



1 OPERATING AISLE. The two new 100,000-lb-per-hr boilers are arranged so meter and control panels, feedwater valves and stairways, to either the basement or the drum platform or fan room, are in or near passageway between the two boilers

Steam Plant Modernized With

Pulp and paper mill eliminates four old stoker-fired boilers, and superimposes 600-psi 700-F steam and power generators on 170-psi 475-F system. Power-plant design emphasizes reliability, economy, easy operation and provisions for expansion

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► MAKING PULP AND PAPER consumes large quantities of steam and electric power. Not only are these items essential to the process, but they also account for a substantial part of the finished product's cost. So it is not surprising that successful pulp and paper mills watch boiler-house and power-plant performance with a critical eye while carefully considering all possible improvements in reliability and economy. Thus Fraser Companies Ltd have recently constructed a new steam plant at their mill in Edmunston, N. B., Canada.

Existing Plant. When the mill was built before World War I, its steam and power facilities were adequate and economical. But 30 years of con-

tinuous operation at constantly increasing production rates had their inevitable result. By 1941, the management realized it could meet present and future needs only by making major additions to the equipment. So our firm, H G Acres & Co, undertook a study to determine what equipment to install for best economy and reliability—in cooperation with F O White, chief engineer for Fraser Companies.

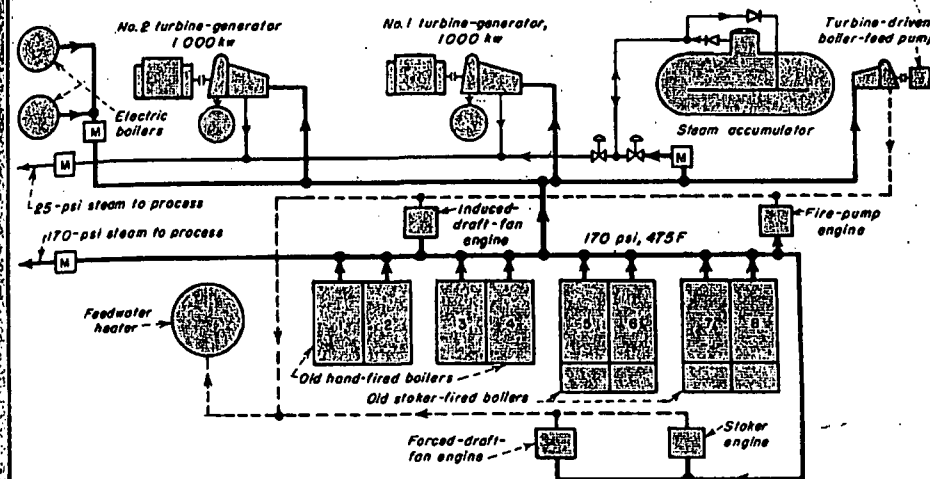
Diagram on facing page shows plant hookup in 1941. Pulp-mill steam was supplied at 170 and 25 psi. Boiler installation consisted of eight longitudinal drum boilers, each of 5000-sq-ft steam-making surfaces fired by under-feed stokers. Four, equipped with dutch ovens to burn wood refuse,

were designed to operate at 170 psi and 475 F.

A steam accumulator of 23,000-lb storage capacity was installed between the 170- and 25-psi mains. Two 1000-kw extraction-condensing turbine-generators had their bleed points connected to the 25-psi system. These supplemented the main supply of hydroelectric power. Two 2000-kw electric boilers supplied 170-psi steam when surplus hydro power was available.

Proposed Changes. The steam and power study resulted in a decision to modernize the plant in two steps:

1. Install two new 100,000-lb-per-hr steam generators, each designed for 600 psi, 700 F. They could supply full mill requirements but no spare capacity. These units, with auxiliaries and feedwater-treating equipment, were to be housed in an extension to the old plant so they could be installed without interfering with operation. Provision was made for a possible extension for two additional units. The final installation could deliver 300,000 lb of steam per hr, with one unit as a spare. This was regarded as the ultimate plant capacity. Temporarily the new units would operate at 170 psi and connect into the old piping system.



2 OLD PLANT ARRANGEMENT. Steam for pulp mill was having 5000 sq ft of heating surface, all stoker fired; 4 supplied at 170 psi from eight longitudinal boilers, each are equipped with dutch-oven furnaces to burn wood refuse

Eye Toward Future Expansion

2. Remove four old boilers and install a 3500-kw turbine-generator in their place. This work would not be undertaken until the new boilers had operated long enough to make all adjustments so further shutdowns would be unlikely. The four old units with dutch-oven furnaces would serve as spare capacity for the new plant and permit using any wood refuse as fuel. It was not desirable to install new refuse-burning units as it was hoped that, by the time the installation had to be abandoned, more advanced designs would be available.

The turbine-generator was designed for inlet conditions of 600 psi, 700 F and for 170-psi exhaust. It would not develop the total power available from process steam, and space was provided for a second unit of equal capacity. Installing the new power-generating unit in the old building not only effected a considerable saving but also gave a more compact and convenient layout. Diagram on p 67 shows final hookup.

When the decision was made to proceed, material was not available so construction did not start until 1944. Late in 1945 the boiler house was completed and the new boilers placed in

operation. The turbine-generator was placed in service in July 1947.

Steam-Generating Units. Boilers have an actual capacity of 87,000 lb per hr each, at 620 psi at the superheater outlet and a total temperature of 700 F. Pulverized-fuel firing is used, designed for bituminous coal from the Minto area in New Brunswick; average proximate analysis is volatile matter 27%, fixed carbon 40%, ash 23% and moisture 10%. Its ash softens at 1900 F, has a grindability of 70 and 10,500 Btu as fired. Sulphur content is generally high. These characteristics were considered in the firing-equipment design.

Each boiler has ample pulverizer capacity in two bowl-type units of 7000-lb-per-hr rating. To insure drying the wet coal, preheated primary air is mixed with a quantity of hot gas drawn from the furnace below the water-cooled ash screen. This gas supplies sufficient heat to permit complete drying under all conditions and to maintain a uniform temperature of the coal-air mixture going to the burners.

These pulverizers have been highly satisfactory. Pulverization is excellent and, even with coal of very high ash content, carbon loss in the refuse is

extremely low. All grades of coal are handled without difficulty with low mill-maintenance cost.

To guard against slagging, liberal furnace volumes and furnace-heat-absorbing surface are provided. At full load, heat release is about 23,600 Btu per cu ft and 80,000 Btu per sq ft of projected watercooled surface. Water-cooled surface has fin tubes on the sidewalls and roof with plain tubes and a refractory backing in the front wall. Experience shows the units can operate continuously at rated capacity, with about 30% excess air, without serious slagging.

Each boiler has a plate-type air heater. The coal's flue gas is likely to be corrosive because of high sulphur content, so low gas temperature must be avoided. At full load, exit-gas temperature is about 380 F and corresponding air temperature about 420 F.

Induced-draft fans are motor driven through hydraulic couplings for speed control. Forced-draft fans are also motor driven and have inlet-vane control. Multi-element tubular dust collectors are installed between air heaters and induced-draft fans.

Cool Handling. Coal is delivered by railway. For the old plant, a track