Q: I recently received a product with markings that appear to be caused by the handling of the steel during the galvanizing process. What causes these surface defects and are they acceptable according to ASTM A 123?

A: A hot-dip galvanized coating could have any number of surface defects that can lower the long-term corrosion performance of the product. Some surface defects can be caused by handling the steel during the process. Surface defects may or may not create a bare spot, defined as an uncoated area or a location where the measured coating thickness is zero. According to ASTM A 123, bare spots are not acceptable on the surface of a hot-dip galvanized steel product.

One surface defect can be caused when steel is hung on lifting racks using chains or wires, and transported around the galvanizing plant. Chain or wire marks, like those seen in *Figure 1*, can sometimes be avoided by proper hanging and transporting techniques. However, some products must be hung in a manner that will create chain or wire marks in order to be galvanized.

Figure 1: Chain marks on a hot-dip galvanized product.

Another surface defect caused by handling steel during the galvanizing process is known as touch marks, as seen in *Figure 2*. Touch marks are either partially coated or uncoated spots on the surface of the galvanized steel and are created when products come in contact with each other during the galvanizing process. This commonly occurs when numerous small products are hung on the same lifting fixture. When you hang products too closely, it creates a higher chance that the products will touch each other when they are placed into the galvanizing kettle. Touch marks can sometimes be avoided by increasing the horizontal and/or vertical spacing between products. To do this, hang fewer products on the same lifting fixture or vary the heights at which the products are hung.

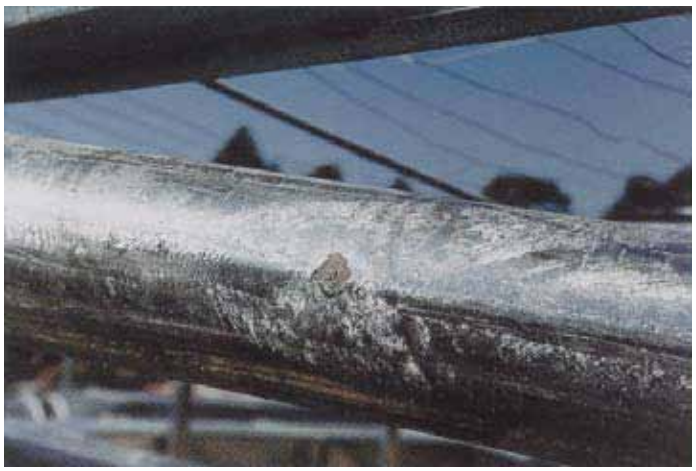

Figure 2: Touch marks on a hot-dip galvanized product.

Any surface defect that creates a bare spot that is below the acceptable size criteria for a repairable area and that is properly repaired by the galvanizer is not cause for rejection. According to ASTM A 123, the definition of a repairable area is the total area of bare spots on a product must not exceed 0.5% of the accessible surface area to be coated, or must not exceed 36 in^2 per short ton (256 cm^2 per metric ton), whichever is less. This means any products with bare spots that meet this definition must be repaired by the galvanizer in accordance with ASTM A 780. However, any products with bare spots that exceed this definition must be rejected. They can be stripped and regalvanized. It is the galvanizer's responsibility to properly handle products during the galvanizing process to minimize surface defects, and if necessary, repair any bare spots that may occur.