

Operating Conditions



Material Guiding

Coil stock handling and feeding equipment cannot “feel” and “compensate” for misguided material the way a person can in a hand fed operation. Alignment of the coil handling equipment to each other and to the dies is critical to a smooth flow of material. Coil handling equipment uses a series of edge guides to maintain the material within a workable bounds. These are just what the name implies, “guides” not “barriers”. They are not a substitute for proper alignment of the equipment. Overworked guides result in damage to themselves or the material. Even if they are rigid enough to withstand the effects of misalignment, the resultant condition of the material and damage to the equipment will detract from a fully productive operation.

Dies

Dies equipped for hand feeding will seldom accept coil stock without some modification. The tooling must provide the intricacies associated with guiding the material, and accommodate the mill tolerances and material conditions inherent in coil. Tolerances on width and thickness of coil stock can be substantial. Provisions must be made within the die or between the die and related equipment to avoid buckling and sagging of the automatically fed material. Provisions to accept within tolerance camber or crown in the stock must also be made within the die. Progressive dies must also be equipped with suitable pilots to eliminate progression error.

Slick Material Finishes

Any number of surface conditions can produce a slick finish which severely inhibits the ability to feed coil stock accurately. It is important to recognize these conditions and to control them to the best extent possible. Proper selection of feeding equipment suited to work with slick material finishes, and die designs with tolerances that can compensate for these conditions will improve production efficiency. Aside from surface conditions slick with oil or other lubricants, galvanized material is one which deserves caution. As a guideline the coil steel should be lubricated after the feeding device.



Sensitive or Critical Surface Finishes

Many materials have surfaces particularly susceptible to marking or distortion. Pre-painted, polished, and non-fervous materials are all considered sensitive materials. Other materials are so critical in appearance that even a normal or tough surface has to be processed with special care. Provisions can be made in the coil handling equipment and in the dies to process these materials. Attention to detail must be taken to properly finish rolls and grippers for special material protection, to avoid touching materials with control devices, or to grip in non-critical areas.

Stop Marks

When material is stopped between rolls, particularly the staggered rolls in a straightener, a series of straight lines can be “imprinted” across the surface. These are variously called “stop marks”, “set marks”, or “witness marks”, by the fact that they often show up after a subsequent process such as painting or plating makes them noticeable. If a pull-through straightener is used, the material will stop in the straightener with every feed stroke, causing these marks throughout the coil run. The stop marks will correspond directly to the roll spacing and feed length. Power straighteners can be adjusted to minimize stopping, or be equipped with a “creep” speed for nearly continuous running if stop marks are a critical factor.

Tough Materials

Almost all coil handling equipment is rated in terms of its capacity to process mild steel. Calculations must be made for the capacity of coil handling and straightening equipment in materials tougher than mild steel. This consideration is particularly critical to the straightening function where the rating of mild steel is generally considered not to exceed 50,000 PSI in yield strength. High carbon steel, stainless steel, and special alloys are among the materials for which caution must be exercised. The material yield strength must be known to make proper application of coil handling and straightening equipment, as well as the material shear strength for any cut-off process.

Production Rates

It is important to avoid interpreting the speed rates of coil feeding equipment as production rates of a press or cutoff process. Catalog listings are charted in general terms for a wide range of applications. Coil handling and feeding is an intermittent operation, and a process employing several coordinated machines. Material is fed to length, the feed waits for the press or shear to do its work, the feeding area is cleared, and then the feed delivers the next length. During the feed cycle there are acceleration, feed time, deceleration, stop time, and often dwell times involved. Production rates depend on many

other variables beside the top speed of the coil feeding equipment. The cycle time of the press or shear needs to be considered, along with the amount of that cycle time which is actually available for feeding. Individual feed lengths, the cross-section of material, the amount of work being done, the amount of slack material, and the capabilities of all the related machinery has to be known to establish true production rates.

Slack Material

Coil handling and feeding consists of a group of functions which range from intermittent to continuous or relatively continuous operation. In order to synchronize these functions it usually becomes necessary to accumulate slack material at some point in the process. There are a variety of methods of accumulating this slack and even more individual devices for assuring its control. This concern is one of the most critical but least understood aspects of coil handling. It must be addressed to properly specify the coil processing equipment for a given application. Variables such as the material type, material thickness, yield strength, passline above floor, depth of looping pit, distance between machines, and targeted production rates must all be defined to assure that the correct equipment is specified for the line.