

Hot dip galvanizing line at U.S. Steel, Fairfield Works

A NEW 260,000-ton/year coating line for the production of hot dipped galvanized and Galvalume sheet steel, No. 5 line, is in operation at U.S. Steel Group's 2.3 million ton/year Fairfield Works in Alabama.

Built at a cost of \$50 million, the new facility, called a Dualine, will produce zinc coated and zinc-aluminum alloy coated sheet steel (Galvalume) products primarily for the construction and metal building markets. It represents a further increase in Fairfield's production of value-added products. An earlier upgrade of the plants' continuous pickling facility and 6-stand cold reduction mill enhanced the capability to provide a high quality substrate for the new coating line.

The line has the capability of producing coated products, 24 to 50-in. wide and in gages from 0.012 to 0.040 in. (A summary of products, sizes and line design data is shown in Table I.)

Line operation

The first product on the new line was coated on Aug. 26, 1996, less than 17 months after the project was autho-



Finished coated products warehouse.

rized. The overall proposal for the line, line layout and majority of the equipment was provided by ADS Machinery.

Cold reduced coils from the cold mill are loaded onto saddles in front of each of the two payoff reels by crane. From the saddles, the coils are moved, one at a time, to the payoff reel using a floor mounted coil car (Southworth). Two payoff reels are used to permit feeding strip into the line on one pass while disposing of the tail end of the previous coil and preparing the head of the next coil on the other payoff reel. The strip pass-line from both reels converge at the same point just in front of the welder where the tail of one strip is fastened to the head end of a new coil.

A coil is raised to the correct height to place the coil on the payoff reel mandrel and then the mandrel is expanded to secure the coil. An operator then cuts the circumferential band around the coil, and then uses the threading table and snubber to peel off the head end of the coil and feed it to the No. 1 pinch roll. From there, the strip is conveyed automatically through the isotope thickness gage (Data Measurement Corp.) and into the shear. The head and tail end of each coil contains some off-gage material that is removed before the remaining portion of the coil is processed. Pieces of strip, approximately 7-ft long, are automatically cut off of the head end until the thickness gage determines that the ordered thickness of the strip is correct. The off-gage pieces are then pushed off the table into scrap bins. The scrap bins are removed and dumped approximately once per shift. The scrap is recycled in the Q-BOP

steel melting process. The strip is then fed to a location just in front of the converging pinch roll to await the tail-out of the other coil.

When the running coil nears its tail end, the thickness gage determines when the thickness deviates from the allowable tolerances and, when the strip thickness exceeds the tolerance, the strip is stopped and the remaining off-gage tail is cut off by the shear. The cut tail end is then automatically pulled forward to the strip welder (Taylor-Winfield). The previously prepared head of the next coil is moved forward to the welder and when both strip ends are properly positioned, the strip ends are clamped, a final squaring cut is made on both ends, the head end of the new strip is then moved forward to overlap the two ends by approximately 1/16 in. and the two strip ends are welded together by electrical resistance. The weld is then planished to produce a total thickness of not more than 110% of the base strip.

Once the strip is welded, it moves to refill the entry accumulator. The No. 1 bridle pulls the strip off the payoff reel and through the entry section, and provides back tension into the entry accumulator. At that time, the remaining tail end of the previous coil is automatically sheared to deplete the small amount of the strip left on the payoff reel. Once the payoff reel is empty, the cycle of loading and preparing the head end of the next coil is repeated.

The entry accumulator is a 6-pass horizontal arrangement with approximately 1180 ft of strip storage. The accumulator is used to allow the process section of the line the remain running while the entry end is stopped

TABLE I Product summary and line design data

Material	Cold rolled, low carbon steel Galvanized: CQ, DQ LFG, Grade D and E Galvalume: CQ, DQ, LFG Grade 50, 60 and 80
Product	
Width	24 to 50 in.
Gage	0.010 to 0.040 in.
Coating weight	
Galvanized	G30 through G90
Galvalume	AZ50 through AZ60
Coil	
ID, incoming	24 in.
ID, recoiling	20 and 24 in.
OD	36 to 84 in.
Weight, entry	20,000 to 60,000 lb
Weight, exit	10,000 to 50,000 lb
Line speeds	
Process	600 fpm (max.)
Entry and exit	900 fpm (max.)
Threading	100 fpm (adjustable)
Line tension	
Entry section	1100 psi (max.)
Entry accumulator	1250 psi (max.)
Process section	500 psi (min.)
Mill/tension leveler	12,500 psi (max.)
Exit accumulator	1250 psi (max.)
Exit section	2000 psi (max.)