Research Foundation Devoted Entirely To War Effort

Metals and Minerals Research Covers Wide Range on Projects

Annealing Copper

During the year Revere Copper and Brass Inc. has launched a new investigation on the annealing of copper. The possibility of heating thin copper strip directly by high frequency currents is now under study.

The Foundation has already done considerable research on the heating of steel strip, in connection with the tinplate studies for the Inland Steel Co., and now the high frequency technique is being used extensively by major producers of electrolytic tinplate.

Container Glass

The glass project sponsored by the Liberty Glass Company continues into its second year. Work on the project has been directed toward improvement in glass manufacture through fundamental long-range scientific investigations of the basic factors of composition and thermal treatment. For purposes of this study a substantial sum has been allocated for acquisition and erection of special research facilities.

Converter Steel

The Whiting Corporation has set up an extensive project on the operation of side-blow converters. A small Whiting side-blow converter has been installed and put into operation. Some new converter linings developed by the Foundation will be tested in the working unit. An attempt is being made to develop a better lining with a longer life.

Cupola Operation

Another research project sponsored by the Whiting Corporation deals with cupola operation. Work on this problem is just being organized as the fiscal year ends.

Die Steel

This research has resolved itself into a study of the fundamental nature of hardenability and a determination of the specific aspects of hardenability responsible for good behavior of die blocks. When a definite knowledge of the mechanism is obtained, it should be possible to suggest means for further improvement.

Dolomite Refractories

Progress on the Marblehead Lime Company prospect on deriving magnesia from dolomite has reached the pilot plant stage with every indication of commercial success.

Forging Magnesium

A research program on the forging of magnesium alloys, sponsored by Revere Copper and Brass Inc., has been in progress for the past two years. This work has included fundamental studies of the flow characteristics of several magnesium alloys as well as detailed studies of the physical properties of experimental and commercial forgings.

Non-Ferrous Melting

An extensive study of non-ferrous melting furnaces and equipment is in progress. The American productive capacity for aluminum is now approximately ten times, and for magnesium approximately one hundred times, as much as it was before the war. This enormous increase in availability of light metals has given added importance to equipment used in melting and fabricating them. The study is being sponsored by the Whiting Corporation.

Open-Hearth Furnace Slags

During the past year, work on the petrographic study of basic open-hearth slags has been completed. This program, sponsored by the Inland Steel Company and continued for three years, has involved microscopic examinations of over 200 samples of slags from various stages of typical heats of all grades of steel. A close relationship has been observed to exist between the mineralogical character of a slag and its essential properties of lime—silica ratio, basicity and oxidation level. At present, emphasis is being given to phosphorous retention, manganese control and slag activity.

Powder Metallurgy

The work on binders for tungsten carbide has continued through the year, under the sponsorship of the Pfanstiehl Chemical Company. In addition to systematic studies of the behavior of certain binders, the effects of sintering temperatures have also been investigated.

In another study in powder metallurgy conducted during the year, a method has been found to produce very porous compacts of copper which have reasonably good strength.

Gyroscopic Type Projectile Studied

Projectiles

A gyroscopic type of projectile has been investigated to determine the extent of improvement on its stability during flight.

Electrical Equipment

During the year a study has been conducted to determine the operating characteristics of a manually driven direct current dynamo under variations in temperature and humidity.

Heat Transfer

The Foundation's heat transfer laboratory has continued to serve in the determination of thermal coefficients for a variety of industrial products. Throughout 1943 this work has involved materials used in war plant construction, housing, military clothing, military vehicles, railway cars, naval vessels, aircraft and similar applications.

Hydraulics

Numerous studies of hydraulic equipment completed during the year include determination of the characteristics of a lightweight high pressure oil pump for aircraft control, a hydraulic variable speed motor, and a variety of hydraulic clutches, brakes and speed reducers.

Materials Testing

A great many tests and investigations have been pursued in the Materials Testing Laboratory during the past year, chiefly at the request of government war agencies or companies satisfying government contracts.

Shock Testing

The Armour Research Foundation, in cooperation with the United States Navy and a group of 20 manufacturers, has built and operates a Navy Shock Testing Machine for lightweight electrical equipment of 400 lbs. or less.

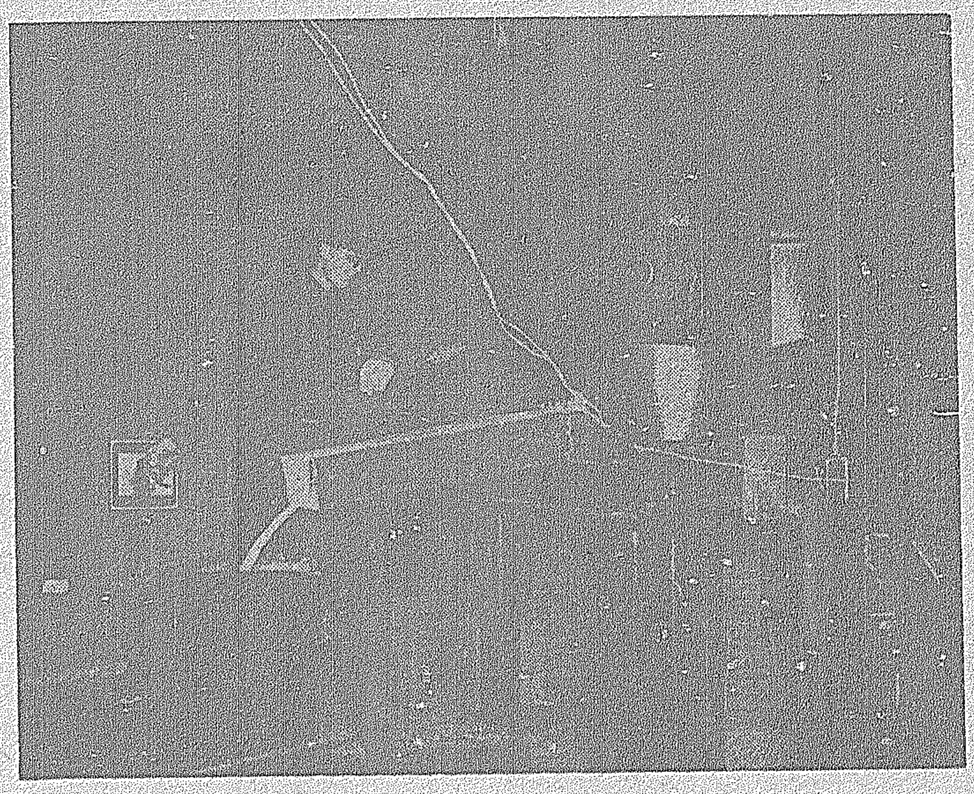
Vibrations

Contributing to a more basic understanding of sound phenomena, an investigation of certain aspects of sound quality has been completed.

Ceramics Research

Measuring Temperature—R. S. Olsen associate ceramist, is pictured making temperature measurements.

Pouring Metal in the Metals Lab



Tapping Cupola—William Wick, now in the United States Navy, is shown tapping the cupola in the Metals and Minerals Research Building.

Chemical Engineering Projects Include Survey of Resources of the Argentine

Argentine Survey

Commissioned in 1942 by the Argentine Trade Promotion Corporation, a government-sponsored agency, to study the economic resources and industrial developments of Argentina, the Armour Research Foundation completed its field investigations in this project during 1943.

The purposes behind this survey were not only to uncover products needed in this country which could be supplied by Argentina but to determine the manner in which technology and research could assist in development and adjustment of that country's industries and products.

Boiler Water Conditioning

A project for improvements in the conditioning of boiler water for locomotives and industrial plants has been initiated by the Dearborn Chemical Company.

An invesigation of the behavior of certain gases under pressure has entered its second year. Following an extensive study of the compatibilities of the gases with a great number of industrial materials, final plant tests on the laboratory results are now being made.

Cooperage

In the investigation sponsored by the Associated Cooperage Industries of America, Inc., considerable work was devoted to a study of the types of liners required to permit shipment of a variety of industrial products in wooden barrels, together with their methods of application. The investigation was centered around the use of materials relatively abundant and simple to apply. Variously modified glues, sodium silicate and special waxes were found to serve as suitable liners for such products as edible oils, petroleum products, dyes, etc.

Core Binders

The project sponsored by the Quaker Chemical Products Corporation for the development of binders used in making foundry cores entered its second year. This investigation is directed toward the development of a broadly new type of binders, with disregard of precedents.

Crystallization

Under the auspices of E. J. Brach and Sons a study is being made of the production and improvement of certain food products. Concerned primarily with development of drying methods, controlled crystallization, and surface coatings to prevent or reduce to a minimum the staling of food products, the work outlined for the future includes standardization of a number of the manufacturing methods employed by this company.

Drum Closures

The research project of the American Flange and Manufacturing Company continues into its sixth consecutive year. During the past year a number of possible rubber substitutes were investigated to determine their suitability for closure gaskets. A wide variety of tests were made on drum closures themselves and on containers equipped with drum closures to determine the safety and efficiency of these for the shipment of aviation gasoline and other vital commodities for the Armed Forces.

The chewing gum manufacturing process developed by the Foundation in 1942 has been set up at the Wrigley plant and is expected to produce gum in commercial quantities shortly.

Fabric Coatings

A comprehensive program for the development of new coating materials and the improvement of present materials and processes is being sponsored by the Joanna Textile Mills. As one phase of the project, a study has been made of the manufacture of tracing cloth and a pilot plant has been set up for experimental work.

Fibers

A project sponsored by the Hawley Products Co. has entered its second year. The program has continued with fundamental studies being carried on simultaneously with developmental work. Among the latter should be mentioned the improvement of radio speaker cones and diaphragms with respect to waterproofness, and the application of special drying methods for curing plastics.

Malting

Under the sponsorship of the Rahr Malting Co., a developmental study is being made on the utilization of a great variety of farm crops. A preliminary phase of this investigation is concerned with determining optimum germination conditions and the changes effected during germination. Simultaneously with this work, the utilization of certain enzymes, molds, and bacteria is being considered.

Meat Processing

An investigation concerned with the sanitary aspects of meat processing was concluded during the year. Final recommendations emphasized the need for re-design of present equipment in order to facilitate access to guarded parts for cleaning and to eliminate many unnecessary potential breeding spots for organisms harmful to the public health.

Appropriations Top $1,250,000

The second anniversary of Pearl Harbor finds the seven-year-old Armour Research Foundation devoted entirely to war service. For the year just concluded, its scientific services to the nations' armed forces, industries and general public have involved research appropriations of about $1,250,000, with expansion continuing in order to meet the increased demand for the technical efforts of the organization.

Armour Research Foundation developments, many of them created since Pearl Harbor, have contributed to the major Allied victories on land, sea and air, and are now in active use in every war theater as well as in a host of war production industries.

Tech News readers are already familiar with the cooperative affiliation which exists between Illinois Institute of Technology and the Armour Research Foundation.

New students may not know that this separate corporate non-profit industrial research organization occupies five buildings on the south side campus, not including additional laboratories under construction. Although the administration and staffs of the two institutions are entirely separate, a close coordination of objectives is achieved through the fact that their boards of trustees have the same membership.

The public service activities of Illinois Institute of Technology and Armour Research Foundation complement one another; the Foundation's operations are, of course, entirely in the research category, and of a character somewhat different from the extensive research carried on in the Illinois Institute of Technology graduate school.

The Armour Plan for Industrial Research has proved especially adaptable to the emergency research needs of the army, navy and war production industries. Each problem is subjected to the collective thinking and cooperative action of a large permanent staff of full-time research workers in virtually every scientific field.

During the year 92 long-term projects have been in operation, including 40 new ones. To date the Foundation has undertaken a total of 223 such long-term industrial research projects. At the present 84 projects are in operation.

At the same time, 1022 new short-term studies and special tests were completed during the year, bringing the total of these to 4803 to date. In all, 1405 companies, associations of manfacturers and governmental agencies, including 156 new sponsors during 1943, have made use of the services and facilities of the Foundation.

$75,000 Lab Under Construction for Lubricant Studies

Lubricants

The Foundation's automotive lubricant program has expanded heavily during the year, necessitating the erection of the $75,000 engine laboratory now under construction on Federal Street. This activity now serves every major petroleum producer in the U.S. as well as additive manufacturers and otners. It has been made the central Diesel lubricant laboratory for the entire Army Ordnance Ground Force, as well as the reviewing point for the work of other laboratories in this connection.

Studies have involved both research and large scale engine testing. Much work is in progress on chemical compounding agents, additives and rust preventive oils, as well as anti-foam materials and metal deactivators.