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ESTABLISHMENT OF AN ENGINEERING DEVELOPMENT AND SERVICE CENTRE (EDSC)

DP/KEN/86/048

REPUBLIC OF KENYA

Technical report: Recommendations to improve marketing, operations and organization of the centre (EDSC)*

Prepared for the Government of Kenya
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of B. Eidsvig, consultant for an integrated production and marketing programme

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* This document has not been edited.

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ABSTRACT
UNIDO Project DP/KEN/86/048/11-56/J-13316:
Engineering Development and Service Centre (EDSC), Nairobi, KENYA

Report from a consultant mission to recommend improved marketing, operations and organization of the centre.

from 3. November 1993 to 17. December 1993 by UNIDO consultant Bjorn Eidsvig.

EDSC, organized under KIRDI, (a parastatal body of the Kenya government) was established in 1990 an has been in operation since. The project has had financial support from UNDP and technical support from UNIDO. The last UNIDO expert left the project in the middle of 1993.

The centre has been extremely under-utilized, the outputs and the revenues have been negligible, the training of local management and staff meager, the financial overview and the control of the economy has been close to non-existent. The plant is well installed in suitable very roomy premises, but not entirely well composed. The plant is kept in good order.
The project has still an ample stock of raw materials. The market for the services is more than sufficient, but no serious attempt to approach the market has been made. The existence of the centre is not known among generally well informed people.

Provided the project can be well managed it has potential to become profitable and self-sustainable. When the necessary personnel will be in place it may take less than a year to gain balance in the economy (Excluding the cost of international assistance).

In addition to the requirement for improved local staff, international expertise with a CTA and say 4 UNVs seem to be required. It may take some time before the required staff can be posted, and the costs of the project must be covered by somebody until it can become self-supporting.

It is recommended that all local costs will be borne by KIRDI/Kenya Government. It is recommended that UNIDO provide the required international personnel assistance and that the costs of that is covered by UNDP.

Further it is recommended that EDSC gets extensive autonomy under KIRDI and that a commercially minded steering committee will be in control of the operations. On a longer term basis possibly a membership organization solution or a management contract solution may be sought.

Nairobi, 13. December 1993

Bjorn Eidsvig

EXPLANATORY NOTES

Value of Kenya shillings during the period of investigations:
1 US$ = 68 Kenya shillings (shs)

Abbreviations:

app.	Appendix
CTA	Chief technical adviser
DFCK	Development Finance Company of Kenya
EDSC	Engineering Development and Service Centre
FKE	Federation of Kenya Employers
haramбee	The Kenyan spirit of acting together and solving problems
ICDC	Industrial and Commercial Development Corporation
IDB	Industrial Development Bank
ISO	International Standard Organization
KAM	Kenya Association of Manufacturers
KIE	Kenya Industrial Estates
KIRDI	Kenya Industrial Research and Development Institute
KSPX	Kenya
NS	Norwegian Standard
OOPP	Object Oriented Project Planning
QA	Quality Assurance
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
UNV	United Nations Volunteer

LIST OF CONTENTS PAGE

LIST OF CONTENTS

APPENDIXES

1 INTRODUCTION

A three year project to start Engineering Development and Service Centre (EDSC) in Nairobi was established in January 1990, funded by UNDP and executed by UNIDO.

In anticipation of a second phase, project bridging financing of continued assistance has been provided from the same sources from the expire of the first phase, committed up to the end of January 1994.

EDSC has been organized under Kenya Industrial Research and Development Institute (KIRDI). KIRDI has kept EDSC accounts jointly with other KIRDI sub-organizations, and had the detail control of all economic undertakings of the centre.

The centre is expected to provide technical services, first of all to mechanical industries in Kenya, as a stimulating factor for their development. It has been anticipated that the centre should be self sustainable and self financing after a period of operation.

The major part of the plant was installed, and operations started early 1991. The development and the outputs from the centre since have been very limited. UNDP and the Kenya government undertakes still all expenses of the project, and the income from the outputs have still only covered a fraction of its material consumptions. The outputs amounts also only to a small percentage of the local salaries and are of about the same size as the telephone expenses.

Even if the plant is still generally intact and in good condition, the development over recent years must be characterized as negative.

On this background, two consultants were hired by UNIDO from October to December 1993;

- Mr. A. Canellas for 2 months, to evaluate the possibilities of to reorganize the Centre externally,

and the undersigned,

- Mr. Bjorn Eidsvig for 1 month (expected to be extended by 3 weeks) to evaluate and recommend internal reorganizations.

Both consultants have worked out their independent reports, and this report is the result of the work of the internal reorganization consultant, Bjorn Eidsvig. Please see the job description appendix 1.

In addition to make findings and recommendations concerning internal organization, it has been found important to work out concrete solutions to a range of problems, including tailoring of procedures and forms. Emphasis has also been put on assistance in implementation advice.

The centre management has appeared interested in adapting new methods and procedures. It is hoped that this work will bear fruits, even if the time allocation for the purpose has been far too short.

It appears evident that the centre has potential to become profitable and self sustainable,

- provided the given advice will be followed,
- provided efficient management will be in place, and
- preferably provided continued assistance will be available.

Nairobi, December 1993

Björn Eidsvig

2 ACTIVITIES

Among others the following activities have been undertaken by the consultant:

- Going through physical installations of the centre and a range of procedures
- Inspecting activities in the different EDSC departments
- Supervising the work of the EDSC to extract information from KIRDI accounts, tailoring together approximate operations accounts for EDSC for the year 1992.
- Conducting a brief market analysis involving visits to ten potential customer industries and communication also with 10 other existing or former customer industries
- Tailoring a market analysis questionnaire concerning possible services to foundries and evaluating the needs for a foundry assistance department
- Conducting an internal organization analysis of EDSC, involving tailoring of a questionnaire, analyzing the replies and conducting interviews with a number of the EDSC staff.
- Tailoring and introducing to EDSC management and operational staff a range of forms, procedures and development activities
- Working out sales material for the centre including a brochure and a circular sales letter
- Making out a sales budget, an "optimum operational budget", an organization plan, a production report system, etc., discussing these within the centre, and reaching consensus about its implementation
- Visiting KAM, KIE, KSPX industry promotion organizations discussing relations with EDSC.
- Preparing background material for (Appendix 2), making introduction to, participating in, and correcting the report from a 3 days OOPP workshop making conclusions in line with this report.
- Writing this report and tailoring its appendixes.

3 THE AIMS OF EDSC

3.1 Indirect aims

The purpose of EDSC is to work for improvement of the standard of living and the economy situation for Kenya and its inhabitants. Generally this can be achieved through:

- Manufacturing of cheaper and/or better products to be used
- Import substitution
- Manufacturing of export products
- Increased employment

It will make no sense to expect that EDSC on its own can make any reasonable impact on any of these parameters. That would take unreasonable efforts, and one would have to compete with ones own customers.

It can not create any positive impact to use government subsidized funds to start the sort of manufacturing which private enterprises as well can do.

EDSC must therefore aim at undertaking actions which can stimulate the private industry to increase and improve their activities. Through catalyst actions of EDSC the total impact on the above parameters can be fairly great.

3.2 Direct aims

The conditions for EDSC to create considerable impact on the private industry and through that to improve the living standard for the people of Kenya, are the following;

- That EDSC gives priority to the tasks which create most development. (Not necessarily the best paid ones.)

- That the work from EDSC is of high quality.

- That EDSC concentrate on tasks which can not be undertaken equally favorably by private industry.

At the same time it will be necessary to operate EDSC under strictly businesslike, profit creating conditions. The activities can not be expected heavily subsidized in the future. If not creating increased profits and considerable results, the donations will stop, the EDSC will collapse, and most of the former efforts will get lost.

If it will not be economical for the customer to pay a price which can create profit for EDSC, the job will also not create considerable impact on the situation of the customer. Hence the higher price one can charge, the greater the chances that the job will be of benefit for the customer - and the development of Kenya.

One should therefore rather not operate with prices for the supplies which are considerably under the regular market prices. Still, however, it is necessary that one select the type of tasks which will trigger off the most positive development or expansion for the customer industry.

Presently the outputs of the centre are extremely low compared with the inputs. Considerable change and increase in the activities of EDSC therefore are necessary.

A changed delivery programme of goods and services from EDSC and steps to increase efficiency and profit therefore are specified in the continuation.

4 FIELDS OF OPERATION FOR EDSC - RECOMMENDATIONS

4.1 General conditions

In the following will be discussed a number of activities which EDSC can involve in. Those activities who give the highest development potential, which can not easily be undertaken favourably by others, and which at the same time creates profits for the centre should have the highest priorities.

The activities hence are divided in 4 priority categories:

1. The activities which should have the highest priority, and should not be displaced by lower priority tasks. One should concentrate as much as possible on priority 1 activities.

2. The activities having moderate priority, and should not displace priority 1 activities, or be displaced by priority 3 activities.

3. The activities having the lowest priority, because of its limited impact on the industry, its low profitability and/or its loading of limited resources.

0. Activities which should be avoided, as having negligible development effect, and may steal capacity from more important tasks.

4.2 Present classification

Presently the following classification is used:

Code:		Output:	Charges:
01	Manufacturing of machines and equipment	Some few	Charged
02	Manufacturing of spare parts and components	Some	Charged
03	Manufacturing of dies and moulds	Some	Charged
04	Services from the workshops	None	
05	Repair and maintenance of tools and machinery	Several tools	Charged
06	Training	Two courses	For free
07	Development of prototypes	Manual oil press 2 Maize shellers Workshop crande Wheel chair	Partly paid Pending Pending Drawing only
08	Making feasibility studies	Wheel chair only	No charges
09	Consultancy activities provided to industry	None	

The wheel chair project was stopped, because it was not found economically viable. The market study seems thorough. It however also seems that the design could have been simplified, machine

loading time seem over estimated, reduction in machine time would also be significant at lager production. If the design, the costs of materials and the time consumption are reestimated, one may possibly arrive at different conclusions.

4.3 Design

4.3.1 General

Design work should in the continuation be looked upon as tasks of its own, to be done for customers. It should not be looked upon as a part of manufacturing. If a manufacturing job require design work, one should first agree to do the design and charge for the job. When the design is approved by the customer or his representative, one may agree to do also the manufacturing.

This makes the design department an individual economic unit or cost centre of EDSC with its own responsibilities and it creates larger flexibility also for the customer. The responsibilities for the quality of the design will be shared with the customer and the chances to avoid mistakes will improve.

The manufacturing department will later on only have the responsibility for doing the job in accordance with the drawings.

When giving quotations,the price for doing design should hence be separate from the price of work from the workshops. The customer should also be free to decide whether he wants both design work and manufacturing done by the centre or not.

4.3.2 Design of tools

These are services which are necessary, are limited available from others have generally high impact on the industry and creates limited capacity problems. Priority 1.

4.3.3 Design of Prototypes based on orders

These services are very important, are limited available from others, should have high impact on the industry and create limited capacity problems for the centre.

To develop prototypes which are sufficiently functional and at the same time limits the costs as much as possible for the future production are difficult tasks. It appears that the centre has a long way to go to create top class services within this area. The required training, however, should come from the work itself, and the principles of Value analysis should be adapted. (See appendix 24 for a working guide). Priority 1.

4.3.4 Design of Prototypes to be sold to manufacturers

These are activities which have very high risks of causing extensive work which will never be utilized or paid for. They most likely will steal capacity from other tasks and create losses which EDSC can not afford. Enough examples exist to prove this. Priority 0.

However, if the product idea is good, it should be possible to create interest among potential manufacturers so that they will participate in financing the development with the aim of starting production. To sell such ideas to potential manufacturers should be the task of the marketing department.

4.3.5 To provide manpower assistance within design

To the extent that other companies lack the necessary skills and/or manpower to do their own design and drawings, the centre should be able to do sub-contracting of such services. It also gives training for young draughtsmen and engineers.

Such work should not replace other design work at the centre. But as long as space is available, or alternatively if one can supervise the customer's own personnel or do the job at their premises, capacity problems should rarely be any constraint. Priority 2.

4.4 Manufacturing

4.4.1 Manufacturing of tools

Manufacturing of tools may remain one of the main activities of the centre. Tools should always be delivered on shortest possible notices. For the customers to get good tools available quickly must be considered very important. Few suppliers in Kenya are able to provide such services. Priority 1.

4.4.2 Maintenance of tools

Maintenance of the tools of the customers must be considered at least equally urgent and important as tools manufacturing. This will most often have great impact both on the output and the quality of supplies from the customers.

This will more so be the case considering that maintenance and repair of tools generally is a much less time consuming task. Priority 1.

4.4.3 Manufacturing of Prototypes based on orders

Manufacturing of prototypes for the customer creates opportunities to start new production in Kenya.

One should, however, be very much aware that it is only the smaller percentage of prototypes made in this world, which results in a viable production. It is therefore important, not uncritically to make any prototype the customer requests for, without first together with the customer judging the idea, the drawings and the potentials of the product and to give advice accordingly. Priority 1.

4.4.4 Manufacturing of Prototypes to be marketed to manufacturers

As explained above, one should not involve in manufacturing of prototypes for sale. It will in most cases end up with a lot of time and money wasted, without being able to secure a customer. This can the centre not afford.

If it will not be possible to involve a customer before starting the job, one will most likely not be able to do so at a later stage either. Priority 0.

4.4.5 Repair of machines

There are very many machines within many factories and workshops, which the customer has been unable to get back into proper working order. The results will normally be reduced production, high amount of faulty products or wreck, increased costs, delays and unnecessary importation of new machines.

To the extent that the centre has the necessary capability and capacity, it should undertake such maintenance and repair. This may be independent on whether it pays best to do the job at the centre or at the premises of the customer. If it involves travel, the travel costs must be covered by the customer, possibly shared with other assignments undertaken on the same journey. Priority 2.

4.4.6 Manufacturing of spare parts

One should give priority to making or repairing spare parts for production equipment of customers, when this can help the customer to keep his production running. Spare part may not any longer be easily available, or may require long waiting time for importation.

Assistance should also be given to foundries to improve their products when castings are required for the manufacture.

The priority of the work may depend on the possibilities for the customer to have the part made from any other local workshops. Priority 2.

4.4.7 Production of product parts to industry

It should generally not be the role of EDSC to participate in any regular production. That is the role of the private industry. EDSC should try to prevent competing with its own customers.

Still there may be cases, say when there is nobody able to make certain items, that this may be done by EDSC for the sake of improving the results from the customer. This, however, must not in any way be on the >expense of other tasks to be performed. Priority 3.

4.4.8 Manufacturing of production machines

It has been discussed whether EDSC should make certain machines for sale. Generally the answer should be no. That is definitely the task of the private industry.

The marketing department should be able to sell priority tasks to the industry. If that can not be done without loopholes,it will still be better to engage in such production than remaining idle.

Smaller items, hard to make, and preferably difficult for others to do, easy to disengage from when higher priority tasks pick up, may for such possible events be made. Possible such products should hence also be of a character which preferably will load more the less busy equipment. Priority 2.

4.4.9 Saw doctoring

Maintenance of sawblades is a problem for many smaller sawmills. Regularly is seen production of poor quality timber because of badly maintained sawblades. Also others do this kind of services. Still it may be useful for certain sawmills to get provided such services.

Sawmills do not belong to the regular type of customers for other services. But since the sawblade sharpening machine has been bought and installed, it is still better to utilize it than to let it remain idle and let the sawmills suffer.

However, sawblade sharpening normally goes together with stretching of sawblades and other saw doctoring work. That require special anvil, hammer , rulers etc., which, however, is not very costly and should be bought if one decide to start saw doctoring as a regular service.

Saw is a special skill, and one must make use of a trained person. There appears to be sufficient work for a saw doctor within the centre. The investigations which have been undertaken are, however, not thorough enough to make firm conclusions. Hence

further study of this special market must be undertaken if one would consider to employ a new person specifically for the task. Priority 2.

4.4.10 Production of products for general sales

It has been indicated above that the centre under certain conditions may make production items for sale to industry. That should not be extended to make products for sale to the general public. One must expect that the centre must be able with reasonable efforts to do more meaningful tasks. Priority 0.

4.4.11 Manufacturing of items for own use

Regularly all institutions and workshops should stick to its line of specialization. One will in that way work more efficiently and economically. That applies also to EDSC. It may be tempting to make items for own use, but later one will generally find that more specialized people could have done the work cheaper and better. Priority 0.

4.5 Advisory activities

4.5.1 Advice on tools use, design and manufacture

The use, design and manufacturing of tools should be one of the major know-how areas of EDSC. In connection with manufacturing and/or design orders, advice should be given freely as a part of the job, independent on whether the customer prefer to do a part of the job or not.

If, however, EDSC is specifically requested to give advice independent of other jobs to be undertaken, it will be natural to invoice a charge for this, as may be agreed upon.

Often the customer can do better with this kind of assistance than with getting the whole job done from the centre. One may in this way create more development with limited involvement. Priority 1

4.5.2 Improvement analysis of industrial products under/for production

To assist the manufacturer to improve his products should likewise be considered one of the most important and meaningful tasks which EDSC can involve in. When the producer can reduce costs and/or improve the functions of his products, generally few tasks will develop his industry and his service to the public better.

Such tasks should not be undertaken for the customer, unless always only together with him. EDSC can provide general knowledge and methodology of Value analysis, whereas the producer knows much more about his products and their applications. Priority 1.

4.5.3 Advice on foundry technology

It should not be expected that the regular staff of EDSC will be qualified to give advisory services within the special field of foundry technology.

It is however proposed to get the services of a foundry specialist who can work in collaboration with local experts to be trained in this field. The major inputs the foundries require is somebody qualified to go along with them within their premises and during their practical work to teach them better pattern-making, sand forming, sand treatment, melting, pouring, after treatment of the goods as well as organizing of work and equipment which they already have.

This takes somebody who is willing to work on the floor with them, not worried for becoming dirty himself. Still, he should also be capable on advising on economy and investments in the foundry.

New foundries should also, according to KIE, be established in 6-8 larger towns in Kenya to cater for the local demands. KIE is most eager to collaborate with a foundry specialist within EDSC in this matter.

If this team can be provided, major development may be created within the foundries, and even more important; better goods and services would also become available for the engineering industry. Priority 1.

4.5.4 Advice on production management

Advice within production management is of utmost importance to the industry. Very few if any, can not benefit from paying for good services in production management.

Still, EDSC must limit its field of operations, and leave with others to do what others can do better. If EDSC try to diversify into this field, it can only be at the expense of other tasks.

At present EDSC knows nothing about production management, while other organizations have reasonable experience within the field. Priority 0.

4.6 Training activities

4.6.1 Training courses within technical subjects

Training activities should yield substantive development effects for the industry. Important criteria for successful implementation include the following, which all must be fulfilled:

- Selection of topics of greatest importance for the industry
- Selection of topics where EDSC is extensively involved in practical work, and is more fit than other organizations to do the job
- Selection of the companies which can benefit the most from participation
- Selection of participants who will make extensive use of the learning themselves
- Lecturers/teachers well experienced in the topics and in teaching
- Opportunities for the participants to practise the learning during the courses
- Participation by EDSC staff, aiming at learning both topics and to learn to do similar teaching
- Participation to be fully paid by the participating companies
- Definite demands to the participants to deliver plans for implementation of all positive conclusions in their future work
- Careful preparations

This is mentioned because these criteria seem to have been somehow neglected during earlier courses. However, if these criteria can be adhered to, such training will have great impact. Initially courses should be held at the centre, but may very well be repeated in other towns and within individual larger companies according to demand. Priority 1.

4.6.2 Training courses within managerial subjects

From what is mentioned above, it should be clear that EDSC should not involve in teaching any managerial topics or any other topics where the centre will not be the best source of information. Pricrity 0.

4.7 Categorizing of activities

As explained above the priorities of the tasks may be summarized as follows:

TASKS OF PRIORITY 1:
- Design of tools
- Design of prototypes based on orders
- Manufacturing of tools
- Maintenance of tools
- Manufacture of prototypes based on orders
- Advice on design and manufacture of tools
- Improvement analysis for industrial products
- Advice on foundry technology (by specialist only)
- Training courses within selected technical subjects

TASKS OF PRIORITY 2:
- To provide manpower assistance within design
- Repair of machines
- Manufacturing of spare parts
- Saw doctoring

TASKS OF PRIORITY 3:
- Production of product components for industry
- Manufacturing of production equipment

TASKS NOT TO BE CONSIDERED (Priority 0):
- Design of prototypes to be marketed to manufacturers
- Manufacture of prototypes to be marketed to manufacturers
- Production of products for general sales
- Manufacture of products for own use
- Advice on production management
- Training courses within managerial subjects

5 FINDINGS AND EVALUATIONS

5.1 Understanding of the aims of the centre

It is important that EDSC and its controllers have the full understanding of the aims of EDSC and how it can have the best possible impact on the industrial development. This is explained above.

It is however clear from several reports and sayings that it is not commonly understood how EDSC can best create development. The following therefore must be stated:

Talking about employment creation within the centre; and about saving of foreign currency through the local supplies from EDSC, or about charging low prices; that will not have any significant development effect.

What will have positive development effects for Kenya, are rather the following:

- Selecting tasks which will develop the customer
- Help the customer to improved priority-making
- Deliver quality goods on short notices.
- Make reasonable profits so that EDSC can survive and grow in capability and capacity.

CONCLUSION:
The EDSC management to study chapter 3 and 4 above including the priority recommendations, discuss internally and with donor- and government agencies, concluding the aims and objectives of the centre. This to be printed in an EDSC brochure, available for the public.

5.2 The economy of the project

5.2.1 The present economy situation of the centre

The year 1992 is told to be the most active year of EDSC operations. This period was selected for an accounts overview. No overview of the economic situation or operational results seem ever before to have been attempted.

The accounts overview shown in appendix 3 has been put together by the EDSC economists after considerable pressure from the consultant. 4 people have been more or less full time involved in the work. It has taken 3 weeks. The figures are mainly extracted from the main KIRDI accounts. The KIRDI accounts are kept common for a range of different centres, and no results from this particular centre can easily be extracted. Explanatory notes to the accounts overview are given in appendix 4.

Cost undertaken by UNDP have also been included, and it has in this connection not been seen as the most important to identify who have incurred which costs. A stock-taking of materials has also been undertaken to determine the consumption of materials. The grave picture of the situation specified in the accounts overview appears to be fairly reliable, even if only few of the figures are exact.

No stock control has ever been kept, and it has not been possible to determine to which extent materials have been used for intended purposes. The value of materials which were stolen at a particular incident has been assessed to shs. 300 000. As can be seen from the account overview, the additional amount of materials consumption in 1992 shs. 2,2 million is almost 4 times higher than the amount invoiced for services shs. 0,6 million.

It can further be seen from the overview that the total variable costs for the period, shs. 6,3 million are about 10 times higher than the total sales value. Additionally comes overheads. The total overheads, shs 25 million are again 4 times higher than the variable costs. The total sales income is of the same size as the telephone expenses.

This extremely grave picture is in spite of that the plant is intact, capable operators are in place, the market is ready available next door and raw-materials are still in stock in a wide range of adequate varieties. No hindrances have existed against a proper utilization of the plant.

This must also be seen in the light of that the centre should have become self-sustainable after an initial period of operations.

5.2.2 The Centre potential to become profitable

As explained above, the centre potential could have been utilized to a much higher degree. The consultant has considered it important to try to clarify the profit possibilities for the Centre. Tentative budget figures are therefore shown in appendix 3 parallelly with the results for 1992. Explanatory notes are given in appendix 4.

The budget figures can not automatically be taken as achievable for 1994. They are first of all dependent on that adequate management will be in place. Some few further staff must be provided, working capital must be available, procedures must be streamlined, the market must be adequately approached, and some expert assistance should be in place.
However the needs for working capital are limited because much raw materials are available, salaries are already paid by KIRDI and a 50% down-payment is required for acceptance of orders.

The most important of these conditions should however be possible to establish in a short period.

The budget specifies a total income of shs. 25 million. Shs. 13 million of this is expected to be generated from machine hour charges. The machine hour charges are specified in the machine service budget, appendix 6, explained in the explanatory notes in appendix 5. The listed machines are specified in greater detail in appendix 7. Reasonable hour rates and machine loads are estimated, considering the demands in the Nairobi market only. Overtime, shift work and increased machine charges have not been considered. These however, represent realistic opportunities for further increase in revenue.

Machine services will normally involve charging for consumption of materials. The gross profit on material sales has modestly been estimated at shs. 1 million.
Design work is estimated charged at shs 160 per hour with a reasonable load factor of 70%. Course fees and consultancy fees may be the most unreliable revenues, but the viability is not dependent on these.

As can be seen, a profit before unpaid cost of shs. 2,7 million annually is estimated. This seem sufficient to make the centre self-sustainable.

Costs of expert assistance, rent of premises, depreciations and interests have not been included. Expert assistance, if provided may be considered to be a gift and a temporary expense for providing training. The buildings are provided free by KIRDI. Depreciations are of course real costs for future renewal of the machinery, but for the time being the existing machinery may possibly not be paid by EDSC or KIRDI.
Later on the centre, however should be in a position to reach balance in economy including the three last mentioned expenses.

5.2.3 The need for economy overview/former reports

The economy picture of the centre shows that it is very due time for actions to be taken. Without substantial changes, the centre will only create losses, and will have no impact on the objectives it was supposed to serve.

Some improvement measures seconded by nice promises and hopes will not be sufficient. For continued operations and support, monthly returns from the various departments must be presented showing a say 12 months time. Further must it be made sure that required changes actually will take place according to a time schedule.

As a starting point an EDSC output report format (appendix 7) has been tailored and introduced to the centre. The centre has indicated that it can come in use say as from January 94. The intention is that reports will come from the 5 productive departments with help from the commercial department and the marketing department. The commercial department and the marketing department are not yet in place. The 5 productive departments are the following:

- Design
- Testing and heat treatment
- Welding and sheet metal
- Machine shop
- Sharpening and grinding

The idea is that all departments will set their own goals for the coming month. By the beginning of the next month the results should be presented for themselves, KIRDI and the donor organization.

It is agreed that EDSC will keep their own accounts, something which should start from the 1/1-94. A number of other economy control measures have also been agreed upon to be implemented immediately. Forms for these are shown in the following appendixes:

Appendix 9: Working out of quotations, planning job time consumption, follow up and recalculation of time consumption and costs after order completion. (The idea is also to get feed-back for improvement of future cost calculations)

Appendix 10: Material requisition to be used for getting materials from the store for all job orders

Appendix 11: Stock card to be used for control of the stock of materials and as input for the purchase.

Appendix 12: Job card to be issued for all jobs to be undertaken in the various productive departments. The results will also be used as input for the monthly output report and recalculation in the quotation calculation.

Appendix 13: Machine load plan, to show how the various crucial machines are expected to be loaded. The aim is to be able to commit delivery times, and to intensify sales of less loaded capacities.

Appendix 14: Person load plan for the design departments, with the same aims as for the machine load plan.

Appendix 15: Working hours registration for the week, separate for all productive departments. The monthly result will serve as an input for the EDSC output reports.

Appendix 16: Customer card to keep track of all contacts with customers, and to ensure follow-up as required.

Appendix 17: Explanation to the use of the forms (appendix 9-16)

5.2.4 Goals and Incentives

A major requirement of reaching adequate results from the centre is that specific outputs are demanded from it. Monthly budgets must be presented from the centre, subject to approval by the steering committee and the donor organization.

The centre must set its own goals, composed by goals from the individual departments, where the staff has participated in the tailoring.

Accordingly the results must be presented to all parties involved at the expire of the month.

The goals and accounting for the results are the most important for struggling for improved outputs. It will however, also be very useful to establish an incentive system to honor good results. Probably the best alternative will be to establish a bonus system. The bonus system must be reasonably easy to understand and to administer. A dual system can be suggested as follows:

A. Each employee will on a monthly basis receive a bonus dependent on the size of the total gross profit for the month. E.g. 10% of the gross profit may be distributed as a bonus. The size of the individual bonuses to be in ratio with the basic salary for each employee.

In the budget, appendix 3, 10% of gross profit shs. 10.4 million = shs 1,04 million. Distributed on total local salaries of shs 10,75 million this amounts to 9,7% additional salary. Bonus should be available from the start as long as any gross profit is made.

B. The employees within the particular productive department will similarly on a monthly basis receive 25% of the portion of the net department contribution which exceeds the former highest contribution. (See appendix 8) This should stimulate to production increases especially in the initial stages.

5.2.5 The need for further investments

5.2.5.1 Investments to keep present facilities operational

Some limited equipment is lacking for full utilization of some of the important production equipment. This includes some cutting wheels, some grinding wheels, operational instructions for the polariscope, limited accessories for the saw blade grinding machine, etc.

At the same time has been bought cutting wheels, which due to their dimensions do not fit on any machine.

Obviously such equipment should be bought/exchanged. The matters are so fairly petty that they already long time ago should have been arranged for on the operational budget.

Similarly has been bought some tool steel of dimensions which are too large to be cut by any available cutting equipment in Kenya. There is also limited scope to use these materials.
Obviously one should soonest possible find out what pays best of,
Exchanging the steel with more adequate dimensions
Returning or selling the steel, or
Request a local rolling mill to reshape the bars.

Major parts of the high value steel are also left outside scattered around in the grass, subjected to corrosion and further theft. It must be taken better care of. There are sufficient space inside if the plates are kept standing.

5.2.5.2 Established Excess capacities

The plant is not fully harmonized. Some items could have been provided, or provided in greater number, while others have too high capacity or may not be required at all.

Especially there is installed an enormous air compressor with 260 KW motor, while there is hardly any equipment using compressed air. The compressor is specially made, and it is difficult to say whether anybody in Kenya can make proper use of it.

It has costed over 6 million shilling. It is also hard to believe that it ever can come into proper use at the centre. The consultant has no good suggestion. It should be looked into what to do with it, whether providing some sort of services requiring that much air, requesting the supplier to take it back, or trying to get it sold. It is also difficult to understand how such an investment could have been approved at first.

Some of the testing equipment installed will probably also never be used for any important purpose. That include among others a sophisticated polariscope for mapping out stress patterns in components. The investment value of these items are lower, and it may be worthwhile to hold an a bit and see to which extent it can find any practical purpose to serve.

Some hand tools as e.g. G-clamps are very abundantly available in great numbers, while others are lacking. If one can obtain sufficient value, it could be worthwhile to arrange for some exchange through local traders.

5.2.5.3 Pilot Foundry

One of the most fantastic ideas that have been proposed in full seriousness, is to establish a modern pilot foundry plant within the centre.

The idea has been that the plant should be used to train local foundries in modern foundry technology and to show them what a proper foundry plant should look like.
It has also been the idea that the plant should manufacture cast iron pieces for spare parts to be manufactured at the centre.
It has ever. been written an elaborous report, lining out the plant in great detail. From a technology point of view, the report looks adequate enough. But there has not even been made the slightest attempt to justify the idea economically.

It must be completely obvious that there is no good reason to pursue the idea further:

- Such a plant is not fit for teaching local foundries how to make better cast iron. Clearly, there is a demand for improvements within most of the foundries. But such improvements can not be achieved by help of a pilot plant. Operators training at the plant will find the conditions very different from their regular environment, and will have difficulties in implementing what they may have learned at the plant.

- The same will apply at the management level, the plant will just be too far from their own plant which they should develop probably step by step.
  Much more useful will it be if a qualified foundry technologist with sufficient sense of economy can come to their own foundry, teach the operators better technics in their own situation, and discuss improvements in plant and operations with the management. (That will not either involve any risky investments.)

- To establish a foundry for the sake of providing cast iron to the centre seems equally meaningless. The centre will not represent any reasonable market outlet for the plant. To start competing with private foundries, seems also not to be a good idea. Instead of a promoting effect, the result will be the opposite.
  If the centre has difficulties in settling its cast iron requirements, it must be much better to assist existing foundries in solving their manufacturing problems.

- The foundry market in Kenya or East Africa is not either big enough to keep a pilot plant busy with tasks of training and technology transfer. One should clearly know in advance that such a plant would create an other headache, what to do with the ghost plant and the wasted investments.

An other matter is that the demand for services from a foundry technologist/economist is great enough, and that services within foundries can create reasonable developments. This is considered elsewhere in the report.

5.2.5.4 The needs for further machine investments

No doubt, for a busy and efficient engineering development and service centre investment in further machinery of the right kind may be both useful and economical.

In the present situation there is however no need to consider further investments. This has three simple reasons:

1. The plant as it is has potential to become profitable enough if it is properly managed

2. The risks of wasting money and adding problems to an already mismanaged project are too big.

3. When the centre possibly can come under proper management, it should in due time be able to invest in extensions from its earnings.

On the concrete ideas that have been presented for further investments it can be commented as follows:

- Spark erosion machine: A new machine is very costly. Reasonable second hand machines are available at more reasonable prices. The machine will probably be useful if properly managed. The machine is however in no way any condition for improved utilization of the existing plant. It is hence not the time to consider such investment.

- Additional lathes and tool milling machine: It will probably be experienced, when and if the plant comes into full use that the capacities of existing lathes and milling machines will be easy to fill. To sub-contract lathe operations should however not involve considerable problems. A great number of lathes in Nairobi are under-utilized. Only when excess means are available, investment in further lathes and a milling machine should be considered.

- Copy milling machine and wire cutting machine: Probably also a useful machine, but it will have a danger of being under utilized until other extensions of plant and activities first have taken place.

- Metalography laboratory: Will probably be grossly under-utilized. It is not very likely that it can become profitable. A feasibility study may be made at a later stage when the centre has become well utilized.

- Additional heat treatment facilities: The existing plant is far from sufficiently utilized. For case hardening it can also easily be utilized outside regular working hours. Considerable problems due to limitation in size of the heating chambers are yet to be experienced. Simple carbonization equipment however, can be established without considerable investments.

- Galvanization: Will probably never become profitable for the centre. Services can easily be sub-contracted.

- Further Welding equipment: This generally involves limited investments and may be carefully considered as soon as capacity problems occur, and as soon as excess means are earned.

- Computer: The work volume has far from reached any level where this is required in stores or planning.

- Staff bus: The centre location is distant and complicated to reach for many. To invest in a bus for such limited use will not be profitable. Also it has been seen that arrangements to get people in position at correct time, has been difficult to reach. Much better will it be:

  A: To collaborate with other companies along the road to invest in upgrading of the road so that it can become passable, for pedestrians, cyclists and cars.

  B: To collaborate with a transport company or matatu organization to make sure that some sort of public transport will be available along the road, at least at strategic times.

  C: Possibly to provide some transport allowance to the employees.

- Working cloth and safety boots especially for the workshop staff: The lack is to great annoyance for the staff. Limited means are required. Should urgently be provided from KIRDI means.

5.3 Market Situation

5.3.1 Needs for machine services

The needs for machining services; i.e. to have the possibility to utilize a particular specialized machine, is first of all interesting for the engineering industry.

Engineering industries lacking a particular machine, can through the services of the centre, be able to do jobs which they otherwise could not do, or could not do with similar quality or cost.

Machining services are, however, interesting also for other industries, even if these demands are much more limited. Often this is limited to repair and maintenance.

Contact with 10 potential customers, most of them within the engineering industry, shows that there is a great demand for practically all available services. Each service opportunity has been discussed with them individually and none of the services, except from the compressor, was required by less than two of

them. The visited industries are short-listed and categorized in appendix 18, and the results of the individual interviews are referred in appendix 19.

The possible volume of work was discussed with each of them. The discussion was based on that services will be executed in a reliable manner, reasonably expedite, with sufficient degree of communication, with reasonably increased prices and with the present quality of work.

Under those conditions, the total requirement for EDSC machine services, from 8 of these companies within engineering, seemed to be in the range of shs. 250.000 per annum. They represent approximately 2.700 employees or 18% of the metal product sector. Totally the metal sector employs about 15.000 people. The total demand for machine services in the metal sector could hence possibly be about one million shs. per annum. Approximately 55% of this is in the Nairobi area.

The total manufacturing sector represents about 170.000 employees. If the rest of the industry has only 10% of the demand of the metal industry, other manufacturers would possibly require another one million shs. of machine services.

The labour costs in the metal industry in Kenya in 1993 seems to be about 850 mill. shs. The rest of the industries seem to have labour costs of about 13.000 mill. shs. Hence, the service requirement of 1 million shs. for each of the two groups of industries would amount to respectively about 1 and 0,08 per mill of their labour costs.

One may conclude that providing machine services can cater only for a fairly limited part of the capacity of the plant.

5.3.2 Needs for Complete Supplies

The needs for complete supplies are very much higher than for machining services. Complete supplies may include priority 1 tasks as;

1. Design, manufacture and maintenance of tools
2. Design and manufacture of prototypes based on orders and improvement analysis for industrial products
3. Advice on design and manufacture of tools
4. Advice on foundry technology (by specialist only)

+

5. Tasks of priority 2.

Individually the needs for these tasks may be judged as follows:

1. **Design, manufacture and maintenance of tools.**
4 of the 10 visited companies buy tools which they considered they as well could buy from EDSC provided services would be reasonable. The annual amounts were indicated as follows:

   - NALIN shs. 5 mill., MECOL shs. 500.ooo, Auto Precision shs 300.ooo, and DATINI shs. 40.ooo

   Extrapolated as in the chapter above, this may possibly amount to shs 30 mill. annually in Kenya, or shs 15 mill annually in Nairobi. This is far beyond the capacity of EDSC.

2. **Design and manufacture of prototypes based on orders and improvement analysis for industrial products:**
Generally one will find that manufacturing companies prefer to make their own prototypes. This was also the case for all the 10 visited companies.

   Still one will find that very many products made in Kenya have a long way to go before they have reached a development level at par with the world industry in terms of manufacturing cost and functionality.

   Hence, the potential market is great, and the possible impact on development is even greater. However, such tasks take a level of expertise not easy for EDSC to achieve.

   One could get hold of an expert in Value Analysis, who together with the national experts could work in close collaboration with the industry. One then, no doubt, could develop solutions having a spreading effect to other industries.

   In connection with new executions, new physical prototypes will have to be made. These might to some extent be required from EDSC. Testing of the prototypes would then also naturally be a task for EDSC.
The staff of EDSC could at the same time learn the technics of product development and Value analysis slowly.

3. **Advice on design and manufacture of tools**
EDSC is presently not capable on advising others on the manufacture of tools. After a further training period of say 2 years with intense deliberate training under a qualified tools designer, this however, could become the case.

Some of the industries, could then be in a better position to make their own tools. That refers to those adequately equipped, and to those who could obtain some of the machine services from EDSC.

4. **Advice on foundry technology (by specialist only).**
There has been talk of establishing a pilot foundry plant under EDSC. There is definitely no market for this. Such a plant would be a new disaster ghost plant. The project would in the continuation create new headaches about what to do with the wasted efforts.

One of the simple reasons for this is of course: The foundries will have much greater benefits of learning how to operate their own plant than on a plant with quite different equipment and conditions. That would also be much cheaper and very much less risky.

To establish a pilot plant for the sake of making better cast iron products, also make no sense. Mistakes done by the existing foundries can be rectified, and it will pay much better to concentrate on helping the foundries within their own environments.

The question is whether the number of foundries and their openness to new ideas is great enough to facilitate a foundry specialist on a 1-2 year contract.

The specialist should give advice and training on the shop floor. He should provide practical training. He should also be able to give practical an economic advice on plant developments. Further, he should work with 2 local trainee engineers to take over the services after his disengagement.

Furthermore, KIE have expressed the need to establish 5-8 new small scale foundries in some of the larger towns in Kenya. The specialist could be of great use in the planning, and later during the start of these establishments.

A questionnaire has been made and sent to some of the foundries to map out their views. Regretfully it was posted too late from EDSC, and no reactions have become available in time.

It however, seems very unlikely that the answer to the question of engaging in foundry advice, will be anything but positive. Still, the matter could be looked further into.

5. Tasks of priority 2.
As can be seen, the needs for work of priority 1 is far bigger than the supply possibilities from EDSC. Still, one can not expect that priority 1 tasks, together with machine services will distribute the work evenly on all available equipment.

Within the frame of available capacities, one should expect to do also work of priority 2. As specified above, these tasks include;

- Manpower assistance within design
- Repair of machines
- Manufacturing of spare parts
- Saw doctoring

There is no need to go in detail in estimating the need for this kind of services. From the visit to the 10 potential customer companies, Nalin and EAI together specify that they buy for 11 mill. shs. annually in spare parts which could be made by EDSC.
This alone is more than EDSC can expect to make of spare parts. Yet, in spite of their size, they represent only a small fraction of the total spare part consuming industry.

5.3.3 Training needs

The environment of EDSC and its field of operation is not particularly fit for teaching any managerial topics. Even for teaching within workshop management EDSC is not fit. Other institutions have such topics on their programme. It would make no sense to start competing along these lines. That would turn out negative. The quality could hardly be as good as from others.

Also elementary teaching of technical subject can be undertaken better by other institutions. Those include technical, schools, institutes and village polytechnics.

The 10 visited companies were requested to express their views on short term training needs from EDSC. A list of 11 topics was presented. The number among the 10 companies who would like to attend within the different courses was as follows:

1.	How to make technical drawings	2
2.	Design of machinery	3
3.	Product development/Value analysis	5
4.	Efficient operation of lathes etc.	3
5.	Eff. oper. of advanced metal working machines	1

6.	Heat treatment	6
7.	Material testing	4
8.	Precision measurement. Phys. quality control	5
9.	Production planning. Time requirement calculation	4
10.	MIG and TIG welding	1
11.	Repair welding of cast iron	2

In general, dependent on the topic, course duration with an average of 3 days, was considered the most appropriate.

Most of the courses address themselves to the needs of the engineering industry, or to maintenance departments of others. There are approximately 15 000 people in the engineering trade. One may e.g. estimate that every 5th person could participate once in a working life of 40 years in averagely 2 of the 11 topics. That would than provide averagely 13 participants per course annually.

This would obviously require very efficient advertising and conducting of the courses. One may also consider a certain magazinating effect, giving further students initially and fewer at later stages.

With averagely 15 participants per course, 1-2 courses could be held annually for each of 12 selected topics.(as suggested in chapter 5.9.2). A training course programme has been recommended accordingly.

5.3.4 Needs for assistance to foundry developments

There are 12 foundries in Nairobi as listed in appendix 27. 4 of them were visited so as to find out their needs for consultant assistance from EDSC.

The four were:

	No of employees	Turnover mill. shs.	Consultant days needed
East African foundry Works	150	100	300
Dynamic Engineering	12	50	350
Hartz and Bell	10	17	41
Jua Kali Castings	12	12	430
Sum	184	179	1121

The specified 1121 "consultant days needed" refer to the answer to the question about how many consultant working days assistance they would require over a two year expert assistance period.

It was indicated that an international foundry expect may be working for EDSC over a two years period, assisted by two local trainees. It was indicated that they would only be required to pay for the services from the two local engineers.

These four foundries represent 30% of the no of foundries in Nairobi and 24% of the foundries in Kenya. In terms of turnover and no. of employees, they may represent about the same percentages. If extrapolating the total no of working days required for all the foundries in Kenya together may amount to something like 4500 hours over the two years.

Considering 230 working days in a year, a consultant will keep busy enough with about 10% of this amount of requirements. Hence even if there are huge overestimations one will expect that here is meaningful work enough for 2 year working period.

KIE have indicated that they require help to establish 4 - 6 new foundries and require help in planning establishment and start. That would require substantial part of the available time if involving.

Additionally to these also Portland cement factory, Mombasa, Mumias Sugar Co., Kakamega and South Nyansa Sugar Co, Homa Bay intend to start foundries and would probably require assistance.

Looking at the sort of assistance required, the four foundries specified the following distribution of the time requirement:

- Quality improvement	32%
- Production methods, plant developm., expansions	22%
- Material compositions and working methods	17%
- Preparation of sand, mouldig, pouring, after-treatm.	10%
- Preparation of patterns and cores	5%
- Selection of equipment	4%
- Cost Control	4%
- Safety problems	3%
- Labour management	2%
- Organization of production lines	1%

All the foundries classified the intended service as very important or necessary for survival and growth.

The idea is that the consultant should be working within the individual foundries, teaching better methods on the shop floor, and actually experiencing that methodology and workmanship improve. He should also work with the management, helping to improve plant, equipment, raw materials procurement and control.

The two local engineers should be working closely together with the expert during the two year period. It should be planned that they should take over the work after his departure.

5.3.5 The experiences of present and previous customers

The 30 companies specified to be customers are shortlisted in appendix 20, representing a total sales over the years of shs 965.000. The consultant managed to contact 10 of them to collect their views concerning the supplies and the services from the centre. Their views are referred in appendix 21. The 10 companies represent 42% of the total sales.

Six of these ten companies expressed deep dissatisfaction with the services. One of them complained that samples were collected but no services or message was received at all in spite of repeated calls from the customer. All of them complained about extensive delays, lack of communication and about promises which never were kept.

5.4 Marketing and sales

Probably the single biggest reason for the extreme low utilization of the Centre is the lack of orders.

When EDSC is lacking orders, it is not because the market is limited. It is not because the industry does not need the services or is avoiding EDSC.

Together with gross neglect of the customers of the centre, it is because EDSC and its services are not well known by the potential customers. EDSC has simply neglected to do reasonable marketing efforts.

- A marketing department or a marketing person does not exist.
- Sales letters or other sales material does not exist, and have never been distributed
- Price-lists, delivery programme and benefits of using the facilities of EDSC have not at all been clarified.
- Nobody within the centre management has background from marketing.
- The former advisers came from communities where marketing was not a regular activity, and had limited understanding of marketing requirements.

Heads of major organizations of industries which should have been important customers does not even know the existence of EDSC. This includes organizations as KAM (Kenya Association of Manufacturers, FKE (Federation of Kenya Employers), KSPX (Kenya Subcontracting Exchange) and KIE (Kenya Industrial Estates). This is in spite of that the In Depth Evaluation Mission one and a half year ago strongly recommended such contacts.

EDSC has experienced that when visiting industry, the interest for giving orders to the centre is there. These visits have, however, not been arranged in an efficient manner, from a cost and time point of view.

A number of industries, however, have been visited by a 4-man delegation, and this has resulted in some few orders. Mainly have far away locations been selected and elaborate minutes have been taken. The results do not reflect the cost and the time which has been spent.

RECOMMENDATIONS:
The following activities are recommended, the most urgent ones mentioned first:

1. **Distribution of information material**
   The centre should immediately send a well composed information letter to approximately 600 industries in Kenya.

   The letter should specify the different services the centre can provide and be enclosed a list of the various operations which can be performed within the plant of the centre. The letter should invite enquiries.

   The consultant has tailored a sales letter and a simple brochure for the centre. The brochure is planned copied on both sides of a A4 colored sheet of paper, folded to contain 6 pages. The management has promised to copy and distribute these urgently. The draft for the two documents are shown in appendix 22 and 23.

   The addresses specified in the KAM directory may be used for the distribution. One does not need to send all the letters at the same time, without first checking the response on a limited quantity. The Nairobi market should be utilized first, later the closer surroundings.

   This may later on be followed up with more elaborate printed information material.

2. **Making the EDSC Services known through other organizations**
It should be a quite obvious way of marketing to let other organizations in the process of promoting industrialization, know about the services of EDSC.

It is not enough that one or two persons within such organizations know that there is something called EDSC. The whole organizations with their executive staff, should also to some detail be able to guide their clients as to which particular services they can expect from EDSC, at which rates and conditions, with which kind of equipment, etc. EDSCs information and sales material should also be available to the public at such places.

At least the following organizations should be active collaborators:
- KAM (Kenya Association of Manufacturers,
- FKE (Federation of Kenya Employers),
- KSPX (Kenya Subcontracting Exchange)
- KIE (Kenya Industrial Estates).
- ICDC (Industrial and Commercial Development Centre)
- IDB (Industrial Development Bank)

3. **Fixing of signposts**
Sufficiently large, well visible signposts, announcing EDSC and its main activities should be erected at the Mombasa road junction, at the gate, and inside the compound.

4. **Establishing of a Marketing Department**
A marketing department with the following staff should be established under the EDSC general manager as soon as possible:
- A sales manager
- A sales planner
- A sales clerk.

The main responsibilities of the Sales Manager should be the following:
- In liaison with the production-, design-, and economy managers to maintain a complete delivery programme and a price list.
- To keep customers constantly informed about delivery possibilities and progress of their orders.
- To collect inquiries and orders for all idle capacities
- To accept and confirm orders; in simple cases immediately, in complex cases after internal planning.

The main responsibilities of the Sales Planner should be the following:
- To calculate cost of work and materials as well as job duration according to procedures and to issue quotations
- To maintain a load plan for all crucial manufacturing capacities.

The main responsibilities of the Sales Clerk should be the following:
- To receive incoming calls from customers, and act on them as far as possible
- To correspond with customers and assist the sales manager and sales planner as required.

Their common responsibilities should be the following:
- To maintain customer journal cards showing developments and committments towards all customers
- To participate in telephone sales and sales visits as time allows

The marketing department may be located within the design office.

It is however, no reason to limit marketing and sales to the marketing department. It should be the task of everybody within the organization, whenever the opportunities are there, to make the services known, and to encourage the industries to make use of the services.

At present a range of people within the different departments are idle, substantive parts of their time. Many of them are fit for it, and could easily approach customers for providing of services which they self execute.
E.g. the staff of the tools grinding workshop should when ever they are idle, visit customers needing tools repair, carry an order book, give prices, take orders, collect tools and do the job. For this they should after payment receive a sales commission, of say 5-10% of the value of the sales.

5. Telephone marketing

First contact to customers should normally be through sending circular sales material.

Second step should be the follow up on telephone. On telephone one may create interest and enquiries, inform about available services and vacant capacities, and agree on next step, i.e. receival of enquiries, giving quotation or agree on a visit.

6. **Sales visits to Customers and potentials in the Nairobi Region.**
If during telephone contact there is discovered need for a personal visit, one from the sales department will go (in technically complicated cases substituted or seconded by a technical person)
A sales visit should result in bringing back an enquiry, an order or e.g. tools for maintenance.

The sales personnel may use their personal vehicle, against refund of expenses pro. km. according to procedure.

7. **Arrangement of an Open Day**
Two consecutive open days may be arranged;
- One when representatives from the industry is specifically invited
- One open tc the public, announced in the media

It should during the day be possible to demonstrate the use of all equipment and machinery. Price and time requirements should be indicated, enquiries should be received, price lists and information material should be handed out, simple orders may be accepted with a discount, and brought along twist drill may be ground free of charge. Possibly may a lecture about e.g. value analysis of industrial products be held, demonstrating cases. A light refreshment may be available.

8. **Information to the Public**
There is further a need to inform the general public about the activities of the centre. There should be no need to involve in costly advertisement or prints. When the centre is ready for it, the press, VOK and TV should be invited to visit the centre, demonstrating equipment, activities and results to them, encouraging them to inform the public in their media accordingly. That should be interesting enough for the media.

Additionally, during special events as e.g. the open day, on successful completion of very special tasks, etc., the media may be notified. The aim should be to create a positive image of the centre, and to remind about favorable service opportunities from the centre.

5.5 Selection of jobs and customers

Because that no reasonable marketing activities have been undertaken, the centre has only had few enquiries. One has hence not had sufficient inquiries to give priority and to be selective. One has just been happy to get any orders at all.

Prioritizing therefore has not been any practical important question.

If one do the necessary steps to increase the amount of inquiries, prioritizing will become important. The centre therefore now must consider this matter.

One should then select the tasks which create the highest development effects for the metalwork industry in Kenya. Priority tasks are specified in chapter 4.7.

The selected tasks must at the same time give necessary profits for the centre to enable growth and development of capabilities.

It has also been discussed which type of industry one should give preference to, from the smallest jua kali workshops to the advanced big scale foreign owned industries.
Obviously the bigger industries can utilize the services best, while a bigger part of the services will be too advanced for most of the smallest workshops. On the other hand the bigger industry can more easily obtain services from other sources. Hence, assistance to the medium scale industry may in the practise yield the most.

Even if favourable medium scale industry, this should not be any rigid regulation, as one should judged each case on its own merits.

5.6 Working moral and motivation

Absence from work:
There does not exist any systematic control or recording of the presence of staff during the working hours. Late coming in the morning between 1/2 and one hour are regular events on all levels, and the same applies to the time for finishing off and going home in the evening. The same applies also to lunch-hour absence, even if with lesser deviations.

Equally it has not been seen any reactions when staff has been absent from duty during the working hours.

Staff can also be absent from work for several days continuously without any reaction beeing taken or records being made. This can have many different reasons; from sickness to sad or happy events in the families. In most cases such occurrences are spoken over with their superiors. It would only have been natural if such occurrences were recorded in the personal files; salaries deducted or balance of annual leave being reduced.

Efficiency of the working time:
Even more serious is it that for most of the staff, the working hours are very far from being efficiently utilized. This very much depends on individuals, but in general far below 50% of the presence time is being utilized. Duration of chatting with friends, two or two together, or more often in larger groups at times become quite extensive.

Long time reading of newspapers etc. in the morning seems to be very regular and accepted on all levels. Still may be the most disturbing factor is the lack of working speed.

Not everything of the above applies to everybody, some good examples exist, but as a whole the situation is depressing. One however must have a very strong personal working moral to withstand the gross habits and the temptations of relaxation.

The situation is prevailing within all ranks of employees. One should expect that the leaders to a much higher degree would set positive examples and demand working discipline.

Reasons:
Major reason for the situations seems to be the following;

- Throughout, there is a frustration because people feel that their skills and abilities are not utilized. They are told what and how to do it and not given the chance of contributing something from their own mind
- No record of work or work volume is made
- Presence, absence or actual working hours is not being recorded
- Tasks to be performed are often not given
- The superior may not be present or care to a sufficient degree
- One has not got the understanding that it is important to work hard.
- No form of incentives for good performances are given

- One has not been committed to live up to certain goals or to fulfill any budget frames.

- The sector leaders have not been made economically responsible for their departments' performances.

It has been mentioned by staff members that the moral is low because of late coming payment of certain salaries and because of uncertainty about the future. Such excuses should not be accepted. Any reasonably intelligent person will understand the need for working hard and devotedly to secure ones own future.

5.7 Management style

The following seems to characterize the management style of the centre:

- The style is autocratic. Much creativity is not encouraged from the subordinates, who are told to follow orders without discussing them.

- Rules and regulations are supposed to be followed as they are, without questioning them or giving room for improvement suggestions.

- Directives from above are obeyed for the sake of obeying

- Trust is generally not shown to subordinates, and powers are not delegated to a sufficient degree. Responsibility is not extensively delegated to subordinates. Instead exists a rigid system of control hindering enthusiasm and devotion.

- Setting of improvement goals and collaboration to reach them has not been typical for the situation. E.g. seems no efforts to have been done to identify the sales volume and to discuss how it can be improved.

- The management has not utilized the uncertainty about the future of the centre to make everybody work hard and devotedly to prove viability, but rather permitted laxation as a result.

It may not be easy for somebody used to a particular leadership style, suddenly to change. Still it appears that a future for the centre is dependent on this. Therefore it must thoroughly be looked into; how one best can secure more progressive management in the future.

5.8 State of design activities

Designing of Prototypes:
It is extremely important not just to make a technically correct drawing. Much more important is the functionality and the cost of the product. The design of the product should always be very dependent on the number of items to be made. Especially when it comes to drawing of prototypes for production this becomes extremely important.

Looking at some prototypes which have been made, it is apparent that more efforts could have been made at the design stage. The prototypes may be functioning, but they are not very fit for production in any greater number.

Instead of making only one or a few sketches before making the prototype, it is worthwhile to make many. The sketches should be thoroughly discussed before making firstly simple drawings, again to be discussed for improvements before finishing the design.

Such discussions should aim at functional improvements, simplification and cost reduction. The principles of Value Analysis may be applied (See appendix no. 24 for a working guide).

The department seems fit to design prototypes for moderately demanding products which generally will function.
Obviously however, design of prototypes which must be work efficient and cost efficient and well fit to be put in production, is a hard and demanding task, very much on the border of the capabilities of the centre. One should not automatically expect that the centre with its present staff will be able to make prototypes designs, which will suit the requirements of demanding customers.

It is important that the design section itself is fully aware of its limitations, and that it will give the customers relevant judgement before starting a job. The centre should not involve in design of prototypes except for when there is an order from a particular customer.

Work elaboration:
The drawings which are made are all traced in ink and are all of a very high technical quality. This is irrespective of whether it concerns a simple spare part to be made in one item ones, or whether it is a complicated item to be made again and again. Obviously this is to go too far for the simplest cases. Pencil drawings, sketches or often no drawings at all may be required for simple items to be made once.

In all cases when it comes to items consisting of many parts there in addition to a assembly drawing, are made separate drawings of each individual part. That is the right thing to do for a final appearance of a product to be put in production. In other cases it may be sufficient to put measurements on the compounded drawing. This is especially so for items to be made only once and when it comes to solutions which are not final.

Most important; one may in such ways reduce both working hours and costs and also waiting time for the customer which is too long. One must in each individual case judge how elaborate the drawings should be.

It has also been seen that sub components which are bought ready made are drawn in great detail with accuracy. (This includes e.g. electrical components). This is both unnecessary and confusing. A dotted contour line may in most such cases be sufficient.

Division of work between Engineers and Draughtsmen:
As of present the engineers make all assembly drawings and part drawings for the workshops. The draughtsmen are left with tracing, i.e. copying of the exact drawings in ink.

Hence the work becomes double and unnecessarily time consuming. The draughtsmen are qualified for making all part drawings, and also simpler assembly drawings and strength calculations. They should be given the task of making the part drawings on basis of assembly layouts.

Hence the part drawing need not to be made more than once: The draughtsman draws it in pencil or in ink as may be required. To make an assembly drawing in a smaller scale, when a layout sketch or drawing in scale 1:1 exists should also be the job of the draughtsman.

Proportioning of working time
On request the design departments have specified the ratios of time consumption for design and manufacture.

When it comes to tools manufacture; design and drawing is told to require 52% of the total time consumption, and actual manufacturing only 45%. Hence, it seems that the design takes an unreasonably high proportion of the total working time. One should seriously look into how this can be reduced. 28% of the design time is used for tracing. In general one may think that tools drawings most often will not require tracing, something which should contribute to time savings.

On prototype manufacturing 45% of the time goes for drawing work, but only 2% on the creative sketch drawing. To reach creative solutions, heavy emphasis is required on making sketches in many alternatives. One will in this way try to reach the best and most reasonable solutions. Probably also here a reallocation of time should be considered.

On spare-parts manufacture 55% of the time is used for design, and only 33% for actual manufacturing. Spare parts should in most cases not require manufacturing of drawings, unless this is specifically requested and paid for by the customers.

Numbering System:
All drawings are numbered with a job number + sub and sub sub numbers. Such numbering may possibly be useful, but alone it is not sufficient. It will soon be difficult, and later it will be almost impossible to find a wanted drawing. The available drawing cabinets can also not be utilized properly.

All drawings should have serial numbers, separate for each standard paper size. They should not be stored in rolls, but according to serial number. The drawings in the drawers, should lay flat, each format separately, in hips of 200 for the smaller, and 100 for bigger formats.

A serial number book for each format should have reference to job number, recorded separately. The compound drawings should have reference to the serial numbers of each detail drawing.

When detail drawings for an assembly drawing are made, the serial numbers of the detail drawings should be specified in the part list.

Drawing paper and formats:
Drawings are made on proper formats framed with title sections. The title sections are very elaborate, drawn in each case by hand, something that often consume more time than making the actual drawing.

Drawing paper use to be available from paper suppliers in standard blocks in formats from A4 to A1. For odd formats may be used e.g. a rubber roller stamp for the title area.

RECOMMENDATIONS

An open minded discussion to take place between the draughtsman/engineer, the superior and possibly other colleagues at the start of a design or drawing job, and also later during the job, to give room for all possible ideas and creativity for improvements in design.

Drawing paper to be bought in format blocks with ready printed frames and title frames

Drawing numbering system to be implemented as indicated above.

Elaborateness of the drawings should be decided in individual cases, judging the extension of their use and importance. Simplification should be sought.

Reproportioning of time consumption to be retailored as indicated above.

5.9 Training activities

5.9.1 Training activities in the past

Of the original extensive expectations, only two training courses have been held in July and August 1991.

The one was a 3 days course on operation of a jig grinding machine. The machine is fairly special, and it is not known how many of the participants could make practical use of experiences from the course. From the programme it appears that the relevant working time of the course was 8,5 hours.

The other course, over 5 days on practical use of tolerances was probably more relevant.

5.9.2 Training activities proposed for the future

A course programme is proposed in appendix 25. The programme has been selected after discussions within several industries as outlined in chapter 5.3.3.

The programme consist of 12 practical technical subjects, estimated to be of high value for the industry. Held as shown in the appendix 1/2 - 2 times per year with a duration of 1 - 5 days, the total programme involves 39 course days per year. This may possibly be extended a bit if any of the courses prove to be particular popular.

All courses should be paid for by the participants or their employers. That is the safest way to ensure that mainly participant who will make use of the acquired knowledge will attend.

With an estimated average of 15 participants in 16,5 courses, with 70% efficiency, and an average course fee of shs. 7.500 it would bring an annual revenue of shs. 1,3 million.

Courses may be held within the premises of EDSC. The centre should be helpful to organize accomondation for those who need it, but not involve in any accomondation themselves.
Courses should be completed with a simple practical test, and a certificate should be issued.

The centre has presently nobody who can involve extensively in any course programme, and any programme can not start until a training organizer, an UNV and a secretary is in place. The staff should be technical/pedagogically oriented. It can still not be expected that courses can be held without making use of a range of trainers from outside.
It may not be expected that the proposed staff can manage more than the indicated 39 course days annually.

5.10 Organisation

5.10.1 Information from the employees:

5.10.1.1 Explanation

A questionnaire was distributed to all 66 employees of EDSC. The employees have in the continuation been divided in groups so as to get a best possible picture about which views and feelings prevail among unlike types of staff. The 4 groups are the following:

		No. of staff in total:	No. of replies:	% Reply:
1.	"Administration" consisting of: Administration, Economic unit, Accounts, office personnel, Drivers	12	2	17%
2.	"Design", consisting of Design and Production offices	19	10	53%
3.	"Machining", consisting of: Machine shop, Measuring, Sharpening, Grinding, Heat treatment, Precision machine operation.	19	17	89%
4.	"Welding", consisting of: Sheet metal and assembly, Welding, Materials store, General, tools store and supplies	16	9	56%

In general the interest for the investigation was very high and enthusiastic, and it was followed up with many personal interviews, giving a great deal of information, which has been made use of in the report. Only in the "Administration" group the interest and the response was unreasonably low with only 2 replies. These responses therefore have been left out in the table below.

The questionnaire form which was used is shown in appendix 26.

5.10.1.2 Summary of the main replies

SUMMARY OF THE MAIN REPLIES OF THE ORGANIZATION QUESTIONNAIRE:

Group:	Total:	Design:	Machining:	Welding:
Total no. of persons:	54	19	19	16
Response, no. of persons:	36	10	17	9
Response, percent	67%	53%	89%	56%

The replies to questions were the following:

Satisfaction with own situation:				
Percentage saying no:	89%	90%	94%	78%
No. of persons saying no:	32	10	16	7
The following reasons for unsatisfaction was specified: (No. of replies)				
- Underutilized. Kept idle:	8	3	2	3
- Underutilized. Not involved	8	4	1	3
- Inefficient bureaucracy (KIRDI)	8	1	4	3
- Poor management	8	3	5	
- Insufficient uniforms & boots	8		6	2
- Lack of training/own development	6	3	3	
- Too low pay/lacking benefits	6	1	3	2
- Lack of tools and accessories	5		4	1
- Transport, poor and unreliable	5	1	3	1
- No moral or economic incentives	3	1	2	
- Services sold unreasonably cheap	1		1	
Utilization of own working time:				
average:	60%	40-90% 56%	15-100% 66%	15-100% 60%
Where will you be working after 2 years? (No. of persons):				
EDSC (no conditions specified)	8	1	3	4
EDSC (if more challenging tasks)	8	2	4	2
EDSC (if new/improved management)	7	3	3	1
Selfemployed/elsewhere/anywhere	7		5	2
A more busy place	3	2	1	
A place with more appreciation	2	2		

5.10.1.3 Further notes from the questionnaire

These are some of the answers to the question:
"How can it be possible to get better results of you and your working hours?":

- By involving me properly in the work which I am supposed to do.
- To give me work according to my qualifications.
- Just allow me to sell EDSC services and we will get enough work.
- Allow me to do costing/sales.
- Through increased communication with the management.
- Not through detail supervision but by getting responsibility.
- Specify responsibilities and delegate duties fully.
- To provide necessary tools and assessories for the job.
- Administration should not hinder procurement of necessary tools.
- By curbing bureaucracy.
- The centre must be privatized!
- Through better work planning and regular planning meetings with the management. (Will ease the work in progress situation).
- Transport to arrive at 800 AM and leave 500 PM, allowing us to work full day
- Through giving me better training.
- Organize job rotation, also between design and production
- Through better pay and appreciation.
- Through making what manufacturers need, not prototypes which nobody cares about.
- Just bring me work! It prevents me from being idle most of the time.
- Not through telling me to cut grass!

The question
"How can EDSC be of better services to the development of Kenya?" received among others the following replies. (Some of the replies were given by several people):

- By organizing the work properly and increasing the working speed to something reasonable
- Overhaul the management (exchange the management or make them more committed to their work, not to remain distant observers)
- Recruit better and impartial managers
- Do not give the CTA too much power, especially when he does not know anything about democratic leadership, could not train us, and could not start any commercial activities. Even the sector leader were instructed wrongly
- Through operating independently, not under the supervision of KIRDI
- Autonomy for EDSC would create a lot of improvements
- Private industry customers should take part in running the EDSC
- Make the EDSC services known to industry
- Customers do not come by themselves. We must start to sell and collect orders
- We need marketing. We do not need red tape, begging and persuading from the customers to after long last getting something done by the centre.
- Services must be rendered expediently
- Improve the quality of work
- EDSC should offer consultancy services to industry
- Establish a training and consultancy unit
- Motivate us through paying overtime rather than giving off duties
- This is a shame. We do not need to be a burden for the government. Let us start earning our own money, and be of good services to the industry of Kenya instead.

Other Thoughts presented by the employees:

- Stop promising the customers short delivery times. Discuss with the technicans first, we may know better.

- We can very well make spare-parts for the customers on basis of the samples they bring. First to make drawings is just a waste of time. Customers should also be allowed to bring their own drawings.

- Internal training should be organized. We may provide considerable inputs ourselves. Especially junior technical staff could benefit from being provided systematic training from senior staff

- Further assistance from UNIDO/UNDP is required

- An incentive payment system should be established, especially in the workshops. Some of the profits should be used to benefit employees

- EDSC must be an profit making organization to enhance growth.

- The management may tell us: "Do only what you have been told, and do not question it". How do you think that such an attitude motivates us?

- Indiscipline/insubordination level is high (Due to lack of respect for the leaders)

- The management of EDSC should be changed, and more serious and competent engineers must be selected.

- Do not hide decisions, but practise transparency. Do not select individuals for training, but let us all apply.

- Employee's views are not taken seriously. Do not keep us with empty talk; "it will be done", and then nothing happens. We are all intelligent and grown-up people. We know a bit about proper management too.

- A very qualified expert in practical engineering is required.

- It is impossible to work full hours unless transport/road is improved.

- Staff transport should be from town, not from old site.

- Here is a conflict of interests: How can EDSC, which is supposed to be manufacturing rationally and profitably operate under KIRDI, a research umbrella, not caring about outputs, and understanding nothing about profit making?

- The neighboring countries need our services as well.

- EDSC should have a proper accounting system, independent of KIRDI to minimize manipulation and corruption.

- Establish rules for promotion, so that we can aim at something.

- We are supposed to help industry to make more money. With our fantastic machines; we should at least be able to make so much profit and money ourselves, that we could have a decent life?

- Provide medical check-up every two years.

- The institute library should provide us with relevant technical literature, so that we at least can develop ourselves, when nobody else cares.

- Please Mr. Eidsvig; let us all get a chance to read your report. I am sure we all can benefit from it. Please give us a chance to do what we are able to, to develop the centre.

- Let us at least get working clothing and safety boots.

- If EDSC does not care about us, why should we care about EDSC?

5.10.1.4 Evaluation

The organization investigation was very useful for different reasons:

1. It gave the employees (at least for once) a feeling of being recognized. It gave them the understanding that somebody was interested in listening to them. It can also be seen from the replies that this matters for motivation.

2. It gave the consultant useful information and insight of value for this report.

3. It shows that the employees are a very useful resource which should be utilized extensively in the operation and the management of the centre.

4. It contains many very useful thoughts, which everybody reading this report and having influence over the future of EDSC should consider seriously.

In addition to the content of the statements which speaks for themselves, the following can be understood from seeing all the statements in common:

- The employees are seriously interested in the output from the centre, and far from not only in their own well-being.
- The employees have not been sufficiently utilized, capabilitywise and capacitywise. This dissatisfies them and worries them a lot.
- They would like to be an asset for Kenyan development. But at present they feel as being a burden.
- There is something seriously wrong with the management style of the centre. The employees should be involved in decissionmaking to a much higher degree. Delegation is not practised, the management is very autocratic and the motivation of the employees is seriously hampered.
- There is grave dissatisfaction with the KIRDI umbrella organization.
- The international advice management seems to have had negative influence on motivation and the spirit of harambee
- The employees can contribute extensively to make the centre more efficient.
- Considerable desertion may be expected unless the management style is changed considerably.

5.10.2 The existing organisation Structure

The present organization structure is shown in appendix 29. It can be commented upon as follows:

- The centre has in the principle room for further people, especially operative staff. However, with the present level of activities the number of people are too many. This is to the extent that people are seriously under-utilized, feeling bored and becoming less responsible.

- Economy, accounts and office administration is divided on three different departments. It is somehow hard to see in the practise what are the real tasks of the economy department - separated from accounts. Required accounts/economy overviews seem to be non-existent. One could probably have benefited from joining the forces,

- Any marketing department is non existent and any real marketing functions have not been executed. The organization is suffering from lack of adequate sales.

- An "Industries Liaison" department expected to do marketing has always been mentioned but has never existed.

- Design is divided in two rigidly separated departments, the one for tools under head of production, the other for prototypes and spares under head of design. This limits the flexibility in accepting orders, and narrows the horizons of the people in the departments.

- The head of production has a too wide organization span, which is hard to manage properly.

- The not very busy heat treatment department with 3 operators has 2 engineers in charge, very much over-administered.

- Materials administration with stores people and purchase is divided into 3 departments without any common control. All are administered under head of production in one way or another.

- The workshops are divided into too many and too small foreman areas.

5.10.3 Recommended Organisation Structure

The recommended organization structure is shown in appendix 30. For the production programme which is indicated the following staff seem to be required, but obviously, there is no need to have all the staff in position until work picks up.

If the tasks will not be efficiently administered, one may also find that some people will become heavy loaded. Before possibly employing further people, it will be wise to look into rationalizing possibilities. The people in the recommended organization plan are the following:

1 General manager
+ 1 Chief technical adviser

1 Training organizer
+ 1 UNV adviser
1 Training department secretary

1 Technical manager
+ 1 UNV adviser

1 Chief designer
4 Tool designers
3 Product designers
5 draughtsmen

1 Workshop engineer
+ 1 Engineer Assistant
+ 1 Short term Heat treatment adviser
1 Foreman heat treatment
2 heat treatment operators
1 measuring shop operator
3 Step in's
1 Foreman sheet metal
4 sheet metal operators
3 Welders
2 General workers
1 Foreman Machine shop
8 machine shop mechanics
1 Foreman Grinding and precision
2 Tool sharpeners/reconditioners
3 Grinding shop mechanics
2 Jig grinding and jig boring

1 UNV foundry adviser
2 foundry adviser trainees

1 Marketing Engineer
1 Quotation calculator/production planner
1 Sales clerk
1 Commercial Manager or Chief accountant
2 Accountants + possibly one economist
1 Administration assistant
2 drivers
2 secretaries (in Pool)
1 Messenger
1 Purchaser/Materials Administration
+ 1 Purchase assistant
1 Operator Materials store
2 Operators Tools store

This totals 73 employees + 4 long term advisers. This is 9 people more than presently, and should when working efficiently, amply be able to cope with the specified turnover of 25 million shs annually. That corresponds to shs 325 000 per employee, which is reasonable for the technologies in question.

However, it will not work without proper management, works discipline and efficient organizing of the work.

The proposed employment is shown in the organization plan, appendix 30.
The plan contains some changes compared with the existing organization:

- A marketing department is established, including combined quotation calculation and production planning.
  This department should be established urgently with qualified marketing engineers.

  A marketing engineer should head the department. It is important that he knows well the capabilities and capacities of the centre. He should be able to give quotations and calculate delivery times on the spot, also when visiting industries.

  A quotation calculator cum production planner is a very crucial person. He should report to the marketing engineer because they together will have the task of making sure that the order profile fits well with the capacities of the centre. To keep the plant evenly loaded with orders is one of the most important tasks of the centre. His skills must also be available to others. He must work in close contact with the technical departments.

  The marketing department should be sited within the design office.

- The economy section is strenghtened and put under one administration including the office administration.
  The department should keep all accounts, and be responsible for the total economy of the centre.

  This include most importantly

  - keeping the accounts updated at all times, and deliver operation returns by the end of every month
  - the monthly economic returns from all productive departments
  - providing the background information required by quotation calculation

- stock control and purchase
- the liquidity

This should be operational from January 1994.

- A job of Technical manager is established. He should be responsible for all technical activities, divided among the chief designer and a workshop engineer with an assistant.

  The chief designer should be in charge of all design.

  The workshops are divided into 4 groups with a foreman for each.

  Reorganization of the technical departments is less urgent than for the marketing and commercial departments

- A small training department is established. The training organizer should report directly to the general manager. The training department should organize the entire course activities of the centre.

  External courses should in general be run by this department, but with possibility to draw on internal and external people as trainers.

  Internal courses should to a higher extent be arranged as harambee activities by the department staff themselves, but with the training department as an important catalyst.

  It may not be possible to start any external course activities before the training organizer is in place

- A foundry advisory section is established, with 2 foundry advisor trainee engineers and a UNV foundry specialist in charge. The department will operate quite independent from other technical activities of the centre. The specialist must report directly to the general manager.

  The people of the section should spend most of their time within the foundries, and mainly report to the centre for administrative purposes.

- Some few under-utilized middlemen and operators are avoided

- The organizational control span has become reasonable on all levels considering that the training and the foundry advice department will run fairly individually.

5.10.4 External assistance to EDSC

5.10.4.1 Past Assistance

Fairly extensive external technical assistance has over the years been provided to the centre. The centre has from different reasons not been able to draw the full benefits of the assistance. It is very important that the parties involved are fully aware of this, so that similar mistakes can be avoided in the future.

The reasons for shortfalls seem mainly to be the following

- The posting of experts has not only been well timed. Operational staff could not be well utilized during the installation period. A CTA qualified more in plant establishment than in operations continued also into the operational phases of the project.

- The CTA practised a very autocratic and undemocratic management style, leading the management into a similar attitude and behavior.

- The commercial attitude of the managing expert assistance seems to have been lacking completely. It seems not to have created any worry that the outputs from the centre had no reasonable relations to the inputs.
  It seems that the lack of accounts, economic overview and control has not bothered anybody. Goals for the operations of the centre have also not been set.

- The needs for proper marketing efforts have also not been emphasized.

- More progressive advisers working under the former CTA were not given sufficient freedom to transfer their skills to the local staff, and the local staff could hence not benefit sufficiently from their work. Apparently also well qualified people got their contracts terminated due to personal conflicts.

- The leadership has not at all been commercially oriented, and marketing seems to have been an unknown field of operation.

- The centre management and staff have been worried to complain to UN and gvt. superiors about the widely visible situation, it appears, mainly for fearing to lose their jobs.

- One would, however, have expected that UNIDO at an earlier stage would have noticed the situation of the centre and taken appropriate action.

5.10.4.2 The needs for expert assistance to EDSC

The needs for foreign expert assistance will depend on the possibility to obtain sufficiently qualified staff locally. Obviously, the required qualifications have very little to do with education and degrees that are obtained.

Judgement of staff must be made, not either on basis of merits and former positions held.
The major selection criteria must remain the performance of earlier duties;

> To which extent has the candidate performed similar duties before?
> To which extent has the candidate been able to conduct his/her tasks, judge the problems, take necessary initiative to improve, develop the work-mates, the organization and its evirons and to perform a democratic and progressive management style?

The possible success of a new project based on the existing plant and considerable parts of existing staff will be wholly dependent on these factors. There has been no obstacles for the former project of such grave nature that it has hindered the success of the project.

It is hard to see any other major reason for the failure of the project than shortcomings in the management.

If sufficiently qualified local staff can not be obtained, it will be necessary to recruit staff on an international basis. The UN system has already provided very large inputs into the centre. So much efforts have already been laid down, that it seems ridiculous to pull out if the failure of the project finally can be turned into success.

Conditions must it of course be that the best possible ownership structure and operating organization is selected. It must be organized under an umbrella which can ensure that the management

will be the best possible, that it will perform to the best of its abilities and that changes in management may take place when required.

A further range of conditions should be laid down as appropriate. Recommendations for such further conditions are specified under recommendations.

If international staff should be recruited, the same selection criteria as specified for local staff must be used and adhered to. International recruitment is in no way any guarantee that sufficiently qualified staff will be selected.

Under the above conditions it can be recommended to recruit the following staff to the management:

A chief technical adviser (for 12 months, subject to renewal for a maximum of further 12 months):

The CTA's qualifications must first of all encompass:

- A democratic management style giving room for motivation of all staff
- A business oriented mind to help the organization to become self-sustainable
- Sufficient knowledge and experience in business economy to help the different organs of the organization to set proper goals for them selves, and to give them help and freedom to reach the goals.
- Best possible overview of the different tasks and technologies the centre should involve in, in order to evaluate and help in the performance within the different departments.

A design adviser. An UNV may be considered.(for 12 months, subject to renewal for a maximum of further 12 months):
The qualifications of the design adviser must first of all encompass:

- Experience in allocation of the principles of value analysis, knowing how to make the staff collaborate to reach best possible functionality and cost of designs.
- Being deeply experienced in design of tools and dies for the engineering industry, as well as possible in design of production machinery for the different technologies as may occur in industry in general.
- Being conversant with operation of engineering workshops in general, and being willing to cooperate also with the people of the various workshops of the centre.

A training engineer. An UNV may be considered. (for 12 months, subject to renewal for a maximum of further 12 months):
The qualifications of the training engineer must first of all encompass:

- Being experienced in teaching. Knowing how to make dull topics interesting and alive to students, helping them to distinguish between what is more and less important.

- Being as well and practically experienced as possible within the different technologies to be taught.
- Being able to select the best possible co-trainers. Being able to step aside and help his co-trainers to perform up to the same level as his own.

A foundry engineer. An UNV may be considered. (for 12 months, subject to renewal for a maximum of further 12 months):
The qualifications of the foundry specialist must first of all encompass:

- Understanding the economical principles of appropriate technology, being able to help the foundries to select the methods and equipment which is most economical for them.
- Being willing, and being pedagogically as well as technically able to work with the foundry staff in the dirt on the floor until sufficient improvements have been reached.
- Having sufficient overview of available foundry technologies, their demands, levels of investment, yields and costs of operation.

A Heat treatment Engineer. A UNIDO expert may be considered. (for 2 months, possible to be recalled again say after 6 and 18 months, each of 2 weeks duration):
The qualifications of the heat treatment engineer must first of all encompass:

- A wide ranging knowledge of steel and metals, with wise selection of material and its heat treatment for the various demands of the metal industry. To demonstrate in the practise the best ways of doing the practical heat treatment and testing of the results.

- Excellent ability to collaborate and transfer his knowledges to the operating and managing personnel of the heat treatment workshop.

- To have the knowledge, personality and as far as possible background material ready to assist in tailoring and conducting of an open 2 days practical heat treatment course for the metal working industry in general.

5.11 Procedures

5.11.1 Calculation of price quotations

A procedure is established where the technical department will give consumption inputs to the economy department. The economy department thereafter will do cost calculations and the manager will issue a proforma invoice. Forms for the purpose are available. No recalculation after completion of a job has been established. It has been experienced that:

- It has taken unreasonably long time to get the quotations ready
- Actual costs have exceeded the cost calculations drastically, but without providing any feed-back
- The procedure has also not been followed.
- No load planning has been practised and one has had no control over delivery times.

A system based upon a form as shown in appendix 9, and explained in appendix 17 is recommended. A person within the marketing department will do the actual cost calculation and issue a quotation, which may be an estimate for costs and delivery time according to the recommended delivery and payment conditions specified in appendix 31. Only in special cases when necessary binding quotations should be issued.

For moderate size jobs it should be possible to do the calculations and issue the quotation during a first visit of the customer or to the customer. It will be necessary for the issuing person to carry updated internal price-lists for charges and cost factors.

The cost calculation will determine the total offer price of the job. After job completion it will show the re-calculated actual cost of the job. That should serve as corrective for future improvement of consumption assessments.
The calculation will also calculate delivery time and show how the delivery time could be kept in the practise.

Closely related procedures are material requisition app. 10, job card app. 12, machine and person load app. 13,14 and customer card, app. 16.

Design and manufacturing should always be quoted separately. Preferably a design work should be approved by the customer before quoting and accepting orders for manufacture.

5.11.2 Delivery and payment conditions

Quotations should always be given in accorance with the EDSC delivery and payment conditions. A recommended set of conditions is specified in appendix 31.

The conditions may be printed on the backside of quotation forms, order acknowledgement forms and invoices, or they must be enclosed.

Only in special cases, when being forced to by circumstances, cetain points in the conditions may be altered. Such alteration must appear in writing in the order acknowledgement to be valid.

5.11.3 Recording of working hours

Employee attendance is as long as stamping clocks are not available suggested on a form, app. 15. The form is issued for a working week for each department separately. The employees register themselves in appearing order when they come and leave. By the end of the week the commercial department calculate individual working hours as required and specifies the balance of working hours to be required, possibly issuing a warning.

By the end of the month data are transferred to the output report, app.8.

A somehow similar system is established, but not well maintained and concluded

5.11.4 Production Planning

Presently there is not undertaken any production planning. Because the activities have been low this has been possible (even if the delivery timing is out of control).

Load planning is recommended as indicated in app. 13 and 14 for the crucial machines and also for all operative staff within the design sections.

The inputs for the plans come from the Quotation form app. 9. The form may be filled in pencil by the quotation officer, and maintained by the foremen. The sales departments should always have copies of the plan available, in order to direct their sales activities towards the less loaded capacities.

5.11.5 Job time calculation

Presently no job timing is registered.

A job card as specified in app. 12 is recommended. The job card is prefilled from the quotation form app.9. The allocated working hours for each operation of the job will appear. Upon completion of the jobs the actual time consumption will appear. These data will be transferred back to the quotation form (If the differences are moderate, only the total figure may be transferred back.)

5.11.6 Materials requisition

A system of materials requisition is in use. To tally better with the further recommendations a new form is recommended in app. 10.

A material requisition form based on specifications in the quotation form is filled by the foreman or the quotation calculator.

It will be signed by the foreman at reception of items from the stores. Sum or detail values will be transferred back to the quotation form.
Further the form will be the input for the stock control.

5.11.7 Stock control

Presently no stock control is in existence. It is not being recorded what is taken from stock and no record of balances is kept.

A stock card as shown in app. 11 is recommended. It is based on material requisitions and packing lists from suppliers. In and out volumes are registered for each type of materials separately, and balances are always updated.

An order point for each item must be established, so as to determine when stock increase should be ordered.

Cross checking stock taking should be established annually or semi annually for cross checking of consumptions and stock values in accounts.

5.11.8 Purchasing

The existing purchasing procedure is spelled out in appendix 32. It involves KIRDT and is extremely cumbersome.

The purchasing officer may be authorized to do purchases based on one of the following inputs:

- A weekly list from the stores over items which have reached a commonly agreed order point.
- A requisition for purchase of items for a specific job order signed by the person in charge of the job or the department leader.
- Any requisition from an economically responsible department leader - within the frame of his budget.

The procedure may involve the following:

1. Issuing a LPO or a written order signed by the purchasing officer and the entitled person.
2. The order to be phoned to the supplier, who will be requested to deliver the goods, or when necessary, be brought to him for goods collection.
3. A competent authorized person or the requestor to sign for satisfactory and complete reception of the supply.
4. Payment to be released by the cashier/accounts department as applies according to LPO conditions and payment conditions as agreed.

Orders should generally be placed with approved suppliers, where delivery and payment conditions have been negotiated and established for supplies in general.

For orders over say shs 10.000 and shs 100.000 may be laid down specific regulations for collecting (possibly on phone), and checking quotations, approval of LPOs and orders.

The commercial manager may at times, dependent on the liquidity situation, give limitation instructions over purchase powers.

5.11.9 Incentive payment system

An incentive system as outlined in chapter 5.2.4 is recommended. The bonuses to be calculated on a monthly basis, based on the accounts results for the previous month and based on the monthly output report from the productive departments (app. 8)

5.11.10 Quality control and Quality Assurance

Different systems exist for quality control and quality assurance (QA), in order to ensure, not just that mistakes are detected and rectified, unless rather to detect possible causes for non-conformances before they ocur. It saves time and costs to do corrective actions before mistakes are made.

Among available systems are ISO 9001 and NS 5801. Probably NS 5801 will be the most relevant for EDSC. One may aim at adapting to it when more immediate problems are solved. Cuts of the standard is presented in appendix 33. Item 14 and later on item 6 may be the first ones one should adhere to.

Practically, a very simple non-conformance form should be available within all departments. The purpose is just that when an insufficient or faulty situation of one or another category is detected, that one must fill the form and deliver it to the QA responsible.
The QA committee will thereafter find and implement solutions not only to how to rectify the situation, without also the cause of the faulty situation.

5.11.11 Operation of motor vehicles

The project is now remaining with a pick up and a landrover. Inability to execute tasks for lack of transport use to be a regular problem, especially when one vehicle is lost.

When activities increase and marketing staff becomes active, the problem may increase.

Some people have their own cars, and would be able to use them in performing their duties. Especially may this be so for marketing staff.

It will generally be both cheaper and more flexible for EDSC to pay km-allowances to staff for using their own cars, rather than providing vehicles and drivers.

Proper but simple procedures for paying km-allowances should be worked out. A form with a list specifying the car use for the month may be established, each journey specifying address, purpose, justification, and approval.

5.11.12 Staff meetings

For the sake of work planning, co-ordination and cross-linking information, regular planning meetings should be held:

1. Weekly inter-departmental planning meetings between the sector leaders including the general manager, the chief designer and the workshop engineer. The meetings should generally be limited to under two hours. The agenda should include:

   - Presentation of the pre-written weekly workplans for the individuals, getting feed-back on these.
   - Presentation of working results from the individuals from last week.
   - Discussing of operational results and possible deviations from the budget goals, both totally and for the individual departments and jobs.
   - Maintaining a rolling 12 month budget, renewed on a monthly basis.
   - Proposed new actions or activities.

   The minutes should be very brief and only contain new activities, responsible person and date of result reporting.

2. Monthly department meetings between the head of department and his staff. The agenda should include:

   - Information from the management; the economy situation and new activities, getting possible feed-back.
   - The work and order situation for the department and department efficiency. Agreeing on steps to improve the situation.
   - Presentation of problems within the department, and agreeing on solutions.

- Presentation of the output report for the department for the last month, and information about bonus earnings. Comparison with other departments. Setting new goals for the next month.

Minutes as above to be distributed to the participants.

3. Other ad-hoc meetings may be held when required because of special situations.

6 RECOMMENDATIONS

6.1 Recommendations to UNIDO and to the donors

The present operations of EDSC require much higher inputs than it brings of outputs. It will be meaningless to provide continued support to the centre to maintain a status quo.

Considerable efforts and means have been invested in establishing the centre both from the government and from UN. What ever one decides, one must make sure that these values will be taken proper care of.

If the project will be abandoned without providing any positive solutions, one may expect that the values will deteriorate, and that the government will continue to support the centre, without getting proper returns for its expenses. Hence, it could possibly be better if the centre never was established in the first place. It does not seem wise to act so that this will be the situation.

The centre has potential to become a viable self-sustainable and profitable venture as described in this report. That is on the condition that qualified management will be in place and on the condition that the advice will be adhered to a sufficient degree.

What ever one does one must make sure that these possibilities will be utilized.

The following steps are recommended:

1. This report together with the reports of Mr. A. Canellas and the OOPP workshop urgently to be studied by UNIDO, UNDP, KIRDI and the Kenya Government. The stands of these parties to be clarified equally urgently.

2. Model 1 of the OOPP workshop recommended solutions, "that EDSC continues under KIRDI with full autonomy, guided by a policy committee" to be implemented immediately.
   The various recommendations of this report for internal operation of EDSC, to be implemented as urgently as possible by the available EDSC staff. This must include sending monthly progress reports as described to the same parties.

3. The model 2 and 3 solutions for EDSC should continuously be worked further on (by whom?) until possibly a better long term solution has been found. These two models include:

   Mod. 2: "To let the plant ownership remain as present, and to let the operations be run under a management contract".

Mod. 3: "To let the ownership remain as present, and to establish a membership organization to run the operations. The organization to have members from the benefiting industrial companies."

4. The involved parties to agree on the directives for establishing a new project document.

5. The involved parties to agree on who should provide bridging financing of which size,for which expenses, until a new project can be approved.

6. UNIDO to make a simple new project document, and to provide the following international expertise:
   - A CTA for maximum 2 years on expert contract
   - A Heat treatment expert for a maximum of 2 months+2 weeks-2 weeks
   - 3 UNVs as outlined in chapter 5.10.4.2, each for a maximum of 2 years.

7. UNDP to limit its continued funding to financing of UNIDO engagements specified under item 6 above.

8. All other inputs to the centre to remain the responsibility of KIRDI/the Kenya government.

Conditions for providing the personnel and financing specified above, at least to encompass the following:

- Adequate management and staff to be paid by EDSC/KIRDI, acceptable to UNIDO/UNDP to be in place soonest possible.

- KIRDI/EDSC acceptance of and adherence to the recommendations specified in this report.

- Adequate goals and budgets to be presented by the steering committee, who will make sure that EDSC adhere to them.

- Timely reception of all progress reports as outlined in this report. The reports must show continuous satisfactory progress.

- The centre to be completely self-sustainable after 2 years from posting of the new CTA.

6.2 Recommendations to EDSC/KIRDI if assistance fails

As long a competent management can be in place and the above recommendations will be adhered to, the centre should be self-sustainable after a limited period of operations.

It is recommended that the international staff as specified above will be allocated to the project. There, however, is no guarantee that this will be granted.
If that will not be the case, the demands to management and staff will only be even tougher, and it will be even more important that only the best possible people will be selected. It should be left with the steering committee to hire and fire management and senior staff.

With the amount of involvement from the Kenya government to this time, there is no good reason for the government to back out now.

KIRDI should however set and practise exactly the same tough conditions to support the project as spelled out for UNIDO/UNDP above under chapter 6.1

EDSC should gradually over the coming two years gain increased profits until it becomes fully self-sustainable. The contributions from KIRDI hence should gradually be stepped down and cease completely at least after two years.

6.3 Recommendations concerning EDSC policy guidelines

This chapter addresses itself more than any other to the steering committee of the centre.

Aims: First of all one must be well aware of the indirect and direct aims of the centre as spelled out in chapter 3.1 and 3.2. If the centre can not to any reasonable degree contribute to the development of Kenya through reaching the direct and indirect aims of the centre, the centre has failed.
The success of the centre can first of all be measured by the sort of development it has created within other industries.

The centre must make profits, but that is not any goal in itself. It is only necessary to enable own development and growth - and to prevent being a burden for the Kenya government.

The profit can also be seen as an indicator of the value of the services. The industry is willing to pay well for services which are of high value for them.

Selection of orders: Which type of tasks the centre should involve in, has not been an obvious matter. Chapter 4 of the report therefore discusses the matter extensively, and concludes with priority-making in chapter 4.7.

Tasks are divided on priority 1, 2 and 3. One should always try mainly to engage in what has been specified as priority 1 tasks.

Secondly one will also realize that not all industries can benefit equally from the services. Generally one may say that:

- Progressive industries with a drive to develop themselves may utilize services better than stagnant companies, and should hence be preferred.

- Companies with less resources will have bigger problems in obtaining services than companies with abundant funds, and may be given preference provided payments can be secured.

- Services may have a higher impact on smaller than on bigger companies. The smaller companies may hence be given preference.

Self-sustainability and self-developing power are also important parameters for order selection. If EDSC can not survive and develop itself it will not persist and can not serve anybody at all. Hence, profit-making is necessary for the centre. The centre must therefore select orders which:

- Provide the best possible pay per working hour

- Provide increased work load on less utilized machines

- Are provided from nearby, conveniently located customers. (There are no good reasons to go to Mombasa for orders when the Nairobi industries are lacking services).

Goals and budgets: The steering committee must make sure that goals an budgets to be presented to them on a monthly basis from the different department carry sense. The goals must represent what the departments realistically can achieve in the existing situation.

Judging of Reports: Equally, the steering committee should make sure that economy and performance reports (appendix 8) to be received in total and from all departments on a monthly basis are correct and represent good performances.

Development plan: The steering committee must always secure that the centre has and adhere to the best possible plans for the development of the centre. The plan should always determine who to do what with pressing problems when.

The steering committee should also make sure that development of the centre progresses according to the plan.
Obviously the recommendations of this report should be present in the development plan until they are fully implemented.

Hire and fire of management and the most senior staff: The steering committee must make sure that the senior people fulfill their duties in a satisfactory manner, and better than what just anybody could do.
It may be an unpleasant task, but when sufficient improvements can not be seen, or reasonably be expected, it is the duty of the committee to fire and hire until the organization perform its optimum.

6.4 Shortlisted recommendations for EDSC internal operations

6.4.1 General

The recommendations listed in the continuation are most of them explained in greater detail in the whole of chapter 5. Findings are outlined under each of the sub-headings, thereafter recommendations are given.

Chapter 6.4 will therefore in chronological order only briefly list the recommendations and refer to the sub-chapter of chapter 5 where the matter is explained in greater detail.

6.4.2 The aims of EDSC

1. Aims and tasks: The recommendations in chapter 3, 4, 5.1 and 5.5 to be studied by EDSC management, the steering committee, KIRDI and donor agencies, discussed together, concluded, adhered to and printed in a brochure.

6.4.3 The economy of the project

2. Budgets: Chapter 5.2.1, 5.2.2, 5.2.3, 5.2.4 and appendixes 3 to 7 to be studied in great detail. Thereafter department budgets for all productive EDSC departments together with a compounded budget for the total economy of EDSC to be established, broken down on calendar-months.
The department budgets should be based on machine service budgets as shown in appendix 6.

3. Rolling budgets: The budgets should be rolling budgets with plans for the coming 6 or 12 months, updated monthly on a continuous basis. The department budgets should originate from the individual departments.

4. Monthly reports: As explained in chapter 5.2.3, 5,2,4 and appendix 8, monthly output reports with reference to last months performance and goals for the next month, set by the department should be presented for each productive department by the beginning of each month.

5. Accounts: As explained in chapter 5.2.3, EDSC shall from January 1994 keep their own accounts. The accounts should be based on an accounts plan allowing making profit and loss accounts on a monthly basis. The account plan should have accounts distribution allowing break down of revenues and expenses as shown in appendix 3 and 8. Hence revenue accounts and some expenses accounts should be separate for the individual productive departments.

6. Quotation calculations: As explained in chapter 5.2.3, 5.11.1 and appendix 9, EDSC should calculate and follow-up quotations and use a form as in appendix 9. That will give overview of inputs, variable and fixed costs, pre-calculated and recalculated actual costs, as well as planned and real timing of the job.

7. Material requisitions: As explained in chapter 5.2.3, 5.11.6 and appendix 10, a material requisition form as shown should be used to tally with quotation calculation and re-calculation. It should be referred to in the stock control.

8. Stock control: As explained in chapter 5.2.3, 5.11.7 and appendix 11, stock-control must start immediately. The stock control must specify in and out quantities of all items and show the balances. The purpose of all withdrawals must be specified and signed for.
Order point and regular order-volumes should also be specified for all items to prevent being out of stock of vital items.
The specified form is recommended.

9. Job card: As explained in chapter 5.2.3, 5.11.5 and appendix 12, a job card should be issued for all jobs, specifying allocated and used working hours. A job card as shown is recommended. Inputs will come from the quotation calculation (app.9) and used time will be fed back to the same as input for the re-calculation.
The actual time consumption may be filled by the operator, or by the foreman based on a personal job card for each operator, where he chronologically specifies his different jobs.

10. Load planning: Time planning of all crucial machines in the manufacturing departments and personnel in the design sections, which all should be kept heavily loaded, must be undertaken. This is explained in chapter 5.2.3, 5.11.4 and in appendix 13 and 14.
The load plan should be used by the production unit, by the quotation calculator, and most importantly by the marketing department in selecting jobs to fill the manufacturing capacities.

11. Working hours registration as explained in chapter 5.2.3. 5.11.3 and appendix 15 should be undertaken on a departmental level.
The number of working hours should be calculated for the individual on a weekly basis. The balance of working hours for the individuals should be carried forward. When the balance comes low, a warning should be issued, thereafter when necessary deductions in salary should be done. Certified positive balances for the operative staff, should be paid as overtime.

12. Customer card: As explained in chapter 5.2.3 and appendix 16, a customer card should be issued for all actual and potential customers. The card should inform about the situation of the customer and his relations to EDSC. Agreements, quotes, sales, deliveries and balance of payments should be recorded. A next follow-up date should be time planned by the marketing department.
A form as shown is recommended.

13. Bonus: As explained in chapter 5.2.4 and 5.11.9 two parallel bonus systems are recommended for the staff. System A is applicable to all employees. System B only for the staff of the particular department. Bonus systems for others, e.g. for collecting orders, may possibly also be implemented.

14. Petty investments: As explained in chapter 5.2.5.1 important tools and equipment which are lacking should be listed and bought. Available and not useful tools should also be listed. One should attempt exchange. Alternatively the excess equipment should be returned or sold.

15. Inadequate tool steel: (Chapter 5.2.5.1) Steel which can not be used should be listed. Inquiries should be made to find out what pays better either:
- to sell the steel
- to get it redimentioned
- to return or exchange it.

16. Steel storage: (Chapter 5.2.5.1) Steel scattered around in the grass outside should be brought inside and stored properly.

17. Excess capacities: Use, sales, and return possibilities for the compressor and other equipment not likely to be used should be investigated, and a plan should be made. (Chapter 5.2.5.2)

18. Pilot foundry: The thoughts about establishing a pilot foundry should be shelved for good. Instead a foundry advisory section is recommended. (Chapter 5.2.5.3)

19. Further machine investments: Thought about further machine investments should be shelved until the centre is self-sufficient economically and make so much profit and are so heavily loaded that such investments can be proved viable. (As explained in chapter 5.2.5.4 not all intended investments will ever become viable)

20. Staff transport: (Chapter 5.2.5.4) A staff bus should not be bought. Instead should be established a harambee sort of action together with other institutions along the same road to:
    A.: Improve the road
    B.: Establish matatu services or Kenya Bus services along the road at crucial times.
    Transport allowance for the employees may be considered.

21. Working cloth and boots: (Chapter 5.2.5.4) To be bought from the general EDSC account.

6.4.4 Marketing

22. Machining services: Machining services should be marketed along with more complete services according to established priorities (Chapter 5.3.1)

23. Directing marketing efforts: The various fields of operations should be marketed in a conscious manner so that an achievable work-load will be established in all departments and machines. (chapter 5.3.2)

24. Separation of design and manufacturing: Orders for design and manufacturing should preferably be kept separate, so that design first is done paid and accepted, whereafter manufacturing can be offered. (Chapter 5.3.2 item 2 and appendix 31)

25. Offering design improvements: One should be able to offer design improvement of industrial products. How this can be managed should be discussed, possibly through employing a Value Analysis expert. (Chapter 5.3.2 item 2 and appendix 24)

26. Foundry Advice: A foundry expert UNV to be employed and a small foundry advice section to be established (Chapter 5.3.2 item 4 and chapter 5.3.4)

27. Training activities: A training organizer together with an UNV to be employed to establish a training department, trough which a course programme as recommended should be implemented (Chapter 5.3.3 and appendix 25)

28. Marketing material: A brochure and a standard letter as worked out and proposed in detail (Chapter 5.4 item 1 and appendix 22 and 23) should urgently be duplicated and distributed to the industry.

29. Approaching organizations: Collaborating with other promotional organizations to be established (Chapter 5.4 item 2)

30. Signposts: EDSC signposts to be established at Mombasa road, at the gate and on the wall (Chapter 5.4 item 3)

31. Marketing department: Establish a marketing department as outlined in chapter 5.4 item 4, 5.10.3 and appendix 30.

32. Marketing activities: To be established as specified in chapter 5.4 item 5 to 8)

(See also recommendation no.6 and 12)

6.4.5 Working moral and management style

33. Management style: A more democratic management style to be practised, delegating powers and responsibilities and involving staff in decisions (Chapter 5.6, 5.7 and 5.10.1)

34. Skills utilization: A personal talk to be established between each employee and his superiors at least as an annual event. Personal ambitious plans and problems to be

discussed together with constructive suggestions. As far as possible to be concluded. To be recorded. (Chapter 5.6 and 5.10.1)

See also recommendation no. 4, 9, 10, 11, 13, 20 and 21

6.4.6 Design activities

35. Efforts proportioning: Reproportioning of efforts and timing in design to be attempted as to chapter 5.8

36. Tracing: The extent of tracing activities should be greatly reduces as outlined in chapter 5.8

37. Drawing of spare parts: Manufacturing of spare parts can normally be carried out on basis of samples. Drawings should be made only when specifically requested by the customer, and when being specifically paid for. Manufacturing may start independent on such drawings. (Chapter 5.8)

38. Utilizing draughtsmen: Draughtsmen should be used for making working drawings more than for just doing tracing.

39. Numbering system and storing: Drawings numbering system should be changed with reference to formats as indicated in chapter 5.8. Cross reference of drawing numbers should be established. Drawings should be stored in drawers chronologically within each format.

40. Drawing techniques: Simplified drawing techniques should be established, including title areas, detailing of brought in components etc. See chapter 5.8

41. Discussing solutions: Discussion of constructive solutions in a constructive manner between leaders, engineers and draughtsmen should be considered to a higher extent.

See also recommendation no. 24 and 25.

6.4.7 Organization

42. Commercial department: In addition to the marketing department, commercial activities should be collected under a commercial manager (Chapter 5.10.3 and appendix 30)

43. Technical department: The technical sections to be collected together under a technical manager. Under him a chief designer should be in charge of all design, and a workshop engineer with an assistant in charge of the workshops through 4 foremen.(Chapter 5.10.3 and appendix 30)

44. External Training: A small training department to be established with a training organizer and a UNV (Chapter 5.10.3 and appendix 30)

45. Internal training to be organized as evening classes. To be run by internal staff. The training department to assist. (Chapter 5.10.3 and appendix 30)

46. Foundry advice to be organized by a small foundry advice department headed by an UNV. (Chapter 5.10.3 and appendix 30)

47. Expert assistance recommended include:
- A CTA for 12 + 12 months
- A UNV design adviser for 12 + 12 months
- A UNV training engineer for 12 + 12 months
- A UNV foundry engineer for 12 + 12 months
- A heat treatment engineer for 2 months + 2 weeks + 2 weeks

(Chapter 5.10.4.2)

48. Expert selection should involve EDSC management and department staff, a thorough scrutiny of candidates an discussion of timing (Chapter 5.10.4.1 and 2)

49. Expert evaluation should be made a few times during their employment by UNIDO in collaboration with department management and staff. (Chapter 5.10.4.1)

See also recommendation no. 31

6.4.8 Procedures

50. Delivery and payment conditions to be established, adhered to and printed on quotation, order confirmation and invoice forms. (Chapter 5.11.2 and appendix 31)

51. Purchasing procedure to be simplified, determined and issued in writing. (Chapter 5.11.8)

52. Quality assurance systems to be established when other more pressing problems are solved. Initially to start with a simple non-conformance rectification system. (Chapter 5.11.10)

53. Motor Vehicles: Regulations to be laid down for use of employee's vehicles.

54. Staff meetings: A weekly heads of department meeting and a monthly department staff meeting to be institutionalized.

See also recommendations 3 to 13.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT IN THE REPUBLIC OF KENYA

JOB DESCRIPTION
DP/KEN/86/048/11-56/J-13316

Title Consultant for an integrated production and marketing programme

Duration One month

Date required August 1993

Duty station Nairobi, Kenya

Purpose of project To assist the Government of Kenya in the achievement of higher utilization of existing industrial capacity through the activity of the Kenyan Industrial Research and Development Institute (KIRDI).

Duties The consultant will work under the supervision of the team leader. He will be specifically expected to:

1. Study the capacity utilization problems of the present EDSC equipment and manpower in relation to:
   a. the present jobbing production system.
   b. existing productive potential vis-a-vis the imperatives of profitability.
   c. the range of specific goods and services, both engineering and economic, which the EDSC should render to small- and medium-scale enterprises in Kenya.

2. Undertake a study of the present and projected demand for specific goods and services (including training), appropriately differentiated and classified, among small- and medium-scale enterprises which the EDSC is technically capable of meeting.

Applications and communications regarding this Job Description should be sent to:
Project Personnel Recruitment Section, Industrial Operations Division
UNIDO, VIENNA INTERNATIONAL CENTRE, P.O. BOX 300, VIENNA, AUSTRIA

Appendix 1.1

3. Elaborate a selective strategy for the EDSC to capture a target share of the present and projected demand for goods and services within the limits of its mandate. An indicative geographical coverage designed to achieve a wider distribution of EDSC benefits would be appropriate in this "selectivity" as would the product/service mix.

4. With the help of the data thus generated, design a production scheduling based on more continuous production and less jobbing production matrix to achieve higher capacity utilization and profitability. Prepare a production programme for part of 1993 and the whole of 1994.

5. Consistent with the foregoing, propose an appropriate shift production system and assess the financial, depreciation, equipment procurement, staffing and management implications of the proposed shift system.

6. Elaborate a tentative but detailed programme of training courses for part of 1993 and the whole of 1994.

7. Review the existing management structure of the EDSC and propose a more suitable one, able to cope with the projected increase in the tempo of production activities, taking into account:
   a. The delineation of duties between the distinct areas of production, Technical and Commercial Departments;
   b. The automatic internal flows of information with specific reference to the monitoring, analytical and forecasting functions of the Commercial Department as part of its corporate planning functions;
   c. staff morale.

8. Elaborate an integrated production and marketing model and related methodologies for use by the EDSC in future production and marketing scheduling and planning.

Qualifications Specialist in production planning and management with extensive experience in monitoring, analytical and forecasting functions of a production plant.

Language English

Appendix 1.2

Background Information

The present project on the Establishment of an Engineering Development and Service Centre had been approved for a duration of three years starting in January 1990.

Considering the need for further technical assistance after the EDSC first phase project, for strengthening of the essential structure which had been established and to support its operation until a certain amount of sustainability is achieved, a second follow-up project phase had already been foreseen in the approved project document.

A joint in-depth evaluation mission, including consultants from the Government and UNIDO under the leadership of a UNDP consultant, also recommended a possible second project phase.

The first draft project document, which was prepared for the second phase, was not found in line with the present UNDP policies and the specific guidelines proposed for the Fifth Country Programme.

In this connection a first extension of the project until 31 March 1993 was approved and a follow-up project formulation mission, originally proposed for January, actually took place in May 1993.

The draft findings and recommendations of the mission, together with a tentative project matrix for the second phase project, were jointly analyzed and discussed by participants from the Government, UNDP and UNIDO in a wrap-up meeting on 3 June 1993.

The recommendations of the wrap-up meeting covered re-arrangement of specific details in some of the proposed immediate objectives and outputs, as well as the organization of a workshop aimed at the discussion and establishment of a consensus between possible partners, with regard to resources mobilization for financing of the proposed project as soon as a fully fledged project document is finalized by a consultant and the backstopping officer.

Another recommendation concerned an intermediate extension of the first project phase, allowing continuation of the EDSC on-going activities of direct assistance to small- and medium-scale industries while programme concept for the second phase is being formulated and the document for the second phase is prepared. A programme support document for a totally reoriented, demand-driven Engineering Development and Service Centre will be the major output of this bridging period between the first and second phase of the project.

Appendix 1.3

EDSC - Findings in brief for the OOPP meeting 31/11-2/12 1993:

It has been my task to look into the situation of the project and to recommend corrective measures where weaknesses are found. The project has its important positive sides. It is important to be aware of these, so that whatever one will decide, they do not get lost. The positive values include:

- A unique, costly and intact plant, well installed, fit and ready to serve important needs of the manufacturing industry in Kenya.

- Suitable premises, sufficiently well located near the industrial area of Nairobi.

- Some reasonably well trained and devoted people, especially among the supporting staff.

- Potential to become a sustainable and profitable institution, well fit to serve the needs.

To be able to utilize the positive values of the project, it is even more important to identify as much as possible the major weaknesses, so that these can be avoided in the future. It is important that one takes so far drastic corrective measures that the weaknesses will be completely avoided. It will not be sufficient just to apply some "improvement measures".

It will also not do to try to hide away or cover over weaknesses, just in order to be "pleasant". That would leave the positive values of the project very slim chances to come into proper use. I therefore must specify the following:

Appendix 2.1

The project is not doing well because:

- Objectives of the project have not been quite clear to the organization, and one has not done what is possible to reach the objectives.

- The project has had practically no impact on the objectives it was supposed to serve.

- There is no reasonable ratio between inputs and outputs. Inputs and outputs are not properly recorded.

- Marketing has not been sufficiently emphasized from the outset of the project.

- The management is not reaching required results.

- The allocation of technical international assistance has failed to cover vital functions.

- Actions have not been taken at an earlier stage to solve the problems which have been visible over a long time.

The marketing is not doing well because:

- Very few of the industries it was supposed to serve, know the existence of EDSC. Some sister organizations also hardly know its existence.

- The marketing activities which have been undertaken, have not been wisely selected or directed, and have been unnecessarily costly.

- In spite of a reasonable market demand, very well equipped facilities and staff ready to work, there has not been provided any reasonable work-load on major parts of the available capacities.

The economy control of the project is inadequate because:

- There is kept no account or overview of results. (Except KIRDI accounts where the results of all its undertakings are lumped together without showing the results of any particular branch).

- Quotations and invoices have been issued without knowing the cost picture of the organization. It has also not been known what has been the actual cost of the jobs after completion.

- There is not existing any stock control. One does not know the amounts of values of goods in stock, goods consumed for jobs and goods which has been stolen.

The operations are not doing well because:

- People and workshops have to a very high extent been kept idle, becoming frustrated from the same reason, and remaining in the job because they have nowhere else to go.

- A part of the jobs which have been undertaken have been of an inadequate nature.

- Delays in performing work have in most cases been unreasonable, to the extent that many customers have regretted that they made use of the EDSC services.

- It has not been attempted to make adequate use of the results concerning the prototypes which have been made.

- Very limited and not very adequate training has been undertaken.

The management is not performing as required because:

- Rectification of the weaknesses of the project have not been attempted to a sufficient degree. Rectification of the weaknesses of the project is first of all the responsibility of the management.

- The bureaucracies hampering the project have not been avoided or streamlined. Delivery times for provided services remain unreasonable.

- A too authoritarian management style seems to have been practiced. Sector leaders and supporting staff have not been sufficiently informed and involved in decision-making.

The international technical assistance to the project has not been up to standard because:

- Adequate training of staff has not been provided

- Proper management has not been taught

- The time scheduling for allocation of assisting staff was not the best.

- Goals for the EDSC operations have not been set, and reasonable attempts to reach adequate goals have not been made.

- Adequate corrective actions have not been undertaken at an earlier stage by the assisting organizations when it should have been seen that results were not fully satisfactory.

A new project based on the established plant in its existing buildings should be established because:

- The present project suffer from so many weaknesses that it seems better to utilize the many good values of the centre to start a new project, rather than letting the present project continue, hoping that rectifications will solve the problems.

- It appears that the umbrella organization has not attempted to solve the problems, and there are no signs visible that extensive improvements can be expected in the future.

- A lot of efforts have been laid down through undertaking huge expenses of the project, both from the side of the government and from the donor organization. Proper returns have not been obtained, but a considerable part of the values paid for, are still in place. If the values will be adequately managed, there are reasons to believe that positive results can be achieved in terms of services to industry, self-sustainability, and profits.

The conditions for donors to involve in a new project, should at least encompass the following:

- Adequate goals must be clearly defined.

- A budget must be presented showing positive relations between inputs and outputs.

- The organization and the operations must be tailored in a manner that there are good reasons to trust that the budget and the plans will be kept. Adequate progress reports must be presented.

- Self-sustainability and balance in economy should be foreseen after a short period of operations.

- Capable and efficient management must be secured.

- No further major investments should be considered, before the project is self-sustained and proved success.

Available backgroundmaterial from the undersigned.
(References are indicated with a figure in the margin above):

1. Considerations concerning aims and tasks for EDSC.

2. Accounts figures for 1992 together with budget estimating a well managed project.

3. Organization plan, present and proposed.

4. Results from an analytical investigation of the Organization.

5. Requirements for expert assistance.

6. Evaluation of the market situation.

7. A plan for marketing and sales.

8. List of all customers with sales volume and some experiences.

9. Manaufacturing budget.

10. List of available services from EDSC.

11. Considerations concerning delivery time with reference to an example.

12. Procedures: An example: Purchase

13. Training courses. Some thoughts and a programme proposal.

OPERATION ACCOUNT FOR EDSC FOR THE PERIOD Calendar year 1992

and MAXIMUM PERFORMANCE BUDGET In shs 1.000:

		Account 1992:	Budget:
SALES AND OTHER INCOME:			
01	Manufactured machines and equipment	370	
2	Manufactured spare parts and components	24	
03	Manufactured dies and moulds	115	
04	Services provided from the workshops	4	
05	Repaired and maintained tools and machinery	37	
07	Cost value of developed prototypes	54	
	Machine hour charges as to machine load budget, (all types of work)		13.253
	Material consumption invoicing, 50% of labour cost (added 20% on cost)		7.952
	Design charges 10 people x 1920h x 70% at 160/-		2.150
	Course fees, 16,5 courses x 15 particip. at 7.500/- x 70%		1.300
	Consultancy fees, foundry assistance 1920hours x 75% at 300/-		432
	Total income	604	25.087
VARIABLE COSTS:			
	Design and Manufacturing wages incl. additionals (15% incentives on budget)	3.837	6.450
	Material consumption (Budget added 5% wastes)	2.197	6.958
	Hire of course lecturers/consultants		312
	Components for the job orders (add to charges)	55	
	Lubricants	4	20
	Electricity for the operations	60	300
	Maintenance, spareparts and repair for machinery	105	500
	Other variable costs	0	100
	Total variable costs	6.318	14.630
	GROSS PROFIT	- 5.714	10.447

Appendix 3.1

OVERHEADS:		
Total fixed salaries and wages, national staff	2.558	4.300
Car expenses, transport of staff (km-allowances)	60	100
Car expenses, transport of goods	53	100
Training costs incl, travel and DSA in Kenya	6	100
Power, fixed consumption	251	300
Insurance	1.000	1.000
Water	34	34
Accounts audit,	0	200
Marketing cost:		
Travel and DSA	55	100
Printing and stationery	0	500
Postage	0	50
Telephone/fax/telex	0	400
Advertising	0	100
Administration costs:		
Travel and DSA	0	0
Printing and stationery	119	200
Photocopying	40	100
Postage	2	10
Telephone/fax/telex	600	200
Advertising	0	20
Loss on customers	209	0
Estimated value of stolen materials	300	0
Sundries	61	100
Total overheads (before expatriate salaries and unpaid costs considered as gifts)	5.348	7.714
Profit before unpaid costs	-11.062	+2.697
Further costs considered as gifts:		
Total cost of expatriates incl. all costs	15.014	14.688
Rent of premises (at market rate, not paid) 27.000sqft at 8/- + 2000 sqft. at 3/-	2.664	2.664
Depreciations:		
Plant and installation, 20 years on shs 24,75mill	1.238	1.238
Tools, 10 years on shs 12,2 mill.	1.220	1.220
Vehicles, 10 years on shs 1,03 mill.	103	103
Office machines, 10 years on shs. 1,03 mill.	103	103
Furniture, 15 years on shs 0.95mill.	63	63
Interests on working capital: 20% on 500*2.779	100	556
Total overheads	25.853	28.349
NET RESULT	- 31.567	-17.902

NOTES to Accounts and Budget:

- All figures above and in the notes below are given in K.shs. 1000.

1. EDSC does not keep accounts. The main part of the above figures are extracted from the common KIRDI accounts, where all KIRDI undertakings are mixed together. These accounts give no individual results for any of the branches. EDSC has therefore been forced, over weeks, to go through huge amounts of vouchers, so as to arrive at reasonably reliable figures. Some of the expenditures are paid by UNDP. This involves all expat. costs, local salaries of 1.714 and other costs of total 508 (All figures in shs 1 000)

2. The account figures are recorded for the calendar year 1992, which is considered as the most active period for EDSC. Other periods would probably give even less favorable results. Total production value of services from the centre including materials over its lifetime is 1,5 mill. shs.

3. The budget figures estimate what should be the possible results;
   - with a well managed project,
   - released from bureaucracy,
   - doing reasonable marketing efforts,
   - and with approximately the same rates for charges as listed presently.

   A limited implementation period of some few months should be expected before such budget results can be achieved.

4. Cost value of developed prototypes refers to values estimated by EDSC of developed prototypes pending within the centre, but not attempted sold.

5. See enclosed machine load budget for how the sales value is arrived at. Reasonably marketable loads on the capacities have been estimated, multiplied with hour rates, mainly as listed presently. Shift work or overtime has not been considered.

6. Charging of materials is included 20% gross profit incl. 5% wastes. (For present stock a higher percentage may be added.). For new purchases reasonable purchase conditions must be secured.

7. It is proposed for the future; that design, manufacture and possibly also fitting in in customers production, should be quoted as separate jobs, possible to buy separately. Efficiency increase in design is estimated as indicated in the report.

8. The course fees is in accordance with the recommended list of courses in the report.

Appendix 4.1

9. A UNV foundry specialist is recommended, to be seconded by 2 local experts. The charges are expected to cover the local costs of the department, which mainly should be active within the private foundries in Kenya.

10. The sales income of the budget is over 40 times higher than the sales income in the accounts. A part of the reason is undercharging of services. Still, only a very limited part of the capacities are utilized for income generating activities.

11. The proposed wages are in accordance with the proposed organization plan and present rates of salary, added 15% incentives.

12. Hire of course lecturers is estimated for 50% of the budgeted course hours 39 days x 8 hours at shs. 2 000 per lecturing hour = shs. 312 000

13. Costs of components are not shown in the budget as these will be charged to the customer.

14. The gross profit in the accounts is negative, because the variable costs exceeds the sales value, something which should never happen. The variable costs exceeds the sales value by over ten times.

15. The budgeted salaries include the changes shown in the proposed plan of organization, including a new marketing and a new training department, as well as 15% incentives which may be awarded according to performance.

16. For transport costs, Km-allowances are partly indicated. It is expecting that some transport requirements may be executed by the officer himself, utilizing his own car against regulations to be established. This is expected to increase efficiency and capacity, as well as to reduce costs.

17. Auditing of the accounts should be established for the sake of securing correct accounts and as a safety precaution.

18. Marketing costs are suggested according to the marketing recommendations of the report.

19. According to payment conditions which are laid down, loss on customers should normally not occur.

20. The values of stolen materials is an estimate because no stock-control exist. Material consumption is not recorded, and stock quantities are not updated at withdrawals.
The figures for theft and material consumption are based on a present stock counting. Major parts of the present over 8 million value of materials is scattered around in the grass outside, subjected to rust and possible further theft.

21. Profit before unpaid costs is relevant to determine, because the further costs mostly are gifts, and because they will not be paid.
The budget balances positively. That means that the project should be self sustainable;
- as long as the plant will not be paid,
- as long as the expats will be able to provide sufficient training for the nationals to continue similarly on their own,
- and at least as long as the calculated rent of premises is lower than the calculated profit.

Hence it may be worthwhile to donate the required extra means which are required for the project to survive; provided it can be safeguarded that the budget will be followed.

22. Costs of expatriates include travel, all overheads as well as support from UN headoffice and regional office.
In the budget there is calculated with:

-	1 CTA in 12 months at $ 11 000 p.m.	8.976
+	3 UNVs in 12 months at $ 1 500 p.m.	3.672
+	1 UN short term adviser at $ 15 000 twice	2.040 =
		14.688

23. The EDSC premises belong to KIRDI and rent is not paid. Still, the costs are relevant, because the premises could have been let to somebody who could pay the stipulated rent. Both the workshops and the offices occupy more space than necessary, hence the rent could have been lower.

24. Both the plant and the tools contains a number of unprofitable elements. Hence, the depreciation costs could have been lower. (As an example, there will hardly be any use for the enormous and expensive compressor which has been installed.)

25. Working capital is in accounts taken as 600 which equals the annual sales.
Working capital in budget is taken as;

-	50% of all annual paid costs, 17.992/2	8.996
	less	
-	50% of 50% prepayments of services, 25 087/4	6.271 =
		2.779

26. That the final net results in the budget is negative is less important, as long as the last part of the costs refer to costs which are paid long time ago and which are donated. This however, must be a very serious reminder; that one must be more considerate with investments and costs. One should make sure, not to involve in further unprofitable investments!

Appendix 4.3

MACHINE SERVICE BUDGET

Below are shown the 31 different processes, by help of which there may be done services to industry. The listed equipment is all available in working order within the EDSC. Only very few accessories and tools are lacking. It should not create big problems, or take unreasonable time or costs to get hold of these.

The "Need" column refers to a market investigation where I visited 10 industries. They were asked whether they were interested in making use of services from the particular machine. The number of companies which were interested in the service is specified for each machine.

The "Rate" column specifies the hour rates for the machine. The hour rate is the price the customer must pay for services from the machine including manpower and all other costs excluding possible materials.
The rate is approximately the same as already determined by EDSC. It appeared in general that the customers could have accepted higher rates.
Hour rates are determined on basis of capital costs and other costs of the machine and the operator, but reduced according to market prices.

The "Load" column indicates the frequency of which the machine may be used for paid services, either as a service charge, or in manufacturing items for customers. The load has been judged as what may be practically possible, considering the information from the companies, and judging the needs and practical circumstances in general. Shift work is not considered. On no. 14 is considered to do case carbonization during absence over the night. On no. 30 and 31 is considered 4 resp. 3 operators.

The "Sales shs 000" column specifies the annual sales in shs 1000 from the machine based on 1920 working hours annually.

The total annual sales is summed up to shs 13 595 000.

Machine Service Budget

	Machine	Need	Rate	Load	Sales shs 000
	Jig boring mc	6	850	75	1211
2	Tool and cutter grinding mc	5	1000	50	950
3	Universal tool milling ms	2	360	60	410
	Horizontal milling ms	2	360	80	547
4	Shaping mc large	4	300	50	285
	Shaping mc small	4	300	30	171
5	Lathe, small	3	300	90	513
	Lathe, large	3	300	80	456
	Lathe, large	3	300	80	456
6	Radial boring mc	7	360	50	342
	Pillar drilling mc	7	250	20	95
7	Band saw	4	300	20	114
	Power hack saw	4	200	20	76
8	Jig grinding mc	5	600	40	456
9	Surface grinding mc.	4	500	60	570
10	Cyl. grinding mc. external	6	500	60	570
11	Cyl. grinding mc. internal	6	500	80	760
12	Drill point grinding mc.	7	360	20	137
13	Saw blade grinding mc.	4	480	30	274
14	Heat treatment equipment	7	360	120	821
15	Compressed air provision	0	1500	0	0
16	Hardness tester	8	500	20	190
17	Rotating fatigue tester	4	500	0	0
18	Impact testing mc.	5	500	2	19
19	Tensile strenght tester	5	500	2	19
20	Critical revolution tester	2	500	1	10
21	Polariscope	2	500	0	0
22	Screw tester	2	500	2	19
23	Torque tester	2	500	2	19
24	Bending/Elasticity mod test	4	500	1	10
25	Toolmakers Microscope	5	800	20	304
	Microscope, 3 coordinates	3	1000	10	190
26	Profile Projector	2	700	20	266
27	Marking plate/equipment	3	360	5	34
28	Identification of materials	6	360	5	34
29	Eccentric press	3	400	10	76
30	General/sheet metal worksho	3	360	300	2052
31	Welding	2	300	200	1140
	T O T A L				13595
	A V E R A G E		483	38	

Appendix 6

LIST OF EDSC SERVICES

SERVICE	MACHINE AND SPECIFICATIONS	HOUR RATE (Shs/h + mat): Now	/ Indic.
PRECISION TOOL MACHINES			
Precision jig boring & milling	Jig boring machine, 5 micron accuracy table 400 x 600 (working 400 x 250 x 420)	850	1000 3000
Reconditioning and making special cutters. (Milling and others)	Tool and cutter grinding machine Table 200 x 485 between centres 483. Swing 203	20% of tool cost	2000 4000
Tool & product milling	Universal Tool Milling Machine table 1200 x 280 mm	360	500
	Horizontal milling machine 110 x 240 mm, travel 800x425 mm	360	500
Shaping	Shaping machine stroke 450 mm + smaller shaping machines	300	500
Turning and other lathe work	Lather 315 x 1500 mm + 2 larger lathes	300	400 800
Drilling	Radial Boring machine dist. 1000 mm, table 992 x 694 mmx 48:	360	700
	Pillar drilling machine 40/50: 200 mm	180	500
Cutting metals	Band Saw. max. 380: or 450 x 260 HYDR. power hacksaw max. 300	300 30/cm 75/cm	800 500
GRINDING OPERATIONS			
Precision Shape grinding	Jig Grinding machine. I micron accurately. Table 300 x 500 mm Digital measuring x,y,z - coordinates	600 - 1000	3000 6000
Plane grinding	Surface grinding machine, hydr. 810 x 405 mm grinding		14000
Cylindrical grinding external	Cylindrical grinding machine, 450 x 255 mm		1250
Cylindrical, internal grinding	Cyl grinding ms. 450 x 250 mm outside.		2500

SERVICE	MACHINE AND SPECIFICATIONS	HOUR RATE (shs/h + mat): Now	Indic.
Bending moment and elasticity module testing	Spec. Machine		500
Determination of exact micro shapes	Microscopes, toolmaker's and 3-coordinated		700 1000
Profile and micro measurement control	Profile projector. Max. maginification 100 times. Precision 1 micron.		700
Accurate marking and measurement	Marking plate 1220 x 920 mm with sundry accessories		400
Identification of materials			400
GENERAL AND SHEET METAL WORKS			
Testing of tools and eccentric pressing	Eccentric press, 63ft depth 315 mm		900
Manufacturing of prototypes, etc.	Guillotine shear. 2000 x 1,5 mm Treadcutting machines (-2" x 200mm) Edge bending machine 2000 x 3 mm Drilling machines, Tube bending machine, hearth, workbenches, vice benches, bench grinders		400
Welding	Welding transformers, MIG/MAG welding spot welding, electrode drying oven	300	300
OTHER SERVICES			
Design of tools		100	400
Design of machines and production equipment		100	400
Design of prototypes		100	400
Further development and value analysis of industrial products		200	400
Copying of drawings		60	400
Mechanical engineering consultancy services		360	500
Assistance for further development of foundry operations and installations			
Installation of production plants		360	400
Installation of compressed air systems		180	300
Training courses : See separate list			300

LIST OF EDSC SERVICES

SERVICE	MACHINE AND SPECIFICATIONS	HOUR RATE (Shs/h + mat): Now	/ Indic.
Reconditioning of twist drills, etc.	Drill point grinding machine		20% of price
Grinding and reconditioning of circular and band saw blades	Saw blade grinding machne 60 - 650: x 5 - 70 thickness Tooth pitch 3 - 35 mm	480	600
SPECIAL PROCESSING			
Heat treatment	2 El furnaces. For components e.g. 100: x 400 mm. 1350 oC. 315 x 200 x 500 mm 1 with double chamber. Temp. contr. Oil and water quenching	360	1000
Providing compressed air	7,5 bar x 400 l/sec (290 kw - 7 cum tank		1800
sand blasting	???		???
HIGH PRECISION TESTING AND MEASURING			
Surface hardness testing. (e.g. vickers, Brinell Rockwell, Knoof)	Hardness tester. 2 different	200 each	200 each
Fatigue testing	Rotating fatigue tester, specifying no. of revolutions		500
Impact strength testing	IMPACT TESTING MACHNE		500
Tensile strength testing	Tensile strength tester (Destructive)		500
Determining critical no. of revolutions	Critical Revolution Tester. Determining resonance points for different materials.		500
Determining stress distribution picture on items	Polariscope. To improve shape of industrial products		1000
Testing maximum load on treads	Screw Tester		500
Torque resistance testing.	Torque Tester		500

EDSC OUTPUT REPORT

MONTH: _____ 19 ___

DEPARTMENT: _____

WORKING HOURS: GROSS: [ ] NET: [ ] INVOICEABLE: [ ]

	GOAL	ACTUAL	ACTUAL LAST MONTH
SALES VOLUME SHS 1000:			
MANUFACTURING WAGES -"-			
MATERIALS CONSUMPTION -"-			
OTHER VARIABLE COSTS -"-			
GROSS CONTRIBUTION SHS. 1000:			
OVERHEAD WAGES & SALARIES -"-			
CAR AND TRANSPORT COSTS -"-			
OTHER DEPARTMENT OVERHEADS -"-			
NET DEPARTMENT CONTRIBUTION SHS 1000			
PUNCTUALLITY: % PRESENCE	%	%	%
INVOICEABLE HOURS: % OF GROSS HOURS	%	%	%
INVOICING: SHS / GROSS HOUR	SHS/H	SHS/H	SHS/H
NET CONTRIBUTION: — " —	SHS/H	SHS/H	SHS/H.

COMMENT:

QUOTATION NO: _____ COMPANY: _____

ACCEPTED JOB NO: _____ CONTACT PERSON: _____

TELEPH. FAX. ADDRESS: _____

Quotation calculation form proposal

MATERIALS & COMPONENTS, ETC.:	READY DATE: PRE:	RE:	VOLUME & UNIT: PRE:	RE:	UNIT PRICE: PRE	RE:	PRE-CALC. SHS.:	RE-CALC. SHS.:
OTHERS (SEE BACKSIDE):								
SUNDRIES/CONSUMEABLES:								
SUB CONTRACTS								
TRANSPORT/TRAVEL:								
SPECIAL CHARGE:								
WORK: COST FACTOR:			SUM MATERIALS:					
MACHINE NO: COMMENT:			TOTAL MATERIALS:					
CLARIFICATION								
DESIGN.								
OTHERS (SEE BACKSIDE):								
ASSEMBLY:								
FITTING/TESTING:								
HANDLING GENERAL:								
DELIVERY DATE:			SUM LABOUR:					
LABOUR COST FACTOR:			TOTAL LABOUR:					
			TOTAL:					

REMINDER 1: INFO 1: INFO 2: ACCEPT:

CONTENT:
DATE:
SIGN.

MATERIAL REQUISITION

JOB NO.: ______

COMPANY: ______

REQUESTED BY: ______ DATE: ______ SIGN.:

STOCK ITEM NO.:	ITEM & UNIT:	VOLUME	UNIT PRICE:	VALUE SHS.	REQUIRED DATE: BY:	RECEIVED DATE: SIGN.:

NOTE:

TOTAL

Appendix 10

STOCK CARD

ITEM NO: _____

ITEM: _____ UNIT: _____

NORMAL ORDER VOLUME: _____ ORDER POINT: _____

ORDER DATE:					
REMINDER " :					
ARRIVAL " :					
UNIT PRICE :					

DATE: SIGN:	JOB/ ARRIVAL NO:	VOLUME:	BALANCE:	DATE: SIGN:	JOB/ ARRIVAL NO.:	VOLUME	BALANCE:

Appendix 11

JOB CARD

JOB NO.: ________

SUB CARD NO.: _____

JOB NAME: ____________________

CUSTOMER: ____________________

REQUIRED DATE: ____ SIGN.: ____

MACHINE NO.:	OPERATOR:	JOB DESCRIPTION DRAWING NO.:	HOURS ALLOCATED	USED:	REQUIRED DATE/TIME:	WORKED FROM:	TO:	COMPLETED DATE: SIGN:
NOTE:		TOTAL:						

Appendix 12

MACHINE LOAD:

JOB NO:

No:	MACHINE:	WEEK NO: M	T	W	T	F	WEEK NO: M	T	W	T	F	WEEK NO: M	T	W	T	F	WEEK NO: M	T	W	T	F

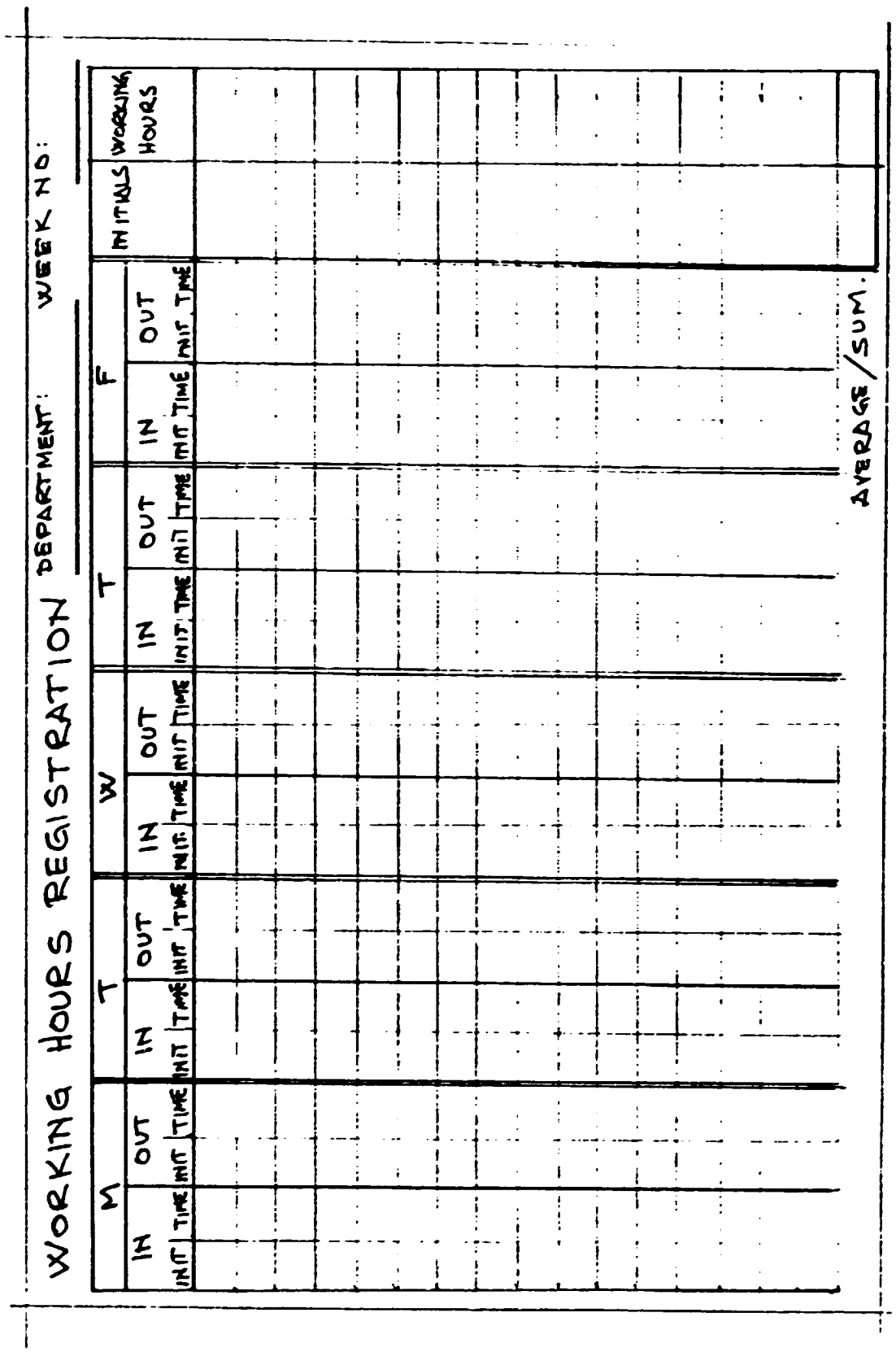
Machine load form porposal

PERSON LOAD

JOB NO:

No:	NAME:	CAPABILITIES:	WEEK NO:					WEEK NO:					WEEK NO:					WEEK NO:				
			M	T	W	T	F	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F

Personal load form proposal


WORKING HOURS REGISTRATION
DEPARTMENT:
WEEK NO:
M
T
W
T
F
IN
OUT
INIT
TIME
INITIALS
WORKING HOURS
AVERAGE/SUM.

Appendix 15

CUSTOMER CARD

CUSTOMER NO: _____

COMPANY: _____

P.O. BOX: _____ PHONE: _____ FAX: _____ TELEX: _____

LOCATION:	IN CHARGES:

COMMENTS:
NEEDS:

CONTACT DATE:	BY: *	NEXT DATE:	AGREEMENT:	QUOTATION SHS:	ORDER SHS:	DELIVERY SHS:	BALANCE SHS:

*P-PHONE, F-FAX, T-TELEX, L-LETTER, V-VISIT P.T.O.

Appendix 16

Explanation to filling of the forms, Appendix 8 - 16.

EDSC output report (Appendix 8):

- The card is filled for each of the manufacturing department on a monthly basis.
- Gross working are the hours supposed to be worked by the existing staff (Deducted annual leave and permitted sick-leave.
- Net working hours are the actual hours worked (From working hours registration appendix 15.)
- Invoiceable hours, are those hours worked for a particular customer to be charged for it. (From job card app. 15)
- Actual: to show the figures from the month just ended.
- Actual, last month: To show the figures from the previous month.
- Goal: The figures the department estimate to reach the month which has just started.
- Sales volume: The sales value of the production during the month.
- Manufacturing wages: The actual gross wages paid for manufacturing staff of the department.
- Materials consumption: To the department for the month. (E.g. from materials requisition)
- Other variable costs: For the department for the month (From accounts)
- Gross contribution: Sales less variable costs
- The overheads: For the same department only.
- Net dept. contribution: Sales less all costs.
- Punctuality: Net divided in gross working hours x 100
- Invoiceable h.: Invoiceable h. divided in Gross h.x 100
- Invoicing: Sales volume divided in gross h.
- Net contrib.: Net dept. contrib. divided in gross h.

Quotation (Appendix 9):

- Materials etc.: Continue the list on backside if needed. Other items listed are added because of using the same cost factor. Total value or cost paid for the item.
- Ready date: Estimate under PRE when materials will be available and when work can be finished after materials are available. Check with and add to machine load plan (Appendix 13) Under RE specify the actual time if different (later)
- Volume and unit: Under PRE specify the estimated consumption and the unit in which it is measured. Under RE specify the real consumption (later)
- Unit price: Calculated price under PRE, later real price paid under RE
- Pre-calc: The calculated cost for the quotation.
- Re-calc.: The real costs later.
- Material cost factor: The percentage to add on materials to cover overheads and profit. E.g.. 20% makes factor 1.2. To be experienced from accounts.

- Work: Specify the different machines to be used, and the no. of working hours for each of them. One line for each machine for the total job may normally be sufficient.
- Labour (work) cost factor: The percentage to add on to sum work to cover overheads and profit. E.g.. 50% makes factor 1.5. To be experienced from accounts.
- Content/Date/Sign.: Specify the situation and dates when offered, reminded the customer, offer accepted, progress informations given and work completed.

Materials Requisition (Appendix 10):
- Item and unit: Specify all items for the job.
- Stock item no: Specify the stock no. of the type of item
- Unit price: Stores to specify the real unit price.
- Value: Volume x real price.
- Required date: Specify as in Quotation sheet the date required in workshop.
- Received: Signature from the workshop receiving the material.
- Total: The total cost of materials for the job. If not very different from precalculated costs, it may be transferred to Quotation sheet in sum only.

Stock Card (Appendix 11):
- Order volume: Specify the regular economic quantity to be ordered when ever the order point is reached.
- Order point: Specify the volume of goods to remain in stock when a new purchase of the item has to be initiated. (Dependent on the normal consumption per month. and the total expected delivery time from the suppliers.
- Order date: Specify the dates when new purchases have been requested. (Each time)
- Reminder: Specify the dates if supplies are not on time.
- Arrival: Specify actual arrival date.
- Unit price: Specify the gross total cost price for each arrival.
- Date/Sign.: Specify the dates for all changes in store volume.
- Job/arrival no: Specify job no for each delivery and arrival no for all arrivals.
- Volume: The quantity taken from/added to stock.
- Balance: The correct quantity remaining in stock.

Job Card (Appendix 12):
- One card or more if necessary (sub cards) for each job.
- Job description: Refer to drawing no when applicable.
- Hours allocated: From quotation form.
- Hours used: The real time, derived from recorded from/to in hours.
- Required date/time according to quotation sheet and Machine load record.
- Completed date: Completed date: Signed by operator or foreman.

- Total: Specify total working hours allocated and used. Specify the most delaying date.

Machine load (and Person load for design) Appendix 13 and 14):
- Machine (Name): Only the machines which are so heavily loaded that they require planning should be listed. (Put them in the form to be copied for every 4 weeks.)
- No.: Use the fixed number of the particular machine, always to refer to.
- The week days: Draw a line for which working hours the machine will be loaded on each machine. Put the job no. on the line.
- It is the task of the sales to make sure that all machines will remain fully loaded!

Working hours registration (Appendix 15):
- In/Out: The first one to arrive or leave notes the time and his signature on the particular day. The next one follows chronologically. (Daytime absence may be recorded on a new line, or columns may be added)
- Initials and working hours: The foreman adds up the weekly actual working hours for the individuals
- Sum: The total working hours for the department for the week are recorded.
- Average: Sum working hours divided in no of persons working during the week.

Customer Card (Appendix 16):
- Company: One card for each customer and potential company. Add a customer serial number.
- Specify whereabouts, persons in charge, and any important information about the relationship.
- Contact date: When was the last contact?
- By: Method of communication.
- Next date: Specify after contact when you next time should contact them. Place the card accordingly.
- Agreement: Specify what ever you have agreed on.
- Shs: Specify When quotation is given, order received, delivery taken place, and if any payment balance remains.
- Marketing dept. to use the card in daily contact with customers.

POTENTIAL CUSTOMERS TO BE VISITED

	BIG	MEDIUM	SMALL	ASIAN	AFRICAN	EUROPEAN	ORGANIZED	LESS ORGANIZED	SIDELINE ENGINEERING	OTHER BRANCHES	EXISTING CUSTOMER PLEASED	EXISTING NOT PLEASED	HAVE HAD CONTACT	NO CONTACT YET
Dahini Mercantile		M			X	(X)	X		X			X		
Africa [illegible]			X	X				X	X					X
FINE ENGINEERING WORKS		X		X				X	X					X
MECHANICAL ASSEMBLY [illegible]			X			X	X		X					X
ITDL PRODUCTS LTD			X			X		X	X					X
AUTO PRECISION PRODUCTS			X	X			X		X					X
NALU NAIL WORKS	X				X		X		X					X
METAL EQUIPMENT		X		X			X		X					X
MECOL		X			X		X		X					X
EA INDUSTRIES	X					X	X			X				X

Appendix 18

AFRICAN

Market Interview of Industries: [illegible]

Company: MECOL .... Person: MRS [illegible] Position: ...

Address: .... Telephone ....

Branch: ENGINEERING Products manufactured: OFFICE FURNITURE

Turnover: 20 MILL. shs/year. Share of the market: [illegible] + EXPORT
150-200 PEOPLE

No. of industries in the branch: 5 ...... % in Nairobi area ......

PURCHASE VOLUME, 1000 shs/year:

1. Dies and special tools: 500
2. Tools design: 50
3. Specially made spare parts: –
4. Prototype manufacturing: –
5. Prototype design: –
6. Heat treatment: –
7. Materials testing: SOME
8. Techn. advice/consult: –
9. Techn. training internal
10. Techn. training: 7 PERSONS/YEAR (LOCAL COMPANY + [illegible])
11. Others: SUB. SUPPLIES 12 MILL.

Which of these services are most important? (No) 1-2-8-10.

Which courses may be of interest? (No) 3, 4, 8, 9, C + REFRESHING 1, 2, 4, 5

Which Machines for Processing may be of interest? (No) 14 TO 24, 29 30 31 32-33-34-35-36 37 MATERIALS TESTING

CONDITIONS FOR PURCHASE:
- [x] Delivery time IMPORTED
- [ ] Price
- [ ] Techn. quality
- [ ] Development quality
- [ ] Communication
- [ ] Others

JUDGING OF PRICES:
- [ ] High
- [x] Average
- [x] Low

IMPORTANCE OF [illegible] SERVICES:
- [x] High
- [ ] Medium
- [ ] Low
- [ ] ....

How are service suppliers selected? 3-5 QUOTATIONS SELECTION OF SERVICE AND PRICE

Which are your biggest problems? COST OF RAW MATERIALS AND IMPORTATION

Which other services should FMSC provide? SELECTION OF MACHINERY

[illegible] NO

Likeliness of becoming a customer: 90% Reason:

How do you consider FMSC generally? TOTALLY UNKNOWN.

Market Interview of Industries:

Company: EA INDUSTRIES Person: NWOBIA Position: CHIEF ENGINEER

Address: BOX 30062 NAIROBI Telephone: 532505

Branch: FOOD/CHEM. Products manufactured: MARGARINE, SOAPS ETC

Turnover: .... shs/year. Share of the market: ...... %
NO OF EMPLOYEES:

No. of industries in the branch: .... % in Nairobi area ......

PURCHASE VOLUME, 1000 shs/year:

1. Dies and special tools
2. Tools design
3. Specially made spare parts: 5 MILL.
4. Prototype manufacturing
5. Prototype design
6. Heat treatment: +
7. Materials testing
8. Techn. advice/consult: +
9. Techn. training internal: +
10. Techn. training: PACKAGE ABROAD
11. Others

Which of these services are most important? (No) 3

Which courses may be of interest? (No) 2, 3, 6, 7, 8

Which Machines for Processing may be of interest? (No): ALL

CONDITIONS FOR PURCHASE:
- [x] Delivery time
- [ ] Price
- [x] Techn. quality
- [ ] Development quality
- [x] Communication
- [ ] Others

JUDGING OF PRICES: ?
- [ ] High
- [ ] Average
- [ ] Low

IMPORTANCE OF FMSC SERVICES:
- [x] High
- [ ] Medium
- [ ] Low
- [ ] None

How are service suppliers selected? PRE EVALUATION REGISTRATION REFERENCES + BLACK LISTING

Which are your biggest problems? LACK OF SPEED AND INNOVATION FROM SUPPLIERS

Which other services should FMSC provide?

How do FMSC overlap other suppliers?

Likeliness of becoming a customer: 80% Reason: DEPENDENT ON SPEED AND PERFORMANCE

How do you consider FMSC generally? TOO SLOW - UNKNOWN.

- HAVE A FILE OF DRAWINGS TO BE MADE FOR STOCK.
- WORK IS AVAILABLE
COME TO SEE THEM!

Appendix 19.1

Market Interview of Industries:

Company: AFALCA ENGT/ CAST DE 2540 Person: PRATIM PATEL Position: MAN. DIR.

Address: Box .... Telephone: 554926

Branch: Foundry .... Products manufactured: Cast products in aluminium, iron, brass (

Turnover: 36 million shs/year Share of the market: ... %

10 PEOPLE

No. of industries in the branch: ...... % in Nairobi area:

PURCHASE VOLUME, 1000 shs/year:

1. Dies and special tools ......
2. Tools design ......
3. Specially made spare parts ......
4. Prototype manufacturing ......
5. Prototype design ......
6. Heat treatment ......
7. Materials testing ......
8. Techn. advice/consult. ......
9. Techn. training internal ......
10. Techn. training ......
11. Others: ......

negligible

Which of these services are most important? (No) 1-2-4-5-9

Which courses may be of interest? (No) 6-11

Which Machines for Processing may be of interest? (No) 155 - 38

CONDITIONS FOR PURCHASE: ☐ Delivery time ☐ Price ☐ Techn. quality ☒ Development quality ☐ Communication ☐ Others: ......

JUDGING OF PRICES: ☐ High ☒ Average ☐ Low

IMPORTANCE OF EMSC SERVICES: ☒ High ☐ Medium ☐ Low ☐ None

How are service suppliers selected? RANDOM

Which are your biggest problems? IMPORTATION/PURCHASE OF SILICONE

Which other services should EMSC provide? FOUNDRY TECHNOLOGY

How do EMSC overlap other suppliers? NO

Likeliness of becoming a customer: 50 % Reason: NEED FOR TRAINING AND FOUNDRY CONSULTANCY

How do you consider EMSC generally?

– A FOUNDRY CONSULTANT IS VERY MUCH NEEDED, BUT NOT ANY PILOT PLANT

– PLEASE OFFER DIES FOR DIECASTING OF [illegible] STATS AND EXPERIENCES

Market Interview of Industries:

Company: ITAL PRODUCTS Person: GIANNI VESCOVO Position: MAN. DIR.

Address: BOX 49952 NAIROBI Telephone: 536950

Branch: ENGINEERING Products manufactured: OVENS, LARGE KITCHEN EQUIPM. SIMPLE FABRICATION

Turnover: ...... shs/year Share of the market: ... %

NO OF EMPLOYEES: 50

No. of industries in the branch: ...... % in Nairobi area:

PURCHASE VOLUME, 1000 shs/year:

1. Dies and special tools
2. Tools design
3. Specially made spare parts
4. Prototype manufacturing
5. Prototype design
6. Heat treatment
7. Materials testing
8. Techn. advice/consult.
9. Techn. training internal
10. Techn. training
11. Others ......

PEOPLE ABROAD

VERY LIMITED.

Which of these services are most important? (No) —

Which courses may be of interest? (No) 10

Which Machines for Processing may be of interest? (No) 6, 10, 11, 13, 14, 28, 32, 33, 34, 40

CONDITIONS FOR PURCHASE: ☐ Delivery time ☒ Price ☐ Techn. quality ☐ Development quality ☐ Communication ☐ Others: ......

JUDGING OF PRICES: ☐ High ☐ Average ☐ Low

IMPORTANCE OF EMSC SERVICES: ☐ High ☒ Medium ☐ Low ☐ None

How are service suppliers selected? RANDOMLY

Which are your biggest problems? QUALITY

Which other services should EMSC provide? CERTIFICATE/APPROVAL OF [illegible] ARGON WELDING

How do EMSC overlap other suppliers?

Likeliness of becoming a customer: 40 % Reason: ROUGHNESS

How do you consider EMSC generally? NOT KNOWN

Market Interview of Industries:

Company: FINE ENGINEERING WORKS LTD Person: GSMAL ELT Position: DIR.

Address: BOX 32512 ...... Telephone: 545414

Branch: ENGINEERING Products manufactured: [illegible]

Turnover: 15-16 mill shs/year Share of the market: ... %

75 PEOPLE

No. of industries in the branch: ...... % in Nairobi area: ......

PURCHASE VOLUME, 1000 shs/year:

1. Dies and special tools
2. Tools design ......
3. Specially made spare parts ......
4. Prototype manufacturing ......
5. Prototype design ......
6. Heat treatment
7. Materials testing ......
8. Techn. advice/consult. ......
9. Techn. training internal ......
10. Techn. training ......
11. Others: ......

MACHINE REPAIR

60.000 SHS

Which of these services are most important? (No) 6.

Which courses may be of interest? (No) 3-6-7-8-9

Which Machines for Processing may be of interest? (No) (7) 13 - 10-11 [illegible] 35 - 37 8

CONDITIONS FOR PURCHASE: ☒ Delivery time ☒ Price ☒ Techn. quality ☐ Development quality ☐ Communication ☐ Others: ......

JUDGING OF PRICES: ☒ High ☒ Average ☐ Low

IMPORTANCE OF EMSC SERVICES: ☒ High ☐ Medium ☐ Low ☐ None

How are service suppliers selected?

Which are your biggest problems?

Which other services should EMSC provide?

How do EMSC overlap other suppliers? VIEC KENYA RAILWAYS, EA FOUNDRY KENYA CASTINGS

Likeliness of becoming a customer: 70 % Reason: 50 % on time/need

How do you consider EMSC generally?

HAD A CUTTING JOB LAST WEEK, BUT DID NOT KNOW OF THE CENTRE

Market Interview of Industries:

Company: METAL EQUIPMENT Person: K.S MATHARU Position: DIRECTOR

Address: BOX 45291 NAIROBI Telephone: 55374

Branch: ...... Products manufactured: MACHINE [illegible], SPARE PARTS FABRICATION

Turnover: ...... shs/year Share of the market: ... %

NO OF EMPLOYEES: 50-60

No. of industries in the branch: ...... % in Nairobi area:

PURCHASE VOLUME, 1000 shs/year:

1. Dies and special tools THEMSELVES
2. Tools design OF INTEREST
3. Specially made spare parts
4. Prototype manufacturing
5. Prototype design
6. Heat treatment
7. Materials testing OF INTEREST
8. Techn. advice/consult.
9. Techn. training internal
10. Techn. training
11. Others: ......

PEOPLE ABROAD

Which of these services are most important? (No) 2, 7

Which courses may be of interest? (No) 2, 6, 7

Which Machines for Processing may be of interest? (No) 16, 19, 32

CONDITIONS FOR PURCHASE: ☒ Delivery time ☐ Price ☒ Techn. quality ☐ Development quality ☐ Communication ☐ Others:

JUDGING OF PRICES: ☒ High NEW PRICES ☒ Average NOW PRICES ☐ Low

IMPORTANCE OF EMSC SERVICES: ☐ High ☒ Medium ☐ Low ☐ None

How are service suppliers selected? CHECK CAPABILITY IN ADVANCE

Which are your biggest problems? CAN WE HELP TO GET A CNC MACHINE INTO OPERATION?

Which other services should EMSC provide? CNC MACHINE SERVICE

How do EMSC overlap other suppliers? MOST IS AVAILABLE EXCEPT GRINDING

Likeliness of becoming a customer: 50 % Reason: DEPENDS ON [illegible]

How do you consider EMSC generally? UNKNOWN

THEY HAVE BIG MACHINES INCL 15'×3' PLANER, 11'×3' MILLER

Appendix 19.2

Market Interview of Industries:

Company: DIT M. MERCANTILE LTD. Person: DANIEL H. SHAH Position: FACTORY MANAGER

Address: P.O. Box 4549 NAIROBI Telephone: 591713

Branch: ENGINEERING Products manufactured: TOLERING SHAFTS, MILK CHURNS, WHEEL BARROWS, SHELVING SYSTEMS ETC

Turnover: 50 MILL shs/year. Share of the market: ...... % 160 EMPLOYEES

No. of industries in the branch: .... % in Nairobi area: ......

PURCHASE VOLUME, 1000 shs/year:

1. Dies and special tools	340	6. Heat treatment	10
2. Tools design		7. Materials testing	
3. Specially made spare parts	10	8. Techn. advice/consult.	
4. Prototype manufacturing	20	9. Techn. training internal	8 COURSES
5. Prototype design		10. Techn. training	15 PERSONS
11. Others:			

Which of these services are most important? (No) 1. 4. 6. 7

Which courses may be of interest? (No) 1. 2. 4. 5 6 7 8 9 11

Which Machines for Processing may be of interest? (No) 1 2 (6) 8 9 10 11 12 14 16 17 (19) (25) 27 (28/29) 30 32 33 34 35 37 39

CONDITIONS FOR PURCHASE: [x] Delivery time [ ] Price [x] Techn. quality [x] Development quality [x] Communication [x] Others: INADEQUATE QUOTATIONS AND

JUDGING OF PRICES: [ ] High [x] Average [ ] Low

IMPORTANCE OF ... SERVICES: [x] High [ ] Medium [ ] Low [ ] None

How are service suppliers selected? NO PROCEDURE

Which are your biggest problems? LACK OF MACHINERY & TRAINING.

Which other services should ... provide? —

How do ... overlap other suppliers? NO

Likeliness of becoming a customer: 95 % Reason: LACK OF EFFICIENCY

How do you consider ... generally? NOT GOOD TODAY
NO MESSAGE RECEIVED ON DEVELOPMENT OF SHOE CAP HAVE GIVEN ... AFTER OVER A YEAR 50% PAID.
TOO MUCH INACCURACY
TOO SLOW RESPONSES. TOLD TO COME BACK
QUOTATIONS TAKE 2 DAYS

Market Interview of Industries:

Company: NTO PRECISION PRODUCTS LTD Person: MUKESH Position: DIRECTOR

Address: Box 15619 NAIROBI Telephone: 553045 SPARE PARTS & MACHINES

Branch: MACHINE REPAIR Products manufactured: SPARE PARTS & MACHINES MACHINE REPAIR

Turnover: .... shs/year. Share of the market: ...... % 30 PEOPLE

No. of industries in the branch: .... % in Nairobi area: ......

PURCHASE VOLUME, 1000 shs/year:

1. Dies and special tools	— 200	6. Heat treatment	40
2. Tools design	—	7. Materials testing	5
3. Specially made spare parts	—	8. Techn. advice/consult.	—
4. Prototype manufacturing	—	9. Techn. training internal	36
5. Prototype design	—	10. Techn. training	
11. Others:			

Which of these services are most important? (No) 1. 6.

Which courses may be of interest? (No) 4-8-9

Which Machines for Processing may be of interest? (No) 1, 2, 3, 6, 8, 11, 14, 16,

CONDITIONS FOR PURCHASE: [x] Delivery time [ ] Price [ ] Techn. quality [ ] Development quality [ ] Communication [ ] Others: ....

JUDGING OF PRICES: [ ] High [ ] Average [ ] Low

IMPORTANCE OF ... SERVICES: [x] High [ ] Medium [ ] Low [ ] None

How are service suppliers selected? SERVICE / PRICE SUGGESTED

Which are your biggest problems? ABSENTEEISM. AVAILABILITY OF RAW MAT.

Which other services should ... provide? —

How do ... overlap other suppliers? SOME PRIVATE 50%, ..., DIES & MOULDS

Likeliness of becoming a customer: 80 % Reason: SPEC. PROCESSES

How do you consider ... generally? UNKNOWN.
FLEXIBLE ...

Market Interview of Industries:

Company: MECHANICAL ASSEMBLY SYSTEMS Person: TERRY ... Position: MAN. DIR.

Address: Box 56520, NBI. Telephone: 559762

Branch: MACHINE BUILDING Products manufactured: PACKAGING MACHINES. OVER 500 DIFFERENT MACHINES

Turnover: 5 MILL shs/year. Share of the market: ...... % LAST 10 YEARS
NO OF EMPLOYEES: 27

No. of industries in the branch: .... % in Nairobi area: ......

PURCHASE VOLUME, 1000 shs/year:

1. Dies and special tools	......	6. Heat treatment	IMPORTANT
2. Tools design	......	7. Materials testing	......
3. Specially made spare parts	......	8. Techn. advice/consult.	......
4. Prototype manufacturing	......	9. Techn. training internal	......
5. Prototype design	......	10. Techn. training	......
11. Others: SUBCONTRACTING	300	PEOPLE ABROAD	

Which of these services are most important? (No) 6-11

Which courses may be of interest? (No) 3.

Which Machines for Processing may be of interest? (No) 1 4 5 6 (7) 8 9 10-11 13 14 33

CONDITIONS FOR PURCHASE: [ ] Delivery time [ ] Price [ ] Techn. quality [ ] Development quality [ ] Communication [x] Others: TO KNOW WHERE TO GET IT

JUDGING OF PRICES: [x] High [ ] Average [ ] Low — THEIR RATE THROUGHOUT 350/-

IMPORTANCE OF ... SERVICES: [ ] High [x] Medium [ ] Low [ ] None

How are service suppliers selected? RANDOMLY

Which are your biggest problems? LIMITED MARKET SIZE

Which other services should ... provide? HARD CHROMING

How do ... overlap other suppliers? TOO MUCH OVERLAPPING PRIVATE INDUSTRY.

Likeliness of becoming a customer: 60 % Reason: HEAT TREATMENT

How do you consider ... generally? COMPLETELY UNKNOWN.

Market Interview of Industries:

Company: ... WORKS Person: ... RIZVI Position: MAN. DIR.

Address: Box 30130 NAIROBI Telephone: 557000

Branch: ... Products manufactured: ROLLING MILL, HOT/COLD FORMING, GALVANIZING 3000 t/month

Turnover: ...... shs/year. Share of the market: ...... % SMALL ...
NO OF EMPLOYEES: 2300 ... / 50 ACRES

No. of industries in the branch: .... % in Nairobi area: ......

PURCHASE VOLUME, 1000 shs/year:

1. Dies and special tools (imports)	5 MILL	6. Heat treatment	SELF
2. Tools design		7. Materials testing	SELF
3. Specially made spare parts	6 MILL	8. Techn. advice/consult.	
4. Prototype manufacturing	—	9. Techn. training internal	
5. Prototype design	—	10. Techn. training	PEOPLE ABROAD
11. Others: ... TOOL STEEL	4 MILL		

Which of these services are most important? (No) 1.

Which courses may be of interest? (No) 0. DO THEMSELVES

Which Machines for Processing may be of interest? (No) 1, 2, 6, 8, 9, 10, 11, 14, 16.

CONDITIONS FOR PURCHASE: [ ] Delivery time [ ] Price [ ] Techn. quality [ ] Development quality [ ] Communication [ ] Others:

JUDGING OF PRICES: [ ] High [ ] Average [ ] Low

IMPORTANCE OF ... SERVICES: [x] High [x] Medium [ ] Low [ ] None

How are service suppliers selected? ON EFFICIENCY.

Which are your biggest problems?

Which other services should ... provide?

How do ... overlap other suppliers? THEIR OWN CAPACITIES

Likeliness of becoming a customer: 90 % Reason:

How do you consider ... generally? NOT KNOWN.
ARRANGE AN OPEN DAY!
THEY DEVELOP AGRICULTURAL IMPLEMENTS

INTEGRATED IN ... ANALYSIS.

Appendix 19.3

LIST OF CUSTOMERS

Customer's Name	Sales	Experience
Kazuri Ltd.	171	Work OK. Time not
East African Match Co.	75	Very poor
MIU Electric Co. Ltd.	51	Very poor
Datini Mercantile Ltd.	26	Very poor
Sterling Craft Kenya	17	Very poor
Mount Kenya Bottlers, Nyeri	0	Very poor
Pan Afric Paper Mills	0	Nothing was done
Kenya Ports Authority	183	Not known
Ministry of Agriculture	73	Not known
Jua Kali Women's Textile project	58	Not known
Motor crankshaft grinders	46	Not known
Leather Development Centre	31	Not known
Malindi Industries	28	Not known
Wananchi Roofing Tiles	26	Not known
Kenya Bureau of Standards	23	Not known
Safepak Ltd	19	Not known
AMM Engineering Works	14	Not known
KIRDI	13	Not known
Highland Canners	10	Not known
Bridge Agency	8	Not known
Kenya Reclaimed Rubber	8	Not known
Wire Products Ltd. Nairobi	6	Not Known
EHG Economic Housing Group	5	Not known
Sundries	4	Not known
Struts Engineering Works	3	Not known
EMCO Steel Works, Nairobi	2	Not known
Rural Oil Processing	1	Not known
Afrotech Machinery	23	Acceptable
Yanken Industries, Nairobi	38	Acceptable
AMREF	3	Acceptable
	965	

Record of Communication with some of the past and present EDSC customers

November 17 - 19, 1993

Visit to Kazuri Beads, Karen - Miss Linda Garner:

The company makes clay products, employs 150 people and has a turnover of shs. 60.0 million. EDSC has made several machines for them:

- A hammer mill which was successful and very cheap
- A jigger for tableware which was good but had a small play in the shaft, which had been possible to rectify
- A plaster wheel which was excellent and very innovative
- A kickwheel which is good
- A flywheel press where they still are awaiting dies which were ordered together with the press, but which are now ready for supply more than one year after the press itself.

Kazuri was very pleased with the low prices and the friendly people of EDSC, but disappointed with the long delivery times and the lack of communication, during the last half year. They thought the center had closed down.

EDSC African Match Company, Mombasa - Chief Engineer - D.D. Joshi:

Mr. Joshi has visited the centre and is very impressed with the machines, but has found it very frustrating to work with EDSC. He has given EDSC 2 jobs but has got very limited response. He has been waiting for one and half years without getting problems solved. A technician from EDSC was recently there with the tools they ordered, tried it with them for 2-3 days whereafter he took it back to EDSC. Thereafter, he has not heard from EDSC.

Only some small and very simple jobs which were done under the CTA's presence were done satisfactorily and fast enough. (He thinks that the staff has no motivation or incentives and guesses that payment incentives might have helped). He has had no contact with Mr. Cvijanovic', Magore and Osogo.

MIU Electric Company - Managing Director - Mr. Njuguna

The company has a turnover of shs. 12 million and 15-25 employees. They could easily provide orders for shs. 200,000 - 300,000/year, but they have been let down by the centre's management. When the foreign officers were there they were a bit fast and efficient, but now there seems to be no motivation, discipline or care. An order for a tool was placed in March 1993 and the design was alright. It should have been supplied in July, he has put pressure on, but only now he has got the message that it is ready. He has used Metal Box for similar supplies which are much more efficient, but not always available. He has gone to EDSC several times to pressurize the matter but just met reluctuncy.

Appendix 21.1

Afrotech Machinery - Mr. Webber:

The Company is representing a German mother company and makes bottling machines for East Africa. Only one relatively simple job was done by EDSC, hardening and grinding of a disc. The job was done satisfactorily but the work which took 2 weeks could have been completed in 2 days. The price was competitive.

Sterling Craft (K) Ltd. - Mr. Kimani Rugendo:

One item of tool was delivered one year ago. The work was good, but the delivery time of 6 weeks was delayed to 4 months. No communication was given in the meantime. The center was given more samples in order to make new quotations and supplies. He called many times, but he never got any reaction at all, until he finally gave up. He was pleased with the drive of the CTA but others did not care at all. He is continously in the market for more tools and machines, and could safely provide orders of a million shillings evenly distributed over the year if only the center would care.

Mount Kenya Bottlers - Nyeri - W.N. Wangaru - Maintenance Manager:

There was a visit in 1991. EDSC collected a range of samples and promised to work and bring back product samples. They have called a number of times, but have never got any feedback, so no supplies have taken place ever. Once he was supposed to meet Mr. Magore, but did not get the opportunity. (The indepth evaluation mission report specifies that 12 orders have been executed for them. This is not correct, but refers only to the samples which were collected, but no work was done for them at all).

Associated Electrical Industries - Managing Director - Steve Kuria:

EDSC has made some small parts for the light bulb factory, controlled by the CTA. The work was satisfactory but very slow. The last job was done in February 1993.

Pan African Paper Mills, The Managing Director:

He can not recall that EDSC has done any work for them as stated in the In-depth evaluation mission report. He cannot imagine not being informed if the paper mill in Webuye had ordered the work.

Ombi Rubber Industries Nairobi, Manager - Mr. P.M. Githera

He has only got a quotation for a mould, quoted by EDSC's CTA in August 1992. He has had no other dealings with EDSC and is still confident that EDSC can do a good job for him.

SALES LETTER

Proposal for the content of a sales letter to industry

IMPORTANT INFORMATION ABOUT AVAILABLE ENGINEERING SERVICES

We have the pleasure to inform you that EDSC, Engineering Development and Service Centre, after the initial erection and training period, now has started its regular services to Kenya industry. All new machines are in position ready to serve, and the staff has been trained.

As you can see from the enclosed brochure, the plant is unique and without any comparison in Kenya. All machines are brand new, and include equipment for machining, grinding, heat treatment, tools maintenance and repair, sheet metal work and welding. Design departments for tools and machinery manufacture with well trained engineers are also located within the heart of the centre, conveniently located close to industrial area in Nairobi.

The establishment of the centre has been supported by the UN system, a part of the reason why the centre can offer high-tech. jobs at affordable prices.

In addition to doing individual design jobs and machining jobs for you, the Centre is also ready to undertake the following services:

- Design and/or manufacture of tools, dies, jigs, fixtures and manufacturing equipment
- Design and/or manufacturing of prototypes for industrial metal products
- Repair of most kinds of metal cutting tools
- Manufacture of special spare parts
- Heat treatment of metal products
- Testing of materials and products
- Technical advice within tools design and manufacturing, metal design and metal products
- Training of engineers and technicans

When time allows we can also help you with manpower assistance for your own design work, and you can hire machine time from any of our specialized equipment.

At a later stage we expect that specialist advice will also be available within foundry technology, and a range of technical training courses will be presented.

Our capacities are limited. Please bring your enquiries and orders now. You are also welcome to visit us and see for yourself the plant and the workmanship we have ready for you.

Recommended 6 page brochure on A4 sheet

EDSC TRAINING PROGRAMME:

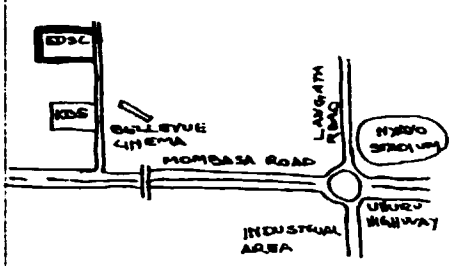
The centre holds concentrated training courses over 1-5 days, withing the following and other topics:

- Technical drawings and design of machinery
- Design of tools, jigs and fixtures Product Development with Value Analysis
- Efficient Operation and maintenance of metal working machines.
- Heat treatment of Metal Products. Selection of steel qualities.
- Testing of materials and Machine components. Quality Control.
- Precision measurements and tolerances.
- Production planning
- Reconditioning of tools in the mechanical industry.
- Introduction to modern methods of welding.

ASK FOR EDSC COURSE PROGRAMMES

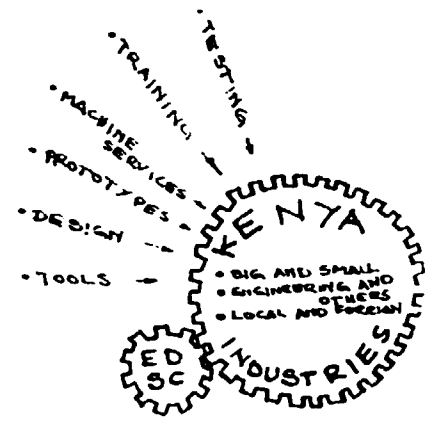
CONDITIONS OF SUPPLY:

LOCATION AND ADDRESS:



EDSC
ENGINEERING DEVELOPMENT AND SERVICE CENTRE
PHONE 504866-7 505269
FAX 505546 TELEX 23033
P.O. Box 30218
NAIROBI.

ENGINEERING DEVELOPMENT AND SERVICING CENTRE



WHAT THE CENTRE CAN DO FOR YOUR INDUSTRY →

THE IDEA OF THE CENTRE:

GTZ and the kenya government has seen that the industry has problems in obtaining qualified high-tech machine services within kenya.
The Centre has therefore now been established to help alleviate this problem.
Quality expert services should be available fast and at reasonable prices.

HOW TO QUALIFY FOR HELP FROM THE CENTRE

The Centre is open for all manufacturers in Kenya. Big scale as Small scale industry, Jua kali as well. The whole Engineering industry is an obvious user of the services. But the Centre is open also for all other producers!
The only criterium is that the tasks should have industrial development effect.

AVAILABLE RESOURCES:

In addition to an intact, well equipped and ready plant of unique machines, the centre has in stock a wide range of tool steel in a variety of qualities.
The plant is operated for you by specialists and foreign experts.

THE CENTRE CAN DO A LONG RANGE OF COMPLETE JOBS FOR YOU - MANY WHICH NOBODY ELSE IN KENYA CAN OFFER:

As far as the capacities of the entre reaches, it can do:

TASKS OF PRIORITY 1:
- Design and manufacture of tools
- Design and manufacture of prototypes based on orders
- Manufacturing of tools
- Maintenance of tools
- Advice on design and manufacture of tools
- Improvement analysis for industrial products
- Advice on foundry technology (by specialist)
- Training courses within selected technical subjects

TASKS OF PRIORITY 2:
- To provide manpower assistance within design
- Repair of machines
- Manufacturing of spare parts
- Saw doctoring

TASKS OF PRIORITY 3:
- Production of product components for industry
- Manufacturing of production equipment

JUST BRING YOUR ORDER OR ENQUIRY!

HIG-TECH. MACHINE - SERVICES REASONABLY AVAILABLE:

These are some of the new precision equipment/services and possible work piece dimensions:

- JIG BORING mc. 400x420x250mm
- JIG GRINDING mc. 300x500mm
- SURFACE GRINDING mc. 810x405mm
- UNIVERSAL TOOL MILLING mc 1200mm
- TOOL and CUTTER grinding
- SMALL & BIG LATHES (2500x600mm)
- BIG (450mm) and SMALL SHAPING
- RADIAL BORING mc (1000mm arm)
- METAL BAND SAW (to 380Ø/450mm)
- CYLINDER GRINDING inside/outside
- TWIST DRILL RECONDITIONING mc
- SAW BLADE GRINDING mc. 650x70mm
- AIR COMPRESSOR, 290kw-4001/sec.
- ECCENTRIC PRESS, 63T.
- HEAT TREATMENT 500x315x200mm
- WELDING, MIG/MAG, Spotwelding
- SHEET METAL WORK
- TESTING OF: Hardness, Fatigue resistance, Impact strenght, Tensile strenght, Critical revolution speed, Stress distribution, Tread loads, Torque resistance, Elasticity module, Micro shapes (3-d microscope and profile projector)
- Precission marking and measuring
- DESIGN of tools, machines and prototypes
- VALUE ANALYSIS of industrial products
- FOUNDRY expert assistance

ALL THESE MACHINES ARE READY FOR YOU. AN UNIQUE PLANT OPERATED BY SPECIALIST: KE, FOREIGN EXPERTS!

VALUE ANALYSIS OF INDUSTRIAL PRODUCTS

A short working guide

Most industrial products design suffer from the following:

- Not all important functions or characteristics which the products should have are well covered
- Unimportant and unwanted functions cost too much
- Waste of, or unnecessary use of costly materials

Designs should be analyzed in order to improve the products and reduce their costs. The following working sequences have proved efficient in achieving drastic improvements in improving product characteristics and reducing costs. It is called Value Analysis:

1. Collect information about the product
2. Determine the functions of the product
3. Develop ideas for improvement (Brain storm)
4. Turn the best ideas into constructive ideas
5. Evaluate the solutions
6. Develop the solutions further
7. Calculate costs and make choices
8. Make prototype, try it out, discuss again and implement the improvements

The mentioned steps should be made one by one in the mentioned order as follows:

1. Collect information about this product.

Specify all costs individually for all items. List the costs of all material components and working processes. Add the costs together item by item. Do not include overheads.

If possible find out how the product is being used by the regular users, what their complaints and special desires are. See what the product looks like after long time use; see which of its characteristics or functions have not been used and which have been extensively used. See what appears to have been too weak, and what has been too strong. List all available comments.

2. Determine the functions of the product

On basis of the information, list all important functions that the product should have. (Those may be different from the functions the product at present actually have).

Be brief in listing the functions, preferably limit the description to two words, a verb and a noun. Include necessary working functions and also desirable appearance functions.

For each function specify importance and present coverage (Scale: 1 = unimportant or poorly covered. 10 = absolutely necessary or fully covered).

When applicable also determine function specifications. A part of the function list may as an example appear as follows (for a wick-stove).

Function	Importance (1 - 10)	Coverage (1 - 10)	Specifications
UTILIZE ENERGY EFFICIENTLY	6	8	
SAFE AGAINST FIRE	10	6	
PREVENT SMELL & SMOKE	8	7	ALSO DURING START, STOP & MISADJUSTMENT
AVOID SPILLING FUEL	6	2	PERMIT TILTING/SHAKING
EASY CLEANING/MAINTEANCE	4	8	NO DISMANTLING
DURABILITY	4	3	5 YEARS
APPEARANCE	5	8	

3. Develop ideas for improvement (Brain storm)

Now look at the costing and the list of functions: Does it all make sense? Is there really any reasonable relationship between the cost on one side, and the importance and coverage of the functions on the other?

What ideas can you make that will:

- Reduce cost (and still maintain the important functions)
- Improve coverage of functions?

Also pay special attention to:

- high costs
- costs apparently easy to reduce
- poorly covered functions
- lacking function

Adhere to these rules during the brainstorm:

- When possible put together a small group of people for the brainstorm, ideally 3 - 5 people
  The brainstorm may be repeated in other groups of people.

- Ideas should be welcomed on all levels, from details in processing to completely new designs or products.

- Get as many ideas as possible, and note them all down in a list, also the crazy ones. Make sure that all aspects of costing and functions are adhered to.

- Do not allow any criticism of ideas at this stage. Instead of criticizing, try to find better ideas yourself, making use of the positive elements of other ideas but avoiding their weaknesses.

- Information to show weaknesses of ideas is not permitted at this stage. Only information that encourages further ideas should be permitted.

4. Develop the best ideas into constructive solutions

First when a long list of ideas is available, try to make practical constructive and low cost solutions out of them. Make several rough drafts, also presenting different solutions to the same matter.

Do not go in great detail, but try to get the best, both out of alternative ideas, and ideas covering different matters of the product.

5. Do evaluation of the solutions

Now do a proper evaluation of the proposals. Are they really good enough? Are they too costly?

What is wrong with the ideas? At this stage you may very well sit together in a small working group again. You may now use a negative brainstorm, trying to find all problems, difficulties, loop-holes and shortcomings of the proposals. You may also make criticism without being fully sure about its validity.

You should also give proposals for further improvements. Conclude the discussions into a workplan for further development.

6. Develop the solutions further

Use the conclusions from the evaluation session and be sure that faults are rectified and/or that the criticism is not valid.

7. Calculate costs and make choices

Now calculate the costs of the practical workable solutions and alternatives.

Are the solutions really so much better and/or cheaper that they deserve to be implemented? Where alternatives exist, which of them provides the best improvement in cost and functions? Make the choices!

8. Make prototype, try it out, discuss again and implement the improvements.

Before final implementation be sure that the alterations really are as good as expected. When necessary make prototypes and have them tried in the practise. Discuss with the regular users as may be required.

Appendix 24.4

TRAINING COURSES - Proposed to be offered from EDSC

	Duration Days:	Times annually:	
1.	3	1	How to make technical drawings (You will be training on the drawing of spare parts) (Step 1)
2.	5	1	Design of Machinery (You will start with making sketches and complete the drawings for your machine) (Step 2)
3.	3	1	Design of press tools for sheet metal production. (You will make your designs yourself) (Step 3a)
4.	3	1	Design of jigs and fixtures in mechanical industry (You will make designs for the requirements of your product) (Step 3b)
5.	3	2	Product Development, Value Analysis and Value Engineering (How to improve and at the same time reduce the costs of your products. Bring your sample with you!) (Step 3c)
6.	2	1	Efficient Operation of Lathes and Regular Metal Working Machines. Maintenance of the machines. Get higher performance, and a wider range of operation possibilities out of your machine!
7.	2	1/2	Efficient use and selection of more advanced Metal Working Machines.
8.	2	2	Heat treatment of Metal Products. Selection of steel qualities.
9.	1	2	Testing of materials and Machine components. Physical Quality Control. Precision measurements and tolerances.
10.	2	2	Production planning for metal work. Calculation of time requirements for the various machines and processes, based on drawings.
11.	2	1	Reconditioning of tools in the mechanical industry. (Press tools and cutting tools)
12.	2	2	Introduction to modern methods of welding. Including MIG and TIG welding, cast iron gas welding of broken machine parts, welding of aluminum alloys and stainless steel.
Total.	39	course days annually	

Appendix 25

UNIDO/EDSC, BE, November 26, 1993

Questionnaire to EDSC employees:

Can you please answer these questions as honestly and completely as you are able to. Your replies will not in any way be disclosed to anybody in the management or anybody at all except me personally. I will use it in making proposals for a better EDSC in the future. You will in no way be disclosed in the report. Please deliver the filled sheet personally to me today. Thank You for Your Help!

Bjorn Eidsvig - UNIDO Consultant.

Name:..... Title:.....

Specify the major duties you perform. Mention the most time consuming ones first:

1:..... 2:.....
3:..... 4:.....
5:..... 6:.....

Are you completely satisfied with your work and work situation? If not, please explain why:

.....
.....
.....

What percentage of your daily working hours is efficiently utilized:....%

How can it be possible to get better results of you and your working hours?

.....
.....
.....
.....

Which work are you able to do for EDSC, which you presently are not requested to?

.....
.....
.....

How can EDSC be of better services to the development of Kenya:

.....
.....
.....

Where do you think you should be working in two years from now, and which work should you be doing by than?

.....
.....
.....

Other important thoughts:

.....
.....

UNIDO/EDSC, BE, December 10, 1993

THE DELIVERY TIME FOR DESIGN AND MANUFACTURING OF a PROGRESSIVE DIE FOR PRODUCTION OF A BATTERY TOP for East African Match Company, Mombasa (An example):

The Company complains heavily about the delivery time for the die, which was not specified in advance. The quoted price shs 71.943,80 appears to be much too low. The work has taken 1 1/2 years and is still not completed. The development appears to have been as follows:

Date:
? A visit to the company was made and an inquiry was received
2.7.92 A proforma invoice, together with an invoice for prepayment of 50% of the cost was issued
2.9.92 Part payment was received and the work could start
10.9.92 The design work started
4.11.92 The design was ready from the engineer
4.12.92 The drawing was completed in ink from the draughtsman
5.1.93 The drawing was checked by the head of department
19.1.93 The drawing was approved by the CTA. Approval by the customer was not requested.
25.1.93 Manufacturing started.
25.3.93 The customer in Mombasa was visited. It was discovered that the tool could not fit on their press. Manufacturing was stopped, and the matter was taken back to the drawing board.
? The drawings were completed
? Manufacturing was resumed
July 93 The tool was ready, and one awaited authorization of funds from UNDP for travel.
Sept 93 Funds were approved. One awaited approval to travel.
4.10.93 Approval was ready. One awaited new rates of DSA.
18.10.93 Preparation for the journey started
24.10.93 Testing the tool in Mombasa started.
29.10.93 The tool was taken back for modification, which it still is undergoing.

It seems from this, and from other examples that major reasons for extensive delays are:

- The different jobs take too long to do, too many working hours are spent. Lacking training and motivation are indicated as reasons for this.

- Inadequate prices and improper cost calculation of jobs, e.g. not allowing for travel if that is required.

- Waiting time, much attributed to limited planning

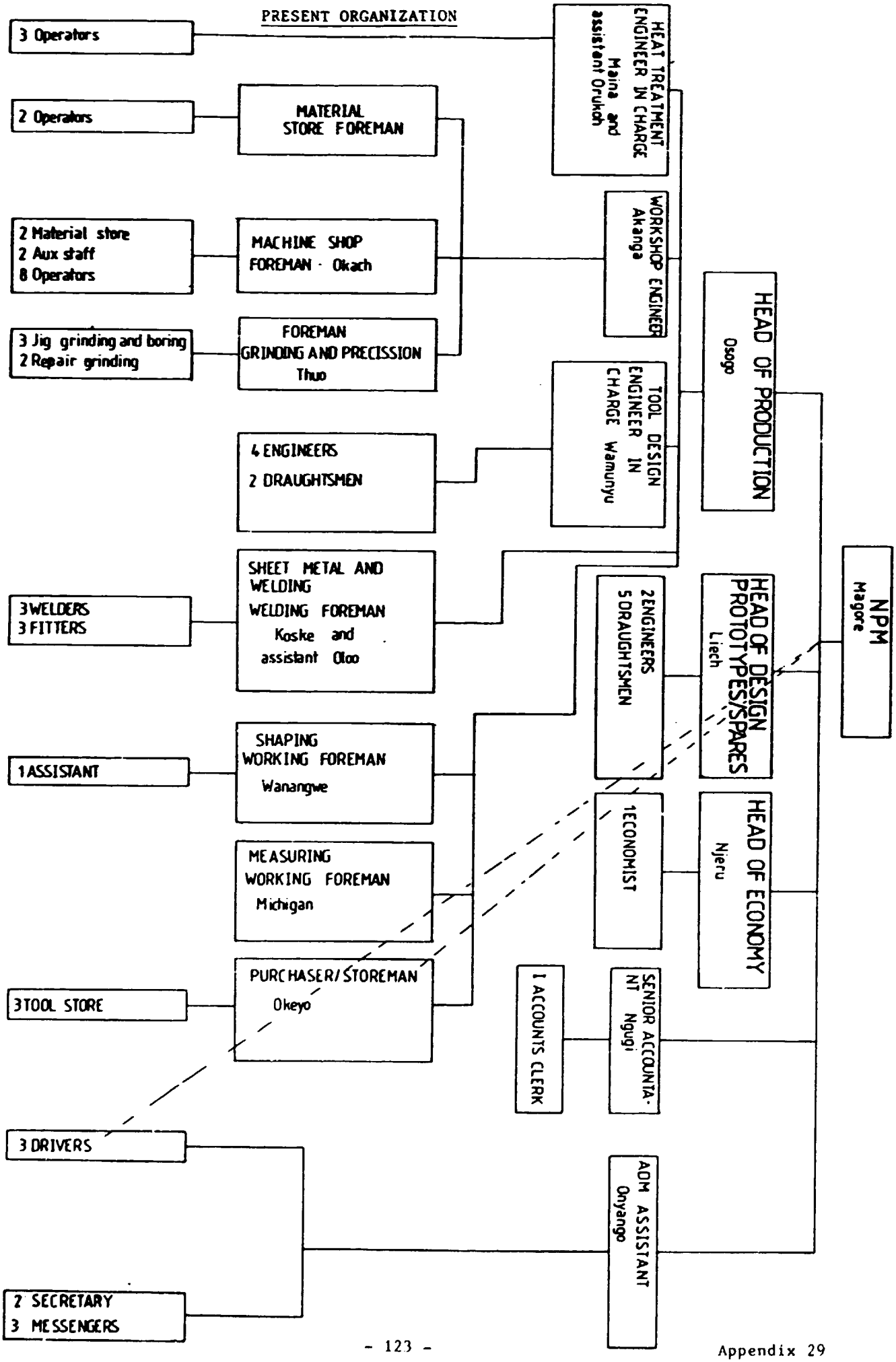
- Bureaucratic procedures

- Reworking. Partly due to lack of pre-investigations and proper communications with customers

The extended delivery times and unreliability of supply with lack of communication is the most serious complaint from the customers. This must be taken very serious. The following measures are proposed:

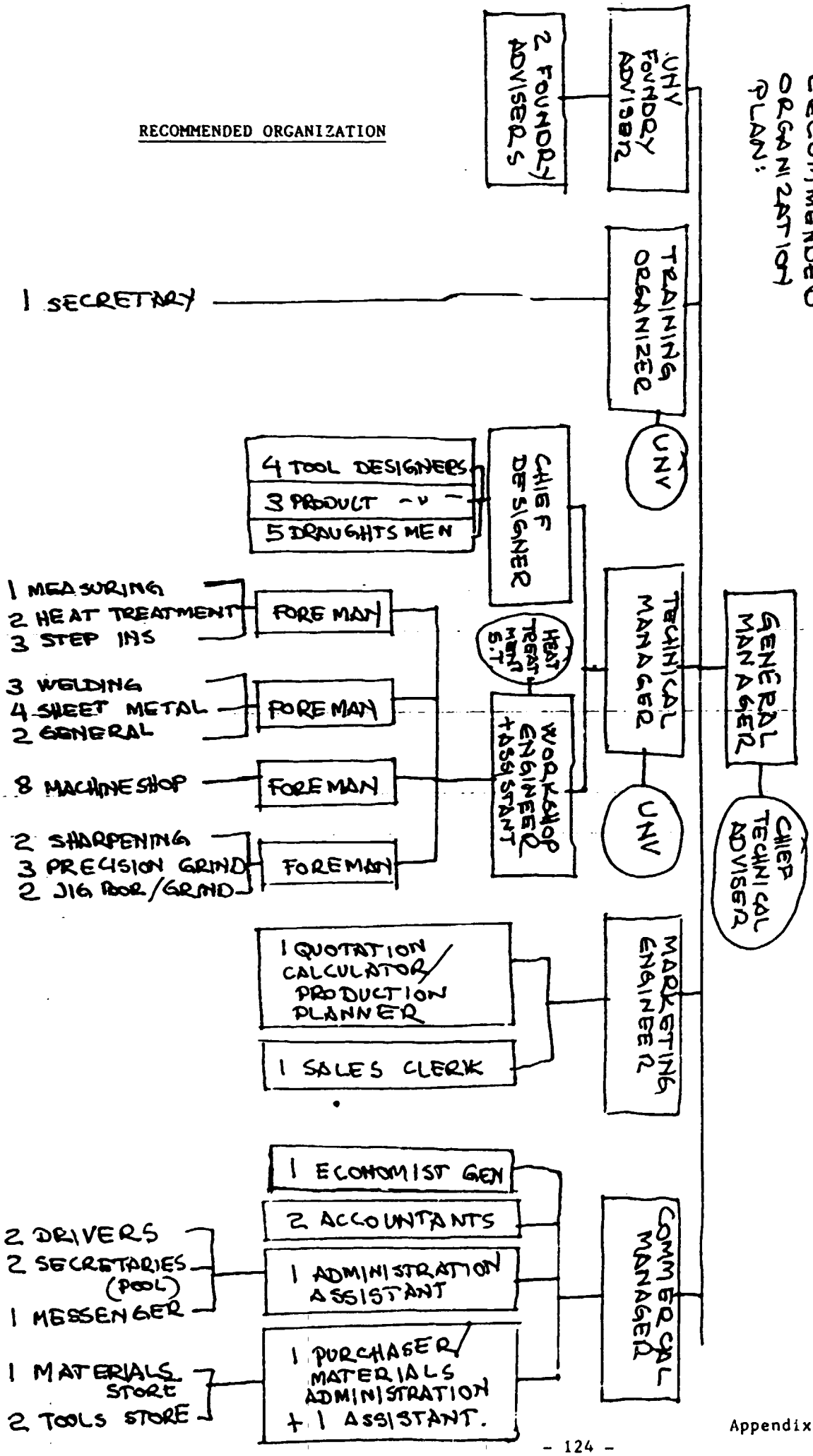
- Proper cost calculations, including overheads and all costs involved in the job. (A new calculation format and form is included in the report)
- Production planning, calculating and specifying delivery time to the customer.
- Quoting the jobs of design and manufacturing (possibly also testing) separate from each other to the customer. First should design be completed, approved by the customer and paid. Thereafter may manufacturing be ordered and executed according to the approved drawings. If transport or testing is required, that must be quoted specifically, or left with the customer to do.
- Specifying to the customer which costs are included in the quotation, and which he possibly should cater for himself (e.g. testing)
- Initiatives to the necessary communications must be taken. (Whenever problem arises or delays are foreseen)
- The real job costs must be calculated after completion and compared with the precalculation.
- Initiating incentives/motivation in the workshops
- Streamlining procedures as recommended. (E.g. on purchase)

	FOUNDRY	LOCATION	ADDRESS	TEL. NO.	PERSON TO CONTACT
1.	East African Foundry Works (K) Ltd	Baba Dogo Rd Ruaraka	Box 48624 NAIROBI	802604-7	Mr. Ramesh Shah
2.	Alloy Steel Castings	"	"	802605-7	Mr. Jaspal Singh Sagoo
3.	Harrtz & Bell Engineers	Workshop Rd	Box 40185 NAIROBI	556890/ 556689	Mr. Mubarak Ali
4.	Kenya Railways	Workshop Rd	Box 30121 NAIROBI	221211	Mr. Adhosh
5.	Kens Metal Industries	Lusaka Rd	Box 45726 NAIROBI	555455	Mr. M. L. Pendolia
6.	Jua Kali Castings	Kariobangi R/About	Box 77292 NAIROBI	791293 795053	Mr. Makinya Gechege
7.	Kenya Castings	Likoni Rd	Box 74654	555065 542747/8	Mr. Kibui
8.	Dynamic Engineering	Enterprise Rd	Box 46235 NAIROBI	555455	
9.	Rubani Engineers	Enterprise Rd	Box 40439 NAIROBI	558920 554965	Mr. K. Awau
10.	Dynamics Gen. & Heavy Industries (K) Ltd	Isiolo Rd	Box 54392	555455	
11	Foundry Workers Ent.			760856	
12.	Beta Engineering	Likoni Rd	75809 NAIROBI		


PRESENT ORGANIZATION
3 Operators
2 Operators
2 Material store
2 Aux staff
8 Operators
3 Jig grinding and boring
2 Repair grinding
3WELDERS
3 FITTERS
1ASSISTANT
3TOOL STORE
3 DRIVERS
2 SECRETARY
3 MESSENGERS
MATERIAL STORE FOREMAN
MACHINE SHOP FOREMAN - Okach
FOREMAN GRINDING AND PRECISSION Thuo
4 ENGINEERS
2 DRAUGHTSMEN
SHEET METAL AND WELDING
WELDING FOREMAN
Koske and assistant Otoo
SHAPING WORKING FOREMAN
Wanangwe
MEASURING WORKING FOREMAN
Michigan
PURCHASER/STOREMAN
Okeyo
HEAT TREATMENT ENGINEER IN CHARGE
Maina and assistant Orukoh
WORKSHOP ENGINEER Akanga
TOOL DESIGN ENGINEER IN CHARGE Wamunyu
2ENGINEERS 5DRAUGHTSMEN
1ECONOMIST
1 ACCOUNTS CLERK
SENIOR ACCOUNTANT Ngugi
AOM ASSISTANT Onyango
HEAD OF PRODUCTION
Osogo
HEAD OF DESIGN PROTOTYPES/SPARES
Liech
HEAD OF ECONOMY
Njeru
NPM
Magore

Appendix 29

RECOMMENDED ORGANIZATION



Appendix 30

EDSC DELIVERY AND PAYMENT CONDITIONS:

Validity: As long as no other specific written agreement is entered into for individual supplies, the conditions specified below are valid for all supplies from EDSC to any customer for any order or agreement. The conditions are valid for any new agreements as from the 5/12-1993 until the customers may be informed about possible changes. Possible changes can only have validity for new agreements entered into after such information.

Design and manufacturing:Job orders may be accepted separately and individually for any of the following jobs:
Evaluations - Sketch making - Design - Item manufacturing or repair - Delivery - Fitting into customers equipment - Performance testing.
If EDSC is requested to do both design and manufacturing of an item, this will undertaken as two separate jobs. After completion of the design job, customer approval of the drawings is required for the work to proceed. The customer is free to do any consultation concerning the design, and EDSC will consider requests for adjustments. After approval the design remains the responsibility of the customer.
Manufacturing will be undertaken in accordance with customer's or EDSC design.
Delivery, fitting and testing will not be included in the work of EDSC unless specifically quoted for.

Responsibilities: When a design is approved by the customer, it remains his property and responsibility unless otherwise agreed. When manufacturing has been completed in accordance with drawings, EDSC's responsibilities are fulfilled. Possible alterations will be charged at cost price.

Delivery time: EDSC will do its utmost to keep the delivery time which may be indicated, but will not be bound to it unless specifically agreed. If delay from one or another reason may occur, the customer will be kept informed. EDSC will not be held responsible for delays, on which it has no control or which are due to the arrangements of the customer.

Price estimate or fixed price: If a fixed price is given, EDSC will stick to it unless changes in the market, outside the control of EDSC occur. In such cases EDSC will justify the alterations.
If the price is not declared to be fixed, it is a price estimate. If a price estimate will be exceeded by more than 20%, the customer will be informed and is free to stop the work. He will in such cases only be responsible for the costs already incurred.

Payment: Unless otherwise specified, jobs must be paid 50% before work or purchase can start. The balance is due at collection or before dispatchment. The balance of payment for design work must be paid 80% at completion, and fully at approval.

Design work must be fully paid before manufacturing of the item can start.

Overdue interest: Overdue accounts will be charged 2,5% interest per month or part thereof, from the time an item is informed to be ready for collection. Overdue interests are due for payment before collection.

Order cancellation: A customer is free to cancel a job at any time. His obligations will in such cases be limited to pay the part of the price which corresponds to the part of the costs undertaken by EDSC. Items and committments provided may be demanded upon payment of due balance.

THE PURCHASE PROCEDURE:

The purchasing is extremely slow and inefficient. It works as follows:

1. The demand is recognized. (No stock control is kept and no order point in terms of how many should remain in stock when a new purchase is initiated. Therefore purchase will generally not be initiated before the moment when the stock is empty and the item is urgently needed)

2. A request form is filled by the one who need it, and passed to the head of department.

3. The head of department signs and hand it over to the store/purchaser.

4. The purchaser (if the value is for over shs.. 2000) collects 3 offers. The offers must be in writing. The purchaser therefore when a vehicle becomes available, physically visits the suppliers and collects the quotations.(Possibly the quotations will come only later). The suppliers know the complicated procedures, and will therefore often not offer the most reasonable price.
The same rule applies even if a similar item was bought 2 months ago.

5. The purchaser passes the form, possibly with quotations, on to the NPM who signs and passes it over to the accountant.

6. The accountant prepares a voucher draft.

7. The voucher will be typed by a typist.

8. When a vehicle is available, the voucher is taken to the KIRDI director at the old site for signature.

9. When the voucher is brought back, the accountant writes a cheque.

10. The cheque is taken first to the NPM for signature, and thereafter when a vehicle is available to the KIRDI director at the old site for counter-signature.

11. When the cheque comes back, the purchaser will in turn be informed that he can collect the cheque at the accountant's office, where he signs for it.

12. When a vehicle is available, the purchaser goes to the bank to withdraw the money in cash.

13. When a vehicle again is available, possibly in the same journey, the purchaser goes to the shop, pays and get the goods.

13a. If the shop in the meantime has sold out its stock, or prices have increased, the same procedure may start all over again.

14. The head of the working department will receive the message that goods has arrived, and where it may be collected and signed for.

15. The department head passes the message over to the one who needed the goods, and they go together to the stores, the needy to collect the goods (if it still is needed) and the head to sign for it.

(Even a speedy expedite execution of the procedure may of course take weeks)

An imprest system is also practised, where certain officers, in addition to concrete requirements, going through the above procedure, can add on a lumpsum amount to cover additional costs to come. The disposition of this lumpsum becomes simpler, and has limited control involved. This is, however, limited to purchases of less than shs 2000 in value.

CUTS FROM:

NS 5801

Requirements for the contractor's quality assurance
Quality assurance system

Contents

1 General requirements

The contractor's quality assurance shall be systematically composed and documented. The general description of the contractor's quality assurance shall be summarized in a quality assurance manual. This shall be built upon the basis of existing job procedures and instructions and what is required elaborated in accordance with this standard. These job instructions shall be cited under each chapter.

In addition to informing the employees about their responsibility and duties in quality matters, the quality assurance manual shall also document the contractors' quality assurance for his customer.

In addition, a more detailed description of the quality assurance for the contract, product or service, in question, shall be prepared.

Personell carrying out work of significance for the quality shall have the necessary qualifications and background for such work.

Comments

The quality assurance manual should contain the contractor's quality objective, endorsed by the contractor's top management, a general description of how the requirements in this standard are met, and a survey of how the remaining quality assurance documentation is composed, what it contains, its distribution and how it is kept updated.

2 Organization

The contractor shall have established and documented an organization which clearly shows how the contractor's different tasks are distributed between departments, and it shall show the responsibility and the authority assigned to these departments in order to perform their work. Job descriptions shall be prepared to the extent necessary.

There shall be a person within the organization with sufficiently defined responsibility, authority, resources and organizational freedom to perform the following tasks.

- plan and maintain the contractor's quality assurance program,
- verify that specified requirements are met,
- implement the measures or solutions necessary to ensure quality,
- plan and perform quality audits.

Comments

The requirement to establish an organization cannot be met only by preparing organization charts for the activities. It also demands preparation of job instructions which define responsibility and authority relationships for the most important quality-influencing functions. Such job instructions and organization charts should be collected in one place, e.g. in an organization manual or in the quality assurance manual.

The requirement that the contractor's mananger for the quality department shall have organizational freedom, usually implies that he has an independant position in the organization, with direct responsibility to the top management and is not charged with other quality influencing functions.

It is a basic principle that it is the person who performs a task who is responsible for this resulting in the prescribed quality. Verification that the quality requirements are met shall be carried out by personnel other than those who have performed the work.

3 Planning

The contractor shall review the customer's requirements as early as possible to ensure that they are met. On the basis of this review, the contractor shall plan the various quality assurance activities. This planning shall be integrated in the contractor's total planning which includes:

- preparatory study and contract definition
- development, design and testing
- procurement and production
- delivery and service

Appendix 33.1

4 Job instructions and procedures

Unambiguous job instructions shall be formulated, as shall procedures stating by whom and in what way the work shall be carried out where such job instructions and procedures are necessary for ensuring quality

The work instructions and procedures shall be adapted to the situation in question, and shall, as far as necessary, include design, performance, planning, purchasing, production, inspection, control of non-conformance, handling, storing, installation, functional testing and every other treatment of product(s), facilities and equipment from the start of development to finished delivery

Comments

Job instructions and procedures shall ensure correct understanding and performance of the task and give satisfactory continuity in the work, even if the personnel changes

Usually a distinction is made between general and special job instructions. General job instructions may describe work procedures and lines of responsibility which have general validity in the company over a longer period of time.

Special job instructions will be based on definite products, processes etc and have limited validity.

5 Documentation and changes

A system shall be established which ensures control of validity, publishing and distribution of documentation required in accordance with this standard. This includes:

- verification and approval of documentation;
- that changes in documentation shall be verified and approved by the same authority which approved the original documentation;
- that only the correct edition of the relevant documents is available when and where the activity in question is carried out;
- that all changes are recorded

Comments

With respect to the documentation required in accordance with this standard, not only drawings and specifications are meant, but also all other documentation which is necessary for a satisfactory quality assurance, e g procedures, job instructions, standards, etc

6 Development and design

A system shall be established which ensures that development and design are performed under controlled conditions in order that specified requirements are met

This includes, for instance, the preparation of procedures for

- performance of development and design activities
- continuous updating of the requirements and documentation of the results
- checking of technical documentation
- design review
- design approval

Technical documentation shall be checked by personnel who do not have direct responsibility for preparation of this documentation.

Comments

Design review may be performed at different stages of the development and design phase to ensure that technical features, such as functional requirements, environmental requirements, safety requirements and requirements as to suitability for production, use and service, are met.

All instances which shall work on the basis of documentation resulting from development and design should normally participate in the design review. Design documents released for production shall be approved, and may only be changed in accordance with stated procedures, (see clause 5).

7 Subcontracts

General

A system shall be established which will ensure that all purchased products and services are in accordance with specified requirements.

The selection of subcontractors and the quality assurance which shall be required of them are dependant on the nature of the subcontract.

A systematic procedure for approval of subcontractors and following up of their ability to meet the specified requirements shall be established.

Purchasing document

The contractor's purchasing documents shall contain a clear description of the products and services ordered. The description shall, as far as necessary, include a clear identification of the relevant edition of specifications, drawings, process requirements, quality assurance requirements and other relevant requirements.

Incoming inspection

The contractor shall verify that products received are in accordance with specified requirements. When determining the type and extent of incoming inspection, consideration shall be taken of the inspection carried out by the subcontractor and the documentation presented

9 Measuring and testing equipment

A system shall be established which ensures

- the acquisition of satisfactory measuring and testing equipment for inspecting, testing and verifying that products and services are in accordance with the specifications
- that such equipment is registered, stored under proper conditions and used as intended, by qualified personnel
- that such equipment is calibrated, that the calibration is documented and that the equipment is clearly marked with calibration status

Measuring and testing equipment used by subcontractors shall be subject to the same requirements as apply to the contractor's equipment

Comments

The degree of confidence in measuring and testing procedures, whether they are carried out in connection with design, development or production, is dependant on the accuracy and reliability of the measuring and testing equipment. It is, therefore, required that the necessary equipment is available and that it is used in a correct way.

Measuring and testing equipment does not include only general measuring instruments and general mesasuring tools, but also special equipment used for inspection purposes. Examples are jigs and fixtures which are used during production of a product or for performance of a service.

Measuring equipment, measurements and calibrations do not need to be possessed or executed by the contractor himself, but may be hired or executed by an external institution

Systems for calibration of measuring equipment are described in among others Norwegain Defence Standard FS 7610-1006, AQAP-6 and in BS 5781.

10 Production

General

Production shall be carried out under controlled conditions. This includes use of procedures which state production and inspection methods, professional execution, appropriate production equipment and possible special environmental requirements.

Controlled conditions also include that all necessary technical documentation is available at that place and time the activity in question is to be carried out.

Professional execution shall be specified as far as necessary by means of standards, job instructions etc.. The contractor shall perform the necessary verification of processes and equipment and make provision for the necessary inspection after working operations and processes have been carried out.

A system for preventive maintenance shall be established.

Comments

Evaluation of the professional execution may be difficult in many cases. This applies especially where the quality parameters cannot be measured or quantified by means of instruments or the like. In these cases, work standards which show satisfactory execution may be used

Special processes

The contractor shall establish a system which ensures that all special processes which are used during fabrication and inspection of a product or performance of a service are carried out under controlled conditions and in accordance with stated requirements

Equipment and environmental conditions, which are of importance for special processes, and the qualifications of the personnel who shall control and carry out these processes shall be specified. Personnel working on such processes shall be certified if this is required in the contract or contract documents. The processes shall be described.

Comments

Some special processes are so complex and specialized that extensive procedures are necessary for ensuring correct sequence and execution of the different work operations.

By special processes in this connection are meant, e.g., welding, brazing, soldering, casting, forging, moulding, machining of plastic and wood, heat treatment, electrolytic coating, coating with chemical film, painting and other surface treatments. Special processes also include non-destructive testing e.g. temperature and humidity cycling, radiography, magnaflux, penetrant inspection, ultrasonic inspection and hardness testing and destructive tests e.g. chemical and spectrographic analysis, salt spray testing and mechanical tests, such as tensile tests, cutting, impact tests

11 Inspection status

A system shall be established which ensures indication of a product's inspection status during all stages of manufacture. The contractor shall be able to distinguish between inspected and uninspected products by using some suitable means of identification such as stamps, tags, routing cards, move tickets or other check devices.

Comments

Usually three kinds of inspection status are applied, according to which the product may be

1) not inspected
2) inspected and approved
3) inspected and found non-conforming

12 Records

A system shall be established for recording and storing observed data which show if the specifications' requirements are met. Records from subcontractors may be a part of this documentation. The documentation shall, as far as it is possible and necessary, contain an explicit identification of the material, part, sub-assembly, equipment, subsystem or system, the nature and number of observations made, the number and type of non-conformances found, the quantities approved or rejected, and the nature of corrective action taken.

The data obtained shall be analysed by the contractor and used for maintenance and improvement of the fabrication process. The records shall be stored by the contractor for as long as agreed with the customer.

Comments

For the contractor, the records are an important tool for control of the whole fabrication process and they are also a useful source of information for a possible later assignment of a comparable nature. For the customer the records are an objective proof that the product or the service is in accordance with the contract's requirements.

13 Non-conformance

A system shall be established which ensures satisfactory control and treatment of non-conforming products and documents.

Non-conforming products and documents shall be identified and marked and if necessary segregated from other products and documents.

The system shall include rules about who has the responsibility and authority to decide non-conformance, and what inspection or testing non-conforming products and documents shall be subjected to after e.g. repair or correction.

The results of non-conformance treatment shall be recorded.

Comments

Most processes will produce some products or documents which are not in conformance with the specified requirements. Therefore, procedures shall be established which ensure correct treatment of non-conforming products and documents.

Decisions on further treatment and application are often referred to a Material Review Board.

Possible decisions may be rejection, repair, correction, limited use or full use in spite of non-conformance.

14 Corrective action

The contractor shall establish procedures designed to detect and correct any condition which causes or may cause non-conformance.

This includes:

- analysis of non-conforming products, services and documents to determine the cause of non-conformance and the corrective action needed,
- analysis of processes and operations to detect the cause of non-conformance and determine the corrective action needed,
- procedures which ensure that corrective actions are accomplished, documented and checked.

Comments

Non-conformance is often caused by incorrect working methods in one or more stages from development to delivery, and may often be due to deficient training, deficient or incorrect job instructions, etc.

Quick identification and elimination of causes of non-conformance is an important part of the quality assurance. Segregating non-conforming products and services are not sufficient. Causes of non-conformance must also be found and eliminated to prevent repetition.

Procedures for elimination of causes of non-conformance may also cover products and services from subcontractors.

15 Final inspection

A system for performance of final inspection shall be established.

If the result of the final inspection leads to a product or service being corrected, repaired or modified, a new final inspection shall be performed as far as necessary.

Comments

Final inspection is necessary for verifying that the product meets the contract's requirements.

For some operations and processes inspection at an intermediate stage is sufficient to verify conformance with the contract's requirements. In such cases the final inspection shall include verifying previous records.

16 Quality audit

A system for quality audit shall be established. The audit shall be performed in accordance with a specified plan which states on which items an audit shall be undertaken, how the audit shall be performed and when it shall be carried out.

The audit shall be performed by qualified personnel who are not directly responsible for carrying out or inspection of the activity being audited. The results of the audit shall be documented and corrective actions shall be initiated if necessary.

Backstopping officer's comments

We have reviewed Mr. Eidsvig's final report and our comments are as follows:

1. In a relatively short period of time (1.5 months), Mr. Eidsvig has managed to capture and present a clear view of the current management and engineering picture at EDSC. Unfortunately, both pictures are rather negative.

2. The management of EDSC has failed to develop a coherent commercial, structural and marketing programme that can respond effectively and quickly to requests for work from industry as well as publicize the services and capabilities of EDSC. EDSC is a relatively unknown entity to the local industrial and commercial sectors! This is very unfortunate considering the resources that have been poured into its plant and equipment.

3. We support Mr. Eidsvig's conclusion that the management of EDSC is primarily responsible for its poor performance. We strongly support his recommendations to replace the general manager and all department heads, to establish EDSC as an autonomous centre governed by a project steering committee independent of direct interference by KIRDI and to introduce engineering, costing, and production planning and control systems that delegate responsibility and periodically track and report performance against plan.

4. We strongly urge all relevant parties to review this report, including the technical staff of EDSC and to proceed with implementing its recommendations.