Works for Civil Engineering Equipment

2.1. Visit to the Municipal Transport Authority in Ho Chi Minh City

The leading representatives of the Authority described to the Mission the situation with the transport in Ho Chi Minh City and its surroundings. Ho Chi Minh City is the most populated city in Vietnam. It has very busy traffic in the streets with huge variety of vehicles mainly originated from American and West European markets.

At present the following types of vehicles are in operation:

- TOYOTA	/Japan/	- 5 700 pcs
- FORD	/USA/	- 5 000 pcs
- INTERNATIONAL	/USA/	- 4 800 pcs
- DODGE	/USA/	- 3 600 pcs
- DESOTO	/USA/	- 3 500 pcs
- FARGO	/USA/	- 700 pcs
T o t a l		23 300 vehicles

Out of the total number of vehicles the City has roughly 4 500 buses and the rest are trucks with load carrying capacity higher than 3 t.
Out of the above vehicles types, 40 - 50% have PERKING D 354 engines /USA/. These vehicles have been in operation already for 7 years with minimum availability of spare parts. The repairs are carried out in such a way that 3 to 4 vehicles are dismantled into components and one vehicle is made operational. The total number of civil engineering equipment in Ho Chi Minh City represents approx. 1 200 pcs; they include mainly type D 6 C, D 7 H, D 8 H bulldozers and type 966 C and 988 CATERPILLARS.
There are great difficulties in executing the repairs of Diesel engines for tractors, civil engineering equipment including mobile and building cranes.
There is no factory in South Vietnam which can manufacture spare parts in series for transport vehicles. Each factory is forced to manufacture the required spare parts individually only for their own needs. The methods of repairs are highly uneconomical and do not solve the overall problems of spare parts deficiencies. Due to this fact 20-30% of various types of vehicles are being taken out of operation each year.

With this assumption the whole public transport in Ho Chi Minh City can come to the deadlock if no immediate measures are taken.

The public bus transport in the City is supposed to carry 1 million passengers for a distance of some 30 km per day. On the assumption that 1 bus has transportation capacity of 50 persons, this represents the need of 1 500 buses in an operational state. At present only 800 buses are in operation.
As regards the transportation of goods, it is necessary to handle roughly 100 kg per inhabitant daily. To arrange the transportation of this load 5 000 pcs trucks up to a load-carrying capacity of 5 t are required.
At present only 3 000 pcs trucks are in operation.

2.2. Automobile Repair Works No. 1

Production programme: Manufacture of spare parts
Overhauls of engines
Number of employees: 450
Plant area: 11 000 m2

The Works is the main repair and production works in Ho Chi Minh City and it takes care of overhauls of engines and manufacture of spare parts. The Works is directly controlled by the Municipal Transportation Authority.
The works manufactures the following spare parts:
- Pistons both for automobiles and compressors
- Piston rings
- Connecting-rod and slide bearings for camshafts
- Valves

- Valve lifters
- Pins and journals of all types
- Cylinders

The manufacture of gears and cams is under development.

The Works is carrying out the repairs of vehicles of western countries origin.
The production is concentrated on the manufacture of piston rings, machining of pistons and manufacture of crankshaft slide bearings. From Hanoi area it receives only semi-products for cylinders, piston rings, valves and connecting-rod bearings. All machining operations and heat treatment are carried out at the Works.
The main difficulties in manufacture of the most important types of spare parts are the following:

a) Piston rings - low quality of heat treatment due to the lack of temperature measuring in shaft kilns.
The temperature in a kiln is being estimated roughly which results in a large quantity of rejects (20-50%).

- No adequate quality control and no devices for testing of semi-products.

- No metal structure analysis and the lack of microscopes, sample preparation facilities and other related technique.

b) Pistons - The piston life period and the actual performance of the engines are very short. The required accuracies are not reached due to very old type of machinery used. The (external and internal) machining of pistons is carried out on very old machine types which do not permit the attainment of the required accuracies and outputs.

c) Crankshaft slide bearings - unequal wall casting thickness of the bronze bushings during centrifugal casting due to low and old level of production technology. It requires application and introduction of more modern production technology for slide bearings, The Works needs the following machines and equipment:

- Ultrasonic instruments for determining internal material defects
- Hardness testers
- High-frequency hardening equipment for hardening all types of automotive pins and journals
- Slotting machines
- Tools for gear milling machines in inch execution with a module of P=8 and P=10
- Inspection equipment for engine performance tests
- Equipment for repair of components by depositing of special coatings.

At present the Works does not obtain comprehensive manuals and intructions for carrying out of repairs and preventive maintenance. Training programmes are to be introduced in the Works for lecturing and on-the-job training.

2.3. Corporative Enterprise No. 1 CTHD for manufacture of new buses and repair of engines

Production programme: Manufacture of new buses, 60 pcs per year
Manufacture of 35 chassis for buses
Repair of engines partly

Number of employees: 300

Plant area: 40 000 m2

The corporative enterprise combines of 12 workshops. They carry out mainly repairs of western types auto engines. They intend to diversify production programme.

At present they start the production of a new Vietnamese bus of type SCOTOSO 1 with the use of IFA type engine. The chassis is extended with appropriate adaptation of the drive shaft.

The current target is of 100 buses per year. The target for 1985 is 500. The current target is not yet achieved. To meet the urgent requirements some new machines are to be introduced as follows:

- Press brake for sheet-metal thickness of 2,5 mm and a length of 2,5 m
- Sheet-metal shears for material thickness of 4 mm
- Sheet-metal bending rolls for material thickness of 2,5 mm and a length of 2,5 m
- Marking - off table with size of 2,5x3 m

At present the corporative enterprise uses mainly hand-operation technology. Technology production is to be up-dated and rationalized. Training manuals and instruction courses are also required.

2.4. Repair and Service Centre for civil engineering and road building machines

Production programme: Service inspections
Routine repairs

Number of employees: 120

Plant area: 20 000 m2

The Service Centre was set up only in 1981 and carries out current inspections, repairs and service on civil engineering equipment, such as mobile cranes, caterpillar tractors, bulldozers, excavators, etc.

The present day capacity of repairs is 300 vehicles per year. The capacity of 2500 pcs per year is envisaged for the future. The present day equipment of the Centre is very modest and cannot satisfy under any circumstances the envisaged capacity. The Centre badly needs the following equipment:

- Ultrasonic instruments for internal material flaw tests
- Tensile testing machines for steel cables
- Hydraulic assembly press with capacity of 1 t
- Surface grinding machine - table dimensions 1000 x 320 mm
- Centreless cylindrical grinding machine for max. dia 200 mm.

In general the Centre is very small to carry out major repairs of civil engineering equipment.
Its production capacity will be limited due to work series, qualified personnel and equipment. It can play only a role of a supplementary workshop in the efforts to meet the current requirements.

2.5. Repair and Production Works No. 4 for civil engineering equipment

Production programme:
(very diversified)

- Repairs of trucks of all types
- Construction of river harbours equipment
- Manufacture of pontoon cranes 800 - 1000 t
- Manufacture and repairs of small pontoons
- Control of large tonnage transportation /4 million t.km per year/

Number of employees: 800

Plant area: 170 000 m^2

The Works have additional 11 branch workshops in the South provinces.
The production capacity of the Works No. 4 resulted in a production of:

- 50 pcs new bulldozers
- 15 pcs small river crafts
- 30 t spare parts for civil engineering machines
- 150 t forgings per year
  and overhauls of 150 pcs of civil engineering equipment per year

The Works has its own central acetylene and oxygen station with central distribution system throughout the Works and filling into cylinders with a capacity of 800 pcs per day.
The Works is divided into the following production workshops and processes:

- Material cutting, handling and shaping workshop
- Manufacture of excavators, bulldozers and repairs of steam hammers for piles
- Automobile spare parts repair shop
- Central mechanical workshop (manufacture of spare parts and engine repairs)
- Woodworking shop
- Manufacture and repairs of river craft
- Grey cast-iron foundry (small cupola)
- New hall where free forging hammers, a cold pressing shop and material separation are to be located.

The current requirements of the Works for new machinery and equipment are the following:

- Pneumatic hammer with a hammer weight of 400 kgs
- Surface grinding machine (clamping table 1000x320 mm)
- Internal hole grinding machine (dia 15 mm)
- Centreless cylindrical grinding machine up to dia 60 mm
- Fine boring machine for engine cylinders, max. dia 150 mm
- Honing machines for engine cylinders, max. dia 150 mm

Practically the Works is a major enterprise in Ho Chi Minh City which can handle repair works for civil-engineering equipment.

The available quantity and the capacity of equipment components of the Works is much better than those of

the Centre. The repair works of civil engineering equipment need to be more specialized, rationalized and the training of the staff is to be secured.

3. Statistical data collected during the mission and findings

The public bus transport in the City is supposed to carry 1 million passengers for a distance of some 30 km per day. On the assumption that 1 bus has transportation capacity of 50 persons, this represents the need for 1500 buses in operation condition. At present there are only 800 buses in operation.

As far as the transportation of goods is concerned, it is necessary to handle about 100 kg per inhabitant daily. To arrange the transportation of this load 5000 pcs trucks up to a load - carrying capacity of 5 t are required. At present there are only 3000 pcs trucks in operation.

The situation in the public transport in Ho Chi Minh is reflected in the following table:

Table 1

	Number of pcs	Requirements for pcs	In operation state pcs
Buses	4 700	1 500	800
Trucks	18 600	5 000	3 000
Total pcs	23 300	6 500	3 800
Total percentage	100%	30%	16%

As it is shown in the table only 16% of vehicles are in operational state condition. The major reasons of this drastic situation are the lack of spare parts and difficiancies with the qualification of personnel.

The present requirement on spare parts represents on the average 100 kgs per year for a vehicle with the total sum of 650 t per year. The two main manufecturing and repair works in Ho Chi Minh City have the following yearly planned manufecturing capacity for spare parts:

Works No. 1	250 t per year
Works No. 4	200 t per year

It is envisaged to obtain the remaining 200 t of spare parts from smaller works by their production and also by dismantling and reconditioning of old components of vehicles which are no longer operational.

The planned and actual yearly production of spare parts in the 2 largest above mentioned Works is illustrated in the following Tables:

Repair Works No. 1 in Ho Chi Minh City

Table 2

Spare parts	Planned yearly production	Actual yearly production
Repair of engines	2 000 pcs	250 pcs
Manufacture of pistons	64 000 pcs	16 000 pcs
Manufacture of pistons for compressors	20 000 pcs	5 000 pcs
Manufacture of piston rings	12 000 pcs	3 600 pcs
Manufacture of piston rings for compressors	30 000 pcs	9 000 pcs
Connecting-rod bearings	20 000 pcs	7 000 pcs
Slide camshaft bearings	10 000 pcs	3 500 pcs
Valves	90 000 pcs	36 000 pcs
Valve lifters	60 000 pcs	24 000 pcs
Automotive pins	260 000 pcs	60 000 pcs
Total production of spare parts in t/year	250 t	64 t

Repair Works No. 4 in Ho Chi Minh City

Table 3

Spare parts	Planned yearly production	Actual yearly production
Pistons	3 000 pcs	750 pcs
Piston rings	7 200 pcs	2 100 pcs
Engine cylinders	1 000 pcs	300 pcs
Connecting-rod bearings	6 000 pcs	2 100 pcs
Valves	6 000 pcs	1 800 pcs
Valve lifters	1 000 pcs	300 pcs
Automotive pins	20 000 pcs	9 000 pcs
Manufacture of gear boxes	15 t	4 t
Forgings	500 t	150 t
Overhaul of civil engineering machines	500 pcs	150 pcs
Total production of spare parts in t/year	200 t	70 t

The following requirements for transport vehicles can be forecast in connection with requirements for spare parts:

Table 4

	Present number of vehicles in operation	Present requirements for vehicles	Assumed requirements for 1985
Transportation of persons:	800 pcs	1 500 pcs	1 800 pcs
Transportation of goods:	3 000 pcs	5 000 pcs	6 000 pcs
Manufacture of spare parts:	180 t	650 t	780 t

The Government of Vietnam does not envisage the construction of a new central vehicle repair facility or spare parts production facility either in Ho Chi Minh City or elsewhere in the country;
The Government's intention is merely to increase the efficiency of already existing works.

The Government is planning to improve the maintenance of the existing fleet and to buy in future only those vehicles, for which service facilities and spare parts are more readily available.

Due to the limits in financing it is reasonable to concentrate mainly on the improvements in the existing workshop.

The mission prepared the questionnaire /see Annex No. 6/ and presented it to the representatives of the Ministry of Transportation and Communication on the 3rd of May 1982.

All statistical data were collected on the basis of the questionnaire by the mission. The questionnaire was not actually replied in writing, only partly verbally in the course of the mission. The mission found out that the present needs of existing works are very urgent and cannot be met without outside assistance. The main difficulties are as follows:

- obsolete machinery park
- ineffective and very low technology standards in the manufacture of basic spare parts
- manufacture of spare parts is individual, not serial and it is scattered into many enterprises all over the country
- a large number of transport vehicle types predominantly from the USA and West European countries, for which there is no spare parts production documentation, no workshop handbooks for repairs and identification of faults and defects
- a great deficiency in measuring and inspection instruments, production tools and implements
- qualified technical personnel is very scare
- there are not adequate resources for introduction of new technology improvements in production process management and organization
- preventive maintenance is on the lowest level
- training programmes do not exist.

4. Final Recommendations of the Team

On the basis of its finding the mission recommends the following:

- to recruit international experts namely the Chief Technical Adviser and short-term consultants for implementation of the project

- to concentrate the project on training of national staff through establishment of the training centre and two pilot units for on-the-job training
- to equip pilot units of the training centre with equipment both with UNDP and Vietnamese inputs particularly for the purpose of on-the-job training in the production of major spare parts
- to carry out training programme particularly for only two major enterprises namely No. 1 and No. 4
- to establish production control and preventive maintenance unit for introduction of up-to-date maintenance scheme and modern methods of quality control
- to carry out activities of the training centre for lecturing on basic subjects and theoretical acquaintance with new production methods, new machinery and instrumentation and desing of spare parts
- to carry out activities of the pilot units for on-the-job training with particular attention to the production of spare parts
- to train Vietnamese staff of higher level selected after the local training for further training abroad.

The UNDP and the Government inputs being recommended by the mission are reflected in the following paragraphes:

4.1. UNDP and Government inputs - Provision of expertise through the international team and fellowships programme

4.1.1. Chief technical adviser /see Annex No. 1/

He will be responsible for all the work carried out in the implementation of this project, he will supervise the work of the consultants, the subcontractor's team and will assist in the setting up of the training centre. He will stay in Ho Chi Minh City during the entire period of the project, i.e. 24 months.

Government inputs: office, furniture, transportation, local staff etc.

4.1.2. Short-term consultants for the erection and assembly of machinery and equipment /see Annex No. 3/

They will render technical assistance in the erection and assembly of new machinery and equipment. They will carry out the erection and assembly of complicated machines or some of their parts. The number of these consultants will depend on the case to case needs. Total 12 man-months are envisaged.

Government inputs: workers, erection and assembly materials, power distributions, transportation, execution of foundations, etc.

4.1.3. Short-term consultants for commissioning of turret lathes /see Annex No. 4/

Two consultants, mechanical and electrical engineers will commission 5 pcs of turret lathes and train operators in the control and maintenance of these machines.
Before commissioning the machines, the consultants will carry out reconditioning work, if required. Total 4 man-months is envisaged.

Government inputs: workers, expendable materials, tools, transportation, etc.

4.1.4. UNDP inputs - Subcontract /see Annex No. 5/

A four - member team of specialists will visit the country for a period of 3 months and will render assistance to local workers which will consist of providing instructions, advice and recommendations especially in the manufacture of:

- piston rings
- connecting-rod bearings

- essential spare parts, such as half-axles, gearings, bearings, Cardan shafts, etc.
- in the inspection and tests of the main components of public transport vehicles and civil engineering equipment.

Government inputs: transportation, workers.

4.1.5. UNDP inputs - Training of Vietnamese abroad staff (see Annex No. 2)

Major fields of training are as follows:

- manufacture of piston rings, 2 fellows, total 8 man-months
- manufacture of connecting-rod bearings, 1 fellow, 6 man-months
- manufacture of gears, 2 fellows, total 9 man-months
- manufacture of fuel injection pumps and equipment for the preparation of fuel and air mixture, 2 fellows, total 8 man-months
- management and organization of repair works, 2 fellows, total 10 man-months

4.2. UNDP and Government inputs - Establishment of Training Centre Facilities (Pilot units for on-the-job training and Unit for production control and preventive maintenance)

4.2.1. UNDP inputs - training centre

US $ 42 000
(see Annexes No. 8 and 9)
Government inputs: local staff, building facilities, furniture, transport.

4.2.2. UNDP inputs - Equipment component

for pilot unit for on-the-job training at factory No. 1 US $ 137 400 (see Annex No. 10)
Government inputs: local staff, building facilities, machinery, transportation
(see Annex No. 12)

4.2.3. UNDP inputs - equipment component

Equipment component for pilot unit for on-the-job training at factory No. 4
US $ 269 600 (see Annex No. 11)
Government inputs: local staff, building facilities, machinery, transportation etc. (see Annex No. 13)

4.2.4. UNDP inputs - equipment component

for production control and preventive maintenance unit at factory No. 1
US $ 81 000 (see Annex No. 14)
Government inputs: local staff, building facilities, transportation

The individual positions of technical specifications of machinery and equipment (Annexes No. 10, 11 and 14) are justified by the mission due to great deficiencies in manufacturing of spare parts and in on-the-job training with the current lack of adequate equipment. The main deficiencies appear to consist in the following technological operations:

- machining of pistons, piston rings and engine cylinders, see items 1,2 of Annex No. 10 and items 3, 6, 7 of Annex No. 11

- measuring of hardness after heat treatment, see item 1 of Annex No. 14
- determination of internal material flaws, execution of metallographic analyses and preparation of samples for those analyses, see items 3, 4 of Annex No. 14
- high-quality grinding of both external and internal cylindrical surfaces , see items 4, 5 of Annex No. 11
- free forging, see item 2 of Annex No. 11
- manufacture of slots in components of larger dimensions, see item 3 of Annex No. 10
- manufacture of gears in the inch system, see item 5 of Annex No. 14
- inspection of engines after their repair, see item 4 of Annex No. 10
- execution of repairs of both metal and non-metal components by depositing of special coatings, see item 5 of Annex 10 and item 1 of Annex No. 11
- heat treatment in salt baths and provisions for temperature measurements in electric shaft kilns, see item 4 of Annex No. 14 and item 6 of Annex No. 10
- heat treatment of automotive pins, see item 8 of Annex No. 11
- manufacturing of bolts and nuts, see item 6 of Annex No. 14
- provision of better in-process and final inspection of components, see item 8 of Annex No. 14
- supply of general utility tools and conventionel workshop gauges for the main machine tools essential for the full utilization of their operation capacity, see item 7 of Annex No. 14

With regard to the most effective utilization of the contribution given, the team members have recommended to propose these machines and equipment for the two largest manufacturing and repair works in Ho chi Minh City, i.e. the Works No. 1 and No.4 since the largest number of the qualified technical personnel is con-

centrated in them and they also have at their disposal the better equipped machinery park.

The UNDP and Government inputs for the implementation of large - scale project, its objectives, activities and work plan are developed by the mission and are reflected in the project document submitted separately.

The mission members express gratitude to the UNDP office and UNIDO for the rendered assistance in implementation of the mission objectives.

Annex No. 1

UNITED NATIONS

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

U N I D O

Project in the Socialist Republic of Vietnam

JOB DESCRIPTION
DP/VIE/80/055

Post title	Chief Technical Adviser
Duration	2 years with possibility of extension
Date required	July 1983
Duty station	Ho Chi Minh City with travel to Hanoi
Purpose of project	To render assistance to the Government in maintenance, repairs and manufacture of spare parts for public transport vehicles and civil engineering equipment.
Duties	The Chief Technical Adviser will closely cooperate with the National Director, will organize and supervise on-the-job training and will specifically be expected to : 1. Prepare requisitions for purchasing of equipment, devices and machinery. 2. Prepare a detailed work plan.

3. Detail job descriptions of international staff.

4. Coordinate tne activities of the subcontractor and international experts.

5. Prepare manuals and instructions for preventive maintenance and repairs.

6. Assist and supervise in setting - up of the training centre.

7. Develop fellowships programme of major importance.

8. Control and supervise commissioning of equipment and its putting into operation.

9. Supervise and agree upon related to the project design work of the counterpart agency.

10. Supervise establishing and functioning of the pilot units for on-the-job training.

11. Assist in establishing the production control and preventive maintenance unit.

12. Coordinate designs and production of spare parts.

The Chief Technical Adviser will also be expected to prepare a final report, setting out the findings of his mission and his recommendations to the Government

on further action which might be taken.

QUALIFICATIONS — University degree in mechanical engineering with extensive experience in maintenance, repairs and production of spare parts for vehicles. Knowledge of local conditions an asset.

LANGUAGE — English. Knowledge of French or Russian is an asset.

BACKGROUND INFORMATION — Ho Chi Minh City has a total of some 24 000 public transport vehicles and civil engineering equipment. Out of this approx. 18 500 are trucks with a load-carrying capacity higher than 3 t, approx. 4 500 are buses and more than 1 000 civil engineering equipment. All these vehicles and equipment came from the USA and West European countries and are almost without exceptions more than 7 years old. Only 16% of the above mentioned vehicles are in operation. The existing facilities cannot cope with the demands for spare parts, as well as the demands associated with their maintenance and repairs. The purchase of spare parts from abroad cannot be realized due to non-convertibility of local currency, so that the service is lacking key spare parts which cannot be manufactured locally in satisfactory quantities at present.

Insufficient experience and training of local personnel adversely affect maintenance and repair activities and manufacture of spare parts for these vehicles.
The fear exists that if no rapid measures for improving the situation are taken, all the public transport vehicles in the city will be out of operation within a few years.

Annex No. 2

Training of Vietnamese Fellows abroad

The training of 9 Vietnamese workers will be carried out in foreign factories with a well established manufacture of spare parts for public transport vehicles, their repairs and maintenance.
The training will be intended for specialists in the following activities:

1) Manufacture of piston rings, 2 engineers or technicians, total 8 man-months.
2) Manufacture of connecting-rod bearings, 1 engineer or technician, 6 man-months.
3) Manufacture of gears, 2 engineers or technicians, total 9 man-months.
4) Manufacture of fuel injection pumps and ancilliary equipment, 2 engineers or technicians, total 8 man--months.
5) Management and organization of repair works, 2 engineers or technicians, total 10 man-months.

T o t a l 41 x US $ 2200 = US $ 90 200

The main content of the training of these workers abroad will be the following:

- production technology, management and organization of the works
- actual execution of repairs and manufacture of spare parts
- methods of incoming, in-process and final inspection
- actual execution of heat treatment operations
- methods of routine and medium repairs and overhauls of public transport vehicles and civil engineering equipment and subsequent control

- design of spare parts

- planning and methods of economic evaluation of repairs.

The programme of training will be further specified by the Chief Technical Adviser. The suggested places of training-companies and firms involved in automotive engineering from European and Asian countries.

Annex No. 3

UNITED NATIONS

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

U N I D O

Project in the Socialist Republic of Vietnam

JOB DESCRIPTION

DP/VIE/80/055

Post title	Consultant for assembly and operation of machines and equipment
Duration	1 month with possibility of extension
Date required	Third quarter 1984 - II. quarter 1985
Duty station	Ho Chi Minh City
Purpose of project	Technical assistance in repairs and maintenance of spare parts, in assembly and in operation of related machines and equipment
Duties	The consultant will specifically be expected to : 1/ Approve designs and control power connections before assembly operations. 2/ Render advise and assistance during assembly of the machines. 3/ Instruct and show on major procedures.

4) Carry out setting up and starting of the machines.
5) Assist to the Chief Technical Adviser in all related matters.
6) Instruct an operator now to handle the machines and acquaint him with the maintenance procedures.

QUALIFICATIONS — Mechanical engineer with extensive knowledge and practical experience in assembling, commissioning and putting the machines into operation.

LANGUAGE — English. Knowledge of French or Russian is an asset.

BACKGROUND INFORMATION — Ho Chi Minh City has a total of some 24 000 public transport vehicles and civil engineering equipment. Out of this approx. 18 500 are trucks with a load-carrying capacity higher than 3 t, approx. 4 500 are buses and more than 1 000 civil engineering equipment. All these vehicles and equipment came from the USA and West European countries and are almost without exceptions more than 7 years old. Only 16% of the above mentioned vehicles are in operation. The existing facilities cannot cope with the demands for spare parts, as well as the demands associated with their maintenance and repairs. The purchase of spare parts from abroad cannot be realized due to non-convertibility of local currency, so that the service is lacking key spare parts which cannot be manufactured locally in satisfactory quantities at present.

Insufficient experience and training of local personnel adversely affect maintenance and repair activities and manufacture of spare parts for these vehicles.
The fear exists that if no rapid measures for improving the situation are taken, all the public transport vehicles in the city will be out of operation within a few years.

Annex No. 4

UNITED NATIONS

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

U N I D O

Project in the Socialist Republic of Vietnam

JOB DESCRIPTION
DP/VIE/80/055

Post title	Consultants for commissioning of machines /mechanical and electrical engineers /
Duration	1 month for each
Date required	First quarter 1984
Duty station	Ho Chi Minh City and Hanoi
Purpose of project	To assist in manufacture of spare parts and in commission of turret lathes.
Duties	The consultants will specifically be expected to :

1. Prepare documentation for commissioning.
2. Prepare instructions and conduct on-the-job training of local personnel.
3. Commission the machines.

4. Train an operator in controlling and maintaining the machines.

5. Secure repair and adjustment of the machines.

QUALIFICATIONS — Mechanical or electrical engineer with extensive knowledge and experience in the operation of turret lathes.

LANGUAGE — English. Knowledge of Russian is an asset.

BACKGROUND INFORMATION — Ho Chi Minh City has a total of some 24 000 public transport vehicles and civil engineering equipment. Out of this approx. 18 500 are trucks with a load-carrying capacity higher than 3 t, approx. 4 500 are buses and more than 1 000 civil engineering equipment. All these vehicles and equipment come from the USA and West European countries and are almost without exceptions more than 7 years old. Only 16 % of the above mentioned vehicles are in operation. The existing facilities cannot cope with the demands for spare parts, as well as the demands associated with their maintenance and repairs. The purchase of spare parts from abroad cannot be realized due to the non-convertibility of local currency, so that the service is lacking key spare parts which cannot be manufactured locally in satisfactory quantities at present.

Insufficient experience and training of local personnel adversely affect maintenance and repair activities and manufacture of spare parts for these vehicles.
The fear exists that if no rapid measures for improving the situation are taken, all the public transport vehicles in the city will be out of operation within a few years.
Turret lathes are of considerable importance for production of spare parts. At present these lathes are out of operation and without appropriate documentation.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Terms of Reference for subcontractor's team

1. Basic Data

Country :	Vietnam
Project title	Repair and maintenance of public transport vehicles in Ho Chi Minh City
Project number :	DP/VIE/80/055
UNDP/UNIDO contribution :	US $ 79.200,-
Volume of final work :	Final report
Scheduled start of work :	IV. quarter 1983
Scheduled duration :	3 months

2. Background Information

Ho Chi Minh City has approx. a total of 24 000 public transport vehicles and civil engineering equipment. Out of this are approx. 18 500 with a load-carrying capacity higher than 3 t, approx. 4 500 buses, and more than 1 000 civil engineering equipment. These vehicles and equipment are mostly from the USA and West European countries and are almost without exceptions more than seven years old. Only 16 % of the above mentioned vehicles are in operation. The workshops which are to maintain these vehicles in operation, have at their disposal only the basic facilities which are incapable of meeting the spare parts requirements, as well as the demands for maintenance and repairs. The purchase of spare parts from abroad cannot be realized due to non-convertibility of local currency, so that the service is lacking key spare parts which cannot be manufactured locally in a satisfactory quantity. Insufficient experience and training of local personnel adversely affect maintenance and repair activities and manufacture of spare parts for these vehicles. The fear exists that if no rapid measures to remedy the situation are taken, all the public transport vehicles in the city

will be out of operation within a few years.

3. Objectives

- To improve repair and maintenance of public transport vehicles
- To improve quality of the manufactures spare parts
- To train local personnel in high-quality production of spare parts and in repairs and preventive maintenance of public transport vehicles.

4. Subcontractor's Activities

A four - member team of specialists will visit the country for a period of 3 months. The members should have university technical education and considerable experience in the manufacture of automotiv spare parts. The team will consist of specialists to solve problems of:

- manufacture and heat treatment of piston rings,
- manufacture of connecting - rod bearings,
- execution of repairs, maintenance and manufacture of certain critical components for vehicles and civil engineering equipment,
- measurement and inspection of main parts of vehicles and civil engineering equipment.

The members of the team will advise and assist the Vietnamese staff in the manufacture of spare parts and on-the-job training. In doing so they will assist in setting up the training centre. Their activities will be coordinated by the Chief Technical Adviser. The place of their stay will be Ho Chi Minh City. Within one month after the termination of their work in the Socialist Republic of Vietnam they will present their final report.

The subcontractor's team is expected to :

a/ Assist to local staff in the execution of repairs and maintenance of public transport vehicles and civil engineering equipment.

b/ Assist in manufacture and heat treatment of piston rings.

c/ Assist in manufacture of connecting-rod bearings.

d/ Assist in manufacture of the basic spare parts for public transport vehicles and civil engineering equipment, i.e. especially of half-axles, transmission gears, bearings, Cardan shafts, etc.

e/ Advise and teach local staff to carry out the inspection of main automobile parts.

f/ Advise and teach local staff to measure and inspect the quality of manufactured spare parts.

g/ Teach local staff to manufacture effectively and in good quality certain spare parts, especially piston rings, connecting-rod bearings, half-axles, Cardan shafts, gearings, etc.

h/ Help local staff to work out new, more modern technological procedures for manufacture of main spare parts.

i/ Help local staff in design and manufacture of tools, implements, clamping aids for the newly supplied equipment within this contract.

j/ Assist and train local workers in execution of metallographic tests for inspection of heat treatment operations and incoming inspection of semi-products.

k/ Prepare manuals and guidelines for further training local staff at the training centre and on-the-job.

5. Programme Schedule

a/ It is expected that the subcontractor's team will be selected and the contract signed in the IV. quarter of 1983.

b/ The field work of the subcontractor's team is to begin in the first quarter of 1984.

c/ The field work of the subcontractor's team is to be terminated in the second quarter of 1984.

d/ The final report of the subcontractor is to be presented within one month after the termination of the field work.

Annex No. 6

2nd May 1982

Questionnaire for Public Transport Vehicles

1) When the Research Institute was established?
2) Main work schedule of the Research Institute.
3) Number of employees of the Research Institute and its approximate organization.
4) What is the name of the Organization which controls the Research Institute?
5) The factory for the production of spare parts in Hanoi:
   a) What is the name of the organization that controls this factory?
   b) Lay-out of the factory in 1:100 or 1:200 scale.
   c) Ground plan of each shop, including cross section.
   d) List of machinery, quantity and types.
   e) Production programme and capacity of the factory.
   f) Total number of workers:
      - production workers
      - auxiliary workers
      - administrative workers
6) List of spare parts which should be manufactured for the considered types of public transport vehicles and civil engineering equipment.
7) Types and makes of the vehicles and civil engineering equipment, their quantity in accordance with the specific makes.
8) List of repair and maintenance workshops in all parts of the Socialist Republic of Vietnam with an indication of their capacities and manpower.
9) Requirements of the Vietnamese partners concerning the training of personnel (professions and numbers of persons) abroad and the duration of this training.
10) Suggestions of foreign specialists for training in the Socialist Republic of Vietnam. Their professions, number and duration of stay in the Socialist Republic of Vietnam.
11) Approval of the percentage division of the UNDP contribution of 1 million US $ for the purchase of machine tools, incl. spare parts, accessories, tools

and measuring instruments, and for the personnel training programme. We suggest machinery/training cost ratio from 50/50% to 60/40%.

12) Submission of statistical Bulletins about repairs and the production of spare parts, incl. purchases from abroad, for a period of at least five years.

13) List of the existing plants which could be considered for cooperation (iron foundries, forge plants, pressing shops, battery repair shops, etc.), if any.

14) Prices of raw materials, semi-finished products and subdeliveries.

15) Evaluation and selection of similar components (according to their dimensions) which could be utilized for several makes of vehicles.

16) List of the critical spare parts which are to be manufactured locally by the end of the project.

17) Manpower recruitment sources for the implementation of this project.

18) Statement of the Vietnamese partners concerning the contribution of the Government of the Socialist Republik of Vietnam as a support for solving this highly critical state in the maintenance and manufacture of spare parts for the above mentioned vehicles.

List of Personnel Met During the Mission

Mr. Englund	UNDP Resident Representative
Mr. M. Kahane	UNDP Deputy Resident Representative
Mrs. L. Lindberg	UNDP Programme Officer
Mr. Vy Hai	Chief of Mechanical Engineering Department of Ministry of Transportation and Communication
Mr. Ho Quang Long	Deputy Chief of the above Dept.
Mr. Thai Doan Dnòng	Officer of International Cooperation Division of the Ministry
Mr. Tan Cauk Ťien	Engineer of Mechanical Engineering Department
Mr. Nguyen Hun Dien	Specialist from International Cooperation Division of the Ministry
Mr. Cao Thuy Ann	Director of Research Institute for Science and Technology
Mr. Nguyen Ngok Ťaň	Director of the Factory NGO-ZA-TY
Mr. La Van Ťin	Director of the Factory CHOA BIŇH
Mr, Le Van Čiong	Director of the Repair Factory for Civil Engineering Equipment
Mr. Nguyen Suan Tchiň	Director of the Factory "3rd February"
Mr. Čan Za Tchaň	Director of the Factory CH-410
Mr. Truong Ky Dúc	General Director of the Municipal Transport Authority in Ho Chi Minh City
Mr. Bui Guang Quyen	Deputy Director of Automobile Repair Works No. 1
Mr. Tran Van Dieu	Director of Corporative Enterprise No. 1 CTHD
Mr. Nguyen Nam Tien	Director of Repair and Service Centre
Mr. Tran Bá Bay	Director of Repair and Production Works No. 4
Mr. Pham Chung	Representative of State Planning Committee
Mr. Nguyen Tien Thuan	Representative of State Planning Committee
Mr. Vu Van Ťan	Interpreter

Annex No. 8

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Terms of Reference for setting up of training centre

1. Basic data

Country: Vietnam
Project title: Repairs and maintenance of public transport vehicles in Ho Chi Minh City
Project number: DP/VIE/80/055
UNDP/UNIDO contributions: in the project
Scheduled start of work: IV quarter 1983
Scheduled duration: during the implementation of the project and after

2. Background information

Ho Chi Minh City has approx. 24 000 public transport vehicles, including civil engineering equipment. The majority of these vehicles come from the USA and West European countries and are almost without exceptions seven and more years old. The purchase of spare parts for these vehicles from abroad cannot be realized, because the local currency is not freely convertible on foreign markets. The manufacture of spare parts in the country is insufficient, both due to a small amount of machinery and for reasons of an insufficient number of trained personnel. Maintenance and repairs of the vehicles fleet are carried out by insufficiently qualified personnel. If no speedy remedy is found, the public transport vehicles in the city will be out of operation within a few years. Neither in Ho Chi Minh City, nor in its vicinity exists training centre for motor vehicles. There is an urgent need for setting up of the train-

ing centre which could help in local training of personnel in maintenance and repairs of public transport vehicles and of civil engineering equipment.

The establishment of the Training Centre with a lecturing room and 2 Pilot units for on-the-job training and a production control and preventive maintenance unit is of considerable importance since only 16% of transport fleet is in operation and practically there is no adequate production of required spare parts. The present situation with preventive maintenance and production control is very dangerous. Practically there is no unit which can review the state with machinery and equipment and introduce methods of control and preventive maintenance procedure. There is no up to date equipment and device to ensure this control and inspection.

3. Objectives

It is expected that with the setting up of this Training Centre the following objectives will be attained:

- to acquaint local personnel with the design and construction of vehicles,
- to train local personnel in preventive maintenance and repairs of main vehicle parts,
- to train local personnel in the manufacture of main vehicle parts,
- to train local personnel how to introduce guidance for preventive maintenance and periodic control,
- to prepare manuals, guidelines and instructions,
- to make available up-to-date measures and to ensure controle devices, instruments and equipment,
- to carry out up-to-date training.

4. Activities

The activities necessary for the setting up of the training centre will be carried out by the Chief Technical Adviser in cooperation with the National Director. Before obtaining the models, mock-ups, equipment etc., the counterpart will provide a suitable room.

It will also arrange the necessary installation and possibly civil engineering works in the room or building, respectively, so that the supplied teaching aids and equipment can be connected to the power sources with suitable current ratings. Should this be necessary, it will assist in all other matters. The Counterpart Agency will also provide the furniture for this training centre, such as tables, chairs, black-boards, etc. After the delivery of the teaching aids and equipment which will be taken over from the shipping agent, the National Director will take care of their installation in accordance with the instructions of the Chief Technical Adviser and will furthermore arrange for their protection against damage or loss. Should the need arise for preparing project data for the setting up and installation of certain equipment, the National Director will arrange its working out in accordance with instructions and advice of the Chief Technical Adviser. The National Director will also provide all materials for proper maintenance of the supplied technical aids and equipment in accordance with the instructions of the manufacturers.

5. Programme schedule

a/ The counterpart Agency will provide and secure

a suitable room, installation work and possibly civil engineering works for the Training Centre to begin with II. quarter 1983.

b) The deliveries of the models, mock-ups and further teaching aids will be implemented in the IV. quarter 1983 - I. quarter 1984.

c) The deliveries of the machinery and equipment will be implemented in the period from II/1984 to I/1985.

d) Erection and assembly of machinery and equipment and its putting into operation will be effected permanently upon their deliveries in the period from II/1984 to I/1985.

e) A curriculum and a board chart of the Training Centre will be prepared by the National Director with cooperation with the Chief Technical Adviser. They will be finalized not later than at II. quarter 1984.

f) The regulations for the Pilot units for on-the-job training in the factories No. 1 and No. 4 as well as Production control and preventive maintenance unit in factory No. 1 are to be prepared by the Chief Technical Adviser in cooperation with sub-contractor's firm and National Director not later than at I. quarter 1984.

Equipment and Aids to be purchased for the Training Centre

(UNDP contribution)

Pos. No.	Designation of equipment	Pcs	Price in US $
1	Catalogues in English or French for the following makes of vehicles:		
	TOYOTA	3	
	FORD	3	
	INTERNATIONAL	3	
	DODGE	3	
	DESOTO	3	
	FARGO	3	
2	Workshop manuals in English or French containing the characteristic faults and defects and instructions for their elimination for the following makes of vehicles:		
	TOYOTA	3	
	FORD	3	
	INTERNATIONAL	3	
	DODGE	3	
	DESOTO	3	
	FARGO	3	
3	Wall pictures for visual instruction in English or French		
	- four-stroke petrol engine	1	
	- four-stroke Diesel engine	1	
	- carburettor	1	
	- fuel injection pump	1	
	- hydraulic brake system diagram	1	
	- pneumatic brake system diagram	1	
	- clutch	1	
	- gear box, final drive, differential	1	
	- alternator, DC generator	1	
	- wiring, electrical equipment	1	

Annex No. 9

Pos. No.	Designation of equipment	Pcs	Price in US $
4	Slides for visual instruction - of the main truck types with load-carrying capacities 3 + 10 t, buses and civil engineering equipment / bulldozers, excavators, etc./		
5	Slide projector for visual instruction with time switch, lighting intensity selection and remote control, including: - slide magazine - lead with connectors - spare lamps	1	
6	Overhead projector for visual instruction incl. lead with connectors, spare lamps	1	
7	8 mm film projector including - spare spools - cable with connectors - spare lamps	1	
8	Universal portable projection wall /min.dimensions 1500x1500 mm/	2	
9	Technical literature specifically on the assembly and dismantling of vehicle components, manufacture of spare parts and their workshop inspection in English or French		
10	Sectional model of petrol engine	1	
11	Sectional model of Diesel engine	1	
12	Gear box model	1	
13	Front axle model	1	

Pos.No.	Designation of equipment	Pcs	Price in US $
14	Steering model	1	
15	Differential model	1	
16	Brake system model	1	
17	Instructions for making models of the individual functional groups of vehicles	1 set	
18	Demonstration assembly steel table with top board made of hard wood with min. thickness of 50 mm, min. table dimensions 1200 x 1500 mm	5	
19	Hand-operated hydraulic press up to max. piston pressure of 20 kN	2	
20	Assembly truck for motor-car mechanics	5	
21	Portable unfolding assembly cabinet with tools	5	
22	Mobile arm jack, lifting capacity 8000 kN for the radius of 1500 mm	1	
23	Feeler gauges (range 0-1 mm, length 100 mm)	10	
24	Metric screw pitch gauges 0,4-6 mm	3	
25	Inch screw pitch gauges 28-4	3	
26	Vernier calliper (division "/mm, min. range 150 mm/6", division 1/20 mm-1"/128)	10	
27	Outside micrometer: range 0-25	3	
	25-50	3	
	50-75	3	
	75-100 mm	3	

Pos. No.	Designation of equipment	Pcs	Price in US $
28	Inside micrometer calliper - range 5-45 mm	5	
29	Dial gauge - division 0,01 mm/0,005" range 0-10 mm, approx. dia 60 mm	3	
30	Dial gauge stand with square base and permanent magnet	3	
	Total price of aids stated in Annex No. 9		42 000 US $

Annex No. 10

List of Machinery and Equipment Required for Pilot Unit for On-the-job Training - Works No. 1

(UNDP contribution)

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
1	Special centre lathe for outside and inside machining of engine pistons (machining of face, piston ring grooves, outside and inside piston surface)	1	3,5	1,3	33 000
	- swing over bed 250 mm				
	- distance between centres 350 mm				
	- max. piston length 300 mm				
	- Set of diamond-tipped tools				
	- Number of main spindle speeds 8				
	- Spindle speeds min^{-1} - 350, 500, 710, 1000, 1400, 2000, 2800, 4000				
	Special accessories:				
	- lighting	1			
	- front and rear cross slide	1			
	- hand-operated cross slide	1			
	- chip guard	1			
	- single-cutter holder	1			
	- two-cutter holder	1			
	- set of diamond-tipped turning tools	1 set			
	- circular tool holder	1			
	- cross slide with swivelling tool slide	1			
	- trip dog for precision saddle tripping	1			
	- clamping flange for magnetic chuck	1			
	- tool holder for prismatic cutters 12x12 mm	1			
	- tool holder for prismatic cutters 16x16 mm	1			
	- two-cutter holder 12x12 mm	1			
	- two-cutter holder 16x16 mm	1			

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	- tool holder for prismatic cutters	1			
	- driving collars 3-20 mm	1			
	- driving collars 20-40 mm	1			
	- arbor for drill chuck	1			
	- hollow centre	1			
	- expanding arbour with set of expanding collets I, II, III	1			
	- draw-in arbor for clamping accessories in spindle cavity	1			
	- driving plate dia 40 and dia 60	1			
	- pin with thread	1			
	- spare parts for two years of operation				
2	Horizontal spindle surface grinding machine	1	9,3	3,4	26 000
	- table clamping surface 320 x 1000 mm				
	- max. grinding width 320 mm				
	- max. grinding length 1000 mm				
	- max. workpiece height 350 mm				
	Special accessories:				
	- complete cooling equipment	1			
	- exhaust equipment incl. accessories	1			
	- balancing stand	1			
	- electromagnetic clamping plate 300x100 incl. set of clamps	1			
	- wheel trueing device (without diamond)	1			
	- additional grinding wheel flange	1			

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	Tooling				
	- side feed rest	2			
	- grinding wheel dia 250x20	10			
	- spare parts for two years of operation				
3	Slotting machine	1	3	2,16	15 000
	Slotting length 200 mm				
	Tool overhang 450 mm				
	Rotary table dia 500 mm				
	Table setting:				
	longitudinal 500 mm lateral 400 mm circular 360°				
	Number of double strokes 40 - 163/min				
	Spare parts for two years of operation				
4	Testing machine for the measurement of performance of various engine types within the range of 2-400 HP and the speed range of 200-5000 rpm. (hydraulic dynamometer)	1	-	0,7	10 800
	Spare parts for two years of operation				
5	Equipment for repair and renovation of machinery components by material surfacing with an electrode and welding of grey cast iron, steel, high alloy steels, aluminium and light alloys				3 600
	It consists of the following parts:				
	- Burner for surfacing worn arees up to the height of wear of 1 mm for all metals except aluminium	1			

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	- Spray-on burner for renovating rotary components by building up base material (any metal incl. aluminium) at the temperature of 200 °C	1			
	- Electrodes for welding old and greasy cast iron	7,5 kg			
	- Electrodes for strength welding of grey cast iron	5 kg			
	- Electrodes for welding unknown steels	7,5 kg			
	- Electrodes for welding high alloy steels to low-alloy materials	5 kg			
	- Electrodes for welding aluminium and light alloys	5 kg			
	- Solder for building up broken or worn gear teeth	10 kg			
	- Solder for capillary soldering of very small and fine parts	1 kg			
6	Equipment for heat treatment of small steel components in salt bath				49 000
	It consists of:				
	a) Crucible furnace for heating before hardening in salt bath	1	52	1,9	
	Crucible capacity 135 dm3				
	Rated max. furnace temperature 900 °C				
	Inside dimensions of crucible: diameter 500 mm depth 800 mm				
	Furnace environment - cyanide melt				
	Furnace controller				
	Spare parts for two years of operation				

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	b) Crucible furnace for hardening of small steel components in salt bath up to the temperature of 650 °C with artificial cooling of the crucible by air from a fan	1	30	2,1	
	Crucible capacity 88 dm3				
	Crucible diameter 500 mm				
	Crucible depth 550 mm				
	Rated furnace temperature 650 °C				
	Furnace environment - cyanide bath				
	Electric furnace controller				
	Spare parts for two years of operation				
	c) Crucible furnace for heat treatment of small steel components for annealing and tempering in salt bath	1	30	1,9	
	Crucible capacity 88 dm3				
	Crucible diameter 500 mm				
	Crucible depth 550 mm				
	Rated furnace temperature 650 °C				
	Furnace environment - cyanide bath				
	Electric furnace controller				
	Spare parts for two years of operation				
	<u>Special accessories</u>				
	Cyanide bath for heating before hardening			3 500 kg	
	Cyanide bath for hardening and tempering			4 500 kg	
	Sodium cyanide			350 kg	
	A n n e x N o. 10 - t o t a l				US $ 137 400

Annex No. 11

List of Machinery and Equipment Required for Pilot Unit for On-the-job Training - Works No. 4 (UNDP contribution)

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
1	Equipment for repair and renovation of machinery components by material surfacing with an electrode and welding of grey cast iron, steel, high alloy steels, aluminium and light alloys.				3 600
	It consists of the following parts:				
	- Burner for surfacing worn areas up to the height of wear of 1 mm for all metals except aluminium	1			
	- Spray-on burner for renovating rotary components by building up base material (any metal incl. aluminium) at the temperature of 200°C	1			
	- Electrodes for welding old and greasy cast iron			7,5 kg	
	- Electrodes for strength welding of grey cast iron			5 kg	
	- Electrodes for welding of unknown steels			7,5 kg	
	- Electrodes for welding high alloy steels to low-alloy materials			5 kg	
	- Electrodes for welding aluminium and light alloys			5 kg	
	- Solder for building up broken or worn gear teeth			10 kg	
	- Solder for capillary soldering of very small and fine parts			1 kg	
2	Pneumatic hammer for hammer forging Impact energy 950 kgm	1	28	13,5 with anvil block	66 000

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	Weight of faling hammer 400 kg				
	Number of strokes 130/min				
	Forging height above floor level 750 mm				
	Dimensions of upper anvil 265 x 100 mm				
	Spare parts for two years of operation				
3	Horizontal spindle surface grinding machine	1	10	3,4	26 000
	Table clamping surface 320 x 1000 mm				
	Max. grinding width 320 mm				
	Max. grinding length 1000 mm				
	Max. workpiece height 350 mm				
	Special accessories				
	- complete cooling equipment	1			
	- exhaust equipment incl. accessories	1			
	- balancing stand	1			
	- electromagnetic clamping plate 300 x 100 incl. set of clamps	1			
	- wheel trueing attachment (without diamond)	1			
	- additional grinding wheel flange	1			
	Tooling				
	- side feed rest	2			
	- grinding wheel dia 250x20	10			
	- spare parts for two years of operation				
4	Centreless cylindrical grinding machine	1	13	6,8	30 000
	Max. grinding dia 80 mm				
	Min. grinding diameter 3 mm				

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	Workpiece length for through-feed grinding 250 mm				
	Workpiece length for in-feed grinding 145 mm				
	Grinding wheel dia 500x150 mm				
	Special accessories:				
	- Support for through-feed grinding for wide grinding wheels	1			
	- Balancing mechanism	1			
	- Vibration insulating supports for setting up the grinding machine	1 set			
	- Spare parts for two years of operation				
5	Internal grinding machine	1	16	1,17	39 000
	Grinding diameter 10-25 mm				
	Max. grinding length 80 mm				
	Max. swing 250 mm				
	Work head swivel 0-30°				
	Special accessories:				
	- adapters for grinding spindles	1 set			
	- clamping plates	1			
	- face clamps	1			
	- grinding spindles	1			
	- gauge blanks	1			
	- cooling equipment with magnetic filter	1			
	- face grinding equipment	1			
	Spare parts for two years of operation				
6	Fine engine cylinder boring machine	1	3	4,4	30 000
	Bore diameter 35-240 mm				

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	Max. boring depth 500 mm Boring head stroke 550 mm 6 spindle speeds: 90, 140, 224, 355, 560, 900 rpm. Normal feed 0,0315 - 0,063 mm/p.r. Table clamping surface 500x1000 mm Spindle reach 450 mm Special accessories: - set of boring bars - clamping fixtures Spare parts for two years of operation				
7	Engine cylinder hydraulic honing machine with continuous change of speed and stroke	1	5,5	1,4	30 000
	Max. honing diameter 150 mm Working stroke 200 mm The machine is equipped with: - Cooling pump - Oil pressure measuring equipment Special accessories: - small honing head - standard honing head - bracket - supporting block - honing stones	3			
	Spare parts for two years of operation				
8	High-frequency hardening equipment for motor-car pins and journals with dia 30-60 mm and length 200-300 mm				45 000

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	The high-frequency equipment consists of:				
	a) High-frequency generator, incl. rectifier	1	150	2,1	
	effective high-frequency output 90 kW				
	Working frequency 290-360 kHz				
	Continuous output regulation				
	Spare parts for two years of operation				
	b) Vertical semi-automatic hardening machine	1	1,5	1,8	
	Work feed during hardening 90 - 2400 mm/min.				
	Max. diameter of hardened part 120 mm				
	Max. length of hardened part 1000 mm				
	Max. weight of hardened part 70 kg				
	Spare parts for two years of operation				
	c) Cooler with the output of 70 kW	1	8	0,9	
	Spare parts for two years of operation				
	Special accessories:				
	- set of inductors (7 sets)				
	- clamping fixtures for the respective motor-car pin dimensions				
	Annex No. 11 - t o t a l				US $ 269 600

Annex No. 12

List of Machines and Equipment for Repair Work No. 1

/ Government contribution /

	pcs
1. Centre Lathes: swing over bed 380 mm	3
swing over bed 450 mm	3
2. Turret Lathe: swing over bed 500 mm	2
3. One-spindle bench drilling machine : drilling dia . 20 mm	2
One-spindle column drilling machine : drilling dia. 20 mm	2
One-spindle column drilling machine : drilling dia. 32 mm	2
4. Radial drilling machine: drilling diameter 40 mm	1
Radial drilling machine: drilling diameter 50 mm	1
5. Knee-type milling machines: universal, horizontal and vertical	6
6. Horizontal Shaping Machines:	2
7. Universal Centre Grinding Machine	1
8. Cylinder Drilling Machine for fine Drilling	1
9. Cylinder Honing Machine	1
10. Crankshaft Grinding Machine	2
11. Double-Wheel Pedestal Grinding Machines	3
12. Gear Hobbing Machine	2
13. Hack-Sawing Machine	1
14. Hydraulic Straightening Press	2
15. Electric Shaft Furnace for Heat Treatment	2
16. Centrifugal Casting Machine for Sliding Bearings	1

T o t a l Dong 560 000

Annex No. 13

List of Machines and Equipment for Work No. 4
/ Government contribution /

		pcs
1.	Centre Lathes: swing over bed 380 and 450 mm	6
2.	Turret Lathe: swing over bed 500 mm	3
3.	Knee-Type Milling Machines: universal, horizontal and vertical	6
4.	Bench and Column Drilling Machines - max. drilling diameter 32 mm	6
5.	Radial Drilling Machines - max. drilling dia. 50 mm	2
6.	Horizontal Shaping Machines	2
7.	Double-Wheel Grinding Machines	5
8.	Table Shears	1
9.	Arc Welding Machines	5
10.	Oxygen-Acetylene Gutting Apparatus	3
11.	Hacksawing Machines	2
12.	Eccentric Presses for Cold Forming 63 t	2
13.	Woodworking Machines / saws, planers, thicknessing machines /	6

T o t a l Dong 500 000

Annex No. 14

Measuring and Inspection Instruments for the Production Control and Preventive Maintenance Unit (UNDP contribution)

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
1	Set of test specimens (diamond with holder, balls and standard plates) for Rockwell and Brinell hardness tests	3 sets		0,01	1 000
2	Ultrasonic flaw detector - max. test range in steel - 10 m - minimum flaws detected at the distance of 0,5 m from the test head are 1 mm2 - resolution - 100% - linearity time bases better than ± 2% - attenuator regulation - up to 80 dB - thickness measurement range from 2 mm to 10 m - frequency range from 0,8 MHz to 12 MHz - monitor signals surface flaws acoustically - picture tube dimensions 270 x 85 x 270 mm	1		0,004	10 000
	Special accessories:				
	- ultrasonic heads: - angular ones - for surface waves - standard ones - tests with the aid of two ultrasonic heads				
	- ultrasonic standards - interconnecting cables - spare parts for two years of operation				
3	Metallographic microscope for material structure determination and evaluation	1	0,15	0,15	18 000
	Special accessories:				
	- polarization illuminator with achromatic field of view 12,5 x/0,25 ∞/0 pol	1			

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	- monocular direct body tube with achromatic field of view 25 x/ 0,50∞/0 pol	1			
	- monocular direct body tube with achromatic field of view 50 x/0,80∞/0 pol	1			
	- compensator with achromatic field of view H 1 100/1,30∞/ /0 pol	1			
	- slide lens 46 mm, magnification 3 x	1			
	- 4 centered lenses 46 mm with magazine	1			
	- measuring compensator 1/4 with azimutal rotation for quantitative metal tests	1			
	- set of special interference filters	1			
	- hardness microtester	1			
	- set of calibration weights for micro-hardness tester with magazine	1			
	Sample preparation equipment:				
	a) Saw for cutting metallographic samples	1	1,1	0,06	
	Cutting disk diameter 200-320 mm				
	Cutting depth 50-110 mm Max. diameter cut 70x100 mm Max. diameter cut with feeding device 90 x 250 mm				
	Max. workpiece length with feeding device - 300 mm				
	Max. length with feeding device for large cuts - 600 mm				
	Table surface 475 x 700 mm				
	Shaft speed 1500/3000 rpm.				
	Three-phase AC power supply 380 V/50 Hz				
	Spare parts for two years of operation				

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	b) Polishing machine for polishing metallographic specimens Number of grinding disks 2 Speed 3000 rpm. Three-phase power supply - 220/380 V, 50 Hz Spare parts for two years of operation	1	0,18	0,05	
4	Thermoelectric bar-type temperature feeler with protective metal tube. The feeler is designed for remote temperature measurement, the feeler probe is a NiCr-Ni thermocouple. Execution: Rated tube length 800 mm Functional temperature range 0 - 1000°C Internal cell resistance 0,9 ohms/m	1			2000
	Special accessories:				
	- mounting flange dia 22 mm	1			
	Compensating temperature recorder single-curve, single-range type with line recording, transmission potentiometer and signalling contacts for exceeding the set minimum and maximum	1			
	- Accuracy with adjusted range unit ± 0,5%				
	- Minimum range 5 mV				
	- Maximum range 100 mV				
	- Insensivity - max. 0,2% of range				
	- Recording width 120 mm				
	- Recording length 90 mm				
	- Feed 20-1200 mm/h				
	- Max. power input 25 VA				
	- Insulating resistance 20 Mohms min.				

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	Indicator for thermoelectric temperature feelers with built-in temperature compensation of the thermocouple reference junctions	1			
	Minimum scale range 10 mV				
	Maximum scale range 2 V				
	Scale length 110 mm				
	Rise time 15 minutes				
	Max. power input 4 VA				
	Insulating resistance 20 Mohms min.				
5	Milling tools for gear hobbing machine in inch execution for the modules:				14 000
	Dp = 8		3		
	Dp = 10		3		
	Chucking diameter 32 mm				
6	Equipment for bolt and nut thread cutting up to dia M 22 and M 24 on type 1 turret lathe	1			1 000
7	Tools for machine tools				
	General utility tools for lathes				
	Centre drill with simple cutting edge				
	dia 1		10		
	dia 2		10		
	dia 3,15		10		
	Centre drill with broken cutting edge				
	dia 1		10		
	dia 2		10		
	dia 3,15		10		
	Straight-shank drills				
	dia 3		10		
	dia 3,5		10		
	dia 4		10		
	dia 4,5		10		
	dia 5		10		
	dia 5,5		10		
	dia 6		10		
	dia 6,5		10		

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	dia 7	10			
	dia 7,5	10			
	dia 8	10			
	dia 9	10			
	dia 9,5	10			
	dia 10	10			
	dia 10,5	10			
	dia 11	5			
	dia 11,5	5			
	dia 12	5			
	Short drills				
	dia 4,3	10			
	dia 6,7	10			
	dia 7,6	10			
	dia 8,6	10			
	dia 9,6	10			
	dia 10,7	10			
	dia 11,9	10			
	Taper-shank drills				
	dia 13,9	10			
	dia 15	5			
	dia 17	5			
	dia 19	2			
	dia 20,25	2			
	dia 23,25	2			
	dia 26,5	2			
	dia 28	2			
	dia 31	1			
	Serial machine taps				
	M 6	10			
	M 5	10			
	M 8	10			
	M 10	10			
	M 12	10			
	Round screw dies				
	M 5	10			
	M 6	10			
	M 8	10			
	M 10	10			
	M 12	5			
	Round die stock 20	1			
	Drill chuck 16	1			
	Wrench for drill chuck No. 7	2			
	Arbor for chuck 18x2	1			
	Right-hand straight roughing tools 16 x 16	5			
	Left-hand straight roughing tools 16 x 16	5			

No.	Denomination of machine	Pcs	kW	Weight in t	Price in US $
	Right-hand roughing tools 60° 16x16	5			
	Left-hand roughing tools 60° 16x16	5			
	Right-hand bent roughing tools 16x16	5			
	Left-hand bent roughing tools 16x16	5			
	Flat finishing tools 20x12x140	5			
	Finishing tools 25x16x180	5			
	Inside corner roughing tools 25x25x315	5			
	Inside corner roughing tools 25x25x215	5			
	Right-hand necking tools 20x12x140	5			
	Cutting-off tools 4x18x140	10			
	Right-hand straight roughing tools P40 20x20	2			
	Right-hand straight roughing tools P40 16x16	2			
	Left-hand straight roughing tools P40 20x20	2	pcs		
	16x16	2	pcs		
	Right-hand bent roughing tools P40 20x20	2			
	16x16	2			
	Left-hand bent roughing tools 20x20	2			
	16x16	2			
	Side roughing tools 20x20 P50	2			
	16x16 P40	2			
	Flat finishing tools 20x12 P10	2			
	Finishing tools 16x10 P10	2			
	Inside roughing tools 20x20 P40	2			
	Right-hand necking tools 12x20	2			
	Left-hand necking tools 12x20	2			
	Holder for turning tools M No.3 13-16	2			
	Knurling tool holders	2			

No.	Denomination of machine	Pcs	kW	Weight in t	Price in US $
	Knurling tools 16x6/6 R	2			
	15x6/6 R	2			
	Tapered arbors				
	dia 16	1			
	dia 18	1			
	dia 20	1			
	Adapters with Morse taper				
	4x3	2			
	4x2	2			
	3x1	2			
	General utility tools for turret lathes				
	Turning tool blank				
	10x10x100	2			
	12x12x100	2			
	16x16x125	2			
	20x20x160	2			
	Turning tool blank				
	10x16x160	2			
	10x20x160	2			
	12x25x160	2			
	Turning tool blank				
	4x16x100	5			
	5x20x100	5			
	6x25x160	2			
	8x32x160	2			
	Right-hand straight roughing tools 15°				
	10x10x40	5			
	12x12x80	5			
	16x16x63	2			
	Right-hand straight roughing tools 45°				
	10x10x63	5			
	12x12x80	5			
	16x16x100	2			
	Left-hand straight roughing tools 45°				
	10x10x63	5			
	12x12x80	5			
	16x16x100	2			
	Right-hand side roughing tools				
	12x12x50	5			
	16x16x63	5			
	20x20x125	2			

No.	Denomination of machine	pcs	kW	Weight in t	Price in US $
	Left-hand side roughing tools				
	12x12x50	5			
	16x16x63	5			
	20x20x125	2			
	Flat finishing tools				
	20x12x140	5			
	20x12x140	5			
	20x12x140	2			
	25x16x180	2			
	32x20x220	5			
	Finishing tools				
	16x10x110	5			
	20x12x140	2			
	25x16x180	2			
	32x20x220	5			
	20x12x140	5			
	25x16x180	2			
	Right-hand corner tools				
	12x12	2			
	16x16	2			
	Inside roughing tools				
	12x12	2			
	16x16	2			
	Inside roughing tools				
	25x25x315	2			
	25x25x315	2			
	Inside corner tools				
	25x25x315	2			
	25x25x315	2			
	Inside corner tools				
	10x10x100	2			
	Inside corner tools				
	12x12x125	2			
	16x16x140	2			
	Right-hand necking tools				
	16x10x120	2			
	20x12x140	2			
	20x12x140	2			
	Left-hand necking tools				
	16x10x120	2			
	20x12x140	2			
	20x12x140	2			
	Centre drills with simple cutting edge dia 3,15	10			
	Centre drills with broken cutting edge dia 2	10			

No.	Denomination of machine	Pcs	kW	Weight in t	Price in US $
	Short drills from dia 1 to dia 6 stepped by 0,01 mm (from dia 3,5 to 0,1)	3 sets			
	Short drills from dia 6,1 to dia 10 stepped by 0,1 mm	2 sets			
	Short drills from dia 10,25 to dia 20 stepped by 0,25 mm (dia 10 to dia 15 stepped by 0,1 mm)	2 sets			
	Machine reamers from dia 2 to dia 10 stepped by 1 mm	2 sets			
	Machine countersinking bits for M 4,3 to M 15	2 sets			
	Machine countersinking bits for cone heads M 2 to M 14	2 sets			
	Knurling tool holder 25x30	1 pc			
	Knurling tool dia 20x10	5 pcs			
	Serial machine taps M 6 to M 24	2 sets			
	Serial machine taps M 12 to M 24	1 set			
	Serial machine taps M 5 to M 14	2 sets			
	Machine nut taps M 3 to M 12	2 sets			
	Manual round screw dies M 3 to M 24 M 12 to M 24	3 sets 2 sets			
	<u>General utility tools for drilling machines</u>				
	Machine vice No. 8	1			
	Drill chuck size 10	1			
	Wrench for chuck No. 6	1			
	Set of short drills from dia 1 to dia 6 mm stepped by 0,05 mm	10 sets			
	Set of short drills from dia 6,5 to dia 10 mm stepped by 0,5 mm	5 sets			
	Drill chuck dize 10	1 pc			
	Drill chuck size 16	1 pc			
	Drill chuck arbor 16x3 18x3	 1 pc 1 pc			
	Chuck wrench No. 6 No. 7	1 pc 1 pc			

No.	Denomination	Pcs	kW	Weight in t	Price in US $
	Adapter 3x2	1			
	3x1	1			
	Short straight-shank drills from dia 1 to dia 6 mm stepped by 0,05 mm	10 sets			
	Straight-shank drills from dia 6,5 to dia 15 mm stepped by 0,1 mm	3 sets			
	Straight-shank drills from dia 10,2 to dia 15 mm	2 sets			
	Straight-snank drills from dia 16 to dia 20 mm stepped by 0,5 mm	3 sets			
	Machine reamers H 7				
	dia 7	2			
	dia 8	2			
	dia 9	2			
	dia 10	2			
	dia 11	2			
	dia 12	2			
	dia 13	2			
	dia 14	2			
	dia 15	2			
	dia 16	2			
	dia 17	2			
	dia 18	2			
	dia 19	2			
	dia 20	2			
	Straight-shank countersinking bits				
	60x16	2			
	60x22	2			
	Machine tap				
	M 5	10			
	M 6	10			
	M 8	10			
	M 10	10			
	Nut tap				
	M 4	10			
	M 6	10			
	M 8	10			
	M 10	10			
	Machine vice 80	1			
	flat clamp 14x80	2			
	Straight-shank reamer drills from dia 9,8 to dia 17,75 stepped by 1 mm	1 set			
	Chuck No. 16	1			

No.	Denomination	Pcs	kW	Weight in t	Price in US $
	Chuck wrench No. 7	1			
	Chuck arbor B 18x2	1			
	Adapters 4x3	1			
	4x2	1			
	3x1	1			
	Straight-shank drills, set from dia 6 to dia 10 mm stepped by 0,1 mm	10 sets			
	Straight-shank drills, set from dia 10 to dia 15 mm stepped by 0,5 mm	3 sets			
	Straight-shank drills, set from dia 15 to dia 20 mm stepped by 1 mm	1 set			
	Straight-shank drills with cylindrical shank, set from dia 21 to dia 32 mm stepped by 1 mm	3 sets			
	Machine reamer H 7				
	dia 8	2			
	dia 10	2			
	dia 12	2			
	dia 14	2			
	dia 16	2			
	dia 18	2			
	dia 20	2			
	dia 22	2			
	Countersinking bit				
	60x22	2			
	60x45	2			
	Machine tap				
	M 8	10			
	M 10	10			
	M 12	10			
	M 14	10			
	Nut tap				
	M 8	10			
	M 10	10			
	M 12	10			
	M 14	10			
	M 16	10			
	Machine vice 80	1			
	Straight-shank reamer drill, set from dia 9,8 to dia 19,70 mm stepped by 1 mm	1 set			

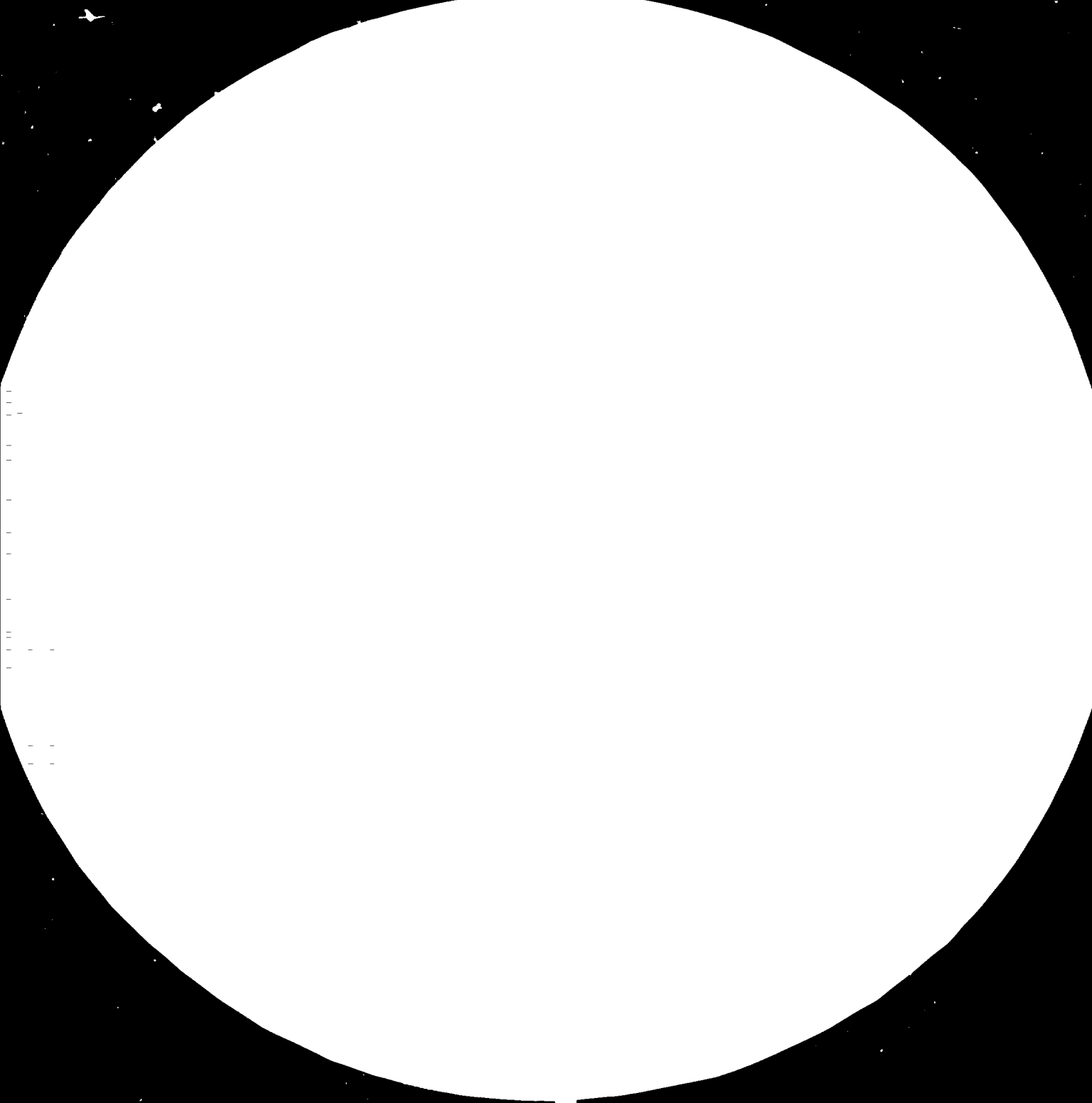
No.	Denomination		Pcs	kW	Weight in t	Price in US $
	General utility tools for milling machines					
	U-shaped clamp	14x160	2			
		14x200	2			
	Flat sliding clamp	14x125	2			
	Bent sliding clamp	14,5x125	2			
	Bent swivelling clamp	14x125	2			
	Clamp support	16x50	4			
	Clamp support	20x80	2			
	Milling arbors with steep tapered shanks for end milling					
		40x16x29	1			
		40x22x37	1			
		40x27x23	1			
		30x27x47	1			
		40x32x60	1			
	Milling arbors with steep tapered shanks for milling heads					
		40x40x43	1			
	Long milling arbors with steep tapered shanks	40x22x500	1			
		40x27x500	1			
		40x32x500	1			
	Adapters with steep taper and Morse cavity	40x2	2			
		40x3	2			
	Adapter couplings	40x2	4			
	Clamping bushing with steep tapered shank for straight-shank cutters	40x16	1			
		40x28	1			
	Clamping bushing inserts for straight-shank cutters					
		16x4	2			
		16x5	2			
		16x6	2			
		16x8	2			
		28x10	2			
		28x12	2			
		28x16	2			
		28x20	2			
	Right-hand 12-cutter milling head dia	160x12	1			
	Left-hand 12-cutter milling head dia	160x12	1			

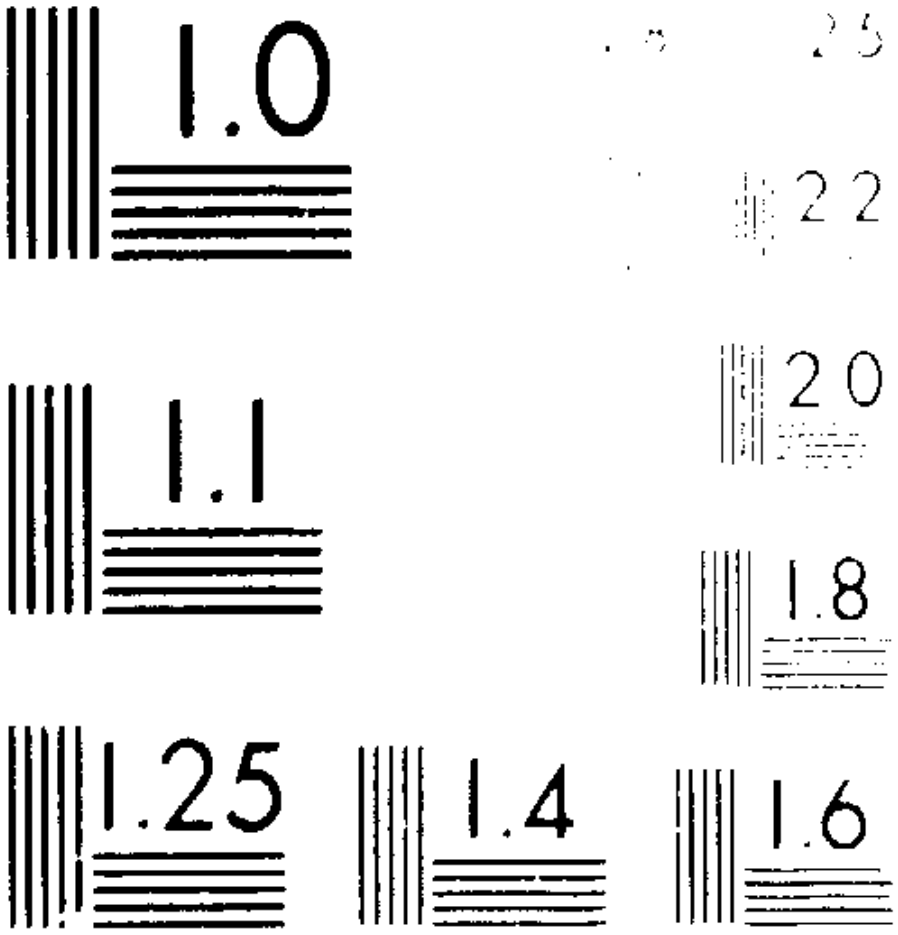
No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Coarse-tooth plain right-hand arbour-type cutter	50x40	1			
		60x80	1			
		80x100	1			
	Coarse-tooth plain left-hand arbour-type cutter	50x40	1			
		63x80	1			
	Fine-tooth plain right-hand cutter	50x40	1			
		50x80	1			
		63x50	1			
		80x63	1			
	Fine-tooth plain left-hand cutter	50x40	1			
		80x63	1			
	Straight-shank plain coarse-tooth right hand face-milling cutter	4x10	5			
		5x12	5			
		6x16	5			
		8x20	5			
		10x20	5			
		12x25	5			
		16x32	5			
		20x40	5			
	Straight-shank plain fine-tooth right-hand face-milling cutter	16x50	2			
		20x63	2			
	Straight-shank plain fine-tooth left-hand face-milling cutter	16x50	2			
		20x63	2			
	Tapered-shank plain semicourse-tooth right-hand face-milling cutter	25x50	1			
		25x80	1			
	Arbor-type plain fine-tooth right--hand face milling cutter	40x40	1			
		50x50	1			
	Tapered-shank plain semicourse-tooth left-hand face-milling cutter	25x50	1			
		25x80	1			
	Arbour-type plain fine-tooth right-hand face milling cutter	63x63	1			
		80x80	1			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Plain fine-tooth left-hand face--milling cutter	40x40	1			
		50x50	1			
	Arbor-type coarse-tooth disk cutter	80x22x10	2			
		100x27x12	2			
		125x32x14	2			
	Arbor-type fine-tooth disk cutter	63x8	2			
		63x10	2			
		80x10	2			
		80x12	2			
		100x14	1			
		125x16	1			
	Arbor-type keyseat disk cutter	50x4	2			
		63x6	2			
		63x5	2			
	Arbor-type keyseat disk cutter	63x8	2			
		80x10	2			
		80x12	2			
		80x14	1			
		100x16	1			
	Straight-shank T-slot disk cutter	15	2			
		18	2			
		25	1			
		32	1			
	Straight-shank keyway disk cutter	16x4	2			
		22x5	2			
		25x6	2			
		38x8	1			
		45x10	1			
	Tapered-shank T-slot disk cutter	40	1			
	Straight-shank half-side keyway milling cutter	4	5			
		5	5			
		6	5			
		7	5			
		8	5			
		10	5			
	Arbor-type semi-circular convex milling cutter	2	2			
		3	2			
		4	2			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
		5	2			
		6	2			
		8	2			
		10	1			
		12	1			
		14	1			
	Arbor-type semi-circular concave milling cutter	2	2			
		3	2			
		4	2			
		5	2			
		6	1			
		8	1			
		10	1			
	Arbor-type gang semi-circular concave cutter	12	1			
		14	1			
	Straight-shank angle-type face--milling cutter	45x16	2			
		45x25	2			
		60x16	2			
		60x25	2			
		75x16	2			
		75x25	2			
	Angle milling cutter	45x16	2			
		45x25	2			
		60x16	2			
		60x25	2			
		75x16	2			
		75x25	2			
	Bent sliding clamps	14,5x125	2			
	Clamp support	16x50	2			
		20x80	2			
	Steep-shank milling arbor	40x16x29	1			
		40x22x19	1			
		40x22x37	1			
		40x27x23	1			
		40x27x47	1			
		40x32x31	1			
		40x32x60	1			
	Milling arbor for milling heads	40x32x48	1			
	Steep adapter for Morse shanks	40x2	1			
		40x3	1			
	Coupling for steep adapter	40x2	2			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Clamping bushing	40x16	1			
		40x28	1			
	Clamping bushing inserts					
		16x4	1			
		16x5	1			
		16x6	1			
		16x8	1			
		28x10	1			
		28x16	1			
		28x12	1			
		28x20	1			
	Right-hand 10-cutter milling head dia 125		1			
	Left-hand 10-cutter milling head dia 125		1			
	Coarse-tooth right-hand face milling cutter dia	4x10	10			
		5x12	10			
		6x16	10			
		8x20	10			
		10x20	6			
		12x25	6			
	Right-hand face-milling cutter dia	16x50	2			
		20x63	2			
	Left-hand face-milling cutter dia	16x50	2			
		20x63	2			
	Right-hand face-milling cutter dia	25x50	1			
		25x80	1			
	Left-hand face-milling cutter dia	25x50	1			
	Arbor-type face-milling cutter dia	40x40	2			
		50x32	2			
		80x80	2			
		100x50	2			
	T-slot milling cutter dia	21	2			
		25	2			
		32	2			
	Keyseat milling cutter					
		16x4	3			
		25x3	3			
		25x6	3			
		38x8	2			
		45x10	2			

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No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Spline milling cutter dia	4	5			
		6	5			
		8	5			
		10	3			
		12	2			
		16	2			
		20	2			
	Tapered-shank milling arbor	40x27x47	1			
		40x32x60	1			
	Tapered-shank milling arbor	27x47xMK4	1			
	Long milling arbor	40x32x400	1			
		40x32x320	1			
	Guide bush	27x110	1			
		32x110	1			
	Spacing collar dia	27x2	1			
		32x3	1			
	Adapter	4x3	1			
	Coupling	4x3	1			
	Steep adapter	40x2	1			
		40x3	1			
	Adapter coupling	40x2	1			
	Clamp bushing	3x16	1			
	Bushing insert	16x6	1			
		16x8	1			
		16x10	1			
	Plain milling cutter dia	63x80	1			
		80x90	1			
	Plain face-milling cutter dia	8	10			
		10	10			
	Fine-tooth face-milling cutter dia	25x50	2			
	plain face-milling cutter dia	63x40	1			
		100x50	1			
	Plain face-milling cutter dia	80x50	1			
	Roughing disk cutter dia	80x10x27	1			
		100x12x32	1			
		125x14x32	1			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Disk cutter with side cutting edge dia	125x16	2			
	keyseat cutter dia	80x10	2			
		80x12	2			
		100x16	2			
		100x18	2			
	Single-spindle slot cutter dia	8	10			
		10	10			
		12	10			
	Radius cutter	8	2			
		12	2			
	Angle milling cutter					
		45°x80	1			
		60°x80	1			
	Bent clamps	18x160	2			
	Flat clamps	18x100	2			
	Long milling arbor, complete					
		50x32x630	1			
		50x40x630	1			
	Steep adapter	40x30	1			
		50x40	1			
	Steep adapter for Morse shanks					
		40x2	1			
		40x3	1			
		50x3	1			
		50x4	1			
	Adapter couplings	40x2	2			
		50x3	2			
	Clamp bushings	40x16	1			
		50x28	1			
	U-shaped clamp	18x250	2			
	Sliding bent clamp	18x200	2	pcs		
	Flat swivelling clamp	18x160	2			
	Clamp supports	16x50	2			
		20x80	2			
	Right-hand milling head	160x12	1			
	Coarse-tooth right-hand plain milling cutter	80x63	1			
		100x125	1			
	Coarse-tooth left-hand plain milling cutter	80x63	1			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Fine-tooth right-hand plain milling cutter	80x63	1			
		80x90	1			
		100x110	1			
	Arbor-type face-milling cutter	50x32	1			
		63x40	1			
		80x50	1			
	Disk cutters	100x22x12	2			
		125x27x14	2			
		160x32x16	2			
	Disk cutters	125x10	2			
		125x12	2			
		125x16	2			
	Arbor-type semi-circular convex milling cutters	12	1			
		16	1			
		18	1			
		20	1			
	Arbor-type semi-circular concave milling cutters	12	1			
		16	1			
		18	1			
		20	1			
	Clamp bushing inserts	16x4	1			
		16x5	1			
		16x6	1			
		16x8	1			
		28x10	1			
		28x12	1			
		28x16	1			
		28x20	1			
	Milling arbors for face-milling cutters	40x22x37	1			
		40x27x47	1			
		50x27x47	1			
		50x32x60	1			
	Milling arbors for milling heads	40x32x48	1			
		50x40x43	1			
	Long milling arbors, complete	50x32x630	1			
		50x40x630	1			
	Steep adapter	40x30	1			
		50x40	1			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Steep adapter for Morse	40x2	1			
		40x3	1			
		50x3	1			
		50x4	1			
	Adapter couplings	40x2	2			
		50x3	2			
	Clamp bushings	40x16	1			
		50x28	1			
	U-shaped clamps	18x250	2			
	Bent sliding clamps	18x200	2			
	Flat swivelling clamps	18x160	2			
	Clamp supports	16x50	2			
		20x80	2			
	12-cutter milling head dia	160x12	1			
	Coarse-tooth right-hand plain milling cutter dia	80x63	1			
		100x125	1			
	Coarse-tooth left-hand plain milling cutter dia	80x63	1			
	Fine-tooth right-hand plain milling cutter dia	80x63	1			
		80x90	1			
		100x80	1			
	Plain face-milling cutters dia	4x10	3			
		5x12	3			
		6x16	3			
		8x28	3			
		10x32	2			
		12x40	2			
		16x50	1			
		20x63	1			
	Right-hand plain face-milling cutters dia	16x32	2			
		20x40	2			
	Plain face-milling cutters dia	25x50	2			
		32x100	1			
		40x63	1			
		40x125	1			
	Plain face-milling cutters dia	25x80	1			
		32x100	1			
		40x125	1			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Arbor-type face-milling cutter dia	50x32	1			
		63x40	1			
		80x50	1			
	Disk cutters dia	125x12	2			
		125x16	2			
		125x18	2			
	Convex cutters	14	1			
		16	1			
		18	1			
		20	1			
	Concave cutters	14	1			
		16	1			
		18	1			
		20	1			
	Angle-face-milling cutters	45°x16	1			
		45°x25	1			
		60°x16	1			
		60°x25	1			
	Rough slotting tools	20	2			
		25	2			
	Keyway tools	6	2			
		8	2			
		10	2			
	Two-lipped slotting tools	16	2			
		20	2			
	Clamp bushing inserts	16x4	1			
		16x5	1			
		16x6	1			
		16x8	1			
	Clamp bushing inserts	28x10	2			
		28x12	2			
		28x16	2			
		28x20	2			
	Machine vice No. 160		1			
	Self-centring machine vice 125		1			
	Tiltable swivel machine vice, face width 160		1			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Plain clamp 160		4			
	U-shaped clamp	18x160	2			
		18x200	2			
	Bent-sliding clamp	18x160	2			
		18x200	2			
	Flat swivelling clamp					
		18x125	2			
		18x160	2			
	Steep-shank milling arbor					
		50x22x19	1			
		50x22x37	1			
		50x27x23	1			
		50x27x47	1			
		50x32x31	1			
		50x32x60	1			
	Milling arbor for milling head					
		50x40x43	1			
	Steep adapter for Morse					
		50x3	1			
		50x4	1			
	Steep adapter coupling					
		50x3	2			
		50x5	1			
	Steep-shank clamp bushing 50x28		1			
	12-cutter right-hand milling head dia	160x12	1			
	Coarse-tooth right-hand face--milling cutter dia	8x20	2			
		10x20	2			
		12x25	2			
		16x32	2			
		20x40	2			
	Coarse-tooth left-hand face--milling cutter dia	8x20	2			
		10x20	2			
		12x25	2			
		16x32	2			
		20x40	2			
	Fine-tooth right-hand face-milling cutter dia	16x32	2			
		20x40	2			
	Fine-tooth left-hand face-milling cutter dia	16x32	2			
		20x40	2			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Taper-shank right-hand face-milling cutter dia	25x50	1			
		32x56	1			
		40x63	1			
	Taper-shank left-hand face-milling machine dia	25x50	1			
		32x56	1			
		40x63	1			
	Arbor-type face-milling cutter dia	50x32	2			
		63x40	2			
		80x50	2			
		100x50	2			
	T-slot disk cutter dia	15	1			
		18	1			
		21	1			
		25	1			
		32	1			
	T-slot disk cutter dia	40	1			
		60	1			
	Slot cutter dia	16x4	1			
		25x6	1			
		28x8	1			
	Keyseat cutter dia	38x8	1			
		45x10	1			
	Slot milling cutter dia					
		8	1			
		10	1			
		12	1			
		14	1			
		16	1			
		18	1			
		20	1			
	Angle face-milling cutter					
		45° dia 25	2			
		60° dia 25	2			
		75° dia 25	2			
	<u>General utility tools for grinding machines</u>					
	Grinding wheel for steel roughing	400x50x127 mm	4			
	Grinding wheel for cast iron grinding	400x50x127 mm	2			
	Grinding wheel dia	70x10	10			
		100x20	10			
		150x16	5			
		175x10	5			
		200x10	5			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
		200x16	5			
		250x20	5			
		250x40	5			
		300x32	5			
		300x40	5			
	Travelling side rest 12		2			
	Grinding wheel dia	250x20	2			
		250x20	2			
		250x20	2			
		250x25	2			
		250x20	2			
	Grinding wheel dia	350x50x127	2			
		350x63x127	2			
		350x40x127	2			
	Grinding wheel for internal grinding dia	13x16x6	10			
		16x20x6	10			
		16x16x6	10			
	Total US $ ...					12 000
8	Measuring and inspection instruments for machining					
	Steel rule	1000 mm	4			
		500 mm	4			
		300 mm	4			
		500 mm	4			
	Slide calliper	1/20-150	4			
		1/50-400	2			
		1/50-500	2			
	Depth slide gauge	1/50-250	2			
	Outside calliper	200	1			
		300	1			
	Inside calliper	250	1			
		300	1			
	Protractor		2			
	Depth slide gauge	1/20-600	1			
	Protractor for measuring tool cutting edges	1	1			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Feeler gauges	0,02-0,20	2			
		0,05-1,00	2			
	Sine bar	300	1			
	Sine bar with tips	200	1			
		300	1			
	Outside radius gauges (cassette)		1			
	Radius gauges	1 - 7	1			
		7,5 - 15	1			
	Screw pitch gauges - metric thread		1			
	Screw pitch gauges for Whitworth and tube thread		1			
	Inspection rule	500	1			
		1000	1			
	Precision set square	160	2			
	Precision try square	160	1			
		250	1			
	Set square	630	1			
	Spring bow compasses	200	2			
		300	2			
	Beam compasses	500	1			
		1000	1			
	Marking gauge with scale	300	2			
		500	2			
		1000	1			
	Scriber		10			
	Adjustable rule stand		2			
	Steel rule for stand	500	2			
		1000	2			
	Ribbed marking-off table	1000	1			
		2000	1			
	Inspection and marking-off plate	100	6			
		130	6			
	Marking-off plate with clamp dog	140	4			
	Tipped support	80	6			
		130	6			
	Slotted support	95	4			
		165	4			
	Micrometer calliper	0-25	2			
		25-50	2			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Micrometer calliper	50-75	2			
		75-100	2			
		100-125	2			
		125-150	2			
		150-175	2			
		175-200	2			
		200-300	1			
		300-400	1			
		400-500	1			
		500-600	1			
		600-700	1			
		700-800	1			
		800-900	1			
		900-1000	1			
	Inside micrometer calliper	3-10	2			
		5-45	2			
	Folding micrometer with adapters	100-1300	1 set			
	Supplementary set of adapters		1 set			
	Micrometer calliper for sheet metal 0 - 10		2			
	Micrometer stand		4			
	Micrometer calliper for gears					
	0 - 25		1			
	25 - 50		1			
	Dial gauge with 0,01 mm division 60/B		2			
	Dial gauge with 0,001 mm division		2			
	Lever-type dial gauge		2			
	Three-contact inside calliper with dial gauge		1			
	Inside calliper with dial gauge					
	type 148 150		1			
	type 148 151		1			
	type 148 152		1			
	type 148 153		1			
	Micro-passameter	0-25	1			
		25-50	1			
	Stand with permanent magnet		5			
	Centres		2			
	Gauging table accessories		2			
	Manual POLDI hardness tester		1			

No.	Denomination	Pcs	kW	Weight in t	Price in US $
	Brinell magnifying glass	2			
	Longitudinal water level size 300	1			
	Frame-type water level size 200	1			
	T o t a l US $				23 000
	T o t a l A n n e x N o. 14 US $				81 000

UNITED NATIONS

U N I D O

Project in the Socialist Republic of Vietnam
General requirements for the post of National Director

DP/VIE/80/055

Post title	National Director
Duration	During the project
Date required	II quarter 1983
Duty station	Ho Chi Minh City, Hanoi
Purpose of project	To render assistance to the Government in maintenance, repairs and manufacture of spare parts for public transport vehicles and civil engineering equipment.
Duties	The National Director will represent the Ministry of Transportation and Communication. He will specifically be expected to: 1. Assist to the Chief Technical Adviser in providing local personnel for on-the-job training in the pilot units and for the production control and preventive maintenance unit. 2. Select candidates for training abroad and develop their training programme.

3. Secure the local personnel by the end of the project who will be able to handle and operate the equipment in future.

4. Solve all problems and requests in the project activities such as material, energy supply, erection and assembly and operation of the equipment as well as other administrative matters are concerned.

Qualifications University degree in mechanical engineering with the knowledge of automotive spare parts production.

Language Vietnamese and English

Background information:

Ho Chi Minh City has a total of some 24 000 public transport vehicles and civil engineering equipment. Out of this approx. 18 500 are trucks with a load-carrying capacity higher than 3 t, approx. 4 500 are buses and more than 1 000 civil engineering equipment. All these vehicles and equipment come from the USA and West European countries and are almost without exceptions more than 7 years old. Only 16 % of the above mentioned vehicles are in operation. The existing facilities cannot cope with the demands for spare parts, as well as the demands associated with their maintenance and repairs.

The purchase of spare parts from abroad cannot be realized due to the non-convertibility of local currency, so that the service is lacking key spare parts which cannot be manufactured locally in satisfactory quantities at present.

Insufficinet experience and training of local personnel adversely affect maintenance and repairs activities and manufacture of spare parts for these vehicles. The fear exists that if no rapid measures for improving the situation are taken, all the public transport vehicles in the City will be out of operation within a few years.

D R A F T W O R K P L A N

Annex No. 16

Description of activities	1983				1984				1985			
	I.	II.	III.	IV.	I.	II.	III.	IV.	I.	II.	III.	IV.
1. Approval of project document												
2. Recruitment of the Chief Technical Adviser and consultants												
3. Invitation of international bids for subcontractors on training												
4. Appointment of National Director, selection and nomination of the National team												
5. Submission of requisition of offers												
6. Provision of offices, buildings and equipment on the Government part												
7. Signing of the contract and provision of services by the subcontractor												
8. Preparation of foundations and power supplies for new equipment												
9. Activity of consultants in the commissioning of turret lathes												
10. Finalisation of fellowships programme, placement of the candidates and training												

Annex No. 16

Description of activities	1983				1984				1985			
	I.	II.	III.	IV.	I.	II.	III.	IV.	I.	II.	III.	IV.
11. Establishment of training centre and its pilot units for on-the-job training												
12. Establishment of production control and preventive maintenance unit												
. Delivery of equipment components:												
a/ Equipment of the training centre - see Annex No. 9												
b/ Equipment of pilot unit for on-the-job training in Works No. 1 - see Annex No. 10												
c/ Equipment of pilot unit for on-the-job training in Works No. 4 - see Annex No.												
d/ Production control and preventive maintenance unit - - see Annex No. 14												
14. Selection and provision of consultants for erection												
15. Erection and assembly of machinery and equipment and their commissioning												
16. Commissioning of training centre and pilot units												
Note: The work schedule is to be further specified by the Chief Technical Adviser in cooperation with the National Director.												

Annex No. 17

Envisaged yearly raw materials consumption for the manufacture of spare parts for public transport vehicles and civil engineering equipment in Ho Chi Minh City based on the scheduled demand

Material	planned production of 650 t spare parts in the year 1982	planned production of 780 t spare parts in the year 1985
Sheet metal up to the thickness of 1,5 mm	92 t	104 t
O-, U-, L-, T-sections	500 t	600 t
Castings: grey cast iron	126 t	142 t
non-ferrous metals and alloys	12 t	14 t
Forgings	66 t	92 t
T o t a l	796 t	952 t

Annex No. 18

P R O J E C T B U D G E T C O V E R I N G U N D P C O N T R I B U T I O N

/ thousands of US dollars /

Country: Vietnam

Project No.: DP/VIE/80/055

Project title: Repair and maintenance of public transport vehicles

10	Project personnel	Total		1983		1984		1985	
11	Experts/post title	m/m	$	m/m	$	m/m	$	m/m	$
11-01	Chief technical adviser	24	162	6	39,6	12	79.2	6	43.2
11-02	Consultants for starting turret lathes	4	26.4	-	-	4	26.4	-	-
11-03	Consultants for erection and commissioning	12	82.2	-	-	7	46.2	5	36
16	Mission Cost, Tripartite review	-	20	-	-	-	10	-	10
19	Total personnel component	40	290.6	6	39.6	23	161.8	11	89.2
29	Total subcontracts component	12	79.2	-	-	12	79.2	-	-
30	TRAINING								
31	Fellowships	41	90.2	-	-	41	90.2	-	-
39	Total training component	41	90.2	-	-	41	90.2	-	-
40	Equipment	-	530	-	-	-	81	-	449
49	Total equipment component								
59	Total miscellaneous component	-	10	-	-	-	5	-	5
99	Grand t o t a l	93	1000	6	39.6	76	785.2	11	175.2

Inputs of the Government of the Socialist Republic of Vietnam / in thousands of Dongs/

Country: Vietnam

Project No.: DP/VIE/80/055

Project title: Repair and maintenance of public transport vehicles

Inputs of the Government

	Total	1983	1984	1985
1. National team personnel	300	50	200	50
2. Design for machinery and equipment supplied by UNDP for training centre and pilot units	150	100	50	-
3. Erection, assembly and indirect materials, incl. required energies for erection and assembly of machinery and equipment, adjustment work plans in production technology	200	-	150	50
4. Civil engineering work for execution of foundations and preparation of training centre and pilot units	500	300	200	-
5. Equipment of training centre and pilot units with furniture, expendable materials, power and water supply	500	250	150	100
6. Equipment of offices and secretariat with furniture and office requisites for project personnel	150	100	50	-
7. Transportation of project personnel, materials and machinery	700	200	400	100
8. Additional equipment for pilot units for on-the-job training	1 000	500	500	-
G r a n d t o t a l	3 500	1 500	1 700	300

UNITED NATIONS DEVELOPMENT PROGRAMME

Project of the Government of

V I E T N A M

12085
(2 of 2)

PROJECT DOCUMENT

Title: Repair and Maintenance of Public Transport Vehicles in Ho Chi Minh City

Number: DP/VIE/80/055 Duration: 2 years

Primary function: Direct support, training

Secondary function: Design and Production

Sector:/Govt.Class/: Industrial Infrastructure /UNDP Class and Code/ Industry /05/

Sub-Sector:/Govt.Class/: Automotive Industry /UNDP Class and Code/ Industrial Services and Institutions /0530/

Government Implementing Agency:
Ministry of Transportation and Communication

Executing Agency:

United Nations Industrial Development Organization / UNIDO /

Estimated Starting Date: July 1983

Government Inputs: 3,5 Mln Dongs / in kind/ UNDP Inputs US $ 1 Mln /US dollars/

Signed:

..... Date: .....
on behalf of the Government

..... Date: .....
on behalf of the Executing Agency

..... Date: .....
on behalf of the United Nations Development Programme

PART I - LEGAL CONTEXT

This Project Document shall be the instrument referred to as such in Art. 1, paragraph 2 of the Agreement between the Government of the Socialist Republic of Vietnam and the United Nations Development Programme, signed by the Parties on March 21st, 1978.

The Government Implementing Agency shall, for the purpose of the Standard Basic Agreement, refer to the Government Cooperating Agency described in the Agreement.

PART II - THE PROJECT

A. DEVELOPMENT OBJECTIVES

To significantly reduce the country's foreign exchange requirements and to provide continuous, economically viable services to the public transport through improved management, training, enhanced self-reliance on domestic technical capabilities, with special reference to effective repairs, preventive maintenance and production control.

B. IMMEDIATE OBJECTIVES

/a/ To improve spare parts production technology,

/b/ To train local technical personnel on-the-job and abroad in manufacture and design of spare parts, preventive maintenance and repairs of vehicles, production control and in production management of repair work shops.

/c/ To assist in establishing and equipping training units on manufacturing of spare parts for the most important components of public transport vehicles.

/d/ To provide expertise in manufacturing of spare parts and commissioning of equipment.

C. SPECIAL CONSIDERATION

The UNDP Country Programme for Vietnam has detailed the subject project in paragraph 91 signed in June 1981.

The General Assembly adopted Resolution No. A/RES/32/3 of 13th October, 1977. The importance of this Project is reflected by its direct relationship to overall economic problems confronting the country and to social problems which are an integral part of general employment development and essential needs of the people.

D. BACKGROUND INFORMATION

The Socialist Republic of Vietnam has the population of about 55 600 000 inhabitants and covers an area of 329 566 square km. The population is not evenly distributed over the country. Some Provinces have a population density of more than 1000 inhabitants per square km, while other Provinces have a density below 30 inhabitants per square km. The population growth rate is estimated at 2,5 - 2,6% per year. The population density is estimated at 169 inhabitants per square km on the average.

The Ministry of Transportation and Communication is to assure the production of spare parts for all kinds of vehicles, in order to operate public transport vehicles as well as civil engineering equipment.

At present there are 40 000 - 50 000 vehicles of 50 different makes in operation all over Vietnam.

Ho Chi Minh City is the largest town in Vietnam. It has about 3,5 million inhabitants. There are the following types and numbers of public transport vehicles in Ho Chi Minh City:

TOYOTA (Japan)	5 700 pcs
FORD (USA)	5 000 pcs
INTERNATIONAL (USA)	4 800 pcs
DODGE (USA)	3 600 pcs
DESOTO (USA)	3 500 pcs
FARGO (USA)	700 pcs
T O T A L	23 300 pcs

40 - 45% of the vehicles have PERKING D 354 engines. Buses account for 20% of the number of vehicles, i.e. 4 660 pcs, and the rest - 18.640 pcs - are trucks with a load-carrying capacity of more than 3 tons.

The overall figure for civil engineering equipment is 1 200 pcs. These are mostly bulldozers of US origin of the types D6C, D7H, D8H and caterpillars of the types 966C and 988. The vehicles have been in operation for 7 years with a minimum availability of spare parts.

The country is facing acute problems in getting spare parts. The repair and maintenance workshops, as well as the spare parts production workshops, have at their disposal rudimentary equipment which cannot cover all the needs both qualitatively and quantitatively. Production control and preventive maintenance are on a very low level. The existing maintenance facilities are deteriorating due to the lack of adequately skilled personnel. The current shortages in the supply of spare parts are mainly interlinked with the non-availability of foreign exchange in the country and bad production management.

The public transport buses are to transport 1 million passengers for a distance of about 30 kms per day in Ho Chi Minh City. This requires the availability of 1 500 buses. For the time being only 800 buses are in operation.

As for the transportation of goods, it is necessary to transport approx. 100 kg per inhabitant per day. To assure this transportation, 5 000 pcs of trucks would be required with a load-carrying capacity of 5 tons. At present only 3 000 pcs of those vehicles are in operation.

Out of 23 000 vehicles only 6 500 vehicles are required to ensure the implementation of the Government plan. At present only 3 800 vehicles are in operation which account for 16 %.

	Number (pcs)	Current requirement (pcs) in operation state	In serviceable state (pcs)
Buses	4 700	1 500	800
Trucks	18 600	5 000	3 000
T o t a l	23 300	6 500	3 800

Each vehicle needs 100 kg spare parts per year in order that its proper operation may be assured.

The overall need of spare parts for public transport vehicles is 650 tons per year; out of this figure 450 tons are meant as the production of new components and 200 tons as the sum of second-hand spare parts.

The above mentioned spare parts are to be produced by the following factories:

- Automobile Repair Works No. 1 - 250 tons per year
- Repair and Production Works for civil engineering machines No. 4 - 200 tons per year
- Other cooperating factories - 200 tons per year which are to be obtained by dismantling and reconditioning old components from non-serviceable vehicles as well as by new production.

The planned and actual yearly production figures for the main spare parts are summarized in the following tables:

Repair Works No. 1 in Ho Chi Minh City

Spare parts	Planned yearly production	Actual yearly production
Repairs of engines	2 000 pcs	250 pcs
Manufacture of pistons	64 000 pcs	16 000 pcs

Spare parts	Planned yearly production	Actual yearly production
Manufacture of compressor pistons	20 000 pcs	5 000 pcs
Manufacture of piston rings	12 000 pcs	3 600 pcs
Manufacture of piston rings for compressors	30 000 pcs	9 000 pcs
Connecting-rod bearings	20 000 pcs	7 000 pcs
Slide camshaft bearings	10 000 pcs	3 500 pcs
Valves	90 000 pcs	36 000 pcs
Valve lifters	60 000 pcs	24 000 pcs
Automotive pins	260 000 pcs	60 000 pcs
Total tons per year	250 t	64 t

Repair Works No. 4 in Ho Chi Minh City

Spare parts	Planned yearly production(pcs)	Actual yearly production (pcs)
Pistons	3 000	750
Piston rings	7 200	2 100
Engine cylinders	1 000	300
Connecting-rod bearings	6 000	2 100
Valves	6 000	1 800
Valve lifters	1 000	300
Automotive pins	20 000	9 000
Manufacture of gear boxes	15 tons	4 tons
Forgings	500 tons	150 tons
Overhauls of civil engineering mechanisms	500 pcs	150 pcs
Total production of spare parts in tons/year	200 tons	70 tons

The repairs of public transport vehicles in Ho Chi Minh City are currently made by dismantling 3 or 4 vehicles, so that one vehicle is made operational. In this way 20 - 30% of the vehicles are taken out of operation every year.

At present No. 1 CTHD Corporative Enterprise in Ho Chi Minh City is starting the manufacture of a new Vietnamese

bus with the trade-mark SCOTOSO 1. They utilize IFA truck engines incl. undercarriages and frames which have been appropriately enlarged and with adapted drive shaft. The manufacture of the body is predominantly manual with the aid of simple tools and fixtures. In general, the manufacture is very ineffective and production figures are very low.

The main policy of the Ministry of Transportation and Communication is to develop only the existing facilities while upgrading the existing machinery and equipment and training personnel on proper production of spare parts.

The country was visited by a team of experts under the project DP/VIE/80/055 in May 1982 for identification of existing problems and submission of recommendations.

The main difficulties are:
- obsollete machinery park
- non-effective and very low technology standards in the manufacture of the basic spare parts
- spare parts are produced individually, not in lots, and the manufacture is scattered into many enterprises all over the country
- a large number of transport vehicle types are predominantly from the USA and West European countries, for which there are no spare parts production documentation and no workshop handbooks for repairs and identification of faults and defects
- a great deficiency of measuring and inspection instruments, production tools and implements
- qualified technical personnel is very scarce
- there are not adequate resources for the introduction of new technology improvements in production process, management and organization
- preventive maintenance is on a very low level
- training programmes do not exist.

The mission recommended to concentrate the project on the establishment of a training centre with two pilot units for on-the-job training of local staff. The mission recommended to eastablish a production control and preventive maintenance unit. Expertise should be provided to the Project through international experts directly and under subcontracts.

The team visited several repair workshops and factories in Hanoi area and in Ho Chi Minh City. The mission came to the conclusion that the project should concentrate on the basis of enterprises of Ho Chi Minh region, particularly Automobile Repair Works No. 1 and Repair and Production Works for civil engineering equipment No. 4. These enterprises are most ready for the introduction of new technology and training of local staff both economically and technically. The first enterprise, i.e. No. 1, can handle repairs of buses and trucks and the other one, No. 4, can do the same for civil engineering equipment.

All the above-mentioned data have been collected by the team of INPRO/Polytechna, Czechoslovakia. The mission has also found that the present needs are highly urgent and cannot be solved without outside assistance.

The mission's detailed recommendations are reflected in the Final Report and in the present Project Document.

E. OUTPUTS

The following specific outputs are expected:

1. The establishment of a training centre wit two Pilot units for on-the-job training.
2. Training under subcontracting in the production of spare parts of major importance, particularly:
   - piston rings
   - connecting-rod bearings

- half-axles, gears, cardan shafts,

and in the measurement and inspection of the main parts of vehicles and civil engineering equipment.

3. The establishment of a production control and preventive maintenance unit.

4. Training of the selected candidates abroad under the fellowship programme as a follow-up of on-the-job training.

5. Preparation of basic manuals, guidelines and instructions for proper control of the production of spare parts and introduction of preventive maintenance scheme.

6. Production of spare parts locally and rehabilitation of existing spare parts with the aim to stop the practice of dismantling components from available vehicles.

7. Substantial increase in the share of public transport vehicles and civil engineering equipment being in operation.

F. PROJECT ACTIVITIES

The main activities during the life of the project are the following:

	Activity and period
1. Approval of the project	II/1983
2. Selection and arrival of the Chief Technical Adviser	III/1983
3. Establishment of the Training Centre	IV/1983-II/84
4. Selection of subcontracting firm and training (see Terms of Reference, Annex No. 5)	I/1984
5. Establishment of the Pilot unit for on-the-job training at factory No. 1 with supply of equipment, its commissioning and providing expertise	I/1984-III/84
6. Establishment of the Pilot unit for on-the-job training at factory No. 4 with supply of equipment, its commissioning and providing expertise	II/84-IV/84

7. Selection of candidates - electrical and mechanical engineers on the repair of turret lathes and their commissioning	I/1984-II/84
8. Fellowships programme	1984
9. Establishment of the production control and preventive maintenance unit	IV/1984-I/1985
10. Selection and provision of short--term consultants in the course of establishment of the Pilot units	III/1984-II/1985
11. Tripartite reviews with participation of the executing Agency and UNDP representatives from Hanoi and HQ	III/1984-II/1985

The activities within the Project are also described in the Work Plan which is enclosed hereto (see Annex No. 16).

G. INPUTS

1. Description of Government Inputs

a) Assignment of national staff

- National Project Director (1)
- Workshop mechanical engineers (2)
- Workshop electrical engineers (2)
- National supervisors of the Pilot units (3)
- Technicians for designing and rehabilitation of spare parts (10)
- Drivers (2)
- Secretary (1)
- Technicians for erection and assembly of machines (12)
- Trainees from Works No. 1 and No. 4 and others (50 for 3 months each)
- Provision of service support personnel (5)

b) The Government will provide and secure:

- buildings and rooms for the Training Centre, Pilot units and project offices
- furniture for the offices of the international staff and the training facilities

- local transport means incl. 2 cars and a truck
- erection, assembly and related expendable materials, water, and power supply / 220 V, 50 Hz/ for the erection and assembly of machinery and equipment
- civil engineering works incl. design for execution of foundations for new machinery and equipment.

/c/ Training provisions

The Government will secure the presence of national staff for envisaged training programme.

/d/ Equipment

non-expendable equipment

The Government will provide some equipment for the Pilot units / see Annexes No. 12,13 /.

expendable equipment

The Government will provide all expendable equipment and materials necessary for the Project.

/e/ Miscellaneous

The Government will assist UNDP/UNIDO experts in technical work, secretarial and administrative services. The Government will secure smooth transport operation for the project. The total Government contribution will amount to 3,5 Mln Dongs.

2. Description of UNDP inputs

/a/ Technical personnel assistance

The following international staff will be assigned to the Project:

1) Chief Technical Adviser (24 m/m)

The Chief Technical Adviser should be a highly qualified person with practical experience in maintenance and repairs. He will be responsible for overall operation of the project and for the management and coordination of the work of the specialists, consultants and subcontractor's team.

The Chief Technical Adviser will make desisions on the timing, numbers and qualifications of the required specialists. His job description is enclosed hereto as Annex No. 1. He will start his work in the 3rd quarter of 1983. His duty station will be in Ho Chi Minh City.

2) Specialists for erection of machinery and equipment (12 m/m - see Annex No. 3)

The specialists should have experience in the erection and assembly of the machinery and equipment, either in the mechanical or electrical part. They will work in close cooperation with the Chief Technical Adviser. Their duty station will be in Ho Chi Minh City.

3) Two specialists for starting turret lathe (4 m/m)

The specialists should be well experienced in working on, handling and maintenance of turret lathes. They should be capable of training local personnel in work on these lathes. They will work in cooperation with the Chief Technical Adviser. Duty stations: Ho Chi Minh City and Hanoi. Two specialists will work for a period of two man-months each, total 4 man--months. For job description see Annex No. 4.

b) Subcontract

1) A four-member team will visit the country for a period of 3 months. The specialists should have University

degrees in mechanical engineering with experience and knowledge in production of piston rings and connecting-rod bearings and basic knowledge of their heat treatment and in repairs, maintenance and manufacture of other critical spare parts (half-axles, gears, bearings Cardan shafts etc.) as well as in inspection and testing of main components of public transport vehicles and civil engineering equipment.

The specialists should help Vietnamese technicians and workers in the manufacture of the above-mentioned spare parts. They should advise how to correctly manufacture and inspect spare parts and maintain them in a good operational condition. The Subcontractor will spend 1 month in his home office in preparing the report.

The estimated sum total required for the subcontract is US $ 79 200. The detailed terms of reference are enclosed hereinto in Annex No. 5.

c) Training

1) Local training

The international experts, mainly the C.T.A., will undertake on-the-job training of the local staff in full cooperation with the National Director. The places of training will be the Training Centre and Pilot units.

2) Specialised training abroad (see Annex No. 2)

Nine international fellowships with a total volume of 41 man-months are proposed for the training of technical personnel in repair works at foreign automotive engineering factories, particularly:

- 2 fellowships for training in the production of piston rings, total 8 man-months,
- 1 fellowship for training in the production of connecting-rod bearings, total 6 man-months,
- 2 fellowships for training in the production of gears, total 8 man-months,
- 2 fellowships for training in the production of fuel injection pumps and associated accessories, total 8 man-months,
- 2 fellowships for training in the management, organization and planning of repair works, total 10 man-months.

The training of these fellows will take place during the year 1984 with the total input of:
41 x 2200 US $ = 90 200 US $.

d) Equipment

The equipment will be provided to the Training Centre with Pilot units. For terms of reference for setting up the Training Centre see Annex No. 8.

/i/ Training Centre will be provided with teaching aids and equipment according to specification enclosed hereto as Annex No. 9. UNDP contribution US $ 42 000.

/ii/ Pilot unit at Automobile Repair Works No. 1
The unit will be used for on-the-job training of local personnel in automobile repair workshops. UNDP contribution US $ 137 400, (see Annex No. 10).

/iii/ Pilot unit at Repair and Production Works No. 4
The unit will be used for on-the-job training of local personnel in repair and production workshops for civil engineering equipment. (See Annex No. 11). UNDP contribution US $ 269 600.

/iiii/ Production control and preventive maintenance unit

The unit will be used for on-the-job training of local personnel in Works No. 1.
UNDP contribution US $ 81 000 /see Annex No.14/

Total UNDP contribution US $ 540.000

H. PREPARATION OF WORK PLAN

The draft work plan for the implementation of the Project is enclosed hereto as Annex No. 16. The detailed work plan will be developed by the Chief Technical Adviser in co-operation with the National Director.

I. PREPARATION OF THE FRAMEWORK FOR THE EFFECTIVE PARTICIPATION OF NATIONAL AND INTERNATIONAL STAFF IN THE PROJECT

Activities necessary for the implementation of the indicated outputs and for the attainment of the immediate objectives of this Project will be carried out jointly by national and international staff assigned to it. The respective roles of the national and international staff will be determined by their leaders by mutual discussions and agreement. Their respective roles shall be in accordance with the established and specific purposes of the technical cooperation.

J. DEVELOPMENT SUPPORT COMMUNICATION

The information media of the UNDP as well as of the Government shall be utilized to publicise the Project activities and results in the other interested developing countries.

K. INSTITUTIONAL FRAMEWORK

The project will be supervised by the Ministry. The Ministry will appoint the National Director who will be responsible for the implementation of the Project in cooperation with the Chief Technical Adviser.

In order to secure coordination, the UNDP Representative will be informed about all the developments. He will then pass on this information to the UNDP/UNIDO Headquarters for action.

L. PRIOR OBLIGATIONS AND PREREQUISITES

/i/ Prior obligations

- The Project shall have access to all the information and to all existing and proposed factories which have a connection with this Project.

/ii/ Prerequisites

- Appointment of the National Director / general requirements see Annex No. 15 /,
- Providing facilities for the training centre and the Pilot units.

When anticipated fulfilment of one or more prerequisites fails to materialize, UNDP may, at its discretion, either suspend or terminate its assistance.

M. FUTURE UNDP ASSISTANCE

None forseen at present. The questions can be considered in the course of the project during the tripartite review.

III. SCHEDULES OF MONITORING, EVALUATION AND REPORTS

A. Tripartite monitoring and technical reviews

The project will be subject to periodic review in accordance with the policies and procedures established by the UNDP for monitoring the project and programme implementation.

B. Evaluation

The project will be subject to evaluation in accordance with the policies and procedures established for this purpose by the UNDP.

The organization, terms of reference and timing of the evaluation will be decided by consultations between the Government, the UNDP and the Executing Agency concerned.

C. Progress and terminal reports

The Chief Technical Adviser will prepare the semiannual project progress reports on behalf of the Executing Agency in cooperation with the National Director, according to the procedures established for this purpose by the UNDP.

The Agency Terminal Report will be drafted by the Chief Technical Adviser in cooperation with the international staff assigned to the project and the National Director for further finalization by the Executing Agency and then submission to the Government.

Annex No. 1

UNITED NATIONS

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

U N I D O

Project in the Socialist Republic of Vietnam

JOB DESCRIPTION
DP/VIE/80/055

Post title	Chief Technical Adviser
Duration	2 years with possibility of extension
Date required	July 1983
Duty station	Ho Chi Minh City with travel to Hanoi
Purpose of project	To render assistance to the Government in maintenance, repairs and manufacture of spare parts for public transport vehicles and civil engineering equipment.
Duties	The Chief Technical Adviser will closely cooperate with the National Director, will organize and supervise on-the-job training and will specifically be expected to :

1. Prepare requisitions for purchasing of equipment, devices and machinery.
2. Prepare a detailed work plan.

3. Detail job descriptions of international staff.

4. Coordinate the activities of the subcontractor and international experts.

5. Prepare manuals and instructions for preventive maintenance and repairs.

6. Assist and supervise in setting - up of the training centre.

7. Develop fellowships programme of major importance.

8. Control and supervise commissioning of equipment and its putting into operation.

9. Supervise and agree upon related to the project design work of the counterpart agency.

10. Supervise establishing and functioning of the pilot units for on-the-job training.

11. Assist in establishing the production control and preventive maintenance unit.

12. Coordinate designs and production of spare parts.

The Chief Technical Adviser will also be expected to prepare a final report, setting out the findings of his mission and his recommendations to the Government

on further action which might be taken.

QUALIFICATIONS — University degree in mechanical engineering with extensive experience in maintenance, repairs and production of spare parts for vehicles. Knowledge of local conditions an asset.

LANGUAGE — English. Knowledge of French or Russian is an asset.

BACKGROUND INFORMATION — Ho Chi Minh City has a total of some 24 000 public transport vehicles and civil engineering equipment. Out of this approx. 18 500 are trucks with a load-carrying capacity higher than 3 t, approx. 4 500 are buses and more than 1 000 civil engineering equipment. All these vehicles and equipment came from the USA and West European countries and are almost without exceptions more than 7 years old. Only 16% of the above mentioned vehicles are in operation. The existing facilities cannot cope with the demands for spare parts, as well as the demands associated with their maintenance and repairs. The purchase of spare parts from abroad cannot be realized due to non-convertibility of local currency, so that the service is lacking key spare parts which cannot be manufactured locally in satisfactory quantities at present.

Insufficient experience and training of local personnel adversely affect maintenance and repair activities and manufacture of spare parts for these vehicles.
The fear exists that if no rapid measures for improving the situation are taken, all the public transport vehicles in the city will be out of operation within a few years.

Annex No. 2

Training of Vietnamese Fellows abroad

The training of 9 Vietnamese workers will be carried out in foreign factories with a well established manufacture of spare parts for public transport vehicles, their repairs and maintenance.
The training will be intended for specialists in the following activities:

1) Manufacture of piston rings, 2 engineers or technicians, total 8 man-months.
2) Manufacture of connecting-rod bearings, 1 engineer or technician, 6 man-months.
3) Manufacture of gears, 2 engineers or technicians, total 9 man-months.
4) Manufacture of fuel injection pumps and ancilliary equipment, 2 engineers or technicians, total 8 man--months.
5) Management and organization of repair works, 2 engineers or technicians, total 10 man-months.

T o t a l 41 x US Ø 2200 = US Ø 90 200

The main content of the training of these workers abroad will be the following:

- production technology, management and organization of the works
- actual execution of repairs and manufacture of spare parts
- methods of incoming, in-process and final inspection
- actual execution of heat treatment operations
- methods of routine and medium repairs and overhauls of public transport vehicles and civil engineering equipment and subsequent control

- design of spare parts

- planning and methods of economic evaluation of repairs.

The programme of training will be further specified by the Chief Technical Adviser. The suggested places of training-companies and firms involved in automotive engineering from European and Asian countries.

Annex No. 3

UNITED NATIONS

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

U N I D O

Project in the Socialist Republic of Vietnam

JOB DESCRIPTION

DP/VIE/80/055

Post title	Consultant for assembly and operation of machines and equipment
Duration	1 month with possibility of extension
Date required	Third quarter 1984 - II. quarter 1985
Duty station	Ho Chi Minh City
Purpose of project	Technical assistance in repairs and maintenance of spare parts, in assembly and in operation of related machines and equipment
Duties	The consultant will specifically be expected to : 1/ Approve designs and control power connections before assembly operations. 2/ Render advise and assistance during assembly of the machines. 3/ Instruct and show on major procedures.

4) Carry out setting up and starting of the machines.
5) Assist to the Chief Technical Adviser in all related matters.
6) Instruct an operator now to handle the machines and acquaint him with the maintenance procedures.

QUALIFICATIONS — Mechanical engineer with extensive knowledge and practical experience in assembling, commissioning and putting the machines into operation.

LANGUAGE — English. Knowledge of French or Russian is an asset.

BACKGROUND INFORMATION — Ho Chi Minh City has a total of some 24 000 public transport vehicles and civil engineering equipment. Out of this approx. 18 500 are trucks with a load-carrying capacity higher than 3 t, approx. 4 500 are buses and more than 1 000 civil engineering equipment. All these vehicles and equipment came from the USA and West European countries and are almost without exceptions more than 7 years old. Only 16% of the above mentioned vehicles are in operation. The existing facilities cannot cope with the demands for spare parts, as well as the demands associated with their maintenance and repairs. The purchase of spare parts from abroad cannot be realized due to non-convertibility of local currency, so that the service is lacking key spare parts which cannot be manufactured locally in satisfactory quantities at present.

Insufficient experience and training of local personnel adversely affect maintenance and repair activities and manufacture of spare parts for these vehicles.
The fear exists that if no rapid measures for improving the situation are taken, all the public transport vehicles in the city will be out of operation within a few years.

Annex No. 4

UNITED NATIONS

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

U N I D O

Project in the Socialist Republic of Vietnam

JOB DESCRIPTION
DP/VIE/80/055

Post title	Consultants for commissioning of machines /mechanical and electrical engineers /
Duration	1 month for each
Date required	First quarter 1984
Duty station	Ho Chi Minh City and Hanoi
Purpose of project	To assist in manufacture of spare parts and in commission of turret lathes.
Duties	The consultants will specifically be expected to :

1. Prepare documentation for commissioning.
2. Prepare instructions and conduct on-the-job training of local personnel.
3. Commission the machines.

4. Train an operator in controlling and maintaining the machines.

5. Secure repair and adjustment of the machines.

QUALIFICATIONS — Mechanical or electrical engineer with extensive knowledge and experience in the operation of turret lathes.

LANGUAGE — English. Knowledge of Russian is an asset.

BACKGROUND INFORMATION — Ho Chi Minh City has a total of some 24 000 public transport vehicles and civil engineering equipment. Out of this approx. 18 500 are trucks with a load-carrying capacity higher than 3 t, approx. 4 500 are buses and more than 1 000 civil engineering equipment. All these vehicles and equipment come from the USA and West European countries and are almost without exceptions more than 7 years old. Only 16 % of the above mentioned vehicles are in operation. The existing facilities cannot cope with the demands for spare parts, as well as the demands associated with their maintenance and repairs. The purchase of spare parts from abroad cannot be realized due to the non-convertibility of local currency, so that the service is lacking key spare parts which cannot be manufactured locally in satisfactory quantities at present.

Insufficient experience and training of local personnel adversely affect maintenance and repair activities and manufacture of spare parts for these vehicles.
The fear exists that if no rapid measures for improving the situation are taken, all the public transport vehicles in the city will be out of operation within a few years.
Turret lathes are of considerable importance for production of spare parts. At present these lathes are out of operation and without appropriate documentation.

Annex No. 5

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Terms of Reference for subcontractor's team

1. Basic Data

Country :	Vietnam
Project title	Repair and maintenance of public transport vehicles in Ho Chi Minh City
Project number :	DP/VIE/80/055
UNDP/UNIDO contribution :	US $ 79.200,-
Volume of final work :	Final report
Scheduled start of work :	IV. quarter 1983
Scheduled duration :	3 months

2. Background Information

Ho Chi Minh City has approx. a total of 24 000 public transport vehicles and civil engineering equipment. Out of this are approx. 18 500 with a load-carrying capacity higher than 3 t, approx. 4 500 buses, and more than 1 000 civil engineering equipment. These vehicles and equipment are mostly from the USA and West European countries and are almost without exceptions more than seven years old. Only 16 % of the above mentioned vehicles are in operation. The workshops which are to maintain these vehicles in operation, have at their disposal only the basic facilities which are incapable of meeting the spare parts requirements, as well as the demands for maintenance and repairs. The purchase of spare parts from abroad cannot be realized due to non-convertibility of local currency, so that the service is lacking key spare parts which cannot be manufactured locally in a satisfactory quantity. Insufficient experience and training of local personnel adversely affect maintenance and repair activities and manufacture of spare parts for these vehicles. The fear exists that if no rapid measures to remedy the situation are taken, all the public transport vehicles in the city

will be out of operation within a few years.

3. Objectives

- To improve repair and maintenance of public transport vehicles
- To improve quality of the manufactures spare parts
- To train local personnel in high-quality production of spare parts and in repairs and preventive maintenance of public transport vehicles.

4. Subcontractor's Activities

A four - member team of specialists will visit the country for a period of 3 months. The members should have university technical education and considerable experience in the manufacture of automotive spare parts. The team will consist of specialists to solve problems of:

- manufacture and heat treatment of piston rings,
- manufacture of connecting - rod bearings,
- execution of repairs, maintenance and manufacture of certain critical components for vehicles and civil engineering equipment,
- measurement and inspection of main parts of vehicles and civil engineering equipment.

The members of the team will advise and assist the Vietnamese staff in the manufacture of spare parts and on-the-job training. In doing so they will assist in setting up the training centre. Their activities will be coordinated by the Chief Technical Adviser. The place of their stay will be Ho Chi Minh City. Within one month after the termination of their work in the Socialist Republic of Vietnam they will present their final report.

The subcontractor´s team is expected to :

a/ Assist to local staff in the execution of repairs and maintenance of public transport vehicles and civil engineering equipment.

b/ Assist in manufacture and heat treatment of piston rings.

c/ Assist in manufacture of connecting-rod bearings.

d/ Assist in manufacture of the basic spare parts for public transport vehicles and civil engineering equipment, i.e. especially of half-axles, transmission gears, bearings, Cardan shafts, etc.

e/ Advise and teach local staff to carry out the inspection of main automobile parts.

f/ Advise and teach local staff to measure and inspect the quality of manufactured spare parts.

g/ Teach local staff to manufacture effectively and in good quality certain spare parts, especially piston rings, connecting-rod bearings, half-axles, Cardan shafts, gearings, etc.

h/ Help local staff to work out new, more modern technological procedures for manufacture of main spare parts.

i/ Help local staff in design and manufacture of tools, implements, clamping aids for the newly supplied equipment within this contract.

j/ Assist and train local workers in execution of metalographic tests for inspection of heat treatment operations and incoming inspection of semi-products.

k/ Prepare manuals and guidelines for further training local staff at the training centre and on-the-job.

5. Programme Schedule

a/ It is expected that the subcontractor's team will be selected and the contract signed in the IV. quarter of 1983.

b/ The field work of the subcontractor's team is to begin in the first quarter of 1984.

c/ The field work of the subcontractor's team is to be terminated in the second quarter of 1984.

d/ The final report of the subcontractor is to be presented within one month after the termination of the field work.

Annex No. 6

2nd May 1982

Questionnaire for Public Transport Vehicles

1) When the Research Institute was established?
2) Main work schedule of the Research Institute.
3) Number of employees of the Research Institute and its approximate organization.
4) What is the name of the Organization which controls the Research Institute?
5) The factory for the production of spare parts in Hanoi:
   a) What is the name of the organization that controls this factory?
   b) Lay-out of the factory in 1:100 or 1:200 scale.
   c) Ground plan of each shop, including cross section.
   d) List of machinery, quantity and types.
   e) Production programme and capacity of the factory.
   f) Total number of workers:
      - production workers
      - auxiliary workers
      - administrative workers
6) List of spare parts which should be manufactured for the considered types of public transport vehicles and civil engineering equipment.
7) Types and makes of the vehicles and civil engineering equipment, their quantity in accordance with the specific makes.
8) List of repair and maintenance workshops in all parts of the Socialist Republic of Vietnam with an indication of their capacities and manpower.
9) Requirements of the Vietnamese partners concerning the training of personnel (professions and numbers of persons) abroad and the duration of this training.
10) Suggestions of foreign specialists for training in the Socialist Republic of Vietnam. Their professions, number and duration of stay in the Socialist Republic of Vietnam.
11) Approval of the percentage division of the UNDP contribution of 1 million US $ for the purchase of machine tools, incl. spare parts, accessories, tools

and measuring instruments, and for the personnel training programme. We suggest machinery/training cost ratio from 50/50% to 60/40%.

12) Submission of statistical Bulletins about repairs and the production of spare parts, incl. purchases from abroad, for a period of at least five years.

13) List of the existing plants which could be considered for cooperation (iron foundries, forge plants, pressing shops, battery repair shops, etc.), if any.

14) Prices of raw materials, semi-finished products and subdeliveries.

15) Evaluation and selection of similar components (according to their dimensions) which could be utilized for several makes of vehicles.

16) List of the critical spare parts which are to be manufactured locally by the end of the project.

17) Manpower recruitment sources for the implementation of this project.

18) Statement of the Vietnamese partners concerning the contribution of the Government of the Socialist Republik of Vietnam as a support for solving this highly critical state in the maintenance and manufacture of spare parts for the above mentioned vehicles.

List of Personnel Met During the Mission

Mr. Englund	UNDP Resident Representative
Mr. M. Kahane	UNDP Deputy Resident Representative
Mrs. L. Lindberg	UNDP Programme Officer
Mr. Vy Hai	Chief of Mechanical Engineering Department of Ministry of Transportation and Communication
Mr. Ho Quang Long	Deputy Chief of the above Dept.
Mr. Thai Doan Dnong	Officer of International Cooperation Division of the Ministry
Mr. Tan Cauk Tien	Engineer of Mechanical Engineering Department
Mr. Nguyen Hun Dien	Specialist from International Cooperation Division of the Ministry
Mr. Cao Thuy Ann	Director of Research Institute for Science and Technology
Mr. Nguyen Ngok Tan	Director of the Factory NGO-ZA-TY
Mr. La Van Tin	Director of the Factory CHOA BINH
Mr, Le Van Ciong	Director of the Repair Factory for Civil Engineering Equipment
Mr. Nguyen Suan Tchin	Director of the Factory "3rd February"
Mr. Can Za Tchan	Director of the Factory CH-410
Mr. Truong Ky Dúc	General Director of the Municipal Transport Authority in Ho Chi Minh City
Mr. Bui Guang Quyen	Deputy Director of Automobile Repair Works No. 1
Mr. Tran Van Dieu	Director of Corporative Enterprise No. 1 CTHD
Mr. Nguyen Nam Tien	Director of Repair and Service Centre
Mr. Tran Bá Bay	Director of Repair and Production Works No. 4
Mr. Pham Chung	Representative of State Planning Committee
Mr. Nguyen Tien Thuan	Representative of State Planning Committee
Mr. Vu Van Tan	Interpreter

Annex No. 8

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Terms of Reference for setting up of training centre

1. Basic data

Country: Vietnam
Project title: Repairs and maintenance of public transport vehicles in Ho Chi Minh City
Project number: DP/VIE/80/055
UNDP/UNIDO contributions: in the project
Scheduled start of work: IV quarter 1983
Scheduled duration: during the implementation of the project and after

2. Background information

Ho Chi Minh City has approx. 24 000 public transport vehicles, including civil engineering equipment. The majority of these vehicles come from the USA and West European countries and are almost without exceptions seven and more years old. The purchase of spare parts for these vehicles from abroad cannot be realized, because the local currency is not freely convertible on foreign markets. The manufacture of spare parts in the country is insufficient, both due to a small amount of machinery and for reasons of an insufficient number of trained personnel. Maintenance and repairs of the vehicles fleet are carried out by insufficiently qualified personnel. If no speedy remedy is found, the public transport vehicles in the city will be out of operation within a few years. Neither in Ho Chi Minh City, nor in its vicinity exists training centre for motor vehicles. There is an urgent need for setting up of the train-

ing centre which could help in local training of personnel in maintenance and repairs of public transport vehicles and of civil engineering equipment.

The establishment of the Training Centre with a lecturing room and 2 Pilot units for on-the-job training and a production control and preventive maintenance unit is of considerable importance since only 16% of transport fleet is in operation and practically there is no adequate production of required spare parts. The present situation with preventive maintenance and production control is very dangerous. Practically there is no unit which can review the state with machinery and equipment and introduce methods of control and preventive maintenance procedure. There is no up to date equipment and device to ensure this control and inspection.

3. Objectives

It is expected that with the setting up of this Training Centre the following objectives will be attained:

- to acquaint local personnel with the design and construction of vehicles,
- to train local personnel in preventive maintenance and repairs of main vehicle parts,
- to train local personnel in the manufacture of main vehicle parts,
- to train local personnel how to introduce guidance for preventive maintenance and periodic control,
- to prepare manuals, guidelines and instructions,
- to make available up-to-date measures and to ensure controle devices, instruments and equipment,
- to carry out up-to-date training.

4. Activities

The activities necessary for the setting up of the training centre will be carried out by the Chief Technical Adviser in cooperation with the National Director. Before obtaining the models, mock-ups, equipment etc., the counterpart will provide a suitable room.

It will also arrange the necessary installation and possibly civil engineering works in the room or building, respectively, so that the supplied teaching aids and equipment can be connected to the power sources with suitable current ratings. Should this be necessary, it will assist in all other matters. The Counterpart Agency will also provide the furniture for this training centre, such as tables, chairs, black-boards, etc. After the delivery of the teaching aids and equipment which will be taken over from the shipping agent, the National Director will take care of their installation in accordance with the instructions of the Chief Technical Adviser and will furthermore arrange for their protection against damage or loss. Should the need arise for preparing project data for the setting up and installation of certain equipment, the National Director will arrange its working out in accordance with instructions and advice of the Chief Technical Adviser. The National Director will also provide all materials for proper maintenance of the supplied technical aids and equipment in accordance with the instructions of the manufacturers.

5. Programme schedule

a/ The counterpart Agency will provide and secure

a suitable room, installation work and possibly civil engineering works for the Training Centre to begin with II. quarter 1983.

b) The deliveries of the models, mock-ups and further teaching aids will be implemented in the IV. quarter 1983 - I. quarter 1984.

c) The deliveries of the machinery and equipment will be implemented in the period from II/1984 to I/1985.

d) Erection and assembly of machinery and equipment and its putting into operation will be effected permanently upon their deliveries in the period from II/1984 to I/1985.

e) A curriculum and a board chart of the Training Centre will be prepared by the National Director with cooperation with the Chief Technical Adviser. They will be finalized not later than at II. quarter 1984.

f) The regulations for the Pilot units for on-the-job training in the factories No. 1 and No. 4 as well as Production control and preventive maintenance unit in factory No. 1 are to be prepared by the Chief Technical Adviser in cooperation with sub-contractor's firm and National Director not later than at I. quarter 1984.

Equipment and Aids to be purchased for the Training Centre

(UNDP contribution)

Pos. No.	Designation of equipment	Pcs	Price in US $
1	Catalogues in English or French for the following makes of vehicles:		
	TOYOTA	3	
	FORD	3	
	INTERNATIONAL	3	
	DODGE	3	
	DESOTO	3	
	FARGO	3	
2	Workshop manuals in English or French containing the characteristic faults and defects and instructions for their elimination for the following makes of vehicles:		
	TOYOTA	3	
	FORD	3	
	INTERNATIONAL	3	
	DODGE	3	
	DESOTO	3	
	FARGO	3	
3	Wall pictures for visual instruction in English or French		
	- four-stroke petrol engine	1	
	- four-stroke Diesel engine	1	
	- carburettor	1	
	- fuel injection pump	1	
	- hydraulic brake system diagram	1	
	- pneumatic brake system diagram	1	
	- clutch	1	
	- gear box, final drive, differential	1	
	- alternator, DC generator	1	
	- wiring, electrical equipment	1	

Annex No. 9

Pos. No.	Designation of equipment	Pcs	Price in US $
4	Slides for visual instruction - of the main truck types with load-carrying capacities 3 + 10 t, buses and civil engineering equipment / bulldozers, excavators, etc./		
5	Slide projector for visual instruction with time switch, lighting intensity selection and remote control, including: - slide magazine - lead with connectors - spare lamps	1	
6	Overhead projector for visual instruction incl. lead with connectors, spare lamps	1	
7	8 mm film projector including - spare spools - cable with connectors - spare lamps	1	
8	Universal portable projection wall /min.dimensions 1500x1500 mm/	2	
9	Technical literature specifically on the assembly and dismantling of vehicle components, manufacture of spare parts and their workshop inspection in English or French		
10	Sectional model of petrol engine	1	
11	Sectional model of Diesel engine	1	
12	Gear box model	1	
13	Front axle model	1	

Pos.No.	Designation of equipment	Pcs	Price in US $
14	Steering model	1	
15	Differential model	1	
16	Brake system model	1	
17	Instructions for making models of the individual functional groups of vehicles	1 set	
18	Demonstration assembly steel table with top board made of hard wood with min. thickness of 50 mm, min. table dimensions 1200 x 1500 mm	5	
19	Hand-operated hydraulic press up to max. piston pressure of 20 kN	2	
20	Assembly truck for motor-car mechanics	5	
21	Portable unfolding assembly cabinet with tools	5	
22	Mobile arm jack, lifting capacity 8000 kN for the radius of 1500 mm	1	
23	Feeler gauges (range 0-1 mm, length 100 mm)	10	
24	Metric screw pitch gauges 0,4-6 mm	3	
25	Inch screw pitch gauges 28-4	3	
26	Vernier calliper (division "/mm, min. range 150 mm/6", division 1/20 mm-1"/128)	10	
27	Outside micrometer: range 0-25	3	
	25-50	3	
	50-75	3	
	75-100 mm	3	

Pos. No.	Designation of equipment	Pcs	Price in US $
28	Inside micrometer calliper - range 5-45 mm	5	
29	Dial gauge - division 0,01 mm/0,005" range 0-10 mm, approx. dia 60 mm	3	
30	Dial gauge stand with square base and permanent magnet	3	
	Total price of aids stated in Annex No. 9		42 000 US $

Annex No. 10

List of Machinery and Equipment Required for Pilot Unit for On-the-job Training - Works No. 1

(UNDP contribution)

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
1	Special centre lathe for outside and inside machining of engine pistons (machining of face, piston ring grooves, outside and inside piston surface)	1	3,5	1,3	33 000
	- swing over bed 250 mm				
	- distance between centres 350 mm				
	- max. piston length 300 mm				
	- Set of diamond-tipped tools				
	- Number of main spindle speeds 8				
	- Spindle speeds min^{-1} - 350, 500, 710, 1000, 1400, 2000, 2800, 4000				
	Special accessories:				
	- lighting	1			
	- front and rear cross slide	1			
	- hand-operated cross slide	1			
	- chip guard	1			
	- single-cutter holder	1			
	- two-cutter holder	1			
	- set of diamond-tipped turning tools	1 set			
	- circular tool holder	1			
	- cross slide with swivelling tool slide	1			
	- trip dog for precision saddle tripping	1			
	- clamping flange for magnetic chuck	1			
	- tool holder for prismatic cutters 12x12 mm	1			
	- tool holder for prismatic cutters 16x16 mm	1			
	- two-cutter holder 12x12 mm	1			
	- two-cutter holder 16x16 mm	1			

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	- tool holder for prismatic cutters	1			
	- driving collars 3-20 mm	1			
	- driving collars 20-40 mm	1			
	- arbor for drill chuck	1			
	- hollow centre	1			
	- expanding arbour with set of expanding collets I, II, III	1			
	- draw-in arbor for clamping accessories in spindle cavity	1			
	- driving plate dia 40 and dia 60	1			
	- pin with thread	1			
	- spare parts for two years of operation				
2	Horizontal spindle surface grinding machine	1	9,3	3,4	26 000
	- teble clamping surface 320 x 1000 mm				
	- max. grinding width 320 mm				
	- max. grinding length 1000 mm				
	- max. workpiece height 350 mm				
	Special accessories:				
	- complete cooling equipment	1			
	- exhaust equipment incl. accessories	1			
	- balancing stand	1			
	- electromagnetic clamping plate 300x100 incl. set of clamps	1			
	- wheel trueing device (without diamond)	1			
	- additional grinding wheel flange	1			

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	Tooling				
	- side feed rest	2			
	- grinding wheel dia 250x20	10			
	- spare parts for two years of operation				
3	Slotting machine Slotting length 200 mm Tool overhang 450 mm Rotary table dia 500 mm Table setting: longitudinal 500 mm lateral 400 mm circular 360° Number of double strokes 40 - 163/min Spare parts for two years of operation	1	3	2,16	15 000
4	Testing machine for the measurement of performance of various engine types within the range of 2-400 HP and the speed range of 200-5000 rpm. (hydraulic dynamometer) Spare parts for two years of operation	1	-	0,7	10 800
5	Equipment for repair and renovation of machinery components by material surfacing with an electrode and welding of grey cast iron, steel, high alloy steels, aluminium and light alloys It consists of the following parts:				3 600
	- Burner for surfacing worn areas up to the height of wear of 1 mm for all metals except aluminium	1			

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	- Spray-on burner for renovating rotary components by building up base material (any metal incl. aluminium) at the temperature of 200°C	1			
	- Electrodes for welding old and greasy cast iron	7,5 kg			
	- Electrodes for strength welding of grey cast iron	5 kg			
	- Electrodes for welding unknown steels	7,5 kg			
	- Electrodes for welding high alloy steels to low-alloy materials	5 kg			
	- Electrodes for welding aluminium and light alloys	5 kg			
	- Solder for building up broken or worn gear teeth	10 kg			
	- Solder for capillary soldering of very small and fine parts	1 kg			
6	Equipment for heat treatment of small steel components in salt bath				49 000
	It consists of:				
	a) Crucible furnace for heating before hardening in salt bath	1	52	1,9	
	Crucible capacity 135 dm3				
	Rated max. furnace temperature 900°C				
	Inside dimensions of crucible: diameter 500 mm depth 800 mm				
	Furnace environment - cyanide melt				
	Furnace controller				
	Spare parts for two years of operation				

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	b) Crucible furnace for hardening of small steel components in salt bath up to the temperature of 650 °C with artificial cooling of the crucible by air from a fan	1	30	2,1	
	Crucible capacity 88 dm3				
	Crucible diameter 500 mm				
	Crucible depth 550 mm				
	Rated furnace temperature 650 °C				
	Furnace environment - cyanide bath				
	Electric furnace controller				
	Spare parts for two years of operation				
	c) Crucible furnace for heat treatment of small steel components for annealing and tempering in salt bath	1	30	1,9	
	Crucible capacity 88 dm3				
	Crucible diameter 500 mm				
	Crucible depth 550 mm				
	Rated furnace temperature 650 °C				
	Furnace environment - cyanide bath				
	Electric furnace controller				
	Spare parts for two years of operation				
	<u>Special accessories</u>				
	Cyanide bath for heating before hardening			3 500 kg	
	Cyanide bath for hardening and tempering			4 500 kg	
	Sodium cyanide			350 kg	
	A n n e x N o. 10 - t o t a l				US $ 137 400

Annex No. 11

List of Machinery and Equipment Required for Pilot Unit for On-the-job Training - Works No. 4

(UNDP contribution)

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
1	Equipment for repair and renovation of machinery components by material surfacing with an electrode and welding of grey cast iron, steel, high alloy steels, aluminium and light alloys.				3 600
	It consists of the following parts:				
	- Burner for surfacing worn areas up to the height of wear of 1 mm for all metals except aluminium	1			
	- Spray-on burner for renovating rotary components by building up base material (any metal incl. aluminium) at the temperature of 200°C	1			
	- Electrodes for welding old and greasy cast iron			7,5 kg	
	- Electrodes for strength welding of grey cast iron			5 kg	
	- Electrodes for welding of unknown steels			7,5 kg	
	- Electrodes for welding high alloy steels to low-alloy materials			5 kg	
	- Electrodes for welding aluminium and light alloys			5 kg	
	- Solder for building up broken or worn gear teeth			10 kg	
	- Solder for capillary soldering of very small and fine parts			1 kg	
2	Pneumatic hammer for hammer forging Impact energy 950 kgm	1	28	13,5 with anvil block	66 000

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	Weight of faling hammer 400 kg Number of strokes 130/min Forging height above floor level 750 mm Dimensions of upper anvil 265 x 100 mm Spare parts for two years of operation				
3	Horizontal spindle surface grinding machine	1	10	3,4	26 000
	Table clamping surface 320 x 1000 mm Max. grinding width 320 mm Max. grinding length 1000 mm Max. workpiece height 350 mm				
	Special accessories				
	- complete cooling equipment	1			
	- exhaust equipment incl. accessories	1			
	- balancing stand	1			
	- electromegnetic clamping plate 300 x 100 incl. set of clamps	1			
	- wheel trueing attachment (without diamond)	1			
	- additional grinding wheel flange	1			
	Tooling				
	- side feed rest	2			
	- grinding wheel dia 250x20	10			
	- spare parts for two years of operation				
4	Centreless cylindrical grinding machine	1	13	6,8	30 000
	Max. grinding dia 80 mm Min. grinding diameter 3 mm				

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	Workpiece length for through-feed grinding 250 mm				
	Workpiece length for in-feed grinding 145 mm				
	Grinding wheel dia 500x150 mm				
	Special accessories:				
	- Support for through-feed grinding for wide grinding wheels	1			
	- Balancing mechanism	1			
	- Vibration insulating supports for setting up the grinding machine	1 set			
	- Spare parts for two years of operation				
5	Internal grinding machine	1	16	1,17	39 000
	Grinding diameter 10-25 mm				
	Max. grinding length 80 mm				
	Max. swing 250 mm				
	Work head swivel 0-30°				
	Special accessories:				
	- adapters for grinding spindles	1 set			
	- clamping plates	1			
	- face clamps	1			
	- grinding spindles	1			
	- gauge blanks	1			
	- cooling equipment with magnetic filter	1			
	- face grinding equipment	1			
	Spare parts for two years of operation				
6	Fine engine cylinder boring machine	1	3	4,4	30 000
	Bore diameter 35-240 mm				

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	Max. boring depth 500 mm Boring head stroke 550 mm 6 spindle speeds: 90, 140, 224, 355, 560, 900 rpm. Normal feed 0,0315 - 0,063 mm/p.r. Table clamping surface 500x1000 mm Spindle reach 450 mm Special accessories: - set of boring bars - clamping fixtures Spare parts for two years of operation				
7	Engine cylinder hydraulic honing machine with continuous change of speed and stroke	1	5,5	1,4	30 000
	Max. honing diameter 150 mm Working stroke 200 mm The machine is equipped with: - Cooling pump - Oil pressure measuring equipment Special accessories: - small honing head - standard honing head - bracket - supporting block - honing stones	3			
	Spare parts for two years of operation				
8	High-frequency hardening equipment for motor-car pins and journals with dia 30-60 mm and length 200-300 mm				45 000

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	The high-frequency equipment consists of:				
	a) High-frequency generator, incl. rectifier	1	150	2,1	
	effective high-frequency output 90 kW				
	Working frequency 290-360 kHz				
	Continuous output regulation				
	Spare parts for two years of operation				
	b) Vertical semi-automatic hardening machine	1	1,5	1,8	
	Work feed during hardening 90 - 2400 mm/min.				
	Max. diameter of hardened part 120 mm				
	Max. length of hardened part 1000 mm				
	Max. weight of hardened part 70 kg				
	Spare parts for two years of operation				
	c) Cooler with the output of 70 kW	1	8	0,9	
	Spare parts for two years of operation				
	<u>Special accessories</u>:				
	- set of inductors (7 sets)				
	- clamping fixtures for the respective motor-car pin dimensions				
	Annex No. 11 - t o t a l				US $ 269 600

Annex No. 12

List of Machines and Equipment for Repair Work No. 1

/ Government contribution /

	pcs
1. Centre Lathes: swing over bed 380 mm	3
swing over bed 450 mm	3
2. Turret Lathe: swing over bed 500 mm	2
3. One-spindle bench drilling machine : drilling dia . 20 mm	2
One-spindle column drilling machine : drilling dia. 20 mm	2
One-spindle column drilling machine : drilling dia. 32 mm	2
4. Radial drilling machine: drilling diameter 40 mm	1
Radial drilling machine: drilling diameter 50 mm	1
5. Knee-type milling machines: universal, horizontal and vertical	6
6. Horizontal Shaping Machines:	2
7. Universal Centre Grinding Machine	1
8. Cylinder Drilling Machine for fine Drilling	1
9. Cylinder Honing Machine	1
10. Crankshaft Grinding Machine	2
11. Double-Wheel Pedestal Grinding Machines	3
12. Gear Hobbing Machine	2
13. Hack-Sawing Machine	1
14. Hydraulic Straightening Press	2
15. Electric Shaft Furnace for Heat Treatment	2
16. Centrifugal Casting Machine for Sliding Bearings	1

T o t a l Dong 560 000

Annex No. 13

List of Machines and Equipment for Work No. 4
/ Government contribution /

		pcs
1.	Centre Lathes: swing over bed 380 and 450 mm	6
2.	Turret Lathe: swing over bed 500 mm	3
3.	Knee-Type Milling Machines: universal, horizontal and vertical	6
4.	Bench and Column Drilling Machines - max. drilling diameter 32 mm	6
5.	Radial Drilling Machines - max. drilling dia. 50 mm	2
6.	Horizontal Shaping Machines	2
7.	Double-Wheel Grinding Machines	5
8.	Table Shears	1
9.	Arc Welding Machines	5
10.	Oxygen-Acetylene Gutting Apparatus	3
11.	Hacksawing Machines	2
12.	Eccentric Presses for Cold Forming 63 t	2
13.	Woodworking Machines / saws, planers, thicknessing machines /	6

T o t a l Dong 500 000

Annex No. 14

Measuring and Inspection Instruments for the Production Control and Preventive Maintenance Unit (UNDP contribution)

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
1	Set of test specimens (diamond with holder, balls and standard plates) for Rockwell and Brinell hardness tests	3 sets		0,01	1 000

2	Ultrasonic flaw detector
	- max. test range in steel - 10 m
	- minimum flaws detected at the distance of 0,5 m from the test head are 1 mm2
	- resolution - 100%
	- linearity time bases better than ± 2%
	- attenuator regulation - up to 80 dB
	- thickness measurement range from 2 mm to 10 m
	- frequency range from 0,8 MHz to 12 MHz
	- monitor signals surface flaws acoustically
	- picture tube dimensions 270 x 85 x 270 mm
	
	Special accessories:
	
	- ultrasonic heads:
	  - angular ones
	  - for surface waves
	  - standard ones
	  - tests with the aid of two ultrasonic heads
	- ultrasonic standards
	- interconnecting cables
	- spare parts for two years of operation
		1		0,004	10 000

3	Metallographic microscope for material structure determination and eveluation	1	0,15	0,15	18 000
	Special accessories:				
	- polarization illuminator with achromatic field of view 12,5 x/0,25 ∞/0 pol	1			

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	- monocular direct body tube with achromatic field of view 25 x/ 0,50∞/0 pol	1			
	- monocular direct body tube with achromatic field of view 50 x/0,80∞/0 pol	1			
	- compensator with achromatic field of view H 1 100/1,30∞/ /0 pol	1			
	- slide lens 46 mm, magnification 3 x	1			
	- 4 centered lenses 46 mm with magazine	1			
	- measuring compensator 1/4 with azimutal rotation for quantitative metal tests	1			
	- set of special interference filters	1			
	- hardness microtester	1			
	- set of calibration weights for micro-hardness tester with magazine	1			
	Sample preparation equipment:				
a)	Saw for cutting metallographic samples	1	1,1		0,06
	Cutting disk diameter 200-320 mm				
	Cutting depth 50-110 mm Max. diameter cut 70x100 mm Max. diameter cut with feeding device 90 x 250 mm				
	Max. workpiece length with feeding device - 300 mm				
	Max. length with feeding device for large cuts - 600 mm				
	Table surface 475 x 700 mm				
	Shaft speed 1500/3000 rpm.				
	Three-phase AC power supply 380 V/50 Hz				
	Spare parts for two years of operation				

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	b) Polishing machine for polishing metallographic specimens Number of grinding disks 2 Speed 3000 rpm. Three-phase power supply - 220/380 V, 50 Hz Spare parts for two years of operation	1	0,18	0,05	
4	Thermoelectric bar-type temperature feeler with protective metal tube. The feeler is designed for remote temperature measurement, the feeler probe is a NiCr-Ni thermocouple. Execution: Rated tube length 800 mm Functional temperature range 0 - 1000°C Internal cell resistance 0,9 ohms/m	1			2000
	Special accessories:				
	- mounting flange dia 22 mm	1			
	Compensating temperature recorder single-curve, single-range type with line recording, transmission potentiometer and signalling contacts for exceeding the set minimum and maximum	1			
	- Accuracy with adjusted range unit ± 0,5%				
	- Minimum range 5 mV				
	- Maximum range 100 mV				
	- Insensivity - max. 0,2% of range				
	- Recording width 120 mm				
	- Recording length 90 mm				
	- Feed 20-1200 mm/h				
	- Max. power input 25 VA				
	- Insulating resistance 20 Mohms min.				

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	Indicator for thermoelectric temperature feelers with built-in temperature compensation of the thermocouple reference junctions	1			
	Minimum scale range 10 mV				
	Maximum scale range 2 V				
	Scale length 110 mm				
	Rise time 15 minutes				
	Max. power input 4 VA				
	Insulating resistance 20 Mohms min.				
5	Milling tools for gear hobbing machine in inch execution for the modules:				14 000
	Dp = 8		3		
	Dp = 10		3		
	Chucking diameter 32 mm				
6	Equipment for bolt and nut thread cutting up to dia M 22 and M 24 on type 1341 turret lathe	1			1 000
7	Tools for machine tools				
	General utility tools for lathes				
	Centre drill with simple cutting edge				
	dia 1		10		
	dia 2		10		
	dia 3,15		10		
	Centre drill with broken cutting edge				
	dia 1		10		
	dia 2		10		
	dia 3,15		10		
	Straight-shank drills				
	dia 3		10		
	dia 3,5		10		
	dia 4		10		
	dia 4,5		10		
	dia 5		10		
	dia 5,5		10		
	dia 6		10		
	dia 6,5		10		

No.	Designation of machine	Pcs	kW	Weight in t	Price in US $
	dia 7	10			
	dia 7,5	10			
	dia 8	10			
	dia 9	10			
	dia 9,5	10			
	dia 10	10			
	dia 10,5	10			
	dia 11	5			
	dia 11,5	5			
	dia 12	5			
	Short drills				
	dia 4,3	10			
	dia 6,7	10			
	dia 7,6	10			
	dia 8,6	10			
	dia 9,6	10			
	dia 10,7	10			
	dia 11,9	10			
	Taper-shank drills				
	dia 13,9	10			
	dia 15	5			
	dia 17	5			
	dia 19	2			
	dia 20,25	2			
	dia 23,25	2			
	dia 26,5	2			
	dia 28	2			
	dia 31	1			
	Serial machine taps				
	M 6	10			
	M 5	10			
	M 8	10			
	M 10	10			
	M 12	10			
	Round screw dies				
	M 5	10			
	M 6	10			
	M 8	10			
	M 10	10			
	M 12	5			
	Round die stock 20	1			
	Drill chuck 16	1			
	Wrench for drill chuck No. 7	2			
	Arbor for chuck 18x2	1			
	Right-hand straight roughing tools 16 x 16	5			
	Left-hand straight roughing tools 16 x 16	5			

No.	Denomination of machine	Pcs	kW	Weight in t	Price in US $
	Right-hand roughing tools 60° 16x16	5			
	Left-hand roughing tools 60° 16x16	5			
	Right-hand bent roughing tools 16x16	5			
	Left-hand bent roughing tools 16x16	5			
	Flat finishing tools 20x12x140	5			
	Finishing tools 25x16x180	5			
	Inside corner roughing tools 25x25x315	5			
	Inside corner roughing tools 25x25x215	5			
	Right-hand necking tools 20x12x140	5			
	Cutting-off tools 4x18x140	10			
	Right-hand straight roughing tools P40 20x20	2			
	Right-hand straight roughing tools P40 16x16	2			
	Left-hand straight roughing tools P40 20x20	2	pcs		
	16x16	2	pcs		
	Right-hand bent roughing tools P40 20x20	2			
	16x16	2			
	Left-hand bent roughing tools 20x20	2			
	16x16	2			
	Side roughing tools 20x20 P50	2			
	16x16 P40	2			
	Flat finishing tools 20x12 P10	2			
	Finishing tools 16x10 P10	2			
	Inside roughing tools 20x20 P40	2			
	Right-hand necking tools 12x20	2			
	Left-hand necking tools 12x20	2			
	Holder for turning tools M No.3 13-16	2			
	Knurling tool holders	2			

No.	Denomination of machine	Pcs	kW	Weight in t	Price in US $
	Knurling tools 16x6/6 R	2			
	15x6/6 R	2			
	Tapered arbors				
	dia 16	1			
	dia 18	1			
	dia 20	1			
	Adapters with Morse taper				
	4x3	2			
	4x2	2			
	3x1	2			
	<u>General utility tools for turret lathes</u>				
	Turning tool blank				
	10x10x100	2			
	12x12x100	2			
	16x16x125	2			
	20x20x160	2			
	Turning tool blank				
	10x16x160	2			
	10x20x160	2			
	12x25x160	2			
	Turning tool blank				
	4x16x100	5			
	5x20x100	5			
	6x25x160	2			
	8x32x160	2			
	Right-hand straight roughing tools 15				
	10x10x40	5			
	12x12x80	5			
	16x16x63	2			
	Right-hand straight roughing tools 45				
	10x10x63	5			
	12x12x80	5			
	16x16x100	2			
	Left-hand straight roughing tools 45				
	10x10x63	5			
	12x12x80	5			
	16x16x100	2			
	Right-hand side roughing tools				
	12x12x50	5			
	16x16x63	5			
	20x20x125	2			

No.	Denomination of machine	pcs	kW	Weight in t	Price in US $
	Left-hand side roughing tools				
	12x12x50	5			
	16x16x63	5			
	20x20x125	2			
	Flat finishing tools				
	20x12x140	5			
	20x12x140	5			
	20x12x140	2			
	25x16x180	2			
	32x20x220	5			
	Finishing tools				
	16x10x110	5			
	20x12x140	2			
	25x16x180	2			
	32x20x220	5			
	20x12x140	5			
	25x16x180	2			
	Right-hand corner tools				
	12x12	2			
	16x16	2			
	Inside roughing tools				
	12x12	2			
	16x16	2			
	Inside roughing tools				
	25x25x315	2			
	25x25x315	2			
	Inside corner tools				
	25x25x315	2			
	25x25x315	2			
	Inside corner tools				
	10x10x100	2			
	Inside corner tools				
	12x12x125	2			
	16x16x140	2			
	Right-hand necking tools				
	16x10x120	2			
	20x12x140	2			
	20x12x140	2			
	Left-hand necking tools				
	16x10x120	2			
	20x12x140	2			
	20x12x140	2			
	Centre drills with simple cutting edge dia 3,15	10			
	Centre drills with broken cutting edge dia 2	10			

No.	Denomination of machine	Pcs	kW	Weight in t	Price in US $
	Short drills from dia 1 to dia 6 stepped by 0,01 mm (from dia 3,5 to 0,1)	3 sets			
	Short drills from dia 6,1 to dia 10 stepped by 0,1 mm	2 sets			
	Short drills from dia 10,25 to dia 20 stepped by 0,25 mm (dia 10 to dia 15 stepped by 0,1 mm)	2 sets			
	Machine reamers from dia 2 to dia 10 stepped by 1 mm	2 sets			
	Machine countersinking bits for M 4,3 to M 15	2 sets			
	Machine countersinking bits for cone heads M 2 to M 14	2 sets			
	Knurling tool holder 25x30	1 pc			
	Knurling tool dia 20x10	5 pcs			
	Serial machine taps M 6 to M 24	2 sets			
	Serial machine taps M 12 to M 24	1 set			
	Serial machine taps M 5 to M 14	2 sets			
	Machine nut taps M 3 to M 12	2 sets			
	Manual round screw dies M 3 to M 24	3 sets			
	M 12 to M 24	2 sets			
	<u>General utility tools for drilling machines</u>				
	Machine vice No. 8	1			
	Drill chuck size 10	1			
	Wrench for chuck No. 6	1			
	Set of short drills from dia 1 to dia 6 mm stepped by 0,05 mm	10 sets			
	Set of short drills from dia 6,5 to dia 10 mm stepped by 0,5 mm	5 sets			
	Drill chuck dize 10	1 pc			
	Drill chuck size 16	1 pc			
	Drill chuck arbor				
	16x3	1 pc			
	18x3	1 pc			
	Chuck wrench No. 6	1 pc			
	No. 7	1 pc			

No.	Denomination	Pcs	kW	Weight in t	Price in US $
	Adapter 3x2	1			
	3x1	1			
	Short straight-shank drills from dia 1 to dia 6 mm stepped by 0,05 mm	10 sets			
	Straight-shank drills from dia 6,5 to dia 15 mm stepped by 0,1 mm	3 sets			
	Straight-shank drills from dia 10,2 to dia 15 mm	2 sets			
	Straight-shank drills from dia 16 to dia 20 mm stepped by 0,5 mm	3 sets			
	Machine reamers H 7				
	dia 7	2			
	dia 8	2			
	dia 9	2			
	dia 10	2			
	dia 11	2			
	dia 12	2			
	dia 13	2			
	dia 14	2			
	dia 15	2			
	dia 16	2			
	dia 17	2			
	dia 18	2			
	dia 19	2			
	dia 20	2			
	Straight-shank countersinking bits				
	60x16	2			
	60x22	2			
	Machine tap				
	M 5	10			
	M 6	10			
	M 8	10			
	M 10	10			
	Nut tap				
	M 4	10			
	M 6	10			
	M 8	10			
	M 10	10			
	Machine vice 80	1			
	flat clamp 14x80	2			
	Straight-shank reamer drills from dia 9,8 to dia 17,75 stepped by 1 mm	1 set			
	Chuck No. 16	1			

No.	Denomination	Pcs	kW	Weight in t	Price in US $
	Chuck wrench No. 7	1			
	Chuck arbor B 18x2	1			
	Adapters 4x3	1			
	4x2	1			
	3x1	1			
	Straight-shank drills, set from dia 6 to dia 10 mm stepped by 0,1 mm	10 sets			
	Straight-shank drills, set from dia 10 to dia 15 mm stepped by 0,5 mm	3 sets			
	Straight-shank drills, set from dia 15 to dia 20 mm stepped by 1 mm	1 set			
	Straight-shank drills with cylindrical shank, set from dia 21 to dia 32 mm stepped by 1 mm	3 sets			
	Machine reamer H 7				
	dia 8	2			
	dia 10	2			
	dia 12	2			
	dia 14	2			
	dia 16	2			
	dia 18	2			
	dia 20	2			
	dia 22	2			
	Countersinking bit				
	60x22	2			
	60x45	2			
	Machine tap				
	M 8	10			
	M 10	10			
	M 12	10			
	M 14	10			
	Nut tap				
	M 8	10			
	M 10	10			
	M 12	10			
	M 14	10			
	M 16	10			
	Machine vice 80	1			
	Straight-shank reamer drill, set from dia 9,8 to dia 19,70 mm stepped by 1 mm	1 set			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	General utility tools for milling machines					
	U-shaped clamp	14x160	2			
		14x200	2			
	Flat sliding clamp	14x125	2			
	Bent sliding clamp	14,5x125	2			
	Bent swivelling clamp	14x125	2			
	Clamp support	16x50	4			
	Clamp support	20x80	2			
	Milling arbors with steep tapered shanks for end milling					
		40x16x29	1			
		40x22x37	1			
		40x27x23	1			
		30x27x47	1			
		40x32x60	1			
	Milling arbors with steep tapered shanks for milling heads					
		40x40x43	1			
	Long milling arbors with steep tapered shanks	40x22x500	1			
		40x27x500	1			
		40x32x500	1			
	Adapters with steep taper and Morse cavity	40x2	2			
		40x3	2			
	Adapter couplings	40x2	4			
	Clamping bushing with steep tapered shank for straight-shank cutters	40x16	1			
		40x28	1			
	Clamping bushing inserts for straight-shank cutters					
		16x4	2			
		16x5	2			
		16x6	2			
		16x8	2			
		28x10	2			
		28x12	2			
		28x16	2			
		28x20	2			
	Right-hand 12-cutter milling head dia	160x12	1			
	Left-hand 12-cutter milling head dia	160x12	1			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Coarse-tooth plain right-hand arbour-type cutter	50x40	1			
		60x80	1			
		80x100	1			
	Coarse-tooth plain left-hand arbour-type cutter	50x40	1			
		63x80	1			
	Fine-tooth plain right-hand cutter	50x40	1			
		50x80	1			
		63x50	1			
		80x63	1			
	Fine-tooth plain left-hand cutter	50x40	1			
		80x63	1			
	Straight-shank plain coarse-tooth right hand face-milling cutter	4x10	5			
		5x12	5			
		6x16	5			
		8x20	5			
		10x20	5			
		12x25	5			
		16x32	5			
		20x40	5			
	Straight-shank plain fine-tooth right-hand face-milling cutter	16x50	2			
		20x63	2			
	Straight-shank plain fine-tooth left-hand face-milling cutter	16x50	2			
		20x63	2			
	Tapered-shank plain semicourse-tooth right-hand face-milling cutter	25x50	1			
		25x80	1			
	Arbor-type plain fine-tooth right--hand face milling cutter	40x40	1			
		50x50	1			
	Tapered-shank plain semicourse-tooth left-hand face-milling cutter	25x50	1			
		25x80	1			
	Arbour-type plain fine-tooth right-hand face milling cutter	63x63	1			
		80x80	1			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Plain fine-tooth left-hand face--milling cutter	40x40	1			
		50x50	1			
	Arbor-type coarse-tooth disk cutter					
		80x22x10	2			
		100x27x12	2			
		125x32x14	2			
	Arbor-type fine-tooth disk cutter					
		63x8	2			
		63x10	2			
		80x10	2			
		80x12	2			
		100x14	1			
		125x16	1			
	Arbor-type keyseat disk cutter					
		50x4	2			
		63x6	2			
		63x5	2			
	Arbor-type keyseat disk cutter					
		63x8	2			
		80x10	2			
		80x12	2			
		80x14	1			
		100x16	1			
	Straight-shank T-slot disk cutter					
		15	2			
		18	2			
		25	1			
		32	1			
	Straight-shank keyway disk cutter					
		16x4	2			
		22x5	2			
		25x6	2			
		38x8	1			
		45x10	1			
	Tapered-shank T-slot disk cutter					
		40	1			
	Straight-shank half-side keyway milling cutter	4	5			
		5	5			
		6	5			
		7	5			
		8	5			
		10	5			
	Arbor-type semi-circular convex milling cutter	2	2			
		3	2			
		4	2			

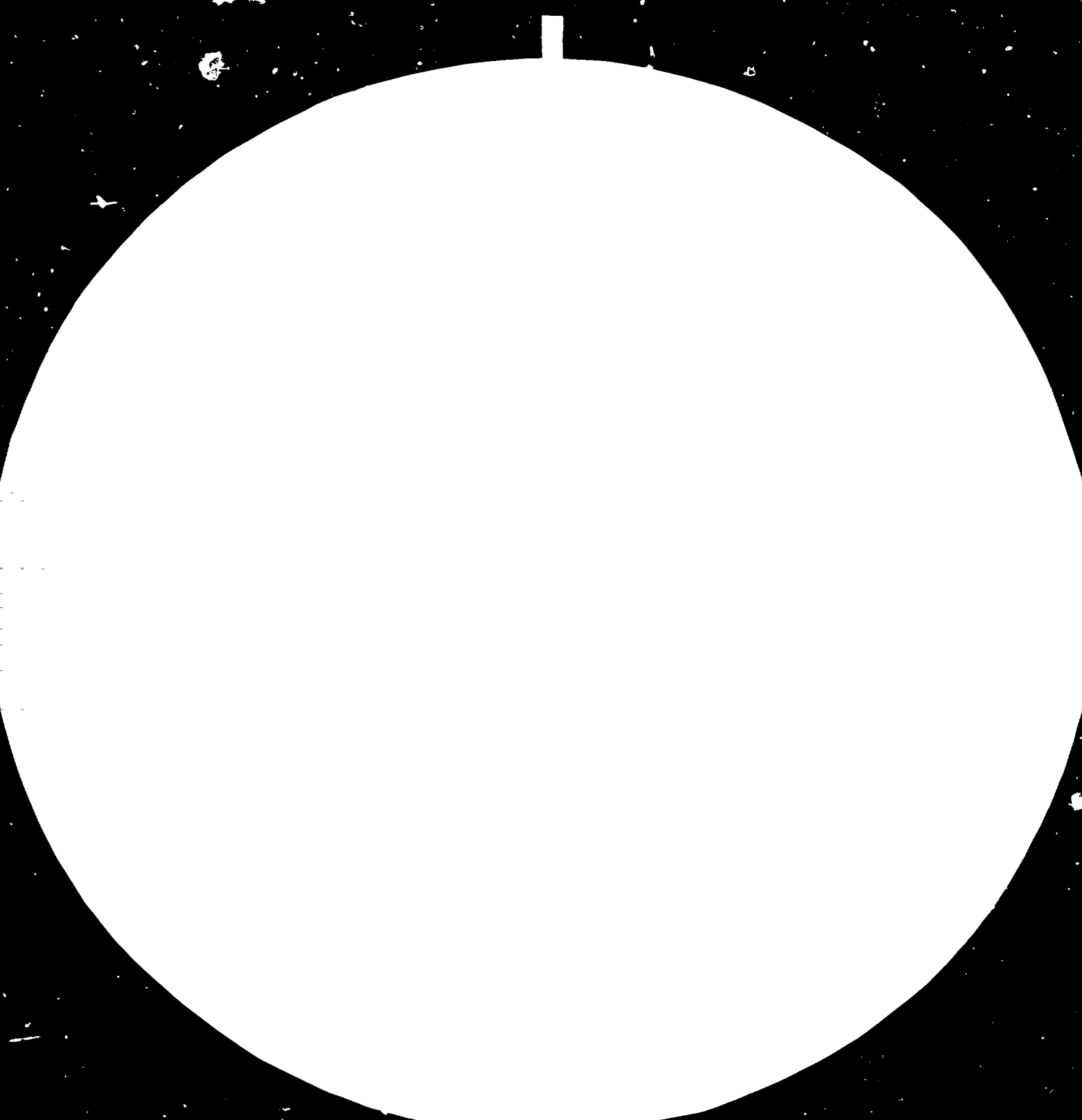
No.	Denomination		Pcs	kW	Weight in t	Price in US $
		5	2			
		6	2			
		8	2			
		10	1			
		12	1			
		14	1			
	Arbor-type semi-circular concave milling cutter	2	2			
		3	2			
		4	2			
		5	2			
		6	1			
		8	1			
		10	1			
	Arbor-type gang semi-circular concave cutter	12	1			
		14	1			
	Straight-shank angle-type face--milling cutter	45x16	2			
		45x25	2			
		60x16	2			
		60x25	2			
		75x16	2			
		75x25	2			
	Angle milling cutter	45x16	2			
		45x25	2			
		60x16	2			
		60x25	2			
		75x16	2			
		75x25	2			
	Bent sliding clamps	14,5x125	2			
	Clamp support	16x50	2			
		20x80	2			
	Steep-shank milling arbor	40x16x29	1			
		40x22x19	1			
		40x22x37	1			
		40x27x23	1			
		40x27x47	1			
		40x32x31	1			
		40x32x60	1			
	Milling arbor for milling heads	40x32x48	1			
	Steep adapter for Morse shanks	40x2	1			
		40x3	1			
	Coupling for steep adapter	40x2	2			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Clamping bushing	40x16	1			
		40x28	1			
	Clamping bushing inserts					
		16x4	1			
		16x5	1			
		16x6	1			
		16x8	1			
		28x10	1			
		28x16	1			
		28x12	1			
		28x20	1			
	Right-hand 10-cutter milling head dia 125		1			
	Left-hand 10-cutter milling head dia 125		1			
	Coarse-tooth right-hand face milling cutter dia	4x10	10			
		5x12	10			
		6x16	10			
		8x20	10			
		10x20	6			
		12x25	6			
	Right-hand face-milling cutter dia	16x50	2			
		20x63	2			
	Left-hand face-milling cutter dia	16x50	2			
		20x63	2			
	Right-hand face-milling cutter dia	25x50	1			
		25x80	1			
	Left-hand face-milling cutter dia	25x50	1			
	Arbor-type face-milling cutter dia	40x40	2			
		50x32	2			
		80x80	2			
		100x50	2			
	T-slot milling cutter dia	21	2			
		25	2			
		32	2			
	Keyseat milling cutter	16x4	3			
		25x3	3			
		25x6	3			
		38x8	2			
		45x10	2			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Spline milling cutter dia	4	5			
		6	5			
		8	5			
		10	3			
		12	2			
		16	2			
		20	2			
	Tapered-shank milling arbor	40x27x47	1			
		40x32x60	1			
	Tapered-shank milling arbor	27x47xMK4	1			
	Long milling arbor	40x32x400	1			
		40x32x320	1			
	Guide bush	27x110	1			
		32x110	1			
	Spacing collar dia	27x2	1			
		32x3	1			
	Adapter	4x3	1			
	Coupling	4x3	1			
	Steep adapter	40x2	1			
		40x3	1			
	Adapter coupling	40x2	1			
	Clamp bushing	3x16	1			
	Bushing insert	16x6	1			
		16x8	1			
		16x10	1			
	Plain milling cutter dia	63x80	1			
		80x90	1			
	Plain face-milling cutter dia	8	10			
		10	10			
	Fine-tooth face-milling cutter dia	25x50	2			
	plain face-milling cutter dia	63x40	1			
		100x50	1			
	Plain face-milling cutter dia	80x50	1			
	Roughing disk cutter dia	80x10x27	1			
		100x12x32	1			
		125x14x32	1			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Disk cutter with side cutting edge dia	125x16	2			
	keyseat cutter dia	80x10	2			
		80x12	2			
		100x16	2			
		100x18	2			
	Single-spindle slot cutter dia	8	10			
		10	10			
		12	10			
	Radius cutter	8	2			
		12	2			
	Angle milling cutter					
		45°x80	1			
		60°x80	1			
	Bent clamps	18x160	2			
	Flat clamps	18x100	2			
	Long milling arbor, complete					
		50x32x630	1			
		50x40x630	1			
	Steep adapter	40x30	1			
		50x40	1			
	Steep adapter for Morse shanks					
		40x2	1			
		40x3	1			
		50x3	1			
		50x4	1			
	Adapter couplings	40x2	2			
		50x3	2			
	Clamp bushings	40x16	1			
		50x28	1			
	U-shaped clamp	18x250	2			
	Sliding bent clamp	18x200	2			pcs
	Flat swivelling clamp	18x160	2			
	Clamp supports	16x50	2			
		20x80	2			
	Right-hand milling head	160x12	1			
	Coarse-tooth right-hand plain milling cutter	80x63	1			
		100x125	1			
	Coarse-tooth left-hand plain milling cutter	80x63	1			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Fine-tooth right-hand plain milling cutter	80x63	1			
		80x90	1			
		100x110	1			
	Arbor-type face-milling cutter	50x32	1			
		63x40	1			
		80x50	1			
	Disk cutters	100x22x12	2			
		125x27x14	2			
		160x32x16	2			
	Disk cutters	125x10	2			
		125x12	2			
		125x16	2			
	Arbor-type semi-circular convex milling cutters	12	1			
		16	1			
		18	1			
		20	1			
	Arbor-type semi-circular concave milling cutters	12	1			
		16	1			
		18	1			
		20	1			
	Clamp bushing inserts	16x4	1			
		16x5	1			
		16x6	1			
		16x8	1			
		28x10	1			
		28x12	1			
		28x16	1			
		28x20	1			
	Milling arbors for face-milling cutters	40x22x37	1			
		40x27x47	1			
		50x27x47	1			
		50x32x60	1			
	Milling arbors for milling heads	40x32x48	1			
		50x40x43	1			
	Long milling arbors, complete	50x32x630	1			
		50x40x630	1			
	Steep adapter	40x30	1			
		50x40	1			

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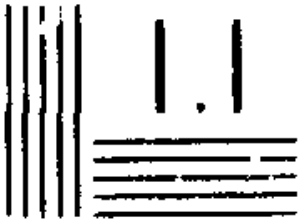
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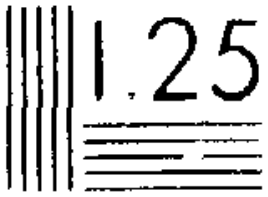
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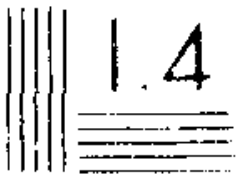
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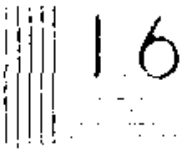
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No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Steep adapter for Morse	40x2	1			
		40x3	1			
		50x3	1			
		50x4	1			
	Adapter couplings	40x2	2			
		50x3	2			
	Clamp bushings	40x16	1			
		50x28	1			
	U-shaped clamps	18x250	2			
	Bent sliding clamps	18x200	2			
	Flat swivelling clamps	18x160	2			
	Clamp supports	16x50	2			
		20x80	2			
	12-cutter milling head dia	160x12	1			
	Coarse-tooth right-hand plain milling cutter dia	80x63	1			
		100x125	1			
	Coarse-tooth left-hand plain milling cutter dia	80x63	1			
	Fine-tooth right-hand plain milling cutter dia	80x63	1			
		80x90	1			
		100x80	1			
	Plain face-milling cutters dia	4x10	3			
		5x12	3			
		6x16	3			
		8x28	3			
		10x32	2			
		12x40	2			
		16x50	1			
		20x63	1			
	Right-hand plain face-milling cutters dia	16x32	2			
		20x40	2			
	Plain face-milling cutters dia	25x50	2			
		32x100	1			
		40x63	1			
		40x125	1			
	Plain face-milling cutters dia	25x80	1			
		32x100	1			
		40x125	1			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Arbor-type face-milling cutter dia	50x32	1			
		63x40	1			
		80x50	1			
	Disk cutters dia	125x12	2			
		125x16	2			
		125x18	2			
	Convex cutters	14	1			
		16	1			
		18	1			
		20	1			
	Concave cutters	14	1			
		16	1			
		18	1			
		20	1			
	Angle-face-milling cutters	45°x16	1			
		45°x25	1			
		60°x16	1			
		60°x25	1			
	Rough slotting tools	20	2			
		25	2			
	Keyway tools	6	2			
		8	2			
		10	2			
	Two-lipped slotting tools	16	2			
		20	2			
	Clamp bushing inserts	16x4	1			
		16x5	1			
		16x6	1			
		16x8	1			
	Clamp bushing inserts	28x10	2			
		28x12	2			
		28x16	2			
		28x20	2			
	Machine vice No. 160		1			
	Self-centring machine vice, 125		1			
	Tiltable swivel machine vice, face width 160		1			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Plain clamp 160		4			
	U-shaped clamp	18x160	2			
		18x200	2			
	Bent-sliding clamp	18x160	2			
		18x200	2			
	Flat swivelling clamp					
		18x125	2			
		18x160	2			
	Steep-shank milling arbor					
		50x22x19	1			
		50x22x37	1			
		50x27x23	1			
		50x27x47	1			
		50x32x31	1			
		50x32x60	1			
	Milling arbor for milling head					
		50x40x43	1			
	Steep adapter for Morse					
		50x3	1			
		50x4	1			
	Steep adapter coupling					
		50x3	2			
		50x5	1			
	Steep-shank clamp bushing 50x28		1			
	12-cutter right-hand milling head dia	160x12	1			
	Coarse-tooth right-hand face--milling cutter dia	8x20	2			
		10x20	2			
		12x25	2			
		16x32	2			
		20x40	2			
	Coarse-tooth left-hand face--milling cutter dia	8x20	2			
		10x20	2			
		12x25	2			
		16x32	2			
		20x40	2			
	Fine-tooth right-hand face-milling cutter dia	16x32	2			
		20x40	2			
	Fine-tooth left-hand face-milling cutter dia	16x32	2			
		20x40	2			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Taper-shank right-hand face-milling cutter dia	25x50	1			
		32x56	1			
		40x63	1			
	Taper-shank left-hand face-milling machine dia	25x50	1			
		32x56	1			
		40x63	1			
	Arbor-type face-milling cutter dia	50x32	2			
		63x40	2			
		80x50	2			
		100x50	2			
	T-slot disk cutter dia	15	1			
		18	1			
		21	1			
		25	1			
		32	1			
	T-slot disk cutter dia	40	1			
		60	1			
	Slot cutter dia	16x4	1			
		25x6	1			
		28x8	1			
	Keyseat cutter dia	38x8	1			
		45x10	1			
	Slot milling cutter dia	8	1			
		10	1			
		12	1			
		14	1			
		16	1			
		18	1			
		20	1			
	Angle face-milling cutter	45° dia 25	2			
		60° dia 25	2			
		75° dia 25	2			
	<u>General utility tools for grinding machines</u>					
	Grinding wheel for steel roughing	400x50x127 mm	4			
	Grinding wheel for cast iron grinding	400x50x127 mm	2			
	Grinding wheel dia	70x10	10			
		100x20	10			
		150x16	5			
		175x10	5			
		200x10	5			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
		200x16	5			
		250x20	5			
		250x40	5			
		300x32	5			
		300x40	5			
	Travelling side rest 12		2			
	Grinding wheel dia	250x20	2			
		250x20	2			
		250x20	2			
		250x25	2			
		250x20	2			
	Grinding wheel dia	350x50x127	2			
		350x63x127	2			
		350x40x127	2			
	Grinding wheel for internal grinding dia	13x16x6	10			
		16x20x6	10			
		16x16x6	10			
	Total US $ ...					12 000

8 Measuring and inspection instruments for machining

Steel rule	1000 mm	4
	500 mm	4
	300 mm	4
	500 mm	4
Slide calliper	1/20-150	4
	1/50-400	2
	1/50-500	2
Depth slide gauge	1/50-250	2
Outside calliper	200	1
	300	1
Inside calliper	250	1
	300	1
Protractor		2
Depth slide gauge	1/20-600	1
Protractor for measuring tool cutting edges	1	1

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Feeler gauges	0,02-0,20	2			
		0,05-1,00	2			
	Sine bar	300	1			
	Sine bar with tips	200	1			
		300	1			
	Outside radius gauges (cassette)		1			
	Radius gauges	1 - 7	1			
		7,5 - 15	1			
	Screw pitch gauges - metric thread		1			
	Screw pitch gauges for Whitworth and tube thread		1			
	Inspection rule	500	1			
		1000	1			
	Precision set square	160	2			
	Precision try square	160	1			
		250	1			
	Set square	630	1			
	Spring bow compasses	200	2			
		300	2			
	Beam compasses	500	1			
		1000	1			
	Marking gauge with scale	300	2			
		500	2			
		1000	1			
	Scriber		10			
	Adjustable rule stand		2			
	Steel rule for stand	500	2			
		1000	2			
	Ribbed marking-off table	1000	1			
		2000	1			
	Inspection and marking-off plate	100	6			
		130	6			
	Marking-off plate with clamp dog	140	4			
	Tipped support	80	6			
		130	6			
	Slotted support	95	4			
		165	4			
	Micrometer calliper	0-25	2			
		25-50	2			

No.	Denomination		Pcs	kW	Weight in t	Price in US $
	Micrometer calliper	50-75	2			
		75-100	2			
		100-125	2			
		125-150	2			
		150-175	2			
		175-200	2			
		200-300	1			
		300-400	1			
		400-500	1			
		500-600	1			
		600-700	1			
		700-800	1			
		800-900	1			
		900-1000	1			
	Inside micrometer calliper	3-10	2			
		5-45	2			
	Folding micrometer with adapters	100-1300	1 set			
	Supplementary set of adapters		1 set			
	Micrometer calliper for sheet metal 0 - 10		2			
	Micrometer stand		4			
	Micrometer calliper for gears					
	0 - 25		1			
	25 - 50		1			
	Dial gauge with 0,01 mm division 60/B		2			
	Dial gauge with 0,001 mm division		2			
	Lever-type dial gauge		2			
	Three-contact inside calliper with dial gauge		1			
	Inside calliper with dial gauge					
	type 148 150		1			
	type 148 151		1			
	type 148 152		1			
	type 148 153		1			
	Micro-passameter	0-25	1			
		25-50	1			
	Stand with permanent magnet		5			
	Centres		2			
	Gauging table accessories		2			
	Manual POLDI hardness tester		1			

No.	Denomination	Pcs	kW	Weight in t	Price in US $
	Brinell magnifying glass	2			
	Longitudinal water level size 300	1			
	Frame-type water level size 200	1			
	T o t a l US $				23 000
	T o t a l A n n e x N o. 14 US $				81 000

Annex No. 15

UNITED NATIONS

U N I D O

Project in the Socialist Republic of Vietnam
General requirements for the post of National Director

DP/VIE/80/055

Post title	National Director
Duration	During the project
Date required	II quarter 1983
Duty station	Ho Chi Minh City, Hanoi
Purpose of project	To render assistance to the Government in maintenance, repairs and manufacture of spare parts for public transport vehicles and civil engineering equipment.
Duties	The National Director will represent the Ministry of Transportation and Communication. He will specifically be expected to: 1. Assist to the Chief Technical Adviser in providing local personnel for on-the-job training in the pilot units and for the production control and preventive maintenance unit. 2. Select candidates for training abroad and develop their training programme.

3. Secure the local personnel by the end of the project who will be able to handle and operate the equipment in future.

4. Solve all problems and requests in the project activities such as material, energy supply, erection and assembly and operation of the equipment as well as other administrative matters are concerned.

Qualifications University degree in mechanical engineering with the knowledge of automotive spare parts production.

Language Vietnamese and English

Background information:

Ho Chi Minh City has a total of some 24 000 public transport vehicles and civil engineering equipment. Out of this approx. 18 500 are trucks with a load-carrying capacity higher than 3 t, approx. 4 500 are buses and more than 1 000 civil engineering equipment. All these vehicles and equipment come from the USA and West European countries and are almost without exceptions more than 7 years old. Only 16 % of the above mentioned vehicles are in operation. The existing facilities cannot cope with the demands for spare parts, as well as the demands associated with their maintenance and repairs.

The purchase of spare parts from abroad cannot be realized due to the non-convertibility of local currency, so that the service is lacking key spare parts which cannot be manufactured locally in satisfactory quantities at present.

Insufficinet experience and training of local personnel adversely affect maintenance and repairs activities and manufacture of spare parts for these vehicles. The fear exists that if no rapid measures for improving the situation are taken, all the public transport vehicles in the City will be out of operation within a few years.

D R A F T W O R K P L A N

Annex No. 16

Description of activities	1983				1984				1985			
	I.	II.	III.	IV.	I.	II.	III.	IV.	I.	II.	III.	IV.
1. Approval of project document												
2. Recruitment of the Chief Technical Adviser and consultants												
3. Invitation of international bids for subcontractors on training												
4. Appointment of National Director, selection and nomination of the National team												
5. Submission of requisition of offers												
6. Provision of offices, buildings and equipment on the Government part												
7. Signing of the contract and provision of services by the subcontractor												
8. Preparation of foundations and power supplies for new equipment												
9. Activity of consultants in the commissioning of turret lathes												
10. Finalisation of fellowships programme, placement of the candidates and training												

Annex No. 16

Description of activities	1983				1984				1985			
	I.	II.	III.	IV.	I.	II.	III.	IV.	I.	II.	III.	IV.
11. Establishment of training centre and its pilot units for on-the-job training												
12. Establishment of production control and preventive maintenance unit												
13. Delivery of equipment components:												
a/ Equipment of the training centre - see Annex No. 9												
b/ Equipment of pilot unit for on-the-job training in Works No. 1 - see Annex No. 10												
c/ Equipment of pilot unit for on-the-job training in Works No. 4 - see Annex No. 11												
d/ Production control and preventive maintenance unit - see Annex No. 14												
14. Selection and provision of consultants for erection												
15. Erection and assembly of machinery and equipment and their commissioning												
16. Commissioning of training centre and pilot units												
Note: The work schedule is to be further specified by the Chief Technical Adviser in cooperation with the National Director.												

Annex No. 17

Envisaged yearly raw materials consumption for the manufacture of spare parts for public transport vehicles and civil engineering equipment in Ho Chi Minh City based on the scheduled demand

Material	planned production of 650 t spare parts in the year 1982	planned production of 780 t spare parts in the year 1985
Sheet metal up to the thickness of 1,5 mm	92 t	104 t
O-, U-, L-, T-sections	500 t	600 t
Castings: grey cast iron	126 t	142 t
non-ferrous metals and alloys	12 t	14 t
Forgings	66 t	92 t
T o t a l	796 t	952 t

Annex No. 18

P R O J E C T B U D G E T C O V E R I N G U N D P C O N T R I B U T I O N

/ thousands of US dollars /

Country: Vietnam

Project No.: DP/VIE/80/055

Project title: Repair and maintenance of public transport vehicles

10	Project personnel	Total		1983		1984		1985	
11	Experts/post title	m/m	$	m/m	$	m/m	$	m/m	$
11-01	Chief technical adviser	24	162	6	39,6	12	79.2	6	43.2
11-02	Consultants for starting turret lathes	4	26.4	-	-	4	26.4	-	-
11-03	Consultants for erection and commissioning	12	82.2	-	-	7	46.2	5	36
16	Mission Cost, Tripartite review	-	20	-	-	-	10	-	10
19	Total personnel component	40	290.6	6	39.6	23	161.8	11	89.2
29	Total subcontracts component	12	79.2	-	-	12	79.2	-	-
30	TRAINING								
31	Fellowships	41	90.2	-	-	41	90.2	-	-
39	Total training component	41	90.2	-	-	41	90.2	-	-
40	Equipment	-	530	-	-	-	81	-	449
49	Total equipment component								
59	Total miscellaneous component	-	10	-	-	-	5	-	5
99	Grand t o t a l	93	1000	6	39.6	76	785.2	11	175.2

Annex No. 19

Inputs of the Government of the Socialist Republic of Vietnam / in thousands of Dongs/

Country: Vietnam

Project No.: DP/VIE/80/055

Project title: Repair and maintenance of public transport vehicles

Inputs of the Government

	Total	1983	1984	1985
1. National team personnel	300	50	200	50
2. Design for machinery and equipment supplied by UNDP for training centre and pilot units	150	100	50	-
3. Erection, assembly and indirect materials, incl. required energies for erection and assembly of machinery and equipment, adjustment work plans in production technology	200	-	150	50
4. Civil engineering work for execution of foundations and preparation of training centre and pilot units	500		200	-
5. Equipment of training centre and pilot units with furniture, expendable materials, power and water supply	500	250	150	100
6. Equipment of offices and secretariat with furniture and office requisites for project personnel	150	100	50	-
7. Transportation of project personnel, materials and machinery	700	200	400	100
8. Additional equipment for pilot units for on-the-job training	1 000	500	500	-
G r a n d t o t a l	3 500	1 500	1 700	300

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