The plant, which will be highly automated, will have an annual capacitv of 100 million pounds of nickel in the form ot pellets and 25 million pounds in the form of powders. Sizable quantities of other refined and semi-refined products will also result.

ADVANCED PROCESS

"This additional refining capability will be based on an outstanding advance in extractive metallurgy – the Inco pressure carbonyl (IPC) process treating sulphide concentrates and metallurgical intermediates," says Mr. Henry S. Wingate, chairman and chief officer. "Besides technological and cost advantages over previous methods of nickel refining, we will gain in such vital areas as metal recovery, product quality and pollution control."

The new process, covered by basic patents and patent applications, integrates the main divisions of the science of extractive metallurgy, pyrometallurgy, vapometallurgy and hydrometallurgy. Feed preparation will be carried out in tuyèreless top-blown oxygen converters, marking the first commercial use of this modern device in sulphide ore treatment. Developed by International Nickel's chemical metallurgy research staff, the IPC process has been proven in tonnage prototype units of special design at the company's Port Colborne (Ontario) research stations.

Mr. Wingate added that the Company's need for much greater refining capacity stemmed from its accelerated mine development and expansion programme in Canada. By the end of 1971, International Nickel will have nine new mines in operation in Ontario and Manitoba; the combined ore recovery from these operations and its ten existing mines – seven of which are undergoing expansion – will enable the company to raise its annual Canadian nickel-production capability to more than 600 million pounds – an increase of some 30 per cent above its current capability.

Besides producing nickel pellets and powders, the new IPC complex will produce copper, cobalt and sulphur and will centralize precious metals concentration operations before final refining at the company's plant at Acton, near London, England.

MANITOBA'S MAN-MADE GRAIN

The world's first synthetic grain species will probably be released for general commercial production in 1970 by a research team at the University of Manitoba.

Triticale, a cross between durum wheat and its distant cousin rye, resembles bread wheat in many respects but has heads up to twice as large and a higher protein content. The world's food shortage will, it is hoped, be solved partly by such protein-rich foods. Fertility and palatability problems remain, however, and must be overcome by further research and development. Field tests in Saskatchewan last year showed that the new grain failed to measure up to commercial cereals in yield, period of maturation and bushel weight at its present stage of development.

Triticale has been puffed, popped, flaked and otherwise prepared for dry breakfast cereal; its flour has been made into bread; pancake flour has been produced from it. But most of the first few million pounds of seed sown by farmers on Canada's prairies will be for livestock feed and for sale to distilleries. Cattle like it – and it is said to make great whiskey.

Test plots of Triticale are being grown in other parts of the world, particularly across the U.S.A., in Mexico, and in India.

Now in the ninth generation, Triticale has become a viable plant, reproducing itself in the field true to type. Much of the work on it is shifting from species synthesis to multiplication of varieties. That work is similar to the search for better varieties of wheat, except that so far only a handful of Triticale varieties have been examined, while thousands of wheat varieties are known.

The sterility of previous crosses is attributed to the impossibility of 14 chromosomes from durum pairing with only seven in rye. Instead of pairing, they arrange themselves as 21 single chromosomes. Without pairs, sexual cells cannot divide to continue the reproduction process into the next generation.

The Manitoba team, which began its work in 1954, overcame this difficulty by the injection of a drug, cholchicine, which has the property of causing plants to double their numbers of chromosomes, so that Triticale can be produced with 21 pairs of chromosomes.

This injection of cholchicine occurs at a curious stage. The first act is removing the anthers from a durum wheat plant, and pollinating its flowers from the anthers of a rye plant. Only a few crosses "take", and in only a few days they face a problem similar to the human body's tendency to reject foreign organs: in the case of plants, the incompatible embryo is simply not nourished by the mother plant. University researchers remove it when it is still a very early 'premie' and place it in a plate of plant food. Instead of developing into a seed, the embryo develops directly into a plant, and eventually it is transplanted into soil. At that stage, the cholchicine is injected into its stem, and with luck this new species of plant will produce fully fertile seed, capable of reproducing normally, through seeds, the plant that was itself never a seed.

AFTER THE BREAKTHROUGH

Triticale is being originated again and again as different varieties of durum wheat and of rye are combined and carried through that difficult but proven process. There is search for a Triticale that is resistant to light, to be grown in the hot countries. There is search for a Triticale with smooth seed, one that will put more weight in every bushel measure.

Normal breeding programmes have solved many of Triticale's early problems, especially its great height which made adult plants with big heads so top-heavy that they fell over and escaped the harvester, and the early problem of sterility. Traditional breeding programmes are expected to develop Triticale strains with higher percentages of lysine, an animo acid valuable in animal feed.