

It should also be pointed out that the existing harbour facilities at Wellington are not of the type desired for the low-cost handling of large quantities of coal and iron ore. A new wharf would be required at a point adjacent to the proposed steel works and the same handling equipment must be installed whether the works are built at Onekaka or Wellington.

In addition to its favourable position for the assembly of raw materials, the Onekaka location has the advantage that there are available, at a very low cost compared with the Wellington district, large areas of land suitable for the erection and extension of the steel works, the establishment of ancillary industries based on steel, and for the erection of the houses which must be erected for the accommodation of the staff and workmen. The area required for the first installation of the steel works will be in the neighbourhood of 200 acres and the differential in favour of the Onekaka location in cost of the land required for various purposes, will amount to a large item in the total capital expenditure.

It is also considered that with the erection of a suitable wharf, Onekaka will compare favourably with Wellington as a distribution centre for the disposal of the steel and by-products to market.

EXTENSION OF THE STEEL WORKS.

In planning the lay-out and equipment due regard should be paid to the extension of the industry in future years. It is inevitable that with the continuous expansion of the country and the establishment of more industrial activity, the demand for steel will show a progressive increase, and this increased demand should be met by a corresponding development of the production.

This development may proceed along two lines, either separately or in conjunction, according to the conditions. Alongside the mining of the assured ore reserves, a continuous exploration programme must be carried on to direct the mining operation and to determine the total amount of ore which can be economically won. If, as is anticipated, further quantities of ore are revealed or a greater proportion of iron sands can be incorporated in the blast furnace burden, the natural trend of development will lie in the direction of increased coke oven and blast furnace plant with corresponding growth of the capacity and scope of the steel-making plant and rolling mills. This is typical of the development in countries which are rich in ore reserves.

If on the other hand, the ore reserves do not show the increased tonnage necessary to justify such development, the further production of steel should develop along the same lines as in countries which do not possess sufficiently large reserves. In such cases, the production of pig iron is limited and a large proportion of the steel is manufactured from scrap and/or a large proportion of the steel demand is met by the re-rolling of billets which are imported from other steel-producing countries more favourably supplied with ore.

This second line of development may be illustrated from the steel industry in Great Britain. The ore reserves in Great Britain, and particularly of high-grade ores, in relation to the magnitude of the industry, are relatively limited. No iron ore exists in Scotland and the whole of the pig iron manufactured in Scotland is produced from imported ore, which owing to freight charges is relatively high in cost averaging at $4\frac{1}{2}$ pence per unit, 18/- to 20/- per ton of 50 per cent. ore. As a result, the pig iron production is small and in the steel-making furnaces the charge melted consists of approximately 70 per cent. of scrap with 30 per cent. of pig iron. Similar conditions, to a lesser degree, apply to the large producing centres of Middlesbrough and South Wales which use only small proportions of British ores. Taking the United Kingdom as a whole, approximately 40 per cent. of the total steel made is produced from re-melted scrap and only in those districts like Lincolnshire and Corby which are built on the ore deposits, is the steel-making based entirely on pig iron and the internal production of scrap.

In addition, a highly profitable industry has been built up in England based on the re-rolling of steel billets and sheet bar imported from abroad. In the post-war years from 1920 to 1935, when tariffs were imposed, an average of 3 Million tons per year of semi-finished steel were imported from the Continent of Europe and rolled in Britain largely into the finished products of wire, sheets and merchant bar. This re-rolling and finishing industry requires more man-power per ton of product than the primary production of semi-finished steel and offers a greater margin of profit owing to the relatively wide differential between the cost of semi-finished steel and the finished product, these differentials being greater as the extent of the finishing work increases.

If the further reserves of ore in New Zealand exposed by development work in the future do not prove adequate for a major extension of the first installation of the coke and blast furnace plants, then the expansion of the steel industry should proceed on the basis of increased steel production from the use of scrap secured largely as in other countries from ship-breaking and similar sources, and on the development of the rolling mills for the re-rolling of imported semi-finished steel. With the present programmes for the increase of capacity in many countries, such as Britain, Germany, France and India, there is every indication that large supplies of these semi-finished products will always be available and could, with advantage, be converted into the finished products required in New Zealand by local labour.

Steps should be taken in the preliminary lay-out of the steel works, to allow for development in either or both of these directions.

ESTIMATES OF MANUFACTURING COSTS.

The preliminary estimates of manufacturing costs, submitted previously, have been revised in the light of the increased programme of production raising the quantity of steel products per year to 104,000 tons, and in view of the change in labour rates and conditions of employment.