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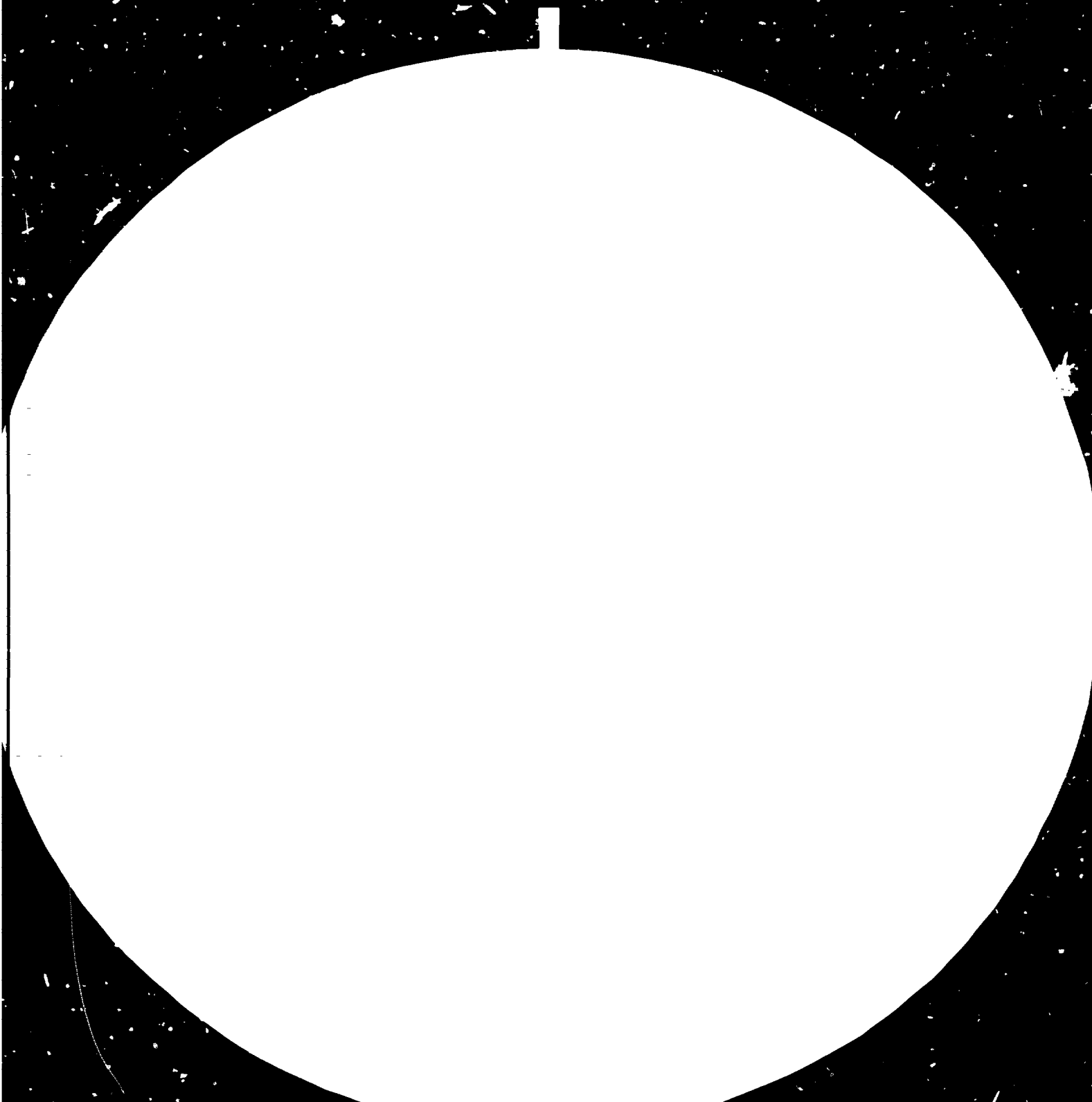
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MICROCOPY RESOLUTION TEST CHART

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RESEARCH AND DEVELOPMENT ACTIVITIES OF THE
METALS INDUSTRY RESEARCH AND DEVELOPMENT CENTER
PHILIPPINES*

by

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INTRODUCTION

Industrialization efforts in the Philippines has been on the rise though not at its expected rate. It is sad to say that despite its vast reserves of raw materials for the manufacture of metal products, the Philippines has remained an exporter of mineral ores and an importer of semi-finished metal products.

The Metals Industry Research and Development Center (MIRDC) was created to serve the needs of the metals industry by providing both the government and the private sector with professional management and technical expertise in such vital activities as training of engineers and technicians, information exchange, research and development, quality control and testing of metal products and business economics advisory services.

MIRDC R & D PROGRAM

It is predicted that during the next ten years and thereon, more national developmental activities will be geared towards catching up with the technological gains made by the Western countries. Nothing spectacular that was not already accomplished by the West may be achieved in the field of R & D except perhaps in the area of agriculture.

Along this line of development, the Center's R & D program is envisioned at research studies dealing with product and process development with a view to improving the performance of existing metals industries and hence accelerating their growth and promoting greater capabilities.

Applied industrial research and development projects are being undertaken by MIRDC to improve existing processes and products, to increase the utilization of locally available raw materials and to adapt new products and new processes to the local system of manufacturing. Research and development give emphasis on the adaptation of manufacturing processes to existing Philippine conditions rather than in basic research and development of new products and processes.

MIRDC has therefore undertaken a number of research and development projects directed towards providing answers to technical problems encountered by the local casting, mechanical and other engineering industries. Consistent with national goals, these research and development projects are aimed at maximizing the local content of manufactured products for export and domestic consumption and better utilization of existing facilities to attain a higher level of productivity.

All of the Center's laboratories have been continuously pursuing the Center's four major research projects, namely:

1. Metal Casting
2. Alloy Design and Heat Treatment
3. Metal Finishing and Corrosion Protection Techniques
4. Metalworking Techniques

In addition the Center also undertakes projects on the design construction and evaluation of prototypes for certain subassemblies, machinery and equipment required by the metals industry. The manufacture of these machine tools could result in the substantial reduction of imports of these products. The equipment prototypes successfully developed by the Center

could be made available to the private sector for commercial scale production. This is important in the selection and adaptation of existing design and technology to suit the needs for equipment and components under local manufacturing conditions.

Described below are the objectives, accomplishments and the work program of the Center on its four major projects.

A. Research on Metal Casting

The research and product development projects are geared towards the improvement of local foundry operations in order to achieve optimum production of local import-substitute quality cast products, to maximize the utilization of indigenous raw materials such as binders, sand and sand additives for foundry applications, and to minimize the importation of various metals products.

B. Research on Alloy Design and Heat Treatment

Researches in this field will include developmental investigations in the design of metal alloys for the manufacture of tools, dies and molds for engineering applications and the application of different heat treatment procedures to different types of alloys to improve their physical and mechanical properties.

C. Researches on Metal Finishes and Corrosion Protection Techniques

Investigations of local conditions that affect the properties and applications of metal materials and products and studies on anti-corrosion chemicals and metal finishes that will suit specific metal materials and product applications will constitute this research work.

D. Researches on Metalworking Techniques

Researches on this field consist of investigations on the application of metal cutting, machining operations, forging, rolling and other forming techniques on the development and manufacture of original and replacement parts for industrial and agricultural machinery and equipment, tools and implements, automotive parts and components, and durable consumers goods.

The following are a more detailed description of the research projects, completed and on-going:

Among the completed projects of the R & D group are:

1. A Study on the Characterization of Philippine Sands.

The study presented the local available sand from different sources along the long stretch of the Island. Tests were conducted to determine the mechanical and chemical properties and the behavior of the sand in relation to their casting products.

2. Technical Feasibility Study of Setting-Up a Sand Grading Plant.

The project proposes to undertake the setting up of a sand grading plant in the Metropolitan Manila Area. This plant will supply the foundry sand requirements of the Metal Casting Industry.

3. Study on Local Clays as Binders for Molding Sand.

Various clay deposits were investigated and characterized to determine which can be used as a binder for molding sand as substitute for imported clay.

4. A Study and Evaluation of the Angat Iron Industry in Angat, Bulacan.

The Angat Iron Industry is an integrated foundry operation that cast white iron and low silicon gray iron for plowpoints and various agricultural implements. The furnace used is made up of local materials and using wood charcoal as fuel.

5. Prototype Development.

The prototype development activities of the Center include market research to determine which machines and which design are most likely to meet public acceptance and industrial needs, equipment design, fabrication of equipment, and tests. The following prototype projects were already completed:

- a. Bench vise (pilot testing)
- b. Machine vise
- c. Belt-driven drill press
- d. Gear-driven drill press
- e. Fiber extraction machine for the Forest Products Industry Development Commission (FORPRIDECOM)
- f. Fiber softening machine for the Philippine Textile Research Institute (PTRI)

Research and development studies are still done at present and some of these projects are:

1. Development of Local Materials for Investment Casting of Industrial Parts.

Since Investment Casting Technology is advanced by developed countries, its raw materials are all imported. Therefore, the

development of indigeneous raw materials as substitute is necessary for this process to be adopted commercially.

2. Development of Methods and Techniques for Hard Chrome Plating.

With the implementation of the progressive car, truck, motorcycle manufacturing programs of the Philippine government, the need for good quality metal finishing or electroplating techniques especially hard chrome plating of various parts and components is imperative. The study consist of an extensive survey in existing methods of hard chrome plating including the different requirements in terms of equipment and materials.

3. Feasibility Study on Jewelry Casting by Lost Wax Process.

The Lost Wax Process is an accurate means of duplicating almost any piece of intricate jewelry, first in wax and then in gold, silver and platinum. Data on both technical and economic aspects are included in the study for the purpose of comparing the possibilities open to a new process applied to the art of jewelry making.

4. Moulding Materials in Foundry.

Quality castings are demanded by numerous industries and the utilization of the right molding materials such as sand, bentonite and other foundry binders are recognize as an important input of this technology. The project proposes to evaluate molding materials used in the foundry for effective control of castings and thereby eliminate the cause of various casting defects.

5. Wear Resistant Materials.

The study provides background data for wear-resistant materials and the opportunities for domestic production primarily in the manufacture of cast and forged materials. The scope of the study includes the properties and uses of wear-resistant materials, manufacturing technologies, demand and local production, and the criteria for the selection of these materials for local industries.

6. Prototype Development.

The development of prototypes is of utmost importance in bridging the gap between conceptual design and the production of local inventions or innovations. The Center shall continue the development and pilot production of machine and equipment prototypes already mentioned. In addition the MIRDC shall endeavor to produce in the future some materials handling equipment, equipment components and simple machine tools.

RESEARCH FOR ASEAN COOPERATIVE EFFORTS

Today, Asean countries (Thailand, Malaysia, Indonesia, Singapore and the Philippines) are aspiring for higher levels of growth for industries, with many of these industries VIS-a-VIS international commitment. The direction of these cooperative efforts towards increased productivity and competitiveness of industries is manifested in the quality and cost-price structure of our products. These would enable Asean Countries to achieve a steady growth in the domestic and exports market.

In conraction with these cooperative endeavors, some research projects are being proposed for regional support.

1. The Corrosion Properties of Typical Philippine Soils.

The project aims to study the corrosion properties of representative Philippine soils and establishing the characteristic parameters which can predict the corrosive properties of the soil under given field conditions.

The objectives of the study are as follows:

- a) to characterize typical Philippine soils and determine the various parameters which may be used to predict the corrosivity of the soil under given field condition.
- b) to conduct actual corrosion tests of structures or sample materials under actual field conditions.
- c) to formulate standard procedure which may be adopted by ASEAN member countries in conducting similar investigations.

2. Atmospheric Corrosion in the Humid Tropics.

It is the primary purpose of this study to present an overview of some of the more important aspects of controlling corrosion in the tropical environment, to highlight the economic significance of corrosion control, to identify specific problem areas relevant to local situation as well as the ASEAN region, seek ways and means of solving these problem by recommending implementary measures that will result in National and Regional cooperative efforts.

The objectives of the study are:

- a) to determine the atmospheric conditions of selected sites in various ASEAN countries to be able to establish parameters which may be used to predict the corrosiveness of the environment.
 - b) to obtain field data on the corrosion rate of various metals under variable tropical atmospheric conditions.
 - c) to establish standard procedures which can be adopted by ASEAN member countries in conducting similar investigations as part of a joint project in atmospheric corrosion in the humid tropics.
 - d) to determine the most effective corrosion control process of providing the desired protection of metals in humid tropics.
3. Research in Raw Materials for Metal Casting, i.e., Sand, Binder and Chemicals for Molding Core Making.

This project proposes to study and evaluate materials used in different molding processes for effective control of quality of castings and thereby eliminate the cause of enumerable casting defects. The project may require raw materials and semi-finished products available in different ASEAN countries for study as possible sources for the different casting processes.

It is the purpose of this study to provide the different ASEAN countries the best known information of the properties of its local materials for the metal casting industries.

MANAGEMENT OF RESEARCH AND DEVELOPMENT PROJECTS

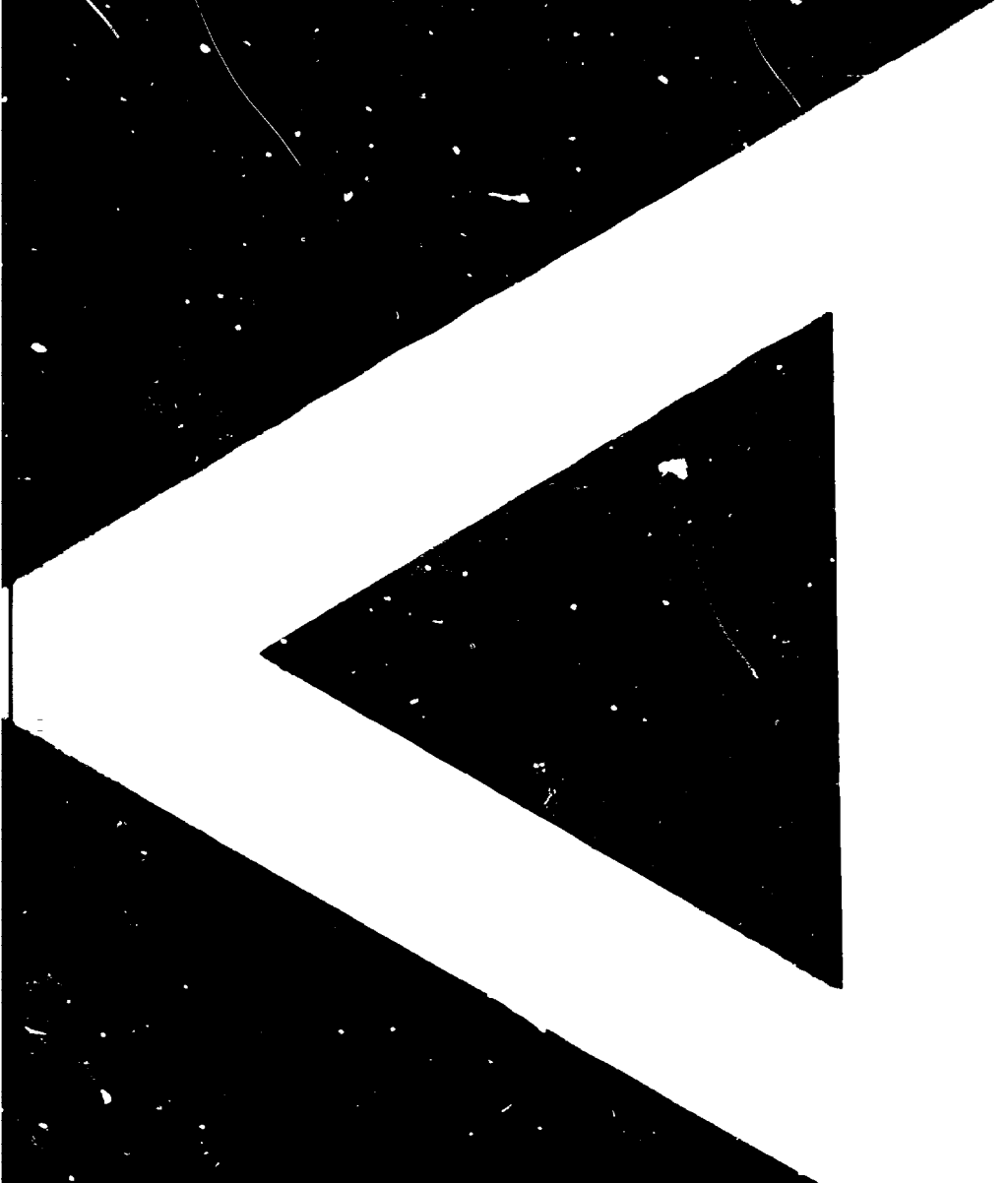
MIRDC, like any other industrial research institute, needs adequate funding to be effective and responsive to the needs of the government and industry. In this respect, a United Nations study published in 1970 entitled "Industrial Research Institute", is hereby quoted:

"The experience of a number of research institutes in developing countries indicates clearly that a firm commitment for the initial capital costs plus adequate working capital for at least a five-year period should be available before the institute is actually started. Even though the institute is intended to become self-supporting, a financial subsidy in one form or another may still be required after the initial five-year period. The importance of this sound financial foundation cannot be overstressed. The creation of an industrial research institute is an important step in national development. Such an organization must be assured of adequate financial support until it has established itself in the community. Without such support, the chances of failure are high, and such a failure would severely handicap any subsequent attempt to establish the necessary facilities even with sufficient funds."

Cognizant of the need for adequate funds to support the establishment and operations of the Center, the National Science Development Board allocated such sum as may be required by the Center out of the proceeds of the Special Science Fund. But such allocation and other resources within the Center were not sufficient to carry out all the research projects in a much faster rate.

Some financial burden, raw materials unavailability and insufficient data on resources, are some of the major constraints encountered by these research and development projects. Despite the difficulties, however, research and development has to continue, to attain the objective set up by the Center closely aligned with its National Goals.

The management of research and development projects requires the establishment of an effective mechanism to monitor the flow of research findings. One problem that was identified is the gap between the research that was being conducted and the actual developmental work needed to overcome the identified problems. Cognizant of this problem and so as to prove the economic feasibility of research findings, the Center, in some cases, designs, constructs, operates, pilot tests and evaluates for a period of time some prototypes it has developed. But due to limited funds, this process usually takes a longer time than is necessary.



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