## XIII METALS INDUSTRY

Project Title: PRE-PROJECT STUDY ON THE CHARACTERIZATION OF PHILIPPINE SANDS

Name and Address of Principal Investigator: MTRD, MIRDC

Description of the Project: Of the 15 sand samples studied representing different localities in the country, 7 were found suitable for foundry applications.

All samples were tested for clay content, specific surface area, grain shape as well as strength, permeability, flowability and hardness.

Project Title: TECHNICAL FEASIBILITY STUDY OF SETTING-UP A SAND GRADING PLANT

Name and Address of Principal Investigator: MTRD, MIRDC

Description of the Project: The study utilized data from the characterization of Philippine sands and took into account the present demand of foundry sands. The complete process description and plant lay-out, list of equipment and other requirements for the setting-up of th sand grading plant were described.

Project Title: STUDY ON LOCAL CLAYS AS BINDER FOR MOLDING SAND

Name and Address of Principal Investigator: MTRD, MIRDC

Description of the Project: Of the 21 various clay samples studied, seven (7) showed promising properties as binders when compared to the standard Wyoming bentonite. Generally, local clays were found inferior to the standard used but two (2) were found applicable to sand mixtures which do not require high dry strength i.e., for production of small and light castings.

Project Title: ACTIVATION TREATMENT OF LOCAL BENTONITES

Name and Address of Principal Investigator: MTRD, MIRDC

Description of the Project: One of the local bentonite supplies found promising from the previous study; Study on Local Clays as Binders for Molding Sand, was subjected to activation treatment to further improve its quality. It was found that the efficiency of the treatment was affected by $Na_2CO_3$ addition and by the temperature of reaction. Other variables showed insignificant effects.

Project Title: PACK CARBURIZING OF LOW CARBON STEELS:

Name and Address of Principal Investigator: MTRD, MIRDC

Description of the Project: The effect of soaking time and temperature on the case depths of pack carburizing low carbon steels (C = 0.14 to 0.25) were determined using metallographic and microhardness tests.

Project Title: DEVELOPMENT OF METHODS AND TECHNIQUES FOR COPPER-NICKEL AND CHROME PLATING ON STEELS

Name and Address of Principal Investigator: MTRD, MIRDC
Description of the Project: To serve as guide to various local electroplating shops, optimum operating conditions involved in the copper-nickel and chrome plating processes were established. Practical methods of analyzing and maintaining quality of plating solutions were also determined. Plate samples were evaluated for adhesion and corrosion resistance.

Project Title: A STUDY AND EVALUATION OF THE ANGAT IRON INDUSTRY IN ANGAT, BULACAN

Name and Address of Principal Investigator: MTRD, MIRDC
Description of the Project: Various operating data were gathered at the plant site, assumed to be representative of the whole Angat iron industry. Based on these data, the status of the industry were evaluated and recommendations made regarding quality control procedures, product and process improvement, product diversification. Studies to be undertaken necessary for the improvement of the industry were recommended.

Project Title: FABRICATION OF AUTOMATIC TEMPERATURE CONTROLLER

Name and Address of Principal Investigator: MTRD, MIRDC
Description of the Project: Controllers for maintaining furnace temperature were assembled out of locally available components at a cost lower than imported ones.

Project Title: DEVELOPMENT OF LABORATORY TYPE ELECTRIC FURNACE

Name and Address of Principal Investigator: MTRD, MIRDC
Description of the Project: The design and fabrication of an inexpensive laboratory electric furnace, utilizing locally available materials were completed. The working designs and assembly instructions will be made available for training purposes.

Project Title: FABRICATION OF CUT-OFF MACHINE

Name and Address of Principal Investigator: MTRD, MIRDC
Description of the Project: The design and fabrication of a cut-off machine which utilized worn-cut resin bonded carbide cut-off wheels were completed. These cut-off wheels were considered as leftovers from previous cutting operations using conventional machine.

Project Title: DEVELOPMENT OF METHODS AND TECHNIQUES FOR HARD CHROME PLATING

Name and Address of Principal Investigator: MTRD, MIRDC
Description of the Project: Conditions involved in hard chrome plating to produce wear and corrosion resistant surface will be optimized. Data obtained will be made available to local platers involved in the vehicle manufacturing program.
Project Cost: ₱263,320.00
Source of Funding: MIRDC/NSDB
Cooperating Agencies: (Proposed) NSDB
Date Started: January 1980
Expected Date of Completion: December 1981
Present Status of Project: It is now forty years since heavy deposition of chrome was offered to the engineering industry, and during this time the importance of the process has steadily increased with its growing use and greater range of applications.

The Philippines still imports most of the hard chrome plated parts and components. There are several local plating companies which are now in the process of developing this technique and one of the objectives of this present project is to optimize its present conditions.

Project Title: DEVELOPMENT OF GOLD PLATING TECHNOLOGY

Name and Address of Principal Investigator: MTRD, MIRDC
Description of the Project: "Flash" deposits of gold on the plating of jewelry and other decorative items to achieve desired appearance, non-tarnishing characteristics and corrosion resistance will be developed and its optimum working conditions as to quality control testing determined.
Project Cost: ₱280,920.00
Source of Funding: MIRDC/NSDB
Cooperating Agencies: (Proposed) NSDB
Date Started: January 1980
Expected Date of Completion: June 1981
Present Status of Project: Two methods of gold plating will be taken into consideration: flash decorative gold plating and heavy decorative gold plating.

In the flash decorative gold plating, thin deposits, up to 7 micro inches thick are generally applied to bright nickel plated brass or to other base metal parts in order to achieve a desired color.

In heavy decorative gold plating, thick layers (about 1-40 microns) are deposited on jewelry parts fabricated from base metals that are subject to considerable wear and abrasion.

Project Title: STUDY ON THE LOCAL MANUFACTURE OF EXOTHERMIC COMPOUNDS

Name and Address of Principal Investigator: MTRD, MIRDC
Description of the Project: Materials, if possible coming from production waste, will be synthesized to give a mixture with properties of an exothermic compound. Mixtures that give good results compared with the imported varieties shall be tested in actual casting operations of a foundry.
Project Cost: ₱57,400.00
Source of Funding: MIRDC
Cooperating Agencies: None
Date Started: September 1979
Expected Date of Completion: March 1981
Present Status of the Project: In recent years, there have come into use, for the production of linings for the inner molten-metalcontracting surfaces of metal casting moulds, or of a hot top for such a mould, shaped bodies or lining made of compositions which contain predominantly a refractory filler material, usually with minor amounts of an organic fibrous materials and of a binding medium.

Project Title: EVALUATION TESTS OF ATMOSPHERIC CORROSION OF G.I. SHEETS

Name and Address of Principal Investigator: MTRD, MIRDC
Description of the Project: Field data on corrosion rates of G.I. sheets and other zinc coated products under variable tropical atmospheric conditions are studied. Parameters investigated include dust content, rainfall, air currents, solar radiation, temperature and zinc coating thickness.
Project Cost: ₱15,660.00
Source of Funding: MIRDC
Cooperating Agencies: None
Date Started: January 1980
Expected Date of Completion: December 1980
Present Status of Project: Prior to the study, there were no known facts on the effects of dust content, gases on the atmosphere, moisture, temperature, rainfall, coating thickness, type and purity of coating, solar radiation and pH on the corrosion of metals. Present visual effects on samples exposed to these different variables include red rust on small portions of the surface of the sheets due to uneven coating thickness and massive white salt formation all over the entire surface.

Project Title: DEVELOPMENT OF LOCAL MATERIALS FOR INVESTMENT CASTING OF INDUSTRIAL PARTS

Name and Address of Principal Investigator: MTRD, MIRDC
Description of the Project: The investment casting process is primarily concerned

with the manufacture of high accuracy components for the aircraft industry, later extending beyond to such purposes as serving machines, electronics equipment and small engine parts. The success of the process is dependent on the control of numerous variables, primarily its raw materials.

Since the technology is advanced by the developed countries, its raw materials such as waxes, refractories and binders are all imported. Therefore, the development of indigenous raw materials as substitutes are necessary for this process to be adapted commercially.

Project Cost: ₱69,740.00
Source of Funding: MIRDC/NSDB
Cooperating Agency: (Proposed) NSDB
Date Started: January 1980
Expected Date of Completion: March 1981
Present Status of Completion: To date, the Investment Casting Process has not been implemented in industries due to the inavailability of local materials as substitute for imported waxes, refractories and binders. Importation problems and location of sources of materials contributed to the delay in the adoption of this technology.

Project Title: FEASIBILITY STUDY ON JEWELRY CASTING BY THE LOST WAX PROCESS

Name & Address of Principal Investigator: MTRD, MIRDC
Description of the Project: As part of the continuing research on investment casting, the possibility of producing jewelries had been explored. Emphasis is on the "lost wax process" where the product quality is improved and its economic profitability considered. Data on the technical and economic aspects are included in the study for the purpose of comparing the possibilities opened to a new process applied to the art of jewelry making.
Project Cost: ₱10,000.00
Source of Funding: MIRDC
Cooperating Agencies: None
Date Started: January 1980
Expected Date of Completion: December 1980
Present Status of Project: Output of the country's most precious metal showed favorable indications that could further stimulate the local production for jewelry making. It would be safe to predict that the development of jewelry casting in our country is necessary and highly recommended. The "lost wax" casting approach may not only improve the probability of insuring conformance with required design limitations but also result in substantial cost savings.

Project Title: STUDIES ON CARBON STEEL AND THEIR CASTING PROPERTIES.

Name and Address of Principal Investigator: Rodulfo P. Garces
NIST

Pedro Gil, Manila

Description of the Project: This project aims to study the effect of percentage of carbon on the physical properties of carbon steel. Simple machines or machine parts made of carbon steel of various grades are to be fabricated. Performance test of these simple machines are to be conducted to determine its physical capabilities.

Project Cost and Source of Funding: (This is a General Fund Project, therefore the project cost is not available.)

Cooperating Agencies: None

Date Started: September, 1976

Present Status of Project: Suspended as of January 1978.