The Galvanizing Process

Hot Dip Galvanizing is the process of applying a zinc coating to steel by immersing it into a molten zinc bath, creating a metallurgical bond to the steel. The process consists of three steps: 1. Surface Preparation (cleaning), 2. Galvanizing, and 3. Final Inspection.

1. The most influential step in the galvanizing process is preparing the steel to be immersed into the zinc bath. Molten zinc will not react properly or metallurgical bond properly to the steel if it not perfectly clean. The cleaning of materials for galvanizing consists of three solutions and rinses. The first of the three is called a caustic bath. Caustic is a hot alkali solution, which removes surface dirt, certain marking paints, grease and oil. The next step is a hot sulfuric acid bath more commonly referred to as the pickle. Pickling removes mill scale and rust, which has formed ant the surface. Pickle time is determined by the cleanliness of the steel. Sand blasting material drastically reduces pickle time and will usually encourage quicker turn-around times. The final step in the cleaning process is the flux. The flux tank is comprised of an aqueous zinc ammonium chloride. The flux eliminated and prevents further oxides from forming on the steel surface prior to galvanizing. Materials removes from the flux are air dried to eliminate zinc from splattering out of the kettle. Between each step in the cleaning process material gets a quick rinse in water to prevent cross-contaminating different solutions.
2. Once the material has been properly cleaned it is ready to be galvanized. Materials are immersed until they reach bath temperature (842); they then begin to withdraw the material at a slow rate to allow excess zinc to run off and out of holes. It is during this step in the process when all the preparation pays off. Proper holes allow zinc to flow from within the material and not have the appearance of running out and solidifying a build-up. Threaded materials are put through a centrifuge and excess zinc is spun off the material cleaning the threads.
3. Once materials are galvanized they are quenched in water or air-cooled for handling and the final inspection. Coating thickness and appearance are the two properties inspectors and customers are most concerned with. Materials are galvanized according to CSA (Canadian Standards Association) and ASTM (American Society for Testing and Materials).