

tion of producing a wide variety of carbon and alloy tool steels, stainless steel and other alloy steel products for domestic and export trade.

*New Trends in the Steel Industry.*—The growing use of low-cost tonnages of oxygen in the production of both iron and steel is a significant trend in the industry. During the past six years, the basic oxygen process has become firmly established as an important method of refining blast furnace hot metal into steel. This is an oxidation process similar to the open hearth furnace but operating at a much faster rate by top blowing a molten bath of iron with gaseous oxygen.

The basic oxygen method uses high-purity oxygen to produce quality steel at high-tonnage rates for a low cost. The furnace or converter used is a refractory-lined pear-shaped vessel into which is charged molten pig iron from the blast furnace and a limited amount of scrap. Oxygen is blown onto the molten bath surface through a water-cooled lance located centrally in a vertical position. Because of the high rate of oxygen supply, oxidizing reactions are very much faster than in the open hearth and existing vessels can produce over 100 tons of steel an hour. The bulk of the steel produced in North America has been in the low-carbon range but the basic oxygen method is capable of producing a wide range of carbon and alloy steels with low nitrogen, phosphorus, sulphur and hydrogen contents.

The present basic oxygen process capacity in North America is 5,500,000 tons per year. Of this total, approximately 1,500,000 tons of capacity is located in Canada, at Dominion Foundries and Steel and at Algoma Steel Corporation.

The open hearth furnace continues to improve in steel production rate and economy by using oxygen which makes it more competitive with the basic oxygen process. The blast furnace method of producing iron is by far the most important at present because it enables quantities of the metal to be produced at a relatively low cost. Dominion Foundries and Steel is the first company to apply heavy oils for the partial displacement of coke in the blast furnace process on a commercial basis, and other Canadian companies are actively considering this practice of introducing fuels through the tuyères of the blast furnace along with the air blast to achieve improved fuel economy. Although the cost of construction of a blast furnace is enormous and there is comparatively little flexibility in its operation, it is expected that it will continue to be the predominant iron producer in large centres of population. However, electric smelting and direct reduction plants of comparatively small capacity will be constructed in various parts of the country, the type of process depending on local market conditions.

In recent years another new development is being applied in the steel industry. This is the use of vacuum both for degassing and for melting of steel. It has been shown that small amounts of gases and impurities in steel can be removed by vacuum methods to produce a purer and more homogeneous product with higher physical properties. Research conducted at the Mines Branch has included a broad program on vacuum arc melting and vacuum degassing either by applying vacuum to the ladle or by stream degassing as the steel is poured. The main benefit is removal of dissolved gases, principally hydrogen.

Important also is the application of direct iron reduction methods for the production of pig iron or semi-steel and sponge iron which may be used in the electric steelmaking furnace to produce high-quality steels. An expanding market may be expected for these products, particularly in Western Europe in areas where supplies of scrap metal are diminishing or where existing scrap contains prohibitive amounts of impurities. Strategic-Udy Metallurgical Limited at Niagara Falls, Ont., has under development a process for the treatment of low-grade and complex ores to produce pig iron and semi-steel. A second process under development is the production of sponge iron pellets by Freeman Corporation, Cap de la Madeleine, Que. Three other processes are under development in Canada and