

ally controlled McNeil boilers, providing space heating and hot water for the glasshouses, the refectory and the Wallace Laboratory. Steam conveyed through underground conduits supplies heat exchangers for the production of hot water, which is passed through radiators, ceiling coils or hot-air circulators.

The Refectory/Common Room is a single-storyed building covering 5,300 sq. ft. It is faced with 'Reformite' reconstructed stone and has large french windows overlooking a pleasant expanse of the fruit plantations. The roof is of double-Roman tiles and the floor of polished Iroko wood blocks. The dining hall, 60 × 37 ft., connects through a folding partition to the common room 35 × 37 ft. With the partition open a hall 95 × 37 × 20 ft. high is provided. There is a well-appointed kitchen equipped with air extractors and refrigerated larder. The building is heated by a hot-air circulatory system linked to the main boiler house.

The Wallace Laboratory is a two-storyed, T-shaped building of 24,000 sq. ft. floor space, roofed and the walls faced in the same style as the refectory (Fig. 1). The entrance hall is panelled in apple-wood veneer cut from a tree of the cider variety 'Knotted Kernel' which formerly stood on the site. Some of its sister

trees of the original cider orchard (planted in 1904) still flourish around the new laboratory. The western arm of the building houses the administration section on the ground-floor, and laboratories for analytical chemistry above. The southern limb of the ground-floor accommodates the pomology and plantations sections, with stores and organic chemistry on the first floor. The remainder of the ground-floor has laboratories for physical chemistry, statistics and willow research, with the section for nutrition of fruit plants above. There are extensive basement rooms for stores and heat-exchange equipment, with a tower at the southern end housing the water cisterns and capped by an observation platform for meteorological recording. The lofts house elaborate fume extractors and 'Plenum' heating equipment.

Among other buildings is one of 8,400 sq. ft. consisting of laboratories for biochemistry and plant physiology which was completed in 1956. During 1959-60, the director's room, the committee room and the library in the Barker Laboratory (the original laboratory building) were redecorated and re-furnished. Extensive improvements and additions have also been made to workshops, machinery sheds and roadways.

R. W. MARSH

THE BRITISH IRON AND STEEL RESEARCH ASSOCIATION

THE Sheffield Station of the British Iron and Steel Research Association, where open days were held on June 15 and 16, houses three of the Association's five main research divisions—the Steelmaking, Metallurgy (General), and Mechanical Working Divisions.

Steelmaking

The Steelmaking Division is responsible for research into all the modern processes involved in the conversion of iron into steel, and prominent among its present research projects are the control of electric-arc and open-hearth furnaces, continuous casting, and the use of oxygen in steelmaking operations.

The use of large electric-arc furnaces for the bulk production of steel is increasing and it is expected that, in 1965, these furnaces will account for one million tons more of Britain's total annual steel output than in 1960. Economy in the use of electrical power is becoming, therefore, a matter of increasing importance. The automatic power input controller (*Apic*), which has been developed recently by the Steelmaking Division for application to electric-arc furnaces, has already shown itself capable of achieving significant reductions in electricity consumption. Trials have been carried out satisfactorily on the Association's experimental furnace at Sheffield and on a 5-ton production furnace at Steel, Peech and Tozer, and further trials are now being carried out on another member's 30-ton furnace.

Continuous casting helps to achieve higher yields and greater uniformity of end product. A number of continuous casting plants has recently been installed or projected, including a twin-strand plant at the Abbey Works of the Steel Co. of Wales. This is based on the process developed by the Association in conjunction with the Continuous Casting Co. of

Weybridge, and will be used for casting low-carbon slabs up to 48 in. × 8 in. in section. The Steelmaking Division's present investigations into this new process are directed mainly towards improved moulds and mould reciprocating cycles. Arising out of these investigations, a new design of mould has been evolved which enables three interconnected ingots to be cast simultaneously, these being afterwards separated and treated as individual castings.

During the past few years there has been a dramatic increase in the use of oxygen for steelmaking processes and the new vessels now being introduced into Britain, such as the *L.D.*, *Kaldo* and *Rotor*, will alone probably account for something like 14 per cent of the total annual steel production in 1965. In addition to pure refining duties, however, oxygen can be used for flame enrichment in open-hearth furnaces and also for pretreating hot metal. The Division is at present conducting trials of a new hot-metal pre-treating device which employs a simple reversal of the converter process principle. With this technique—termed spray refining—instead of passing oxidizing gases through molten metal, the metal is teemed through jets of oxidizing gas, thus breaking up the falling stream of metal and—by increasing the effective metal surface area—promoting rapid and efficient refining reactions.

The current research programme of the Steelmaking Division also includes investigations into control of open-hearth furnace combustion, the rapid desulphurization of electric steel and studies of sub-cutaneous segregates.

Metallurgy

The Metallurgy (General) Division is concerned with the physical, chemical and mechanical properties of iron and steel, and the effect on these properties

of variables in the manufacturing processes. The Division's activities are divided into the broad categories of physical properties, mechanical properties, metal treatment and metallurgical analysis.

Research into physical properties is at present focused on the magnetic characteristics of silicon iron. During 1960, electrical power to the value of eleven and a half million pounds was wasted as a result of losses in silicon iron transformer cores. A reduction of as little as 5 per cent in these losses would result in an annual saving of more than half a million pounds. The Division's investigations into the factors contributing to core losses have already shown that reductions of up to 15 per cent could be obtained.

A better understanding of the factors affecting the fatigue limit of steel would greatly improve the possibilities of achieving better dynamic mechanical properties in high-tensile steels. Also in the context of mechanical strength, it has been established that the presence of certain elements in mild steels affects their resistance to brittle fracture at low temperatures. The Division's work in connexion with the mechanical properties of steel is mainly concentrated on these problems, although research is also being conducted on the mechanism of fatigue and more economical methods of fatigue testing.

Metal treatment research, the third of the Metallurgy Division's spheres of activity, consists primarily of investigations into methods of degassing molten steel. The presence of certain gases in steel often has a significant effect on the qualities that are expected of it. Excess hydrogen, as a specific example, may lead to cracking and other undesirable flaws in the finished product. The Division is at present engaged in investigating two methods of hydrogen removal by degasification techniques. In the first of these a continuous vacuum degassing unit is used, molten metal being poured into an evacuated chamber, degassed at a pressure of about 1/1,000th atm. and discharged into air. In the second method—termed 'jet degassing'—the hydrogen is removed by blowing a neutral gas such as argon, nitrogen or helium on to the surface of the molten metal by means of a lance. This second technique has achieved a reduction of eight parts per million to one part per million in the hydrogen content of an eight-pound melt, and the possibility of using this method on a larger scale is being examined.

The increased throughput rates which have been made possible by the use of oxygen in steelmaking practice have thrown greater emphasis on the need for faster metallurgical analysis. In addition to developing faster and more accurate physico-chemical analytical procedures, the Division is also therefore investigating the application to steel works requirements of the newer physical techniques of direct reading and X-ray fluorescent spectroscopy and electron-probe micro-analysis.

Supplementary to its main research programme, the Metallurgy (General) Division also provides services to other research divisions and departments of the Association, to industry, to research organizations and to universities.

Mechanical Working

The Association's research into all the processes by which ingots are formed into wrought metal products is carried out by the Mechanical Working Division. This Division's research programme is

therefore spread over a wide range of manufacturing processes which may be broadly classified by end-product—sheet and strip, forgings, rounds and sections, and wire.

Because of the superior quality of product obtainable, the use of continuous annealing for blackplate has been increasing in the tinplate industry during the past few years. However, conventional continuous annealing plants are very large and costly, and inflexible in operation. Investigations by the Division on an experimental annealing line at the Swansea laboratories have resulted in the development of a process which, by greatly reducing the pass length, makes possible the use of a more compact plant, with a considerable saving in costs. Products of a commercial quality have been obtained and plans are now in hand for the installation of a pilot production plant at a member's works.

Other features of the Division's research into sheet and strip manufacture include a new process for aluminizing steel strip, the electrolytic smoothing of blackplate, investigations into the prevention of scale formation on coiled strip, and three new in-line inspection techniques. Some fundamental work is also being conducted by the Association's Physics Department on tandem-mill automatic gauge control with the aid of a new analogue computer which has been installed recently at the Battersea laboratories of the Association.

In the manufacture of forgings the Division's main research project is the automatic programme control of forging presses and manipulators. Simple programmed forging operations have already been carried out, both more rapidly and more accurately than in manual operation, and more complicated schedules are now being formulated. Forging research has also resulted in the development of a new procedure for closing ingot cavities by upsetting, and a heat reflector arrangement which, by conserving the heat in the workpiece, has proved capable of achieving a 30 per cent reduction in heating requirements. In addition, the Plant Engineering and Energy Division is at present conducting investigations of batch type forge furnaces on behalf of the Mechanical Working Division.

The Division is also now working on a number of problems associated with wire manufacture—such as wire cooling, continuous wire inspection and control, and the welding of high-carbon steel wire—and the manufacture of rounds and sections.

Development and Information Services

The Sheffield Station also houses the Steel User Section of the Association's Development and Information Services. This Section employs the Association's research resources to assist individual companies in their use of the industry's products. The services which it provides range from answering simple technical inquiries to more complicated investigations into metallurgical and other production problems.

The remaining research divisions and departments of the British Iron and Steel Research Association are located, as in the case of the Sheffield Group, in the area of the country most appropriate to the work for which they are responsible. The Ironmaking Division, for example, has a pilot-plant laboratory at Normanby, near Middlesbrough on the north-east coast, and a blast-furnace laboratory at the Imperial

College of Science and Technology in South Kensington. The Plant Engineering and Energy Division is based at the Association's Battersea Research Station, as are the Physics, Chemistry and Operational Research Departments, and there is also a laboratory

at Swansea, in the South Wales tinplate area, where some of the Mechanical Working Division's research into sheet and strip manufacture is conducted. The Association's headquarters are at 11 Park Lane, London, W.1.

THE INTERNATIONAL COUNCIL FOR BIRD PRESERVATION

THE seventh Conference of the European Continental Section of the International Council for Bird Preservation was held in Stavanger, Norway, during June 19-24, and was attended by representatives of the National Sections of Austria, Belgium, Denmark, France, Germany, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom, together with representatives of the International Wildfowl Research Bureau, Conseil International de la Chasse, International Union of Biological Sciences, and the International Union for the Conservation of Nature and Natural Resources.

The destruction of sea birds by waste oil has become a permanent item on the agenda of all conferences of the International Council, and it was noted with great satisfaction that Poland had ratified the International Convention for the Pollution of the Sea by Oil, and that the U.S. Senate had voted 92-0 to ratify this convention. The adhesion of Poland to the convention is of particular importance to Scandinavian countries for it now only requires the support of the U.S.S.R. to enable steps to be taken to declare the whole of the Baltic a prohibited zone for discharge of oil. The area in the Baltic in which oil discharge is now permitted has resulted in heavy pollution, particularly on the coasts of Sweden, where it has caused such great destruction of the long-tailed duck (*Clangula hyemalis*) that it is feared the status of this species is endangered. The representatives of the Netherlands, where systematic counts of birds killed by waste oil are carried out throughout the year, reported that there were distinctly less than before, and this statement was also supported from Belgium.

A resolution was adopted welcoming the decision of the Inter-Governmental Maritime Consultative Organization to convene, in the spring of 1962, a further conference on oil pollution of the sea, and urging that priority be given to the complete avoidance, at the earliest possible date, of discharge of persistent oils into the sea, and to the immediate provision of adequate facilities for the disposal of oily wastes at refineries, ports of loading and ports of discharge. The resolution further urged National Sections to press their Governments to instruct their delegates to the Inter-Governmental Maritime Consultative Organization conference in 1962 to support action on these lines.

The prejudice against any bird with a hooked beak dies hard, and though some countries reported an increase in certain species it was generally agreed that birds of prey were still being destroyed on a large scale and many species had critically decreased. The need for education on the valuable part these birds play in the balance of Nature was expressed in a resolution which also recommended that if an examination is required to secure a shooting licence a knowledge of identification of birds of prey should be required, in order that protected species

should be distinguished from those allowed to be shot.

The destruction of bird life as a result of the use of pesticides has reached such proportions as to cause grave concern all over Europe, and a resolution was passed requesting Governments to adopt legislation by which all pesticides must be officially tested not only with regard to their effect on noxious animals and plants but also on wild life in general before they are permitted to be sold. Further, that Governments be urged to encourage research on the use of specific pesticides and other methods which limit the destruction of wild life, and to forbid or place drastic restrictions on the use of general pesticides that are dangerous to wild life, wherever effective and less dangerous materials can be made available.

The great increase in herring gulls (*Larus argentatus*) and the harm these cause to other species, particularly in Germany and the Netherlands, has been a problem for many years. In the Netherlands methods of control have been carried out with great success, the number of breeding pairs in 1959 and 1960 being reduced to almost half that of 1954. One of the factors in the great increase of this species is the easy availability of food in winter, through fish offal at ports, rubbish dumps, etc. In Denmark there is no problem as all fish offal is collected and used for food in mink farms or for fertilizers.

The present policy of land drainage in certain European countries, whether it be economic or not, presents a serious threat to many species of water and wading birds, and two areas in particular were the subjects of special resolutions. The first, the Marismas of the Guadalquivir in Spain, is the richest area in western Europe for marshland birds, particularly as regards migrating and wintering species. The disappearance of these marshes would mean not only the loss of the main European breeding ground of several rare species but would also have irreparable consequences to the status of migratory marsh birds in many European countries. On June 1 an international delegation of representatives of the International Wildfowl Research Bureau, the International Council for Bird Preservation, and the International Union for the Conservation of Nature and Natural Resources, with the Consejo Superior de Investigaciones Científicas of Spain was received by the Minister of Education in Madrid to consider the possibility of acquiring an area of the Marismas as a reserve and to establish a biological research station there.

The second area, the Baie de L'Aiguillon (Vendée) on the Atlantic coast of France, with its large expanse of mud flats, provides an exceptionally favourable resting place for migratory birds which breed in northern Europe and rest there on their spring and autumn migration. The project to drain this area, for agricultural purposes of doubtful value, in a