RMG Mechanical Descalers

Material costs usually constitute over 50% of the total manufacturing costs. These costs can be cut 20% by mechanically descaling in-house.

Introduction

Almost all wire products are produced from coiled wire drawn from either chemically or mechanically descaled rod. Due to economic and environmental considerations chemical descaling (pickling and liming) has become a thing of the past, with two possible exceptions:

1. Cold-heading-quality wire which requires an extremely clean surface for enhancing the extrusion process.
2. Plating-quality wire which requires an extremely clean surface for elec tro-chemical bonding, and appearance purposes.

Virtually all other wire products can, and should, be produced from mechanically-descaled material especially parts that are subsequently plastic coated or painted.

Mechanical descaling can be accomplished either at the wire mill or, better yet, immediately before the wire is converted into its final or semi-finished form. The problem of providing suitable coatings or corrosion resistance when descaled and drawn wire is produced at a remote wire mill precludes procuring mechanically-descaled wire from these commercial mills. Therefore, the most practical method of producing this material is *just before* the wire is converted into a straightened, formed, or welded part on site. This especially applies when wire diameter is .218" (5.5 mm) and larger which permits combination single-hole drawing and descaling.

Economic Considerations

Almost any company that purchases cold-drawn wire can lower costs and improve productivity by procuring inexpensive green (non-descaled) rod and producing their own cleaned and drawn wire in-line with their existing production process. Two immediate cost benefits will be realized:

1. Material costs can be cut 20%.
2. Since rod coils are usually available in weights that are double the weight of wire coils, the production process can become much more efficient because of the longer sustained production runs with minimum time lost for coil changeover.

Reverse-Bending Mechanical Descalers

There are two principle methods of mechanical descaling: Shot-blasting and reverse-bending.

Shot-blasting is usually confined to rod diameters larger than .625" (16 mm). Reverse-bending the rod is predominantly done on rod diameters less than .625" (16 mm). This simple process employs, in most cases, two sheaves oriented at right angles to each other. The rod is pulled over and through the sheaves which causes reverse flexing and both compresive and tensile bending on all four sectors of the rod.

The combination of the reverse bending and stretching forces causes the rod to severely elongate and, in fact, it is this elongating process that causes the scale to break away from the surface of its steel parent. Steel is relatively elastic; the laminar ferrous oxide scale is almost completely inelastic and easily fractures and falls away from the rod.

The amount of scale, and the strength of the bond which holds it to the rod's surface, varies with the rod mill's manufacturing practices and is controllable. It is important to tell your rod supplier that you plan to mechanically-descale the rod. The mill can then contribute to somewhat easier scale removal by controlling rod production time and temperatures. Keeping the rod's surface dry and storing indoors also facilitates scale removal.

The amount of elongation imposed on the rod as it traverses through the descaler is a direct function of the pitch diameter of the reverse-bending sheaves. Scale starts to break loose at an elongation of about 5%. At 8% to 9% most of the scale has broken off.

Cleaning Techniques

The breaker rolls can only reverse-bend the wire. Residual dust and scale must be cleaned off the rod before descaling is considered complete. The "air wipe" method using a carbide-inserted guide assembly has proven to be the most economic and effective method of surface dust removal. Using an exiting air-wipe assembly and a liquid lube box on the wire drawing machine provides the best combination for effectively cleaning the material especially when the lube system includes a recirculating pump, a particle settling tank, and a filtering system.

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