

The Canadian Engineer

An Engineering Weekly

DESIGN OF A STRUCTURAL STEEL PLANT

THE HANDLING OF EQUIPMENT AND MATERIAL—LIGHTING AND POWER FACILITIES—COMPRESSED AIR AS A POWER TRANSMITTER—WATER SUPPLY AND DRAINAGE

By E. H. DARLING, M.E.*

(Continued from last issue, page 818.)

HANDLING Machinery and Industrial Tracks.—Next to the selecting of the machinery there is no one feature about a structural steel plant that should receive more careful consideration than the handling equipment. The cost of handling is the largest item in the labor account, and the capacity of the plant depends a great deal on the speed with which material is fed to and taken away from the various machines. Even after every unnecessary motion is eliminated, there is a great deal of handling to do to each piece and the weight, length and flexibility of most of them call for care and special appliances.

In the ordinary run of work it is seldom that a piece of material from the steel mills will exceed three tons in weight. The stock yard crane, however, should have at least ten tons capacity as it is usually desirable to lift several pieces at one draft. Only one crane, having a ninety-foot span, travelling the full width of the lot, will be needed at first. At some future time another crane and runway may be added, which will not only increase the handling capacity, but will double the area of the stock yard.

This yard crane will unload material from the cars and sort it. As it is required in the shop, it will be put on small trucks which run on narrow-gauge tracks from one end of the shop to the other. Inside the building the hoists on the bottom chords of the trusses afford a means by which the material may be taken off the trucks and transferred to any point across the shop. At each end of the building, however, on account of the great deal of handling that takes place, at these points, it is advisable to have travelling cranes of about sixty-foot span—a 10-ton crane at the stock yard end and a 15-ton crane at the shipping end. These cranes will also be found of great service in transferring material from one aisle to another.

At the punches, longitudinal trolley beams with trolleys and chain hoists are necessary to hold the work as it is fed through the machine. These trolley beams must be suspended below the trusses and have openings for the trolleys on the trusses to pass through. Special travellers and jib cranes can be arranged to suit the need of any particular machine.

In that part of the girder shop where the girders are assembled and handled, it will be necessary to have two travelling cranes of thirty-ton capacity. Travelling jib

cranes for carrying riveting machines can be arranged to run along the east side underneath the over-head cranes. In the structural shop the riveters will have 3-ton travelling cranes with fifteen-foot span carried on runways suspended from the roof trusses.

Three- and five-ton air hoists will be required wherever much lifting is to be done, provided the head room is sufficient for the hoist. For holding work at machines, however, a chain block is better, as air hoists are not steady enough. Wherever possible, material will be laid on horses or skids, so as to save raising and lowering more than necessary. If much of it has to be done at any point, rapid-acting blocks should be used.

In course of time it will be found convenient to have a thirty-ton travelling crane with seventy-five-foot span in the yard at the north end of the plant. Under it finished material may be stored and loaded for shipment as required. It can be used for assembling large trusses when it is necessary to put them together at the works before shipping.

All the thirty-ton cranes should have 5-ton auxiliary hoists, or should be provided with change gears, as some cranes are now made. This will save a great deal of time when the crane is used for handling light pieces, the slow motion or main hoist being used only for heavy loads.

The handling equipment under certain conditions should include a 10-ton locomotive crane. Such a machine will be found of great service during construction for unloading and placing building materials, machinery, etc. It will also be a great convenience, if not a necessity, in moving cars, unless unusually good shunting service is available from the railway company. It may be used to good advantage by the erection department for certain work.

All parts of the handling equipment should have a wide margin of strength. Chains, hooks, cables, chain blocks, etc., that are frequently overloaded, soon give trouble and become dangerous. The most serious accidents of a structural steel shop are the result of falling material.

Power and Lighting Systems.—Electric power is usually delivered as two- or three-phase alternating current at a high voltage, to be transformed to suit the requirements of the purchaser. For distribution about the plant a voltage of 220 or 500 volts is usually used. The higher voltage requires less copper in the feeders, but for a structural shop the lower voltage, i.e., 220 volts, is preferable. The presence of so much metal, the rough treatment which wires and conduits are liable to receive, makes it unwise to use a voltage that might be dangerous to workmen.

* McPhie, Kelly & Darling, architects and engineers, Hamilton, Ont.