BRITISH NON-FERROUS METALS RESEARCH ASSOCIATION

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SOME idea of the importance of the non-ferrous metals may be gained from the value of the world's annual production which, if gold is excluded, is not less than £250,000,000. Another illustration is provided by the dependence of the electrical industry on copper and of aircraft production on aluminium and magnesium. The many uses of lead, nickel, tin and zinc are familiar, and the application of three of these four metals as protective coatings for steel illustrates the resistance to corrosion of non-ferrous metals. The British Non-Ferrous Metals Research Association thus has a wide field for its work. It is among the larger of the research associations formed soon after the Great War as part of the Government's policy of stimulating scientific research applied to industrial progress, and about one third of the Association's annual expenditure of more than £30,000 on research and related activities is still provided by Government grant.

The Association's investigations were at first carried out at the National Physical Laboratory and at metallurgical research laboratories elsewhere, but the proportion of extra-mural work has diminished with the growth of the Association's own scientific staff, and two years ago a scheme for the erection of a modern building, near Euston Station, was adopted. The Association owns a freehold site of 13,000 square feet, of which one third is held for future extension. In the choice of location, accessibility was held to outweigh the advantage of the lower cost of suburban land, and the situation is convenient for the many members in the Midlands who use the northern London terminal railway stations. The number of member companies is not far short of three hundred and includes most of the producers and manufacturers of non-ferrous metals and their products in Great Britain, and also many large users.

The laboratories, which accommodate a total staff of about seventy, comprise the older four-story building, formerly rented, the adjacent new block of about the same shape and size, and, in the space between, a glass-roofed melting shop. The total working floor space is about 20,000 sq. ft.

The new building, designed by Mr. J. R. Smith of Messrs. Munby and Smith, is a four-story steel-framed structure with brick panel walls. It has a 90 ft. frontage in Euston Street and is 32 ft. in width.

The extensive use of non-ferrous metals exemplifies their advantages in modern building. The heating installation, electrical conduits, hot- and cold-water supplies to laboratories, soil and waste plumbing and principal rain pipes and hoppers are all in copper; the water supplies to laboratories in BNF ternary lead alloy No. 2; while nickel silver, bronze and anodized aluminium are used for door furniture, water-fittings, etc.

The arrangement of service pipes and conduits has been designed with particular regard for economy in space, clean unencumbered ceiling, wall, and floor surfaces and accessibility. Each laboratory is fed from ducts running vertically, in the window piers, the full height of the building. Ample provision has been made for A.C. and

D.C. electricity supply for power, furnaces and light. Heating is by low-pressure hot water on the 'invisible panel' system and is thermostatically controlled.

One main section of work deals with the influence of melting and casting conditions on the freedom of castings and ingots from cavities, caused by gas evolution or by shrinkage, and from segregation and other troubles. The Association's de-gassing process for aluminium alloys is widely used in manufacture, and the problem of soundness in castings is now being tackled for the tin bronzes and the nickel silvers. Segregation and shrinkage are being investigated in

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aluminium alloys in the first instance. The facilities of the melting shop providing for work on these subjects include coke fired, gas fired and electric resistance (silit rods) crucible furnaces melting 100–120 lb. copper and a high-frequency furnace. There is also a large electric resistance annealing furnace.

The mechanical testing laboratory occupies the lowest floor of the new building. The constant-temperature room (480 sq. ft.) at one end is thermostatically maintained at $20^{\circ}\text{C.} \pm 0.3^{\circ}\text{C.}$ by circulation of air, heated or cooled according to the outside temperature, and is equipped for creep tests. The very complete spectrographic equipment employed in the Association's work on quantitative spectrographic analysis of metals and alloys is housed in the large physics laboratory, the other equipment of which includes that designed by the Association's staff for the determination of thermal conductivity and of optical reflectivity. Good provision is made, in other rooms, for the preparation, examination and photography of metallographic specimens, for pyrometry and heat treatment, and for chemical analytical work.

The top floor of the older building is devoted to corrosion research, a subject in which the Association's work tends always to increase. Condenser tubes, on which work has proceeded for so many

years, have ceased to be a corrosion problem for ordinary conditions of service because of the general use of tubes made of the Association's aluminium brass or other highly resistant alloys developed by makers, but the more severe corrosive conditions sometimes encountered—bacterial action playing a part not infrequently—are the reason for work designed to produce tubes still more resistant. Other corrosion investigations are concerned with lead, copper, zinc and galvanized material, and at least five hundred corrosion tests are in progress at the present time. The older building also contains the machine shop and galvanizing and welding laboratories, while one floor, occupied by the Development Department, includes an exhibition illustrating the practical results of the Association's researches.

The Association's annual lunch on June 29 was made the occasion for celebrating the completion of the new laboratories, and the large company assembled then proceeded to Euston Street where the building was formally opened by the President of the Board of Trade. Mr. Oliver Stanley also unveiled a memorial to the Association's chairman from 1920 to 1937, the late Mr. Thomas Bolton, to whose leadership the success of the Association has been due in no small measure. The memorial is a cast bronze portrait plaque, fixed on the wall of the entrance hall of the new building.

ASSOCIATION OF TECHNICAL INSTITUTIONS

AT the recent summer meeting of the Association of Technical Institutions, held at Harrogate, papers read included "The Present Position of Technical Education in the West Riding" (by Mr. A. L. Binns, director of education for the West Riding of Yorkshire), "Whither Technical Education?" (by Dr. T. J. Drakeley, principal of the Northern Polytechnic, London), and "Technical and Vocational Education in the U.S.A." (by Mr. G. A. Robinson, principal of the South-East London Technical Institute).

Mr. Binns said the organization of technical education in the West Riding was on a regional basis, the machinery for which is provided by the Yorkshire Council for Further Education, which is representative of all the authorities for higher education in the area. The scheme, Mr. Binns pointed out, is a typical English solution of a problem which might elsewhere have been solved by more autocratic methods. "It aims at combining the advantages of close local interest and initiative with those of a common policy over a wide area, and it hopes to secure these advantages by cordial co-operation among free and independent statutory bodies rather than by a policy of subordination or absorption." Elementary technical instruction is provided as close as possible to the homes of the students, while the more advanced work is concentrated progressively in centres where traffic routes converge. In connexion with the advanced work, financial arrangements have been made which leave the students free to attend the institution they prefer, whether it is within or without the boundary of a county borough. In short, the Yorkshire Council for Further Education

works to harmonize the relations between the different local authorities and the industries within the region.

Dr. Drakeley referred, during his paper, to the report on Policy in Technical Education which had been published by the associations dealing with technical education and the National Society of Art Masters. He argued for certain recommendations which he hoped would promote discussion along definite lines and secure, in the words of the above report, that the latter shall produce "not only skilled scientists, technicians and designers, but also persons adaptable to continuous industrial and economic change".

The main point put forward by Dr. Drakeley was that technical education should concern itself immediately with the training of a skilled rank and file for industry and commerce. The training provided in the schools should involve a high degree of craftsmanship, together with a good educational standard. He recommended also, however, that provision should be retained for vertical advancement by the development, where necessary, of senior day technical or trade courses from the age of 16 plus to about 19 plus, such training to lead to the more responsible posts in industry. Speaking of national defence schemes, Dr. Drakeley urged that a fraction of any expenditure on Government or industrial schemes should be set apart for the purpose of training necessary personnel. He also argued that in the development of all technical courses, especially those designed for the training of skilled workers, the active co-operation of employers' and employees' organizations should be obtained.