

*Babcock & Wilcox, Tubular Products Division, Beaver Falls, Pa.*

Babcock & Wilcox is a major diversified supplier of industrial equipment and goods used in consumer products. Its Tubular Products Division is a captive steel-maker with approximately 600,000 tons of raw steel capacity manufactured mostly into seamless tubing. In the early 40s B&W entered into joint development work, with Republic Steel on the continuous casting of steel. The company was the first to continuously cast steel on any consistent scale in the U.S. and is one of the pioneers of the process. B&W's original caster with its 6 ton electric furnace hot metal supply located on the casting floor (at 75 feet above the shop floor, it is probably the highest melting unit anywhere) has not been in operation since the beginning of the Roanoke project. B&W has continued development work on continuous casting by having Roanoke cast heats for other steel companies. Nevertheless, the Tubular Products Division has not installed continuous casting in its own production operations. "Too great a product mix of known castable steels with not enough production of any one item at any one time," explains Isaac Harter, Jr., B&W's long-time head of continuous casting development and promotion.

Engineering and sales of continuous casting equipment has been an important activity of B&W's Tubular Products Division under Harter. The group's first commercial machine came into production at Roanoke Electric Steel in 1962. This unit was also the first production continuous caster in the United States. B&W's second and third commercial machines are presently under construction at Republic Steel's Canton plant. One of these, a four strand bloom caster, is being completely handled by B&W. The second unit, a twin strand slab caster, was laid out by Babcock & Wilcox, and detailed and built by E. W. Bliss Company under a sub-contract.

*Koppers Co., Pittsburgh, Pa.*

Koppers has been associated with continuous casting of steel almost since the process started in the U.S. In combination with the Rossi-Junghans group, Koppers was the contractor for the pioneer steel casting machine at the Water-vliet plant of Allegheny-Ludlum in 1947. Koppers maintained joint ventures with the Rossi group (through Continuous Metalcast Inc.) until 1962. In the early 50s Rossi-Koppers built the pioneer slab-bloom casting machine for Atlas Steels at Welland, Ontario. Several other Rossi-Koppers machines were built in Switzerland, Mexico and Canada before their split in 1962. Since then, Koppers has built or has under construction, twelve machines world-wide. All are straight mold machines, some with bending, some with vertical cut-off configuration.

One of the Kopper's machine under construction is a 18 strand billet caster at Ensedesa, Spain. The set up consists of 3 machines, each of six strands with a range from 4 to 8 in. squares. This high-production unit is certainly the most daring of its kind because of the large number of strands. Start-up of this machine will be watched closely for an indication of design trends for larger capacity machines. This installation will take the entire output of 1.5 million tons/yr of a three furnace BOF shop.

Koppers has become one of the major exponents of straight mold casting machines. Koppers has not built any large slab casting units after the first Atlas unit—perhaps because of its feeling about straight mold, perhaps because of metallurgical problems. At the company's annual meeting this year. Fletcher Byrom, president, said that Koppers has the know-how to design and build slab casters and he indicated strong interest on the part of Koppers in getting orders for such units.

Several technical factors in regard to slab casting are probably affecting Koppers' decision. Vertical slab casting in straight mold machines results in very high ferrostatic heads in the solidifying slab. This high head could be a cause of metallurgical problems with such units. In any event, supporting the 30-plus ton weight of the slab in vertical position creates problems in pinch roll design. Presumably, these are some of the factors creating difficulties for U.S. Steel at its Gary slab caster. (It should be noted that Russian designers have so far opted entirely for vertical slab casting, with nearly 15 million tons installed.) In any event, at present slab casters of curved mold, low head types are unquestionably simpler from an installation standpoint. Whether Koppers, the major exponent of straight mold casting, can overcome these problems by some yet-undisclosed design improvement remains to be seen.