



Inside the Cover

California Steel Industries Inc.



The high-frequency welding (HFW) pipe mill at California Steel Industries Inc. is a straight-seam forge-weld process that was supplied by SMS Meer in 2014. The mill uses induction welding technology and a continuous O-forming process to produce 8 5/8-inch-OD pipe using 27-inch-wide material, up to 24-inch-OD pipe using 76-inch-wide material with wall thicknesses up to 0.750 inch, and API grades up to X70. The mill has an annual capacity in excess of 400,000 short tons.

Shown to the right is the steel exiting the pipe mill's vertical accumulator. The purpose of the accumulator is to have enough steel accumulated using a small footprint to allow the forming section of the mill to continue to run at a constant speed while the entry section stops and joins the head of the new coil to the end of the coil on the accumulator. Once joined, the new coil is uncoiled onto the outer loop of the accumulator at a faster speed than the forming section until it reaches its capacity, then slows to match the forming mill speed. This accumulator holds a maximum of 35 wraps. The material is drawn from the center of the accumulator and turned horizontally into the forming section of the mill.

Rolls form the sheet into a continuous cylinder shape where the edges are very close but not yet bonded. The near-net-shape tube passes through an induction coil. The induction coil is supplied with up to 1,500 kW of power at an alternating frequency in excess of 100,000 Hz. This high-power, high-frequency current creates an alternating magnetic field that surrounds the pipe. This in turn induces an electrical current (eddy current) and heats the edges of the steel almost to the point of melting. The tube is drawn through the welding rolls, where the edges are squeezed together, expelling oxides and contaminants, thereby producing the straight HFW forge weld with no filler metals needed.



To meet the customers' length requirements for pipe, California Steel Industries uses an automated cutoff system. As the pipe travels down the line, the automated cutoff system uses product data and line speed to initiate eight hydraulic clamps to secure the pipe at the entry and exit of the carriage. As this carriage moves along with the pipe, two saw blades rotate and maneuver around the tube to cut it to the desired length. Once complete, the clamps open and the carriage, driven by a rack and pinion, returns to the home position, waiting for enough pipe material to start the process over again.