

THE NATIONAL METALLURGICAL LABORATORY, INDIA

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IT was during the last war that the Government of India realised that only planned industrial research on the many problems of the chemical, metallurgical and engineering industries could harness the country's vast resources for the prosecution of the war. This realization was given effect to by the creation of the Board of Scientific and Industrial Research in April 1940 and of the Council of Scientific and Industrial Research afterwards. The Council was established to meet the long-felt need of a Central organisation for a co-ordinated prosecution of scientific and industrial research. As the main result of the unbounded energies of Sir S. S. Bhatnagar, Director of the Department of Scientific and Industrial Research, that it was made possible to obtain from the Government of India more than a crore of rupees for the establishment of a number of Research Laboratories to be sited in different parts of India. One of these, namely, the National Metallurgical Laboratory, is to be built at Jamshedpur.

In order to ensure the progress and expansion of the metallurgical industry it was decided by the Council that a National Metallurgical Laboratory be established in India. Accordingly, a Laboratory Planning Committee, under the Chairmanship of Sir J. J. Ghandy, Director, the Tata Industries, Ltd., was constituted to formulate a scheme. The author was appointed the Assistant Director to assist the Planning Committee in the preparation of detailed plans, and Messrs. Ballardie Thompson and Matthews of Calcutta were appointed the Architects. A tentative scheme was first circulated in 1945. This scheme was later on drastically altered on the basis of the suggestions and comments received from research workers of repute in various countries, and principally on the basis of the funds available with the Council. The final scheme recently prepared was approved on the 17th September 1946 by the Governing Body of the Council of Scientific and Industrial Research, and the Foundation-Stone of the Laboratory was laid on the 21st November 1946, by the Hon'ble Mr. C. Rajagopalachari, Member for Education and Arts, Interim National Government.

As stated earlier the Laboratory will be located at Jamshedpur which is the centre of modern metallurgical industries in India. The Tata Industries, Ltd., have generously placed at the disposal of the Council a very suitable site for the construction of the Laboratory. Services, such as electricity, water, gas, sewage and effluent disposals, are available close to the site.

The Laboratory when completed will cover all aspects of metallurgical research, both fundamental and applied, and will also carry out research on ores, minerals and refractories as applied to metallurgy. The preparation of minerals and ores and the smelting of the latter are so definitely a part of the development of the country's metallurgi-

cal industries that facilities for mineral research have been provided at the Laboratory, complete with pilot plant equipment for semi-commercial development.

As the metallurgical industry is one of the biggest consumers of refractories, research on this subject has also been associated with that on metallurgy, and that the work on metallurgical furnace design might also be undertaken. Work on refractories will be greatly facilitated by the presence of the ore-dressing and minerals research section with its specialized laboratory and pilot plant assemblies.

In consequence, provision has been made in the final plans of the National Metallurgical Laboratory, for administration, including statistics, library, museum, lecture theatre, etc., chemical analysis, physical chemistry, physics as it affects metallurgical problems, the examination, preparation and smelting of metallic ores, the melting, heat-treatment and working of metals and alloys, research into the structure and physical properties of metals and alloys, the electro-deposition and surface treatment of metals, and research on refractories. Facilities will also be provided for the application of research results to commercial operating conditions and for the study of such conditions as they affect the quality of the products and the efficiency and economy of commercial production. The National Metallurgical Laboratory will work in close collaboration with the other laboratories of the Council, particularly on long-term research of a fundamental nature.

Broadly, the work of the National Metallurgical Laboratory will be divided into the following divisions:—

1. *Physical Metallurgy Division* including thermal, electrical and magnetic tests, experimental heat treatments, pyrometry, X-ray analysis, radiography, optical properties, application of ultrasonics to metallurgical problems, etc.

2. *Metallography Division* including electron and normal microscopy, macroscopy, inclusions study, experimental foundry, making, mechanical working and heat treatment of metals, physical testing of metals at various temperatures, etc.

3. *Chemical Metallurgy Division* including extraction and refining of metals from their similar materials (ore-dressing and mineral beneficiation).

4. *Inorganic Chemistry Division* including analytical chemistry of metals, alloys, ores, refractories, slags, fuels, etc., study of gases and inclusions by vacuum fusion and other methods, micro-analysis, etc.

5. *Physical Chemistry Division* including electro-metallurgy, study of corrosion and protection of metals, surface treatment of metals, polarography, spectrography, study of slag-metal relationship, chemical microscopy, thermo-dynamics, radioactivity, colorimetry, electro-chemistry, electrolytic production of

metals, determination of pH and its application, general electro-chemistry, etc.

6. *Refractories Division* including study of moulding sands, binders and auxiliary materials, thermal and other physical characteristics, physical properties at various temperatures, petrographical study of minerals and refractories, etc.

7. *Survey and Intelligence Division* including survey of raw materials, library, research and technical information service, translation service, scientific liaison, museum, publication and publicity.

Summarily, the Laboratory is meant to function as an up-to-date research centre where knowledge of the fundamental science of physics, physical and inorganic chemistry, metallography, engineering, etc., will be utilized to solve the problems which confront the ferrous and non-ferrous masters and metal fabricators to-day and are expected to confront them even more in the future when competition from foreign countries will have to be met. The Laboratory is also meant to function as a clearing house for information. The Laboratory will give facilities to a number of scholars to an advanced course and will train them in the application of scientific methods to metals industries, so as to enable them to take charge of technological duties in the works. To help and encourage industrialists in the solution of

their problems, facilities will be provided at the Laboratory by establishing Fellowship System, first inaugurated at the Mellon Research Institute, Pittsburgh.

The Laboratory will consist of a Main Building housing administrative offices, research laboratories, library, lecture theatre, museum, etc., and a Technological Block comprising large workshop-type laboratories or bays associated with control rooms for semi-commercial scale operation. The Main Building will have three floors. The administrative section is centrally located on the second floor. The actual working floor area on the first floor is approximately 26,000 sq. ft., with an equivalent space on the ground floor and about 8,600 sq. ft. on the second floor. The Technological Block providing a working floor area of about 28,000 sq. ft., has been situated to the south of the Main Building and connected to it by covered ways. The individual laboratories and the administrative section in the Main Building will be air-conditioned by refrigeration system.

The total cost of construction and equipment of the Laboratory is estimated to be Rs. 42,80,000. Buildings, services, air-conditioning, heavy electrics, etc., are estimated to cost Rs. 25,00,000 and for equipment a provision of Rs. 17,80,000 has been made. The recurring expenses in the initial stages are approximately estimated at Rs. 6,00,000.

HYDERABAD ENGINEERING STANDARDS COMMITTEE

IN order to bring the P.W.D. Officers together for the purpose of discussion of their problems and programmes and to benefit by personal contacts, a Conference of the P.W.D. Officers was held for three days in Hyderabad. It was presided over by the Hon'ble Nawab Zain Yar Jung Bahadur, the P.W.D. Member, and was attended by the Chief Engineers, Superintending Engineers and all the Executive Engineers and Divisional Engineers. They visited the Engineering Research Laboratories on the 14th of December 1946 when the various experiments regarding irrigation, building and road researches were shown to them. The next day Dr. S. P. Raju, Director of Engineering Research, moved the following resolution at the Conference:—

“Resolved that in view of the importance of accurate determination of strength of materials and their economical use in construction, an Engineering Standards Committee be formed to work in collaboration with the Engineering Research Department, with the programme of collection of the different engineering materials of the State, their systematic testing and the drawing up of the standards of specifications.”

In explaining the need of such a Committee Dr. Raju stated that the fact of American engineers constructing some of the biggest buildings, dams and other engineering structures in the world was due to their confidence in their knowledge of materials and methods of construction derived by extensive testing and

standardising of specifications. He referred to the work of the American Society for Testing Materials (A.S.T.M.), American Society of Highway Officials (A.S.H.O.) for Road Standards, Bureau of Reclamation for Irrigation Standards and then to the British Standards Institution.

He was glad that the Government of India had decided to set up an Indian Standards Institution with the object of evolving national standards in respect of structures, materials, operations, practices, etc. He referred to the speech of the Hon'ble Member in which he had said: “In order to get the greatest good out of engineering research there must be a close co-ordination between engineering practice and engineering research” and stressed the need of a body like the Conference of P.W.D. Officers to be associated with researches on materials and their standardisation.

The Hon'ble Member strongly supporting the resolution mentioned some of the big things he has in view for engineering progress in Hyderabad which would be needing the help of such a Standards Committee and stated that the Research Laboratories and the P.W.D. Officers may thus co-operate in a work of great importance and be linked with the National Body of the Indian Standards Institution.

The Proposals were unanimously accepted.

Hyderabad has the good fortune of carrying an Engineer-P.W.D. Member who can, not only administer the Department but also enter fully into its technical details.