Annex 03

CENTRAL METALLURGICAL RESEARCH
AND DEVELOPMENT INSTITUTE
CHAIRMAN OFFICE

Business Plan

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Business Plan

I. GENERAL VIEW

1.1. INTRODUCTION

The whole world is undergoing dramatic political and economical changes . The protective regulations are being abolished, thus exposing industry in the third world countries to fierce competition . In order to be able to pursue their mission in enhancing the competitiveness of local industries, research and technology organizations (RTO_s) will have to undergo a process of revitalization .

1.2. MISSION

To participate in the national economic growth by enhancing material competitiveness in the industrial sector .

To fulfill this mission, the institute will keep abreast of technological development .

1.3. GOALS

The improvement of the quality of products and processes or the development of new products and new processes .

1.4. BOARD OF DIRECTORS

The board consists the chairman of CMRDI, who is in the meantime the managing director :

- Vice Chairman of CMRDI .
- The Heads of the 4 Divisions of CMRDI.
- The Chairman of the Metallurgical Industries Holding Company .
- The Chairman of Engineering Industries Holding Company .
- The Vice Chairman of Egyptian Union of Industries.
- Representative of the Private sector .
- Members with special experience , e.g. the Former Chairman of CMRDI, a University Professor.

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1.5. MEETINGS AND GROUP DISCUSSIONS

Monthly meetings are being held at the levels of laboratories, divisions, division heads and the board. Brain storming sessions are held to deal with the critical issues .

1.6. CLIENTS

There is a wide range of industries which would draw upon the technological capabilities and facilities of CMRDI, e.g. all industries which produce, use recycle or protect minerals, metals and alloys such as the mining , metallurgical , engineering , chemical, food, power, oil, construction, pharmaceutical and transportation industries.

More than 350 different contracted industrial R&D projects were carried out by CMRDI over the past decade. These projects are classified according to their main objectives as projects aiming at :

i) introduction of new technologies to the Egyptian industry
ii) production of new products as import substitutes
iii) development of a product or production process
iv) maximization of indigenous raw material exploitation
v) development of new alloys
vi) environmental protection
vii) development of small and medium enterprises SME s
viii) failure analysis and trouble shooting
ix) technical services and consultations
x) nondestructive testing and third party inspection
xi) training
xii) capability strengthening of CMRDI

The total budget of these projects exceeded 50 million L.E. Table(1) shows some details .

Table (1) : **Earned Income of Different Activities, Over the Past 10 Years at CMRDI**

Category of Activities	Earned Income, 1000 L.E.	%
i) Introduction of new technologies to the Egyptian industry	3200	6.4
ii) Production of new products as import substitutes	4800	9.7
iii) Development of a products or production process	2850	5.7
iv) Maximization of indigenous raw material exploitation	3200	6.4
v) Development of new alloys	600	1.0
vi) Environmental protection	980	2.0
vii) Development of small and medium enterprises SME s	1250	2.5
viii) Failure analysis and trouble shooting	750	1.4
ix) Technical services and consultations	1300	2.5
x) Nondestructive testing and third party inspection	1750	3.4
xi) Training	2500	5
xii) Capability strengthening of CMRDI	27000	54
TOTAL	50180	100.00

II. ADMINISTRATION OF TECHNICAL ACTIVITIES

II. 1 SELECTION OF PROGRAM AREAS

The institute serves a large number of companies within the Mining , Metallurgical ., Chemical and Engineering Sectors. The technological needs of these sectors are known to the institute through many avenues :

- Mutual visits paid to the companies at all levels and versa.
- A technical committee which consists of representative of companies, with which the institute is connected with contract research .
- The National Councils of the Academy of Scientific Research and Technology (ASRT).
- Conferences .
- Societies.
- Training Courses.

The technical needs being known, the institute focuses on recruitment and training in such areas where the demand is increasing , e.g. welding, foundry, heat treatment , materials evaluation composites, ...ets.

The institute does not have a special unit for marketing , the job being done by the senior staff.

II.2 THE IN- HOUSE PROJECTS

The evaluation of the proposals and progress and final reports is done by a committee of emeritus professors of the institute . The final approval rests with division ' councils . Each project is managed by the " principal investigator" who plans, organizes, staffs and controls the project . The original proposal contains the outputs, objectives , plan, bar chart, members of the team, the task of each member and the resources available and resources needed (including budged and equipment) . Six-monthly reports are presented .

II.3. CONTEACT RESEARCH

Contract research aims at the improvement of quality of product or process or the introduction of new products or processes. In many cases, the companies finance such projects. However , financing may be secured through the Academy or foreign agencies. In each case the evaluation of proposals and reports is done by- and according to the formats of the funding agency in question .

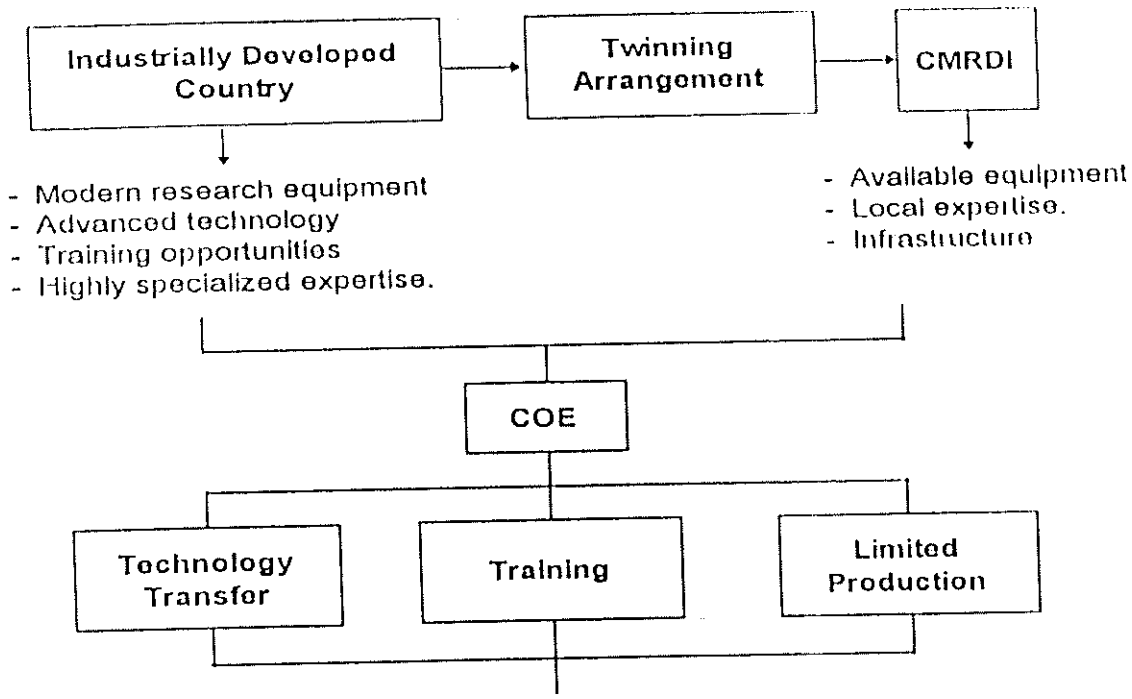
The institute has a special unit for the administration of technical services . The unit acts as a liaison between the customers and the different laboratories.

II.4. CENTRES OF EXCELLENCE (COE)

Over the past decade , CMRDI has adopted the policy of establishing specialized centres of excellence in collaboration with institutions from industrially advanced countries. These centres played a major role in :

- Strengthening the research capabilities of CMRDI by providing modern equipment.
- Technology transfer to CMRDI and hence to Egyptian and regional industry

The mechanism of establishing those COE may be summarized in the following chart:



Presently , CMRDI has the following COE :

COE	Established in Cooperation With
Hydrometallurgy	Berlin University- Germany+ CMRDI
Foundry	TNO-the Netherlands & USAD
Welding & Sheet Metal Forming	JICA - Japan
Steel making	MEPHOS- Sweden
Metal Casting	THO- the Netherlands
Precision Casting	AID - USA
Ore Benefaction	UNIDO+ AID-USA + CMRDI
Up- Grading of Metals Technology & Project	JICA
Clean Foundry Technology	MEPHOS- Sweden
Vacuum metallurgy	CMRDI
Materials evaluation + Testing	CMRDI

The production activities at the Foundry and Metal Cutting COEs may be considered as pioneering for RTOs even on the international scale. High quality spare parts produced at these COEs currently cover the demands of more than 50 organizations in both industrial and service sectors, e.g. the Egyptian Railway Authority, El-Nasr Automotive Co.,...etc as import replacement. The welding COE has become a recognised training centre for the whole African Continent , where more than 220 engineers from 20 African countries and Palestine have been training over the past 13 years .

II.5. INTERNATIONAL RELATIONS AND TWINNING ARRANGEMENTS

CMRDI maintains good relations with RTOs and research funding organizations in countries like Japan , Sweden , the Netherlands , U.K,. Canada, United States, Germany, France ...etc These relations enable the institute to transfer modern technology to local industry , to acquire modern laboratory and pilot equipment , to send young researchers to get their training and scientific degrees abroad and receive experts.

III .GENERAL EVALUATION OF THE PRESENT STATUS

III.1. EVALUATION OF STAFF CAPABILTIES

III.1.1. Size and Classification

Table 2 shows the human resources' size and classification . Table 3 shows that the ratio of the research staff to the total staff is maintained at about one third . The growth in number is , however , dictated by the need of those divisions where the demand is increasing .

III.1.2. Professional Training and Experiences of Staff

The young researchers get their training in research through their work for M.Sc. or Ph.D. either in Egypt or abroad. Post-doctor training is obtained in industrialized countries through fellowships which enable them to spend one- two years in one of the well-reputed laboratories.

Simultaneously, the young staff are trained on industrial research or RD&E through their work in contract research with industrial production .

Moreover , they attend short courses on computers , report-writing , ...etc.

III.2. EVALUATION OF FACILTIES

III.2.1. The Area for Each Member of the Research Staff

The area available to each research staff member (including laboratories and pilot plants) amounts to :

941.4/123= 76.5 m^2 i.e. = 80m^2 / researcher

Table (2) : Human resource progress.

Position	87/98	98/99	99/2000	2000/2001	2001/2002
Research professor	33	33	35	36	40
Assistant Research Professor	17	19	19	19	16
Researcher	21	24	23	24	34
Assistant Researcher	37	41	41	40	41
Research Assistant	30	29	32	31	24
Total (1)	**138**	**146**	**150**	**150**	**155**
Chemists and Engineers	32	35	33	32	43
Administrations	130	136	138	141	142
Technicians	70	73	75	77	91
Clerk	40	42	42	41	47
Workers	63	75	74	74	70
Total (2)	**335**	**361**	**362**	**365**	**393**
Grand Total of Employees	494	530	540	554	533

Table (3) : Ratio of professional to support staff

Position	97/98	98/99	99/2000	2000/2001	2001/2002
Research Staff	138	146	150	150	155
Total Staff	473	507	513	515	548
Ratio (%)	29 %	29 %	29 %	29 %	28 %

This area is adequate since the literature recommends 20-40m^2/ researcher. In the present case 80m^2 may be divided (40 m^2 each) between the laboratories and the pilot plant sheds.

III.3. EVALUATION OF FINACIAL POSITION

Over the past 5 years, the earned income/individual ranged from 15 to 46 thousand pounds and from 6 to 14 for the research - and total staff members, respectively.

The earned income comes mainly from process and product development projects and from technical services . Training per se does not contribute substantially to the earned income. However, training is usually done as a part of product and process development projects .

The earned to the total income ranged between 40 and 70 & , averaging 55%. According to the United Nations rating: < 30 is modest , 30-50 good and 50 > is excellent . The data collected from 5 Canadian research and organizations in a study conducted by the Saskachewan Research Council . A comparison shows that CMRDI's financial performance is mostly in the excellent range - though it might be in the upper range of " Good ": .

It is important to notice that the earned income figures mentioned do not include the value of pilot facilities obtained through individual efforts of CMRDI research staff over the past decade, which amounts about 15 million pounds . If this value is to be added to the earned income of the institute , then the abovementioned ratios may reach unpreceeded values .

III.4. POINTS OF CMRDI'S STRENGTH AND WEEKNESS

Based on the very brief analysis of CMRDI's performance mentioned in the above discussion, the main points of strength and weakness of CMRDI in its present situation may be summarized in the following :

Points of Strength

1. Strong relations with the customer. CMRDI has created an image which continuously attracts new customers. The CMRDI staff , and in particular the new generation are quite aware of the institute's mission .
2. The basic skills of project management have been acquired by the CMRDI staff through on -the - job training . The CMRDI has successfully completed a large list of contracted projects .
3. CMRDI has a large experience in successful and fruitful international cooperation which has always been oriented to the technological needs of local industry . The institute has benefited from cooperation with institutes in all industrialized countries by getting foreign consultants, training opportunities, modern equipment and pilot units.
4. CMRDI has highly competent teams in the areas of ore beneficiation , steel making hyrometallurgy, pyrometallurgy, surface protection , welding technology ,and NDT, foundry and machining and failure analysis & trouble shouting . The team constitutes more than 60% of the work force of the institute. Bench-marking shows that through these teams the institute scores " Excellent " if evaluated through the earned to the total income ratio.
5. Successful corporation at the regional level.
6. Material resources: equipment and space are presently satisfactory to carry out conventional as well as advanced R&D programs.

Points of Weakness

1. A strong need to restructure the institute in order to re-orient or totally get rid of some non-competent research staff and administrators.
2. The selection of middle management must be based on sound criteria . The selection must be followed by periodic training and evaluation
3. Lack of technical staff rather than research staff .

4. The governmental budget of CMRDI mainly covers the salaries and can not be relied upon for acquiring any equipment or conducting any extensive and advanced research programs.
5. The transport facilities are hailing and need considerable support. Being located in a remote area , this issue seems to be vital for CMRDI existence.
6. The working hours of the institute should be seriously revised.
7. Lack of important units such as sound information system, marketing and techno-economic feasibility studies, process engineering , process simulation and modelling and design capability

IV. STRATEGIC FUNDAMENTAL DEVELOPMENT GUIDELINES

IV.1. BENCHMARKING AND BEST PRACTICES STUDIES

Benchmarking is defined as " the process of continuously measuring and comparing an organization , product or process against leaders anywhere in the world to gain information which will help the organization take action to improve its performance .

Although benchmarking is conceptually fully applicable to CMRDI as any other RTO, it has not been benchmarked to this point .

Currently , CMRDI is involved in a project designed to identify , benchmark and document successful RTO practices (best practices and underlying principles) and assist RTOs in the implementation of these practices , in order that can serve their clients better. The project is led by WAITRO and sponsored by the Danish International Development assistance (DANIDA) and Canada's International Development Research Center (IDRC) .

This project may be a powerful tool in the development process of CMRDI and will assist the institute to meet the ever changing demands being placed on it by its competitive environment .

VI.2. ACCREDITION

International recognition of RTOs has become a major prerquisite for both national and international competitiveness. Thus, the accreditation of RTO's and the certification of their entire operations has become an integral part of industrial and technological R&D management . And yet these subjects remain relatively unknown to many RTO's , especially in the less advance countries.

Being aware of the importance of that subject, CMRDI together with the World Association of Industrial and Technological Research Organizations (WAITRO) had

organised a seminar in Cairo 19-22 Nov. 1996 to raise awareness and to shed lights on the problems and prospects that it portends for RTO's .

The seminar provided CMRDI an opportunity to make use of the experience of international experts and organizations concerned with these issues. The accreditation of CMRDI and the certification of its activities seem essential - at this phase of growth-to increase CMRDI's competitiveness on both regional and international arenas

CMRDI is currently carrying out analysis and testing of various materials, e.g. , minerals , metal, alloys with respect to chemical , physical and mechanical properties. Profound experience is gained in failure analysis and non- destructive testing. CMRDI is issuing certificates of the results. These certificates are recognised nationally . After the establishment of material testing department, the certificates should be recognised internationally assuming that the department will be accredited by internationally reputed organisations. CMRDI is making necessary arrangement to get accredited for issuing an International Welding Engineer certificate .

CMRDI is cooperating with the National Institute of Standards, Egyptian Organisation for standardization and the Inspection of Exports and Imports Authority in the establishment of a National Accreditation Body in Egypt and its alliance with one the European Accreditation bodies, e.g., European Organistion for Testing and certification EOTC, or European Accreditation of Certification EAC, or European Cooperation for Accreditation of Laboratories EAL. CMRDI has already established links with these organisations. Moreover, CMRDI id is collaborating with the World Association of Industrial and Technological Research Organisations WAITRO in organizing conferences and seminars on certification and accreditation in Egypt,

IV.3. METALLURGICAL INFORMATION CENTER

In the last years of the 20th century and at the threshold of the 21 st Century , access to information is a key element in managing the increasing pace of industrial technological development . Intensive use of modern communication technologies is therefore an essential element of the proposed route for CMRDI development . Accordingly, establishing a metallurgical information center is a profound milestone in the development programme . This information center will get the chance to communicate with various national and international networks providing information services of science and technology in the fields of metallurgy , mineral processing , chemical industries and relevant activities. On the national basis, the information center will be a documented reliable source for information about local metallurgical , mineral and chemical industries which could help decision makers to access and apply quality data and relevant current information to development activities. Also , the center will be a nucleus for national data base for local metallurgical , mineral and chemical research work which will be made available for people working in the universities , research institutions and industry. On the other hand , the information center will host international CD Roms for metal and material standards, phase

diagrams, physical and chemical properties, etc. as well as various engineering software.

The information center with the above mentioned capabilities will be able to provide research , industrial and technological service organizations with continuous updating of the latest development in industrial technology, provide training for human resource development and industrial technologies, establish and develop an international task force for developing national and transnational networks for small and medium size industry and finally provide commercial information service related to industrial and technological development opportunities .

IV.4. TECHNICAL SUPPORT TO SME'S

SMEs are now being recognized as critical in the economic and social development of Egypt. They are especially important for their role in job creation with low investment regional development , as suppliers to large companies , and in case of new technology- based firms, innovation of new products and processes.

In the recent years, Egypt has undertaken special schemes to develop and strengthen SMEs. These assistance schemes have focused on both the formation of new SMEs as well as assistance to existing SMEs. Assistance has included different facets of their operations, including financing , marketing and management , but with so little done realted to technical aspects, manufacturing engineering , quality and human resource development. It is clear that SMEs cannot attain their full potential without improvements in their ability to access absorb, adapt and exploit advanced technologies. For this to happen CMRDI can play a rather critical role.

The technical support service CMRDI can provide to SMEs include:

- Technical advice on production and quality control problems.
- Consultancies on larger issues in enterprise operations .
- Advice on waste exchanger or reprocessing.
- Pilot plant implementations.
- Project development
- Plant layout advice.
- Advice on materials and product handling.
- Energy saving and management.
- Material testing.
- Assessment of equipment capabilities.
- Industrial safety
- Issuing quality certificates .

Any sound SMEs support effort, CMRDI has to play in the future should be concerted with the Ministry of Industry with its different concerned institutions such as the Productivity Council. Standardization Organization, General Organization for Industrialization (GOF) and Federation of Industries together with the Social Fund for

Development. Such consortium can suggest a SME support system for metal industries which should develop.

- A program to identify the business needs of the SMEs.
- A system to diagnose " the real needs" of the SME at that particular time.
- Methods to identify the appropriate technology to solve the problems faced by individual SMEs.
- The capcity to organize and use management/technology teams to operate in the needs assessment and opportunity identification stage of collaboration with firms.
- Reoriented seminars and training programs so that they focus on the needs of specific subsections or industry groupings.
- Ways to collaborate with private sector group in order to enhance the quality and scope of services available at CMRDI .
- Collaboration with other provincial institutions to develop an outreach program .

IV.5. CLEANER INDURTRIAL PRODUCTION (CIP)

Metallurgical industries are among the most polluting industries, and it is the role of CMRDI in the next phase of development to take active part in seeking clean production technologies (CIP) the metallurgical and related fields. It is of vital importance that CMRDI would be able to have access to share the information on cleaner technology options made available by the different international , regional and national bodies involved in the production of cleaner production . In this respect , a standardized approach to information management , i.e., data collection , storage and dissemination mechanism , should be established. The proper funding mechanisms present a challenge and should include industries and end-users.

The training aspect and development of human resources constitute a very important issue and can be viewed as the basis for any successful program on cleaner industries . In alliance with other concerned bodies, CMRDI will consider organising training courses and seminars on specific subjects such as assessment of adequate technologies in the metallurgical and related industries.

Apart from cleaner technologies in the conventional production fields such as foundries , steelmaking ...etc., bioleaching processes will deserve special attention in the near future at CMRDI . Leaching of minerals by environmentally friendly techniques. No chemicals will be used thus avoiding pollution and corrosion problems. Micro-organisms will extract the elements without wastes under mild temperature conditions. The bioleaching techniques are clean , save and cheap. Much care should be taken to allow the micro-organisms to grow. Preference will be given to Boileaching of phosphate and manganese ores. Contacts have been already established between CMRDI and bioleaching centers in Canada, England and Thailand.

IV.6. REGIONAL ROLE

As Africa in the main source for numerous mineral of the world , CMRDI is highly interested in establishing cooperation programs with various African countries either bilaterally or through international cooperation agencies. CMRDI already signed agreements with Nigeria and Tanzania for the development of mineral resources. A major cooperation program for Nile-Basin countries aiming at purification of Nile water using domestic raw materials, e.g., bauxite and clay is under perpetration . The technology for processing of these raw material to produce water cleaning chemical is available in CMRDI .

As CMRDI has already acquired a profound experience in the processing of bentonite ore (activation for foundry, and drilling oil bleaching purpose) A cooperation program will be prepared for technology transfer to North African Arab Countries where extensive reserves of high quality bentonite are present. Establishment of bentonite industry in these countries, especially for drilling for oil will secure the needs of the oil-producing Arab Countries so that self-sufficiency from this material can be reached and consequently dependence on imports from outside the region could be minimized .

CMRDI has been involved in search R&D projects with Syria (ore beneficiation) , Saudi-Arabia (SABIC) as well as other countries in the region. The all\-Africa annual training program on welding technology has been carried out for the seventh year in 1995 with sponsorship from JICA-Japan. The Dutch Government has contracted CMRDI to train the foundry Project is being now Khartoum Central Foundry. African Foundry Network Project is being now considered by IDRC-Canada, where CMRDI's foundry experience could serve other countries in the continent . Extensive training programs has been organized in Libya through the Industrial Research Center in Tripoli.

All these examples indicate the increasing role CMRDI can play in developing the metallurgical and related industries in the region. Networking proposals are available at CMRDI and has been submitted to international funding organizations and it is quite hopeful that some networking projects will start in the next few years.

IV.7. TECHNOLOGY INCUBATORS

The existing pilot facilities at CMRDI could represent a sound basis for technology incubators for different metallurgical industries . The available foundry, metal-cutting, ore beneficiation as well as process metallurgy pilot facilities could be very well utilized in this respect. Establishment of technology incubators (production models- prototype plants) for chemical processing of materials to produce inorganic chemicals. CMRDI has already established production lines including reaction , soild/liquid separation by thinking , filtration , and drying . Expansion of this plant will include evaporation, crystallization , spray drying unit. Further expansion will include rotary furnace calcination line, high pressure station. The capacity of the CNRDI

prototype plant is about 1 to/day. This plant will enable the preparation of technology package for investors to establish small scale chemical industries.

IV.8. ESTABLISHMENT OF NEW CENTRES OF EXCELLENCE (COE)

The policy of establishing (COE) has shown considerable success over the past few years and the existing ones are very actively involved in ethnology transfer, training and even limited production of sponge parts for different industrial seetors.

CMRDI has considered in the few past years expanding the same concept to new centres dealing with novel and advanced technologies , examples are :

- Industrial support design centre .
- Surface engineering centre.
- Composite metal-matrix materials and ultra hard alloys .
- .Ulta-fine particulate of metals , metal oxides and super concentrates.
- Lazer applications in metals welding, cutting, heat-treatment and surface treatment .
- Die design and manufacturing .
- Vacuum melting for the production of Superalloys of strategic importance .
- Magnetic materials .
- Medical implant materials .

Most of necessary equipment for these COE have been erected and efforts will be continued to furnish CMRDI with the other recalled facilities.

IV.9. PRODUCTION ACTIVITIES AT CMRDI

The pioneering experience of limited production of high quality spare parts at the foundry and metal-cutting pilot facilities as well as sheet metal fabrication shop, vacuum melting shop and hydro metallurgy unit of CMRDI should be encouraged and expanded. CMRDI is, currently , supplying more than 50 production and service organiztions with their needs of spare parts as import substation (examples are the Egyptian Railway Authority, El Nasr Automotive and many others) . The revenue of the production may represent substantial support for the current R&D projects.

The same experience could be as successfully implemented in other CMRDI departments.

IV.10. NEW DEPARTMENTS

(i) Process Engineering Department

The department deals with the engineering aspects of the technologies developed by CMRDI basically in the area of mineral processing. This department compress :

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- Process Design Unit:

Design of the processing equipment , flowsheet , calculations of the mass balance , i.e. quantitative material flow along the various streams of the process, calculation of energy balance and utilities consumption .

- Basic Engineering Design Unit :

Identification of the equipment , specification , production of basic engineering design drawings of the individual equipment .

- Feasibility Studies Unit:

Calculation of plant investment based on material and equipment costs and other inputs, financial analysis and profitability estimation .

(ii) Material Testing and central services Department

The department deals with charactrisation and testing of minerals and their products, e.g., concentrates , inorganic chemicals, alloys with respect to chemical composition , physical and mechanical properties. It will provide service to the mineral, metal, chemical and engineering industries in addition to services to the on-going projects in the other departments of the institute. The laboratories of this department are :

- Chemical analysis
- Physical metallurgy including metallography
- Mechanical properties.
- Information and standards.
- Most of necessary equipment have been purchased and erected .

It is very important to accredit this department internationally as testing laboratories will not be able continue its activities unless they are accredited.

(iii) Simulation and Modelling Unit

Modern fundamental studies are an essential back-up requiement for evaluating initial ideas for metallurgical processes or to solve basic technical problems which might have been encounterend some companies. Such studies can invlove mathematical modelling , physical modelling or simulation of metallurgical and mineral processing experimentation . Mathematical modelling of processes are undertaken both to evaluate new process ideas and to aid the progress and development of research projects or new plants. On site computer facilities can be used in an interactive mode for rapid programme develpoment and for routine runs of established programmes. A number of invaluable library programes can be used regularly ranging from free engergy minimisation routine to statistical packages. Physical modelling studies can be undertaken in a water modelling laboratory for

simulating problems ranging from metal flow to modify the design of water cooling system. Air modelling laboratory can help studying problems such as gas flow measurement , air pollution paked-bed aerodynamics.

IV. Industrial Support Centre

Such centres usually act as technology transfer nodes, helping the local industry, specially SME's to bring the knowledge and technology gap facing them. Most of the services provided by such centres are intended to help the companies increase the local design control in their products thus increasing their added value and this mainly depends on introducing the new trends in II for these companies .

The centre will include :-

- Industrial automation unit
- Drafting and Modelling unit
- Rapid prototyping / Modelling unit
- Design , analysis and simulation unit
- Database and Archiving unit
- Programing / Developing unit

(V) Techno-economic and Feasibility

Having reached the technical goals of the research project is not an enough visa for passing to the complementation phase due to lack of techno-economic assessment . Economic studies have to start early and proceed side by side with progress of the research project. Throughout the project and at different intermediate steps, economic evaluation must be undertaken not only to answer " STOP, GO" questions but also to determine which route out of different alternative should be adopted . Also the general objective of the project , e.g., product quality improvement , improved production technique , use of local raw materials , etc. has to be evaluated money wise in order to identify priorities for investment opportunities . Pre-feasibility study has \be undertaken so as to demonstrate preliminary project viability . This initial evaluation of the technical, financial and economic aspects of a project is carried out in broad terms and in its outcome depend decision to go ahead with promotional actives and a full feasibility study . Estimates for the capital investment , financial structure and profitability measures will help investing parties to take decision about implementation of the project.

(VI) Marketing

During the past 10 years , marketing of research results was carried out by the principal investigators or their associates , practically without complete awareness of the marketing skills, which to a certain extent limited the implementation of the projects . To bridge the gap, marketing unit should be established . Information about client needs, specification of materials, export and import prices ..etc. are essential

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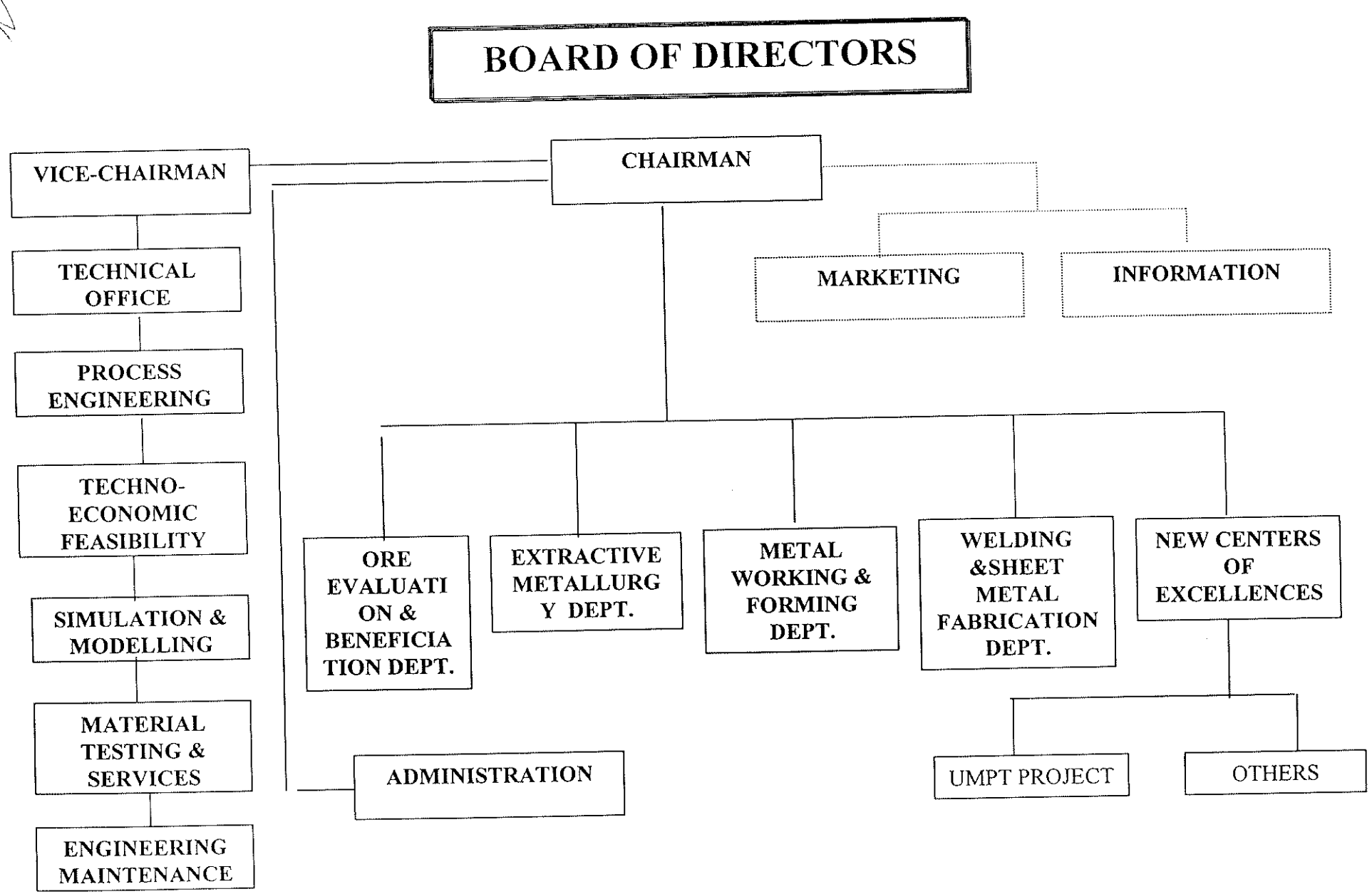
inputs. The unit is closely connected with the feasibility studies unit to ensure proper marketing of the projects and products.

IV.1 RESTRUCTURING AND ORGANIZATION CHART

The organizational chart of CMRDI has not undergone any changes since the institute was established . With the new units and departments under establishment in the light of this development plan, complete restructuring of the institute should be considered . This issue is nowadays a subject of a serious and constructive debate between the research staff and a final chart should be drawn very soon. However , there is general agreement , that the new units of common interest to different departments of the institute should start as units affiliated to the Institute's Chairman . The following organization chart is a preliminary suggestion.

IV.2. PROMOTION SYSTEM

Research staff promotion criteria should be reconsidered . More effective weight should be given to the researcher's contribution to the industrially oriented programs.


BOARD OF DIRECTORS
VICE-CHAIRMAN
CHAIRMAN
TECHNICAL OFFICE
MARKETING
INFORMATION
PROCESS ENGINEERING
TECHNO-ECONOMIC FEASIBILITY
ORE EVALUATION & BENEFICIATION DEPT.
EXTRACTIVE METALLURGY DEPT.
METAL WORKING & FORMING DEPT.
WELDING &SHEET METAL FABRICATION DEPT.
NEW CENTERS OF EXCELLENCES
SIMULATION & MODELLING
MATERIAL TESTING & SERVICES
ADMINISTRATION
UMPT PROJECT
OTHERS
ENGINEERING MAINTENANCE

BUSINESS PLAN
FOR
MATERIAL EVALUATION FACILITIES

1- Executive Summary

The material evaluation facility represents a substance addition to CMRDI potential and directly contributes to strengthening its capabilities to support the growing demand of the Egyptian industry. Meanwhile, through the mutual cooperation with the concerned companies their competence will be enhanced.

2- Background

Problems with the incorrect part design without considering the rolls of fracture mechanics basics and without material evaluation certificate normally lead to tremendous loss of money (by way of failure) particularly when the components are used in bridges, trains, spare parts for cars, etc.

Following the above design rolls in addition to material evaluation will certainly contribute in reducing the failure of components and then reduce the dependency in importing many of the needed capital investment equipment. Evermore, they will encourage the possibility of exporting new well-designed and high quality Egyptian products. Moreover, The project will contribute in upgrading the level of engineers and in enhancing the development of local experience and technological know-how.

3- Objectives

3-1. General objectives

- To transfer the up to date of fracture mechanics and know-how of how the components fail to the concerned industries.
- To develop and execute the proper quality control and quality assurance systems for each type of industry.
- To put the design fundamentals according to the fracture mechanics rolls to increase the potential of local manufacturers in production of capital investment equipment and spare parts in order to decrease the imported volume of such equipment and spare parts.
- To do a research work for the CMRDI's staff for M.Sc. Ph.D. degrees.

3-2. Specific objectives

- To establish and specify the appropriate material for each component with a material evaluation certificate.
- To train and qualify engineers and workers of the concerned companies.
- To produce the proper quality control manual for each specific company.
- To strengthen R&D activities in material evolution field at CMRDI as well as at affiliated institutions and companies of this project.
- To further promote the achieved know-how and technology at CMRDI in production of spare parts based on the Egyptian material that evaluated in cooperation with the concerned companies and also measuring the residual stresses and strains at the bridges.

4- Detailed description and technical approach

This project aims at developing and updating the material evaluation sector for the end user. The utmost target is to prevent failure of components during service. At the same time, it aims at introducing and implementing the main elements of quality control and quality assurance systems in order to qualify the product of the concerned companies to the relevant international standards.

The technical and scientific experience that the staff at CMRDI has gained through the several R&D research activities and technical services submitted to the wide scope of Egyptian industries will be of great help to fulfill the targets of this project. Besides, the large facilities and equipment are considered a very big asset for carrying out the research activities and training programs of this project.

5- Work stage

To achieve the objectives of this project, the following stages will be carried out:

Stage I: Preparation, installation and operating of the fatigue equipments

- Preparation of electricity supply
- Installation of the equipments and facilities
- Operation, training of the staff and calibration of the equipments

Stage II: Evaluation of existing facilities and market survey

- Surveying and classifying the existing facilities and capabilities of concerned companies.
- Evaluating the existing QA/QC systems for each company
- Specifying the actual constraints for quality improvement for each company
- Determining the most important points for R&D necessary for each company

Stage III: R&D, Training and qualification activities

- R&D activities on minimizing the components failure for the concerned companies
- R&D activities on upgrading the existing material evaluation sectors conducted by companies
- Training and qualification of engineers and workers
- Transferring adapted technologies to each specific company

End Users

Automotive parts, bridges, construction companies, industrial machinery parts, and all components subjected to fluctuated stresses and strains.

Methodology

1- In addition to the achievement of all objectives mentioned earlier in this project, it is also aimed at creating R&D staff at each company of the end users who will be able to continue work on developing and improving of products. Therefore, the majority of tasks of this project will be conducted mainly by CMRDI staff hand in hand with participants from each company to encourage them to be more

B.E.

M. Eva

2

and more involved in R&D activities. Research team will be supported by relevant specialists from JICA experts, different institutions and organizations.

2- All equipment and facilities will be used for R&D activities, training of engineers and workers.

3- Due to the fact that the fracture mechanics that includes failure analysis considered as major subjects at all levels of engineering education in Egypt, it is significantly important to exert special effort on training of engineers. Therefore, several training programs starting from the basic level to the advanced level will be organized.

4- Special questionnaires will be prepared for each item of stage II. Extensive use of computer (data base) to compile and analysis the data to be collected during the market survey will be done.

5- The type of R&D activities will be decided on the basis of the outcomes of the study of stage II of the project.

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Business Plan for Laser Group

Nature of Business: Laser Material Processing (Cutting, Welding, Surface modification)

Advantages of Laser Technology Include:

- High energy density
- Low heat input
- Narrow weld and HAZ
- Narrow cut and HAZ
- Less distortion
- High processing quality
- High processing speed
- Higher process flexibility
- Removing the need for expensive after machining processes
- Non contact process
- Time sharing

Cost effectiveness of the laser is due to its fast processing speed and the high processing quality that reduces or eliminates after treatment and hence makes significant manufacturing cost savings.

Objective:

Promotion of R&D & E in the area of laser material processing on the national level.

Vision:

Spite laser material processing is being applied in different industrial fields in many countries, it still in its beginning stage in Egypt. It is expected that there will be an increasing demand for implementing laser technology in Egyptian industries in the near future. In other words, Egyptian industries might be only waiting for the market to be educated in the use of lasers before it is widely applied.

Therefore, CMRDI as a national research institute concerned mainly with supporting Egyptian industries and helping in its development has started since 1994 to build up its capability in this new field through international cooperation. Recently, CMRDI established a new department concerned with laser material processing and induced the latest system of solid state Nd-YAG laser with the following specifications:

- Power: 2200W (CW & pulse)
- Wave length: 1.06 μm
- Pumping: Diode laser
- Beam delivery: 0.3mm diameter optic fiber
- 6-axis robot with 1658mm maximum reaching

Applications of Laser at CMRDI:

Both small and large-scale industries working in sheet metal fabrication in Egypt produce variety of products with small quantity. Sheet metal fabrication is currently carried out mainly using different mechanical methods. However, frequent tool change in the case of mechanical processing leads to higher coast and unstable quality. Since these problems can be overcome using laser, it is expected that laser will replace mechanical methods in the future.

Laser at CMRDI is used in a variety of different industrial processing of both ferrous and non-ferrous materials. Laser material processing include:

- Cutting (10mm carbon steels, 6mm stainless steels, 4mm aluminum alloys)
- Welding (3mm ferrous, 2mm non-ferrous)
- Surface modification of different materials

One of the main laser applications is the cutting of any shaped hole, as well as profile cutting of different parts in engineering industries including automobile and house appliances.

Laser beam technology is used in the tailored welded blanks as a new alternative as well as in welding assembly in automobile body. It is applied also for circumferencial and longitudinal pipe welding. Hardening of extrusion dies and crack shaft is among the applications of laser surface modification.

Planning Schedule:

- First stage

(until end of 2002):

* R & D in the filed of laser beam cutting of different materials with different thickness (flat & shape cutting) as following:
  - Carbon steel; 10mm thickness,
  - Stainless steels; 6mm thickness,
  - Aluminum alloys; 4mm thickness.

- Second stage

(From January 2003 to October 2003):

* R & D in the filed of laser beam welding of different materials with different thickness (flat & shape welding) as following:
  - Carbon steel & stainless steels; 3mm thickness,
  - Aluminum alloys; 2mm thickness.

* R & D in the filed of laser surface modification of different materials.

- Second stage

(From January 2003 to ~):

* Supporting Egyptian industry in the filed of laser beam cutting of different materials with different thickness (flat & shape cutting) as following:
- Carbon steel; 10mm thickness,
- Stainless steels; 6mm thickness,
- Aluminum alloys; 4mm thickness.

- Third stage

(From November 2003 to ~):

* Supporting Egyptian industry in the filed of laser beam welding of different materials with different thickness (flat & shape welding) as following:
  - Carbon steel & stainless steels; 3mm thickness,
  - Aluminum alloys; 2mm thickness.

* Supporting Egyptian industry in the field of laser surface modification of different materials.

Targets:

- Technical support for Egyptian industry to improve the quality of products and processes.
- Technology transfer in the fields of laser material processing.
- Technical services for metal processing industries.
- Improvement of products quality and reducing production costs.
- Troubleshooting for production processes and solving technical problems.
- Development of processing through pilot plant runs and prototype units.

Approaches:

- Training for engineers of concerned industries in the field of laser material processing (four times per year regular courses in addition to tailored ones).
- Holding monthly seminars in the fields of laser material processing for the concerned industries.
- joint research projects with concerned industries
- Direct contact with the concerned industries.
- Issuing monthly news letter
- Organizing and holding annual congress

Business Plan for Cold Box Group

Advantages of Cold Box Technology Include:

- High productivity
- Labor saving
- No heat required (Energy saving)
- Dimensional stability of cores.
- Minimum losses of sand and binders.
- high complicated shapes can be produced
- Excellent surface finish

Objective:

-Technology transfer of cold box which characterizes with high productivity and good surface finish to molding lines in Egyptian foundries and implementation of this technology using Egyptian sand..

- Applying of technology transfer of shell molding (later on, starting phase March 2002).
- Replacement of metallic die technology by Araldite materials

Vision:

In spite of high purity and good quality of Egyptian sand as a foundry sand, the application of this sand is very limited in medium and small foundries in green molding which causes some surface casting defects, specially in small and complicated

D.2
C.Box

castings, therefore a need to apply and to transfer the cold box is currently increased. Through implementing of this project, it is possible to transfer this technology to the Egyptian foundries.

Cold box machine supplied from Japanese side

Type	TVC – 440
Molding Method	all automatic
Operation	continuos Automatic
Molding size	Unexpected end of form
	400*400 mm
Molding capacity	15 kg.
Gassing time	40 sec.

Applications of Cold box at CMRDI

Wide experimental tasks were carried out in CMRDI-foundry to establish the basic parameter and technological experience to apply this technology in order to optimize the basic conditions to use the Egyptian sand.

Future plan of the project

Due to limitation of cold box die manufacturing in Egypt, it was planed in this project to replace the needed metallic die by using Araldite technology, which is more easy and cheaper.

B. 2
C. Box

Goals:

-Absorption of cold box technology to produce complicated and complex cores, by using easy forming material.

-Replacing the araldite material to produce the dies for cold box machine instead of steel dies.

-Enlarging the use of cold box technology to cover all the needed cores for CMRDI foundry.

-using the cold box machine to produce small precision molds

-Introducing new technology of cold box to some Egyptian foundries, by using Egyptian resins by collaboration with the national petroleum institute.

-Introducing the shell molding technology.

Planing Schedule:

- 1st stage (till the end of 2002):

- Includes:

* Implementing the shell molding technology

From March to June 2002

- Optimizing of cold box technology by using Egyptian sand. Through the following evaluation tests (bench life – bending strength with laps time – binder %)

- Produce an araldite dies through the following steps:

Die design – wooden die manufacture – araldite die manufacture

From June to September 2002

B.2
e. Box

- Practicing and implementation to produce complicated cores of different three castings.

From September to December 2002

- 2nd stage (till the end of 2003)
- Includes:
  - Optimization of alternative araldite dies – by inserting cheap material with araldite to achieve the following goals:
    - Reducing die costs.
    - Reducing die weight.
    - Increasing die strength

From January to April 2003

- Optimization of shell molding technology.
  - -Die design study.
  - -Die making in CMRDI work shop
  - -Using cheap materials for making shell molding die

Till the end of 2003

B.Z
C. Box

Business plan for die casting group

1.Excutive summary

High pressure die casting machine and its option represent a substitutional addition to CMRDI potential and directly contributes to strengthen its capabilities to support the growing demand of the Egyptian industry. Meanwhile, through the mutual cooperation with the concerned companies their competence will be enhanced.

2. Background

Die casting is a method of production finished castings by forcing molten metal into a suitable mold, which is arranged to open after the metal has solidified so that the casting can be removed. The die casting process makes it possible to secure accuracy and uniformity in castings, and machining costs are either eliminated altogether or are greatly reduced. The greatest advantage of the die casting process is due to the fact that the parts are accurately and, usually, completely finished when taken from the dies. When the dies are probably made, casting may accurate within 0.001mm or even less and a limit of 0.002 and 0.003 mm can be maintained easily in many classes of work.

Die casting are extensively used in the manufacturing of such products as cash registries, meters, time controlling devices and parts for a great variety of mechanisms. Lugs and gear teeth are cast in place and external screw threads can be cast. Holes can be formed within about 0.001 mm of size and must accurate bearings require required only a finish reaming operation.

As to the limitation of the die casting process it may be mentioned that the cost of dies is high, and, therefore, die casting is applicable when a large number of duplicate parts are required.

This process in Egypt is very limited and faces a lot of problems such as:

No experience in the field of die design and machine
Absents of qualified engineer and workers who have a good knowledge in this field.
There is no adequate quality control as well as quality assurance systems of this process.

Therefore, there is a significant need to upgrade the level of engineers and supervisors through attending some training course in order to have a good experience in the process of high pressure die casting.

3.Objectives

To develop and transfer the up to date high pressure die casting process and know how of getting the best quality.
Implementation of a systemize process in order to reduce defects and improving surface quality.

To develop and execute the proper QC and QA systems for such type of industry.
To minimize the process cost.
To train and qualify engineers and workers.
To produce special products that imported.
To transfer the Japanese know how in the field of high pressure die casting to the Egyptian industry

4.Detailed description and technical approach

This project aims to develop and update the high pressure die casting technology for the end users. The utmost target is minimize surface defect and to improve quality through rational approach to the application of modern high pressure die casting technique and upgrading the skills of engineers and workers. In addition, it also aims to introduce and implement the main elements of QC and QA systems in order to qualify the products of the concerned companies to the relevant international standards.

The technical and scientific experience that the staff at CMRDI has gained through the several R & D activities and technical services submitted to wide scope of Egyptian industries will be of great help to fulfill the targets of this project. Besides, the large facilities and equipment are considered a very big asset for carrying out the research activities and training programs of this project.

5. Working Stages

To achieve the objective of this project, the following stages will be carried out:

Stage 1: Preparation, installation, and operating of high pressure die casting facilities at CMRDI:
Preparation of working stage, electricity supplies, air supply system and cooling water.
Installation of the equipment and facilities.
operation, training of the staff and calibration.

Stage 2: Evaluation of existing facilities and market survey:
Surveying and classifying the existing facilities and capabilities.
Evaluating the existing QA/QC systems for each company.
Specifying the actual constraints for quality improvement for each company.
Determining the most important point for R & D necessary for each company.

Stage 3: RD & E, Training and qualification activities:
RD & E activities on minimizing defects for concerned companies.
RD & E activities on upgrading existing high pressure die casting procedures conducted by companies.
Training and qualification of engineer and workers.
Training on QA/QC programs.
Transferring adapted technologies to each specific company.

6.End Users

Automotive parts, precision instruments industrial machinery parts and house application parts.

7. Methodology

1. In addition to the achievement of all objectives mentioned earlier in this project, it is also aimed to create RD & E staff at each company of the end users who will be able to continue work on developing and improving of products. Therefore , the majority of tasks of this project will be conducted mainly by CMRDI staff hand in hand with participants from each company to encourage them to be more and more involved in RD&E activities . Research team will be supported by relevant specialists from JICA experts, different institutions and organizations.

2. All equipments and facilities will be used for RD&E activities , training of engineers and workers.

3.Due to the fact that high pressure die casting technologies are not considered as major subjects at all levels of engineering education in Egypt , it is significantly important to exert special effort on training of engineers . therefore , several training programs for each specialty starting form the basic level to the advanced level will be organized .

4. Special questionnaires will be prepared for each item of stage 2 . extensive use of computer (data base)to compile and analysis the data to be collected during the market survey will be done .

5. the types of RD&E activities will be decided on the basis of the outcomes of the study of stage 2 of this project .

BUSINESS PLAN FOR
HEAT TREATMENT FACILITIES

1- Executive Summary

The heat treatment facility represents a substantial addition to CMRDI potential and directly contributes to strengthening its capabilities to support the growing demand of the Egyptian industry. Meanwhile, through the mutual cooperation with the concerned companies their competence will be enhanced.

2- Background

Problems with heat treatment during manufacturing (by way of failure) normally lead to tremendous loss of money particularly when the heat treated components are used in processing plant or as spare parts in automotive companies.

Meanwhile, the implementation of adequate quality control and quality assurance systems (QC/QA) as well as adapting up-to-date technology of heat treatment many of Egyptian industries are still immature. This of course is reflected on the quality and cost of products. In addition, the absence of integrated quality control and quality assurance systems together with the absence of qualified engineers, and approved heat treatment procedures are significant constraint for further development in Egyptian industries.

Therefore, there is a significant need to transfer modern heat treatment technique as well as adequate QC/QA system to Egyptian industries. Moreover, intensive R & D activities in utilizing safe environmental heat treatment industry as well as for improving the quality are necessary to increase the potential of such small scale industry in Egypt.

The above mentioned activities together will certainly contribute in reducing the dependency in importing many of the needed capital investment equipment. Evenmore, they will encourage the possibility of exporting new high quality Egyptian products. This will improve the economic situation of Egypt. Moreover, the project will contribute in upgrading the level of engineers and in enhancing the development of local experience and technological know-how.

3- Objectives

(a) General Objective

- To develop and transfer the up to date heat treatment technology and know how for special steels and other alloys to the concerned industries.
- To develop and execute the proper quality control and quality assurance systems for such type of industry.
- To put the fundamentals to increase the potential of local manufacturers in production of capital investment equipment and spare parts in order to decrease the imported volume of such equipment and spare parts.
- To systemize the heat treatment processes with a close follow-up of the professional code instructions and to improve the quality of products through rational approach.

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H. Treat

(b) Specific Objectives

- To establish and specify the appropriate heat treatment technologies for each specific company.
- To minimize surface defects and improve quality at minimum production cost.
- To train and qualify engineers, and workers of concerned companies.
- To produce the proper quality control manual for each specific company.
- To strengthen R & D activities in heat treatment and surface treatment at CMRDI as well as at affiliated institutions and companies of this project.
- To further promote the achieved know-how and technology at CMRDI in production of spare parts based on Egyptian local raw materials in cooperation with the concerned companies.

4- Detailed Description and Technical Approach

This project aims at developing and updating the heat treatment technology for the end users. The utmost target is to minimize surface defects and to improve quality through rational approach to the application of modern heat treatment technique and upgrading the skills of engineers and workers. In addition, it also aims at introducing and implementing the main elements of quality control and quality assurance systems in order to qualify the product of the concerned companies to the relevant international standards.

The technical and scientific experience that the staff at CMRDI has gained through the several R&D research activities and technical services submitted to wide scope of Egyptian industries will be of great help to fulfil the targets of this project. Besides, the large facilities and equipment are considered a very big asset for carrying out the research activities and training programs of this project.

The Quality Assurance system will based mainly on ISO standard 9000 and 14000 series requirements and will comply also with QA/QC requirements of ASTM or any other international standard depending on nature of the products of each company.

5- Working Stages

To achieve the objectives of this project, the following stages will be carried out.

Stage I: Preparation, Installation and Operating of heat treatment Facilities at CMRDI:

1. Preparation of working stage, electricity supply, gas supply system, cooling water and duct for oil fume.
2. Installation of the equipment and facilities
3. Operation, training of the staff and calibration.

Stage II: Evaluation of Existing Facilities and Market Survey:

1. Surveying and classifying the existing facilities and capabilities of concerned companies.
2. Evaluating the existing QA/QC systems for each company.

B.2

H. Treat

3. Specifying the actual constraints for quality improvement for each company.
4. Determining the most important points for R & D necessary for each company.

Stage III : RD&E, Training and qualification Activities

1. RD & E activities on minimizing defects for concerned companies.
2. RD & E activities on upgrading existing heat treatment procedures conducted by companies.
3. Training and qualification of engineers and workers.
4. Training on QA/QC programs.
5. Transferring adapted technologies to each specific company.

Stage IV : QA/QC activities

1. Specifying the proper heat and surface treatment technique for each company and preparing necessary forms and documents.
2. Adapting adequate QA/QC systems for each company.
3. Preparation of quality control manual for each company.
4. Implementation of developed QA/QC system for one prototype for each company.

Stage V : Performance Analysis and Techno-economic Study

1. Assessment of the achieved in-plant performance for each company.
2. Preparing the participated companies to apply for the qualification certificate of the relevant international code and standard.
3. Recommendation for new equipment and facilities that will help in increasing the potential capability and efficiency of participated companies.
4. Evaluation of latest technical potential and capability of participated companies for improving the performance and reliability of products.
5. Evaluation of the latest potential of the participated companies together or separately to their contribution in reducing the import/export gap by increasing productivity and producing new products of capital investment equipment.

6. End Users

Spare parts, chemical and petrochemical industries, mining, construction companies, car industry, etc..

7 - Methodology

1. In addition to the achievement of all objectives mentioned earlier in this project, it is also aimed at creating RD&E staff at each company of the end users who will be able to continue work on developing and improving of products. Therefore, the majority of tasks of this project will be conducted mainly by CMRDI staff hand in hand with participants from each company to encourage them to be more and more involved in RD&E activities. Research team will be supported by relevant specialists from JICA experts, different institutions and organizations.
2. All equipment and facilities will be used for RD & E activities, training of engineers and workers.

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H. Treat

3. Due to the fact that heat and surface treatment technologies are not considered as major subjects at all levels of engineering education in Egypt, it is significantly important to exert special effort on training of engineers. Therefore, several training programs for each specialty starting from the basic level to the advanced level will be organized.
4. Special questionnaires will be prepared for each item of stage II. Extensive use of computer (data base) to compile and analysis the data to be collected during the market survey will be done.
5. The types of RD&E activities will be decided on the basis of the outcomes of the study of stage II of this project. Regarding RD&E activity for production of spare parts, it will be based mainly on replacing the imported item with local ones in addition to the introduction of ADI as a strategic developed alloy to the industry. Any technical and scientific achievement of RD & E activity on pilot scale at CMRDI will be directly transferred to concerned company and will be upgraded to production scale whenever it is possible.
6. It was mentioned earlier that the staff at CMRDI has gained considerable experience on all phases of manufacturing, heat treatment and inspection of several spare parts and equipment during its contract with some foreign association and companies. This has given a golden chance for CMRDI staff to gain a lot of experience on all phases of production and QC/QA systems at different companies. All these experience will be directly transferred to end users particularly that in concern with QC/QA activities.
7. According to the results of stage VI, performance analysis and techno-economic study, recommendations will be made concerning the immediate requirements for upgrading the capabilities of the participate companies by using new technique, applying better control procedure on environmental pollution, introducing new spare parts or equipment,..etc. Also, recommendation for some new items that could be produced either by each company independently or by co-working together will be given.

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H. Treat.

Annex 04 | The Income and Expenditure of CMRDI Budget for Past Three Years

Item	Fisc. Year 99/2000		Fisc. Year 2000/2001		2001/2002	
	Estimated (A)	Actual (B)	Estimated (A)	Actual (B)	Estimated (A)	Actual (B)
Governmental Budget						
Salaries &Wages	6000	5000	7000	5600	7400	6540
Consumables, Maintenance, etc.	800	704	1600	780	1500	780
Equipment, Buildings, Furniture, etc.	4400	10000	9500	12064	27500	17500
Sub-Total						
Supplementary budget						
Total	11200	15704	18100	18444	36400	24820
Self Income						
Contractual Projects		839,41		162,45		212
Consultations		--------		9,-		5,3
Technical Services		888,9		461,1		369,3
Training		255,8				216,0
Sub-Total						
International Agreement						
Grants						
Donations						
Total		1984.11		632.55		802.6
Gross Total	11200	17688.11	18100	19076.55	36400	25622.6

(2) Expenditure of CMRDI

Year	99/2000	2000/2002	2001/2002
Salaries	4850	5300	5300
Raw Materials, Spare Parts, Fuel	767	884	770
Buildings	1770	614	760
Equipment	7800	5230	6260
Furniture	92	262	560
Transport & others	49	154,0	108,5
Total	15328	12444	13758.5

Annex 05

List of Japanese Experts Dispatched

As of 31/03/2002

Year	2000 (4 7 10 1)	2001 (4 7 10 1)	2002 (4 7 10 1)	2003	2004
Long-term Experts	**1.Taira Sunami** (Chief Adviser) 11/01 ——— 10/31				
	2.Shinichi Osaka (Coordinator) 10/01 ——— 09/30				
	3.Masataka Suga (M.E./Q.C.) 10/01 ——— 09/30				
	4.Toshio Suzuki (Al. Die Casting) 10/01 ——— 09/30				
	5.Makoto Kabasawa (Laser) 10/01 ——— 09/30				
Short-term Experts	**1.Kyusuke Maruyama** 3/24 ——— 5/11 (Fatigue Testing)				
	2.Shinichiro Shibutani 4/15 ——— 6/12 (Cold Box)				
	3.Takahiko Moriyasu 5/26*5/30 (F. Automatic Dilatometer)				
	4.Takashi Ida 5/28 — 6/12 (Carburizing)				
	5.Yasuo Akiyama 5/28 — 6/13 (Laser)				
	6.Kenichi Oi 5/28 ——— 6/28 (Laser)				
	7.Akira Fukuzawa 6/24*6/28 (Seminar Lecturer)				
	8.Kyusuke Maruyama 1/19 ——— 2/19 (Fatigue Testing)				
	9.Masayoshi Kurihara 3/6 — 4/1 (Strength & Fracture)				
	10.Shinichiro Shibutani 3/6 ——— 4/27 (Shell Molding)				
	11.Isao Sato 3/6 — 3/23 (Die Cast Gate Planning)				
	12.Takashi Ida 3/6 — 3/26 (Carburizing/Carbunitriding)				
	13.Yuichi Tokita 4/10 — 4/20 (Die Design)				
	14.Kiyomasa Muramatsu 4/10 — 4/20 (Die Making)				
	(**Instalation Engineers**)				
	1.Masanobu Matsushita 3/26*3/28 (Fatigue Testing Machine)				
	2.Shinichi Suzuki 4/7 — 4/18 (Cold Box)				
	3.Kazunori Higashida 4/7 — 4/18 (Cold Box)				
	4.Masahiro Usutake 5/8 — 5/22 (Al. Die Casting)				
	5.Tamotsu Goto 5/8 — 5/22 (Al. Die Casting)				
	6.Tamotsu Shimizu 5/15 — 5/30 (Carburizing/ADI)				

Annex 06

List of Counterpart Training in Japan

As of 31/03/2002

Year	2000				2001				2002				2003	2004
	4	7	10	1	4	7	10	1	4	7	10	1		
C/P Training in Japan					**3. Shoker Abdel Fadeel** 1/7 — 2/				20 (Al. Die Casting)					
					4. Mohamed Abd El-Aty) 1/7 — 2/				20 (Carburizing/Carbunitriding)					
					5. Dr.Khalid Abdel Ghany 1/7—				3/20 (Laser Cutting)					
	1. Dr.Adel Nofal 7/3 — 7/16(Metal Processing)													
	2. Dr.Bahaa Zaghloul 7/3 — 7/16(Metal Processing)													

List of UMPTP Counterpart

As of 18 April 2002

Field			JP Fiscal Year / Name	C/P Allocation 2000 (4 7 10 1)	2001 (4 7 10 1)	2002 (4 7 10 1)	2003 (4 7 10 1)	2004 (4 7 10 1)	Training in Japan FY	Training Organization	Remarks
Suga	Heat Treatment	◎	Dr. Alber Sadek		———						
		○	Mohamed Abd El-Aty	———	———				01	NIMS/Oriental Eng. etc.	
		○	Mohamed Abdel Hady		———						
		×	Mohamed Ramadan	———	———						
		×	Khalid Abdel Azem	———	———						Retired in Mar.2002
		×	Eng. Tarek	———							Transferred to Other Dep.
	Material Evaluation	◎	Dr .Khalid Ibrahim	———	———						
		○	Ayman Hamada	———	———						
		×	Esam Ibrahim	·····							Transferred to Other Dep.
		×	Fady Mohamed El-Subbugh	———	———						Retired in Aug.2001
Suzuki	Die Cassting	○	Prof. Ahmed Nagy	———	———						*Not regularly attended
		◎	Dr. Mohamed Waly	———	———						
		○	Shokury Abdel Fadeel		———				01	Hibino Industry etc.	
		○	Waleed Siam		———						
		△	Ahmed Abdel Moghny		———					*JICA Group Training	*Training for Welding Cource
		×	Hesham Ahmad	———	·····						
	al Mould	◎	Dr. Ibrahim Mustafa	———	———						
		○	Hassan Ahmed	———	———						

	Chemica	○	Rafeet Ahmed								
		○	Usama G. Baheeg								Retured from Militaly in Mar.2003
Kabasawa	Laser	◎	Dr. Abdel-Monem El-Batahagy								
		○	Dr. Khalid Abd El-Ghany						01	Tosei Elc. Beam etc.	Senior C/P
		○	Ahmad Allam								Allocated in Mar. 2001
		○	Haytham Abdel-Rafla								Allocated in Mar. 2001
			Mohamed Newish y								1 year Militaly Service
		×	Mohmoud Tobbaa								Transferred to Other Dep.
		×	Ahmad Abd El-Nagi								Retired in Jan.2001
		×	Ibrahim Mohamed Mohmoud						01	*JICA Group Training	Retired in Sep.2001

◎ **Chief C/P**

○ **Attending C/P**

△ **Not Participate**

× **Resigned or Transferred**

R. 2

List of Machinery and Equipment Provided by JICA

Each amount more than 1600000JPY As of December 31, 2001

Provision Year	No.	Name of the Equipment	Total Value in 1000JPY	Qty.	Place of installation	Status of Use	Status of maintenaqnce	Remark
2000	KY12－001	**Cold Box** Cold Box: Cross Co.Ltd	9,410	1	CMRDI-Foundry	good	good	
〃	KY12－002	**Cold Box** Die (Metallic Pattern) -Die for cuppling head parts: Cross Co.Ltd	3,969	1set	CMRDI-Foundry	good	good	
〃	KY12－003	**Cold Box** Die (Metallic Pattern) -Die for sand testing : Cross Co.Ltd	3,779	1set	CMRDI-Foundry	good	good	
〃	KY12－004	**Cold Box** Accessories for Cold Box (Shoot/Gas controller/Transverse tester etc.): Cross Co.Ltd	16,813	1set	CMRDI-Foundry	good	good	
〃	KY12－005	**Carburizing Eqip.** Drip-Feed Gas Atmoshere Furnace P-3080	19,386	1set	CMRDI-Heat Treatment Workshop	good	good	
〃	KY12－006	**Carburizing Eqip.** Quenching Oil Tank EQ-3080	2,697	1unit	CMRDI-Heat Treatment Workshop	good	good	
〃	KY12－007	**Carburizing Eqip.** Hot Water Cleaner PCA-3080	4,799	1unit	CMRDI-Heat Treatment Workshop	good	good	
〃	KY12－008	**Carburizing Eqip.** Tempering Furnace PTF-3080	4,256	1unit	CMRDI-Heat Treatment Workshop	good	good	
〃	KY12－009	**Carburizing Eqip.** Pit Type Gas Atmosphere Furnace P-50120	11,356	1set	CMRDI-Heat Treatment Workshop	good	good	
〃	KY12－010	**Carburizing Eqip.** Salt Bath Type Austempering Furnace SPE-50120	5,411	1set	CMRDI-Heat Treatment Workshop	good	good	
〃	KY12－011	**Fatigue Testing Mchn.** Plane Bending Testing Machine PWOG-L	8,036	2sets	CMRDI-Fatigue Testing Lab.	good	good	One machines had broken and sent back to Japan for repair
〃	KY12－012	**Al. Die Casting Mchn.** DC250J-T: Toshiba Ltd.	31,970	1set	CMRDI-High Pressure Al. Die Casting Workshop	good	good	

〃	KY12－013	**Al. Die Casting Mchn.** Option Item (Automatic Ladding Unit DAL250SVSH2): Toshiba Ltd.	2,730	1set	CMRDI-High Pressure Al. Die Casting Workshop	good	good	
〃	KY12－014	**Al. Die Casting Mchn.** Option Item (Automatic Spray Unit DBS250MSH): Toshiba Ltd.	2,510	1set	CMRDI-High Pressure Al. Die Casting Workshop	good	good	
〃	KY12－015	**Al. Die Casting Mchn.** Option Item (Automatic Take Away Unit DTO250SLH2): Toshiba Ltd.	2,730	1set	CMRDI-High Pressure Al. Die Casting Workshop	good	good	
〃	KY12－016	**Al. Die Casting Mchn.** Option Item (Die Temparature Controller): Toshiba Ltd.	5,750	1set	CMRDI-High Pressure Al. Die Casting Workshop	good	good	
〃	KY12－017	**Al. Die Casting Mchn.** Option Item (Gas Removal Equipment): Toshiba Ltd.	3,580	1set	CMRDI-High Pressure Al. Die Casting Workshop	good	good	
〃	KY12－018	**Al. Die Casting Mchn.** Option Item (Melting and Holding Furnace): Toshiba Ltd.	4,310	1set	CMRDI-High Pressure Al. Die Casting Workshop	good	good	
〃	KY12－019	**Laser Cutting Mchn.** Laser Oscilator DY-022: Rofin Sinar	46,590	1set	CMRDI-Laser Application Lab.	good	good	
〃	KY12－020	**Laser Cutting Mchn.** Nozzle Unit for Cutting with Hight Sensor	4,760	1set	CMRDI-Laser Application Lab.	good	good	
〃	KY12－021	**Laser Cutting Mchn.** Nozzle Unit for Cutting with Hight Sensor (for Spare)	3,140	1set	CMRDI-Laser Application Lab.	good	good	
〃	KY12－022	**Laser Cutting Mchn.** Accessories for Laser Machine (Chiller Unit XYW6033D)	3,400	1set	CMRDI-Laser Application Lab.	good	good	
〃	KY12－023	**Laser Cutting Mchn.** Accessories for Laser Machine (6 Axus Robot MOTOMAN-UP20)	8,250	1set	CMRDI-Laser Application Lab.	good	good	
〃	KY12－024	**Laser Cutting Mchn.** Accessories for Laser Machine (Rotary Table SPNC-502C)	3,300	1set	CMRDI-Laser Application Lab.	good	good	
〃	KY12－025	**Laser Cutting Mchn.** Accessories for Laser Machine (Operation Booth for Beam Protection)	2,220	1set	CMRDI-Laser Application Lab.	good	good	
〃	KY12－026	**Dilatometer** Full Automatic Transformation Testing Instrument	11,570	1set	CMRDI-Material Evaluation Lab.	good	good	Mechanical failure caused was once found then fixed in Egypt

〃	KY12－027	**Dilatometer** Peripheral Equipment 2190-7M7	4,350	1set	CMRDI-Material Evaluation Lab.	good	good	
〃	KY12－028	**Contour Meter** Contracer CP-410	2,450	1set	CMRDI-Laser Application Lab.	good	good	
〃	KY12－029	**Mini-Bus** Hashim Bus HB208	5,160	1	CMRDI	good	good	LE.172,000－ (LE.1=30JPY)

List of Machinery and Equipment Provided by JICA

Each amount less than 1600000 & more than 100000JPY As of December 31, 2001

Provision Year	No.	Name of the Equipment	Total Value in 1000JPY	Qty.	Place of installation	Status of Use	Status of maintenaqnce	Remark
2000	KY12-030	**Cold Box** Die (Wooden Pattern) -Die for cuppling head parts: Cross Co.Ltd	526	1set	CMRDI Foundry	good	good	
〃	KY12-031	**Cold Box** Spare Parts (Mold fame seal packing/Pressure connection gasket/Supply shutter for sand etc.): Cross Co.Ltd	315	1set	CMRDI Foundry	good	good	
〃	KY12-032	**Cold Box** Additional Spare Parts (Resin pump/Compressed cylinder seal kits etc.): Cross Co.Ltd	300	1set	CMRDI Foundry	good	good	
〃	KY12-033	**Carburizing Eqip.** Secondary Wiring Material	862	1unit	CMRDI-Heat Treatment Workshop	good	good	
〃	KY12-034	**Carburizing Eqip.** Secondary Piping Material	862	1unit	CMRDI-Heat Treatment Workshop	good	good	
〃	KY12-035	**Carburizing Eqip.** Jig-1	600	3	CMRDI-Heat Treatment Workshop	good	good	
〃	KY12-036	**Carburizing Eqip.** Hot Water Cleaner Tank	1,163	1set	CMRDI-Heat Treatment Workshop	good	good	
〃	KY12-037	**Carburizing Eqip.** Jig-2	600	3	CMRDI-Heat Treatment Workshop	good	good	
〃	KY12-038	**Carburizing Eqip.** Spare Parts (O2 Sencer OS-650 & Fan shaft SCH)	443	1set	CMRDI-Heat Treatment Workshop	good	good	
〃	KY12-039	**Fatigue Testing Mchn.** Optional Accessories (Acrylic cover for the main body & for moving parts)	486	2sets each	CMRDI-Fatigue Testing Lab.	good	good	
〃	KY12-040	**Leser Cutting Mchn.** Optic Fiber with Collimation Unit	550	1set	CMRDI-Laser Application Lab.	good	good	

〃	KY12-041	**Leser Cutting Mchn.** Optic Fiber with Collimation Unit (for Spare)	1,050	1set	CMRDI-Laser Application Lab.	good	good	
〃	KY12-042	**Leser Cutting Mchn.** Nozzle for Welding F-Length 200/120mm (Original & for Spare)	280	2sets	CMRDI-Laser Application Lab.	good	good	
〃	KY12-043	**Leser Cutting Mchn.** Focussing Unit for Cutting & Welding F-Lg. 200mm (Original & for Spare)	960	2sets	CMRDI-Laser Application Lab.	good	good	
〃	KY12-044	**Leser Cutting Mchn.** Focussing Unit for Cutting & Welding F-Lg. 120mm (Original & for Spare)	900	2sets	CMRDI-Laser Application Lab.	good	good	
〃	KY12-045	**Leser Cutting Mchn.** Accessories for Laser Machine (Air Curtain Equipment)	240	1set	CMRDI-Laser Application Lab.	good	good	
〃	KY12-046	**Laser Cutting Mchn.** Accessories for Laser Machine (CCD Camera Unit)	400	1set	CMRDI-Laser Application Lab.	good	good	
〃	KY12-047	**Laser Cutting Mchn.** Accessories for Laser Machine (CRT Monitor Display)	100	1	CMRDI-Laser Application Lab.	good	good	
〃	KY12-048	**Laser Cutting Mchn.** Accessories for Laser Machine (Output Meter)	1,400	1set	CMRDI-Laser Application Lab.	good	good	
〃	KY12-049	**Laser Cutting Mchn.** Accessories for Operation (Condensor Welding Machine 33706)	470	1set	CMRDI-Laser Application Lab.	good	good	
〃	KY12-050	**Dilatometer** Accessories (Arc Percussion Welder)	240	1	CMRDI-Material Evaluation Lab.	good	good	
〃	KY12-051	**Dilatometer** Accessories (Instruction Manual)	1,266	1	CMRDI-Material Evaluation Lab.	good	good	
〃	KY12-052	**Dynamic Strain Meter** Strain Gauge Amplifire CDA-700A	1,216	4	CMRDI-Material Evaluation Lab.	good	good	
〃	KY12-053	**Dynamic Strain Meter** Accessories (Table SD-MXNK1890)	103	1	CMRDI-Material Evaluation Lab.	good	good	
〃	KY12-054	**Dynamic Strain Meter** Accessories (Personal Computer CPXJ650GT)	421	1	CMRDI-Material Evaluation Lab.	good	good	

〃	KY12-055	**Dynamic Strain Meter** Accessories (Software Photoshop V6)	118	1	CMRDI-Material Evaluation Lab.	good	good	
〃	KY12-056	**XY Recorder** X-Y Recorder 701830 F-HJ/M2/C8/G2	1,550	1	CMRDI-Material Evaluation Lab.	good	good	
〃	KY12-057	**XY Recorder** Optional Accessories for X-Y Recorder (Personal Computer CX110)	607	1	CMRDI-Material Evaluation Lab.	good	good	
〃	KY12-058	**XY Recorder** Optional Accessories for X-Y Recorder (Software Photoshop V6)	118	1	CMRDI-Material Evaluation Lab.	good	good	
〃	KY12-059	**Contour Meter** Accessories for Contour Meter (Analisys Software FORMAPAK 1000)	804	1	CMRDI-Laser Application Lab.	good	good	
〃	KY12-060	**Contour Meter** Accessories for Contour Meter (Cross Travel Table 218-001)	275	1	CMRDI-Laser Application Lab.	good	good	
〃	KY12-061	**Contour Meter** Accessories for Contour Meter (Rotary Table 218-003)	176	1	CMRDI-Laser Application Lab.	good	good	
〃	KY12-062	**Contour Meter** Accessories for Contour Meter (Viblation Isolater 178-023)	303	1	CMRDI-Laser Application Lab.	good	good	
〃	KY12-063	**Contour Meter** Accessories for Contour Meter (Personal Computer)	608	1	CMRDI-Laser Application Lab.	good	good	
〃	KY12-064	**Contour Meter** Accessories for Contour Meter (Software Photoshop V6)	118	1	CMRDI-Laser Application Lab.	good	good	
〃	KY12-065	**Radiation Thermometer** IR Thermometer IR-FBW1H	1,070	1	CMRDI-Laser Application Lab.	good	good	
〃	KY12-066	**Radiation Thermometer** Accessories for IR Thermometer (Beam Condensing Parts IR-FLOAN4)	388	2	CMRDI-Laser Application Lab.	good	good	
〃	KY12-067	**Radiation Thermometer** Accessories for IR Thermometer (Temperature Indicater B KHIE01-NDN)	255	1	CMRDI-Laser Application Lab.	good	good	
〃	KY12-068	**PC Projector** CP-S860	862	1	UMPTP Office	good	good	

〃	KY12-069	**Digital Camera** CAMEDIAC-2100 UltraZoom: OLYMPUS	118	1	UMPTP Office	good	good	
〃	KY12-070	**Metal Testing Eqip.** Mounting Press SIMPLIMET 2: Buehler	769	1	CMRDI-Material Evaluation Lab.	good	good	USD 6,994- (1USD=110JPY)
〃	KY12-071	**Metal Testing Eqip.** Grinder /Polisher BETA/2: Buehler	712	1	CMRDI-Material Evaluation Lab.	good	good	USD 6,474- (1USD=110JPY)
〃	KY12-072	**Digital Video Camera** NV DS-35EN: Panasonic	218	1	UMPTP Office	good	good	
〃	KK12-001	**Desktop Personal Computer** Netvista A20 with PC Moitor G54: IBM	708	5	UMPTP Office	good	good	LE.23,600- (LE.1=30JPY) *P.C. LE19500/Monit. LE.4100
〃	GG12-001	**UMPTP project telephone line instllation fee for international call**	127	1	UMPTP Office	good	good	LE.4,219— (LE.1=30JPY)

Annex 09

ملحق رقم ١
التجهيـــزات الأساسيـــة بالمركـــز

Pilot Plants at CMRDI

P. 2.

Ore Beneficiation

The following equipment have been intensively employed on both laboratory and pilot plant scales in the evaluation and maximum utilization of natural resources, e.g. beneficiation of El-Baharia Desert Iron Ores and Aswan Iron Ores for blast furnace operations; the upgrading of Sinai kaolin and Kalabsha kaolin for different industrial application; the production of ceramics and glass raw materials; e.g. feldspar, white sand and ball clays; the production of phosphos-concentrates from local low grade phosphates for phosphoric acid and NPK fertilizers manufacture; utilization of local calcium carbonate in filler production for the use in plastics, pigments and paper industries.

(a) Pilot Plant Facilities (Running Capacity 0.5 t/hr):

Equipment	Manufacturer
Crushing and Grinding:	
2 Jaw Crusher	Denver, U.S.A.
2 Roll Crusher	Denver, U.S.A.
Hammer Mill	Denver, U.S.A.
Rod/ball Mill	H-Quinn, U.S.A.
Cylindrical Ball Mill	Denver, U.S.A.
Attrition Scrubber	Denver, U.S.A.
Sampling:	
Pan Sampler	Denver, U.S.A.
Vezin Sampler	Denver, U.S.A.
Sieving:	
Vibrating Screen	Russel Finex, U.K.
2 V.D. Deck Screen	Denver, U.S.A.
DSM Screen	Dorr-Oliver, U.S.A.
Classification:	
Cyclone Cluster	Krebs Eng., U.S.A.
Cyclone + Mixer	Sepor, U.S.A.
Air Classifier	Denver, U.S.A.
Spiral Classifier	Denver, U.S.A.

Equipment	Manufacturer
Conditioning:	
Conditioning Tank	Denver, U.S.A.
2 Conditioning Tank	Local, Egypt
Conditioning Mill	Denver, U.S.A.
Flotation Separation:	
Flotation Cell	Denver, U.S.A.
2 Flotation Bank	Denver, U.S.A.
Column Flotation	Local Egypt
Magnetic Separation:	
Belt-magnetic Separator	Dings, U.S.A.
Erez High Wet Magnetic Separator	Eriez, U.S.A.
Gravity Separation:	
Shaking Table	Denver, U.S.A.
2 Jigs	Denver, U.S.A.
Heavy Media Separators	Denver, U.S.A.
Electrostatic Separation:	
Electostatic Separator	Carpco, U.S.A.
Thickening	
2 Thickener	Denver, U.S.A.
Filtration:	
Disc Filter	Denver, U.S.A.
Drum Filter	Denver, U.S.A.
Sintering:	
Sintering Rig	Head Wrightson Ltd., U.K
Pelletization:	
Disc Pelletizer	Denver, U.S.A.

(b) Laboratory Facilities

Equipment	Manufacturer
Chemical Analysis:	
Atomic Absorption	Perkin-Elmer, U.S.A.
Spectrophotometer	Perkin-Elmer, U.S.A.
X-ray Diffractometer	Philips, Holland
Heating, Drying, Ignition:	
3 Hot Plates	Linoberg
3 Dryers	Stabil-Therm
2 Muffles	Mnuve-MF120, Turkey
Crushing and Grinding:	
Cone Crusher	Denver, U.S.A.
Disc Crusher	Denver, U.S.A.
Rod Mill	Denver, U.S.A.
Bond Mill	H-Quim, U.S.A.
Vibrating Mill	Denver, U.S.A.
2 Porcelain Ball Mills	Denver, U.S.A.
Steel Ball Mill	Denver, U.S.A.
Planetary Ball Mill	Fritsch, Germany
Sampling:	
Jone-Splitter	Denver, U.S.A.
Rotary Splitting Riffle	Denver, U.S.A.
Sieving:	
Vibrating Screen	Denver, U.S.A.
Vibrating Screen	Denver, U.S.A.
Classification:	
Mozely Cyclone	Mozely, U.K.
Micro-Cyclone	L/S Sep. Ltd., U.K.
Cyclosizer	Warman, U.K.
Magnetic Separation:	
Wet High Intensity Magnetic Separator	Boxmag-Rapid, U.S.A.
Dry High Intensity Magnetic Separator	Carpco, U.S.A.
Particle Size Analysis:	
Laser Particle Sizer "Analysette 22"	Fritch, Germany

Mineral Processing

The following machinery and equipment have been used in tens of development projects with industrial institutions in many fields such as the following:

- *Development of steelmaking industry, e.g. oxygen lancing, implementation of EAF water-cooled panels, high strength steel, tool steel.*
- *Development of ferroalloys industry, e.g. ferromanganese, ferrosilicon, ferrotitanium, ferrochrome, ferrovanadium, silicomanganese.*
- *Processing of local ores, e.g. phosphate ores, ilmenite, magnesite, barite, iron ores, bentonite, chromite.*
- *Production of chemicals, salts and materials, e.g. aluminum fluoride, cryolite, barium sulphate, magnesium chloride and sulphate, silicon carbide, sodium and potassium chromate, sodium sulphide, ferrites.*
- *Process development, e.g. aluminum industry, copper refining, lead alloys industry.*

(a) Pilot Plant Facilities:

Equipment	Capacity	Manufacturer
Submerged Arc Furnace	50 kg, 75 kw	U.K.
Pilot Submerged Arc Furnace	200 kg	U.K.
Baby Arc Furnace	150 kg	U.K.
Rotary Calciner	100 kg/h	U.S.A
Electroslag Remelting Unit	5 tons	Local
Cupola Furnace	5 tons	Local
Pilot Bottom Blowing Converter	250 kg	Local
Pilot Top Blowing Converter	250 kg	Local
Aluminum Powder Production Unit	2 tons/day	Local
Cored Wire Production Machine		Local

Equipment	Capacity	Manufacturer
Hydrometallurgical Continuous Pilot Plant:		Germany
Rubber Lined Reactor (3 units)	3 m^3	
Horizontal Filter (2 units)	1 m^2	
Counter Current Washing Thickening System	3 m^3	
Filter Press	0.5 m^2	
Percolation Tank	2 m^3	
Rotary Drum Filter	1 m^2	U.S.A.
Hydrometallurgical Continuous Bench Scale Unit	12 kg/day	U.S.A.
6-Stage Solvent Extraction Pilot Plant Unit	100 l/h	U.S.A.
Two Compartment Electrodialysis Unit		Germany
Hybridizer for Surface Coating of Powders		Germany
Spray Dryer	0.25 kg/h	Japan
Slurry Fluidized Bed Dryer	1 kg/h	Japan
Pilot Belt Filter	10 m^2	Holland
Pilot Belt Dryer	250 kg/h	Local
Unit for Steel Shot Production		Local
Unit for Nitriding of Ferroalloys		Local

Experimental Foundry

Equipment	Model and Capacity	Manufacturer
-High Frequency Induction Furnace	ABB (1-12 kg)	U.S.A.
Medium Frequency Induction Furnace	ABB (100 kg)	Germany
Medium Frequency Induction Furnace	ABB (350 kg)	Germany
Medium Frequency Induction Push and Furnace for Non-Ferrous Alloys	ABB (100 kg, Cu ± 30 kg Al	Germany
Complete Sand Preparing Plants	Eiricl (8 t/hr)	Germany
Continuous Mixer	GEMCO (0.5 t/hr)	Holland
Core Blower	GEMCO (15 kg/hr)	Holland
Cold Box Machine	TOYO Shell Machine (12 kg/40 sec.)	Japan
Die Casting Machine	TOSHIBA - DC250JT (1.5 kg cast/min.)	Japan
Vortex Unit for Mg - Treatment of Ductile Iron	(100-350 kg)	Holland
Complete Sand Testing Laboratory for Green Sand	+GF+	Germany
Complete Sand Testing Laboratory for Chemical Bonded Sands	KUROSU	Jica - Japan
Shell Molding Machine	SH611 Mold Machine	U.S.A.
Investment Casting Unit Including: Wax Injector Mixer	 Mueller Phipps International (MRI) ROMCO	 U.S.A. U.S.A.

Welding Workshop

Equipment	Model and Capacity	Manufacturer
8 Arc Welding Machines	KRA-300 AC-OTC	DAIHEN Corp. Japan
2 Arc Welding Machines	KR-600 AC-OTC	DAIHEN Corp. Japan
7 Arc Welding Machines	Arc Junior 360	Italy
Drying Furnace	4.4 kw, 220V	
3 TIG Welding Machines	OTC Accuting - Model AEP-500	DAIHEN Corp., Japan
TIG Filter Control Unit	Model HC-71	DAIHEN Corp. Japan
CO_2 Welding Machine	Compact 315	ESAB. Sweden
CO_2 Welding Machine	MAG STAR 35	MISSER-Greshaien
2 CO_2 Welding Machine	OTC-Dyna Auto	DAIHEN Corp. Japan
Plasma Cutting and Welding Machine	OTC-PC-500	DAIHEN Corp., Japan
Inverter Air Plasma	VRC M-30	DAIHEN Corp., Japan
Transistor Pulsed MIG	TR-500	DAIHEN Corp., Japan
Dyna Auto 500 for Cored Wire		DAIHEN Corp., Japan
Submerged Arc Welding Machine	SAW-500	DAIHEN Corp. Japan
Generator DC Welding Machine	EMIT	DAIHEN Corp., Japan
TIG DC Arc Welding Machine	ARGO 300	DAIHEN Corp., Japan

Equipment	Model and Capacity	Manufacturer
2 TIG Machine	300A	ESAB, Sweden
2 TIG Machine	450A	FRONIX, Austria
3 CO_2 Machine	400A	FRONIX, Austria
2 SMAW Machine	650A	FRONIX, Austria
SMAW Machine	400A	ESAB, Sweden
Tecna Resistance Welding Machine	4500A	Italy
Spot Resistance Welding Machine	25 kA	Spain
Oxy Acetylene Cutting	1K-12 max 3	DAIHEN Corp., Japan
Pipe Positioner	LD-1000N	Koike Sanso Kogyo Ltd., Japan

Sheet Metal Fabrication

Equipment	Model and Capacity	Manufacturer
Hydraulic Shear Cutting Machine	NS20 - 12mm thick cutting	COLMAL, Italy
Press Bending Machine	PIX - 200 ton	COLMAL, Italy
3-Roll Bending Machine	MG - 12mm thick plate bending using 300mm diameter roll	MG s.r.l., Italy

Heat Treatment

Equipment	Model and Capacity	Manufacturer
Pit Type Gas Carbo-Nitriding Furnace	UNIC P-3080 - 50 kg	OH. Strong Oriental Engineering Co., Ltd., Japan
Pit Type Quenching Oil Tank	EQ-3080 - H	
Hot Water Cleaner	PC A-3080	
Pit Type Tempering Furnace	PTF - 3080 - HL	
Pit Type Tempering Furnace	P509120 - 150 kg	
Salt Bath Type Austempering Furnace	SPE-50120	
Hot Water Cleaning Tank	WE-50120	

Metal Forming

Equipment	Model and Capacity	Manufacturer
Experimental Rolling Mill	Sheffield 838DL 320x320mm diameter rolls	England
Pneumatic Hammer	Beche & Grohs, Model L4 150kp	Germany

Powder Metallurgy

Equipment	Model and Capacity	Manufacturer
Hot Isostatic Press	AIP6-30H	U.S.A.
Pilot Unit for Powder Metallurgy	Thermtech	S. Korea
Metal Atomizer	PSI	England

Advanced Melting Techniques

Equipment	Model and Capacity	Manufacturer
Vacuum Induction Melting	PVA (100 kg steel)	PVA, Germany
Vacuum Induction Melting and Casting Furnace	(VIM/ISM) 120 kg. Conventions VIM Melting Capacity and 10 Induction Skull Melting Capacity	Consarc, Scotland
Plasma Arc Melting Furnace	10 kg	Ukraine
Induction Melting Furnace	10 kg	Bulgaria
Electro-Slag Melting and Casting	60 kg	Ukraine

Laser Industrial Applications

Equipment	Model and Capacity	Manufacturer
Nd:YAG Laser: - Diode Pumped Laster - 0.3mm Diameter Fiber for Beam Delivery - 6-axis Robot with 1658mm Reaching	DY-022 - 2200 W	Rofin Sinal, Germany

Metal Cutting

Equipment	Model and Capacity	Manufacturer
CNC Lathe - 40 kW	Profturn 400S, max. length 750mm max. dia. 400mm max. weight 300kg	Holland
CNC Vertical Machine Center	Hartford HV35 max. length 500 mm max. dia. 500 mm max. weight 300 kg	Taiwan
Universal Milling Machine	FGS 50Tos max. length 700mm max. dia. 400 mm max. weight 500 kg	Czech Republic
Conventional Lathe	SUS63 Tos max. length 200mm max dia. 630mm max. weight 600kg	Czech Republic
Drilling Machine	VE320Flott, Drill hole from 1mm to 40mm	Germany
Tool Grinding Machine	FC50N Slgp, ½ PI	Holland
Mechanical Saw	F280, max. cutting dia. 400mm	Italy
Small Lathe	MN80A, For precision turning	Czech Republic
Surface Roughness Measurement	Surface Test 211	Japan
Set of Dynamometers	For Cutting Force Measurement	
Conventional Lathe	RIGIOTURN560, max. length 2250mm max. dia. 600mm max. weight 5000 kg	India

Equipment	Model and Capacity	Manufacturer
2 Lathe	Tug-40. max. length 1000mm max. dia. 300mm max. weight 250kg	Poland
Lathe	162 max. length 1200mm max. dia. 500mm max. weight 400kg	Egypt
Milling Machine	Bharat max. length 300mm max. dia. 300mm max. weight 200kg	India
Milling Machine	Harrison. max. length 300mm max. dia. 300mm max. weight 200kg	England
Grinding Machine	H208. max. length 500mm max. dia. 300mm max. weight 200kg	
Shaping Machine	7305 max. length 300mm max. dia 300mm max. weight 300kg	USSR
Mechanical Saw	Kilser200. max. cutting dia. 300 mm.	USSR
Cutting Disk	H-16B. max. cutting dia. 100 mm	Italy
Drilling Machines	100A. drill hole from 1mm-130mm	Egypt
Tool Grinding Machine	AEG-HBS100	USSR

B.2

Material Characterization and Evaluation

(a) Material Evaluation

Equipment	Model and Capacity	Manufacturer
Scanning Electron Microscope (SEM) with Energy Disperse X-ray EDX Microanalysis	SEM JEOL GSM5410, 30 K ev, EDX Oxford	Japan England
Transmission Electron Microscope	JEM-2010 Fas TEM -200kV accelerating voltage -0.194nm point resolution - 0.14mm line resolution	JEOL, Japan
X-ray Fluorescence (XRF) Ores and Liquid and any Metals	ARL940, 3 kW X-ray Tube	Switzerland
Spectrometer for Analysis of Titanium and Zinc Alloys	SQ Baird, 2 bias metal	USA
Spectrometer for Analysis of Copper, Ferrous and Aluminum Alloys	SPECTRO,3 bias metal	Germany
Spectrometer for Analysis of Copper, Aluminum, Ferrous and Nickel Alloys	ARL5420, 4 bias metal	Switzerland
X-ray Diffraction (XRD) to Evaluate the Different Phase and Semi-Quantitative Analysis	BRUKER	Germany
Unit of Metallography including Sample Preparation, Microscopes and Photography		Germany & Japan
Automatic Dilatometer	Formaster - EDP FTF-200	Fuji Electronic Industrial Co., Ltd., Japan
Pore Sizer	Micromeritics	U.S.A.
Surface Area Analyzer	Micromeritics	U.S.A
Carbon-Sulphur Analyzer	CSA302	Germany

Equipment	Model and Capacity	Manufacturer
High Speed Density Analyzer		U.S.A
Apparatus for Measuring Oxygen Content in Molten Steel	L. Heraeus	Germany
Unit for Determination of Activity in Multi-Component System	L. Heraeus	Germany
Nitrogen and Oxygen in Steel	L. Heraeus	Germany
Apparatus for Measuring Hydrogen Content in Molten Steel	Leco	U.S.A.
Thermal Diffusivity Meter	FL5000	U.S.A.
Differential Scanning Calorimeter	LABSYS DSC	France
Vibrating Sample Magnetometer	LDJ600	U.S.A.

B.2

(b) Material Testing

Equipment	Model and Capacity	Manufacturer
Tribometer:		
Wear Testing Machine	2.2 kW, Load range: 10-4000N	TNO, Holland
Tensile Testing Machines:		
Universal Testing Machine	1000 KN	Shimadzu, Japan
Universal Testing Machine	100 KN	UTS, Germany
Tensile Testing Machine	50 KN	Shimadzu, Japan
Tensile Testing Machine	500 KN	Shimadzu, Japan
Tensile Testing Machine	300 KN	Shimadzu, Japan
Fatigue Testing Machines:		
Rotating Bending Fatigue	200N.m	Amsler, Germany
Plane Bending Fatigue	0.2kW Dynamic load = ±15N.m	TKS, Japan
Uniaxial Fatigue Testing Machine	Static Load=150KN Dynamic Load = 100KN	Amsler, Germany
Creep Testing Machines:		
Creep Testing Machine	20 KN, T=1000°C	UTS, Germany
Creep Testing Machine	50KN, T=1200°C	ESH, England
Impact Testing Machines:		
Impact Testing Machine	150J	Amsler, Germany
Impact Testing Machine	300J	Shimadzu, Japan
Macrohardness Testing Machines:		
Vicker Hardness	50 kgf	Indentec, England
Brinell Hardness	3000 kg	Zwick, Germany
Rockwell Hardness	150 kgf	Indentec, England
Universal Hardness Testing Machine	150 kgf	Indentec, England
Microhardness Testing Machines:		
Microhardness	2000 gr	Highwood, Japan

(c) Non-Destructive Testing

Equipment	Model and Capacity	Manufacturer
2 Ultrasonic Flaw Detectors Units	FD-610	Mitsubishi, Japan
Ultrasonic Flaw Detectors	USM-2	Kraut Kramer, Germany
X-ray Radiography	200 kV	Hitachi, Japan
X-ray Radiography	250 kV	Rigaku, Japan
X-ray Radiography	250 kV	Philips, Germany
Ultrasonic Thickness-meter	FD-34	Mitsubishi Japan
Ultrasonic Thickness-meter		Cygnus, England
Hardness Tester Unit		Equotip, Switzerland
2 Magnet Yoke Type Units	M-26	Pony Magna Atomic Industry, Japan
Mobile Type Unit	M-32	Pony Magna Atomic Industry, Japan
2 Permanent Magnet Units		

Annex 10

RECORD OF SERVICES TO INDUSTRIES

as of April 18, 2002

JICA Project on Upgrading of Metal Processing Technology in The Republic of Egypt(1 / 5)

1 SEMINAR / OPENING CEREMONY

No.	Date	Title / Location	Participants	Contents
1	11-12 Jan, 2001	Workshop of EEMI (Egyptian Society for Engineering and Metal Industries) in Ein El-Sofna	M.Kabasawa, Bahaa Zaghloul, Khanlid El-Ghany	Lectures for laser by professors of Cairo Univ. Introduction of current state of laser in Japan and UMPTP project in CMRDI by M.Kabasawa
2	27 Jun, 2001	OPENING CEREMONY for and GRAND OPENING of the Project in CMRDI	Mufeed Shehab(The Minister of Higher Education and Scientific Research), Takaya Suto (The Ambassador Extraordinary and Plenipotentiary of Japan) Total: Appr. 120 Participants (Industries, etc.)、	Opening Ceremony, Presentation, Handing-Over Ceremony, Turn-key Ceremony, Demonstration, Special
3	29 Jul, 2001	Preliminary Meeting of Laser Industrial Application Committee (Final Name : Egyptian Society for Laser Industrial Application) in CMRDI	Adel Abdul Azim (Former President of CMRDI), Yehya Badr (Dean of NEALS at Cairo Univ.) Total: 36 Participants	Discussion to found particular organization to spread laser technology in Egypt, Finally this was agreed
4				

2 ORGANIZED ACTIVITY WITH INDUSTRIES AND NEUTRAL SECTOR

No.	Date	Title / Location	Participants	Contents
1	3 Oct. 2001	Regular Meeting of ESLIA in Cairo University	M.Kabasawa, Abdel Monem, Khalid El-Ghany, Abdul Azim total: appr. 30 Participants	Lecture on Thermal Cutting laser by M.Kabasawa
2	3 Nov. 2001	Regular Meeting of ESLIA in Academy of Science	M.Kabasawa, Abdel Monem, Khalid El-Ghany, Abdul Azim total: appr. 30 Participants	Lecture on ULSAB Project by M.Kabasawa
3	19 Jan. 2002	Regular Meeting of ESLIA in Academy of Science	M.Kabasawa, Abdel Monem, Abdul Azim total: appr. 30 Participants	Lecture on Principal of Laser by Yahya of NEALS

4	16 Feb. 2002	Regular Meeting of ESLIA in Academy of Science	M. Suga, Abdel Monem, Abdul Azim total: appr. 30 Participants	Lecture on Principles and Features of Laser Cutting
5	23 Mar. 2002	Regular Meeting of ESLIA in Academy of Science	M.Kabasawa, Abdel Monem, Khalid El-Ghany, Abdul Azim total: appr. 30 Participants	Presentation on Company's Problem by Hesham Mohamed of Sakr
6	13 Apr. 2002	Regular Meeting of ESLIA in Academy of Science	M.Kabasawa, Abdel Monem, Khalid El-Ghany, Abdul Azim total: appr. 30 Participants	Presentation on Current Laser Technology in Japan by Khalid El-Ghany of CMRDI
7				

3 TRAINING COURSE FOR INDUSTRIES

No.	Date	Title / Location	Participants	Contents
1	29 Dec, 2001-2 Jan, 2002	One Week Training Course for Laser Application in Cairo University (1 day) and CMRDI (4 days)	35 Trainees from 18 Companies, Lecturer : Prof. Yahya of NEALS, Prof. Nagi of NEALS, Abdel Monem, M.Kabasawa, Khalid El-Ghany	Principle, Welding, Cutting, System and Demonstration
2				

RECORD OF SERVICES TO INDUSTRIES

as of April 18, 2002

JICA Project on Upgrading of Metal Processing Technology in The Republic of Egypt(3 / 5)

4 EXCHANGE OF OPINION BETWEEN C/P AND INDUSTRIES

No.	Date	Name of Companies / Organizations	Project Staff visited	Remarks
1	18 Nov, 2000	NIELS (National Institute of Laser Enhanced Science) in Cairo University	M.Kabasawa, M.Suga, Monem, Khalid	Visited to Testing Rooms and Discussion about Cooperation
2	26 Nov,2000	ESPI (Egypto Swiss Precision Industry) in 10th of Ramadan	M.Kabasawa, Khalid	Target Company for Laser, One Laser Cutting Machine is Operated.
3	6 Dec. 2000	GEMET(General Metals)	T.Sunami, T.Suzuki, M.Suga, Waly	Target Company for Die Casting, Die Casting Machines are Operated,
4	13 Dec, 2000	El-Araby	T.Sunami, T.Suzuki, M.Kabasawa, M.Suga,	Target Company for Die Casting, Die Casting Machine are Operated,
5	22 Jan. 2001	NASR Casting	T.Sunami, T.Suzuki, M.Suga, Ibrahim Mustafa	Visited to Cold Box and Castings
6	23 Jan, 2001	Alexandria National Iron and Steel	T.Sunami, T.Suzuki, M.Suga, Ibrahim Mustafa	Visited to CC and Hot Rolling Mill
7	28 Jan, 2001	MOG	T.Sunami, M.Kabasawa, T.Suzuki, M.Suga,	One Laser Cutting Machine is Operated, Discuss about Company's Needs
8	13 Feb, 2001	Abou-Youssef. Eng. Office	T.Sunami, M.Kabasawa, T.Suzuki, M.Suga,	Target Company for Laser

RECORD OF SERVICES TO INDUSTRIES

as of April 18, 2002

JICA Project on Upgrading of Metal Processing Technology in The Republic of Egypt(4 / 5)

9	20 Feb, 2001	Sakr	M.Kabasawa, Khalid	Target Company for Laser and Heat Treatment, Two Laser Machines and Many Types Heat Treatment Facilities are Operated
10	24 Mar, 2001	Helwan Steel	M.Suga, T.Sunami, T.Ida, Alber Sadek, Abdel Aty, Abde Hady, Khalid Abdel Azeem	Visited to Heat Treatment and Machine Shop of Maintenance Section
11	15 Dec. 2001	NISR Spinning and Weaving	M. Suga, T. Suzuki, T Sunami, Alber Sadek, Abdel Monem	Target Company for Heat Treatment, Visited to Maintenance, Heat Treatment and Casting Shop
12	5 Jan. 2002	El-Araby	T.Sunami, T.Suzuki, Nofal, Waly	2nd Visit
13	15 Jan, 2002	MOBICA	T.Suzuki, M.Kabasawa, M.Suga, Waly, Khalid Ibrahim, Alber Sadek,	Target Company forDie Casting and Laser
14	3 Mar. 2002	El-Araby	T.Suzuki, Sato, Waly, Shokury, Ahmed	3rd Visit
15	13 Mar. 2002		T.Suzuki, Sato, Waly, Shokury, Ahmed, Waleed	2nd Visit
19				

RECORD OF SERVICES TO INDUSTRIES

as of April 18, 2002

JICA Project on Upgrading of Metal Processing Technology in The Republic of Egypt(5 / 5)

4 EXTENTION SERVICES (VISIT TO INDUSTRIES)

No.	Date	Name of Companies / Organizations	Project Staff visited	Remarks
1		(Under Planning)	(Under Planning)	(Under Planning)
2				