

The application of this basic process to other materials for production of nickel, cobalt and copper has been demonstrated in both laboratory and pilot plant, and a continuing program of research and development is maintained to improve process details and broaden the application.

Preliminary figures for 1960 show that once again nickel became the leading metal with a production of about 427,283,000 lb. valued at \$312,738,000.

### **By-product Iron**

In January of 1961, The Consolidated Mining and Smelting Company of Canada Limited produced pig iron in its new smelter at Kimberley, B.C. The unique feature of this plant is the use of roasted pyrrhotite concentrate as the source of iron.

It is estimated that 28,000,000 tons of pyrrhotite tailings have accumulated from the concentration of lead-zinc ore from the great Sullivan mine. This concentrate is roasted to provide sulphuric acid for the manufacture of phosphate fertilizer. The iron calcine from the roaster is being treated on a sintering machine for use in an electric reduction furnace.

Annual capacity of the furnace now in operation is 36,500 tons of pig iron. As markets expand, electric smelting facilities will be developed and a basic oxygen furnace for the production of steel ingots as well as light steel rolling-mill facilities are contemplated. Thus, a fully integrated electric smelting plant for the production of steel shapes will be developed to serve the growing needs of Western Canada.

### **Titanium and Remelt Iron**

Titanium is a low-density silvery-white metal that owes its importance to a combination of lightness, strength and resistance to corrosion. Because of its high strength-weight ratio, titanium and its alloys have special application in the aircraft industry, particularly in jet aircraft and guided missiles. There is no commercial production of titanium metal in Canada at the present time but titanium metal supplied by imports of sponge, ingots and billets is used in the production of aircraft components by several Canadian companies. The Mines Branch conducts investigations on various phases of titanium research from processing of ores to methods for production and fabrication of its alloys.

Canada's titanium industry is based on the use of ilmenite for the electric-furnace production of titanium-dioxide slag used in the manufacture of pigment and of co-product remelt iron. New records were established in 1960 for shipments of ilmenite by Quebec Iron and Titanium Corporation from Havre St. Pierre, Que., to the smelter at Sorel, and in shipments of titanium-dioxide slag and remelt iron from the smelter to the company's customers.

In 1950 this company began test operations at Sorel on ores from the world's largest known ilmenite deposits at Allard Lake. Concentrates from the up-graded ore analyzing 37 p.c. titanium dioxide and 42 p.c. iron are calcined in rotary kilns to lower the sulphur content. Electric smelting of this product in arc furnaces with powdered anthracite coal yields a slag containing about 72 p.c. titanium dioxide with 11 p.c. iron, and a low phosphorus iron containing about 0.12 p.c. sulphur and 2.25 p.c. carbon. This remelt iron is ladle-desulphurized to a low-sulphur content, and other constituents adjusted as necessary before casting into pigs. Production in 1959 amounted to 145,959 tons. In a recent expansion program the number of furnaces has been raised to eight, designed to consume 2,400 tons of beneficiated ore daily to produce 400,000 tons of titania slag and 300,000 tons of high-grade iron annually.

The only current producer of titanium-dioxide pigment is Canadian Titanium Pigments Limited at Varennes, Que., which uses the titanium-dioxide slag from the Sorel smelter. Sulphuric acid, the other main ingredient used in the manufacture of the pigment, is made