

Considerations Particular to Coil

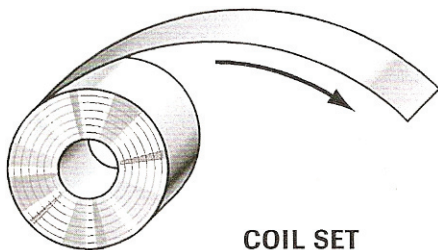


Before the use of coil stock begins to sound too good to be true, let us bring the issue down to earth. There are certain considerations, particular to coil stock, of which the user should be aware and wary. Many of these considerations are best dealt with by the material supplier, but a brief discussion of them here could be helpful.

Material Conditions

Coil Set

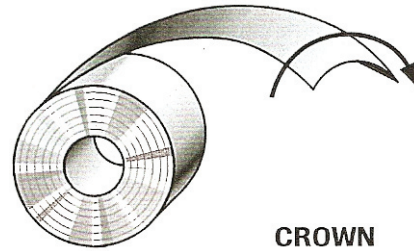
All coil stock will have, to some degree, a condition known as "Coil Set". This is a curvature of the stock corresponding to its direction of the winding into a coil. Since the winding of material is accomplished under tension, the coil set condition will persist even after material is unwound. The severity of coil set will depend on a number of factors including properties of the material, amount of tension, thickness of stock, size of coil, and the technique of processing. Coil stock straightness are offered to remove a sufficient degree of coil set to enable automatic feeding. For the most severe conditions of coil set, precision levelers may be required. Due to pre-processing techniques ranging from simple slitting through pre-painting and coil coating, the coil set can be in a reverse direction or even reverse itself within a single coil. Special provisions must be made for these conditions if they cannot be eliminated at the source of material supply.



Crown

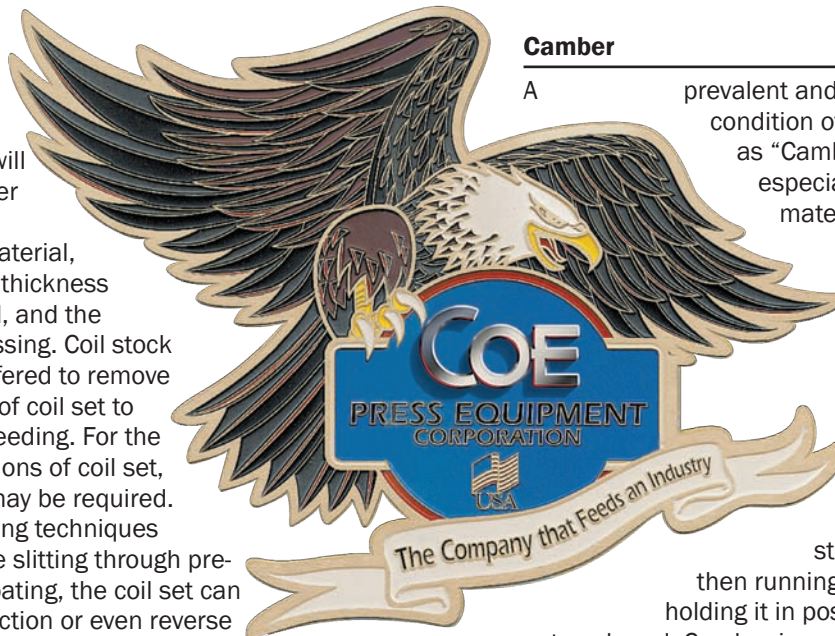
A curvature of stock through its cross-section, where the center of the stock is higher than the edges, is known as "Crown". As with most adverse material conditions, it is best minimized during process operations at the

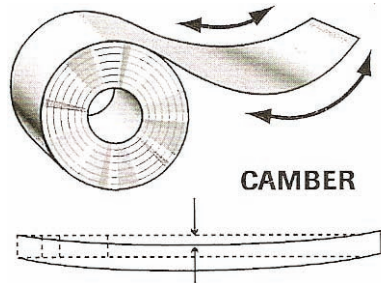
source of supply. Once present in the material it can be reduced by a leveling process, but most often it must be accommodated within the dies and coil equipment. The latter approach means introducing abnormal clearances for the stock by recessing rolls or plates to allow passage of the edges of the stock while providing pressure on the flat surface at the center of the stock. Obviously, thick materials with severe crown are difficult to accommodate and efficiently process.



Camber

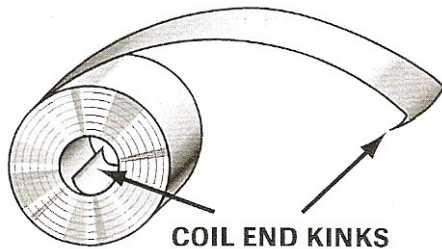
A prevalent and particularly troublesome condition of coil stock is known as "Camber". This condition, especially noticeable in narrow materials, occurs when one edge of the material is longer than the other. The material curves off to the side in one direction or even snakes back and forth. The direction and degree of camber can be determined by laying an ample length of stock on the floor and then running a string along the side, holding it in position against the edge at each end. Camber is measured in the number of inches (or fractions) of offset in a given length. There are mill tolerances for the amount of camber in standard materials, and as well as reduced camber stock, or so-called "camber-free" material. Obviously, stock with significant camber is very difficult to keep on center line of the tooling during the coil feeding process. The condition is best minimized at the source of supply. Because of varying degrees of camber from coil to coil, or even within a given coil, it is nearly impossible to correct the situation once it occurs. Coil processing equipment and dies need to accept and accommodate the worst case conditions of camber. Sometimes provisions are made for squaring the strip within the die. The die designer and tool maker must be careful not to design excessive clearances into the tooling, thus compromising part quality to accommodate poor quality material.





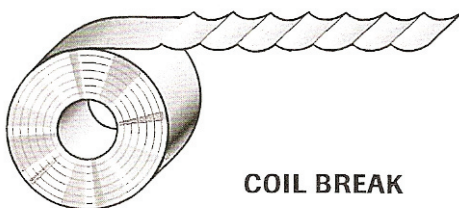
Coil End Kinks

The leading and trailing ends of coil stock can have a substantial “Kink” in them. This kink usually has to be removed to enable automatic coil handling and feeding. Commonly, it is removed by a knibbling device, or a cropping shear in large, high production lines. Other removal processes utilize “coil breakers”, “debenders”, or “flatteners” at the entry station of the power straightener. A power straightener will not completely remove a coil end kink. After initial debending, the straightener will often reduce it sufficiently to enable automatic feeding. When the kinked portion passes through the die, however, it is quite likely to result in an unacceptable part.



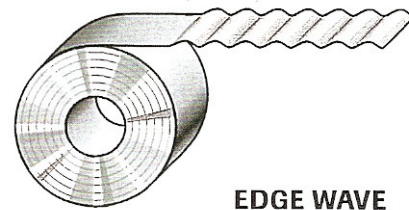
Coil Break

Coil material with a series of kinks or lines across the surface, usually evenly spaced, has a condition known as “Coil Break”. This condition cannot be completely corrected within the conventional coil processing line, but it can often be avoided at initial material supply or during subsequent coil processing. If not too severe, coil break can be accommodated within the coil handling and feeding system without detriment to production. However, it can result in an unacceptable surface condition on finished parts.



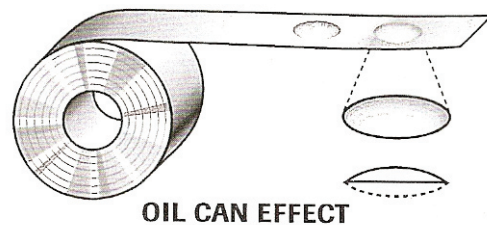
Edge Wave

Also referred to as scalloped edges, “Edge Wave” is another coil stock condition which can detriment coil processing efficiency and finished part quality. It can be imparted to the material at several stages of the initial coil production, coil processing, and handling. It is best eliminated by proper care and procedures at those stages. If occurring at the coil handling, straightening, and feeding process it is most likely the result of excessive pinch roll pressure or excessively stressed rolls which deflect in the center and deform the edges of the material.



Oil Can Effect

“Oil Can” usually appears after the blanking operation. The material is dished. The center of the material is stretched more than the edges. If rolled, the “bump” will simply transfer to the other side, or pop back and forth like an oil can. The stresses in the material which result in this condition are imparted at initial coil production and sometimes worsened by subsequent processing. Conventional coil handling equipment will provide no remedy for this condition. Even precision leveling will have minimal effect. If detrimental to the operation or the part quality, this condition must be minimized at the source of material supply.

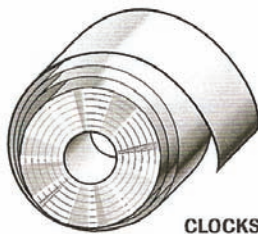


Coil Clockspring

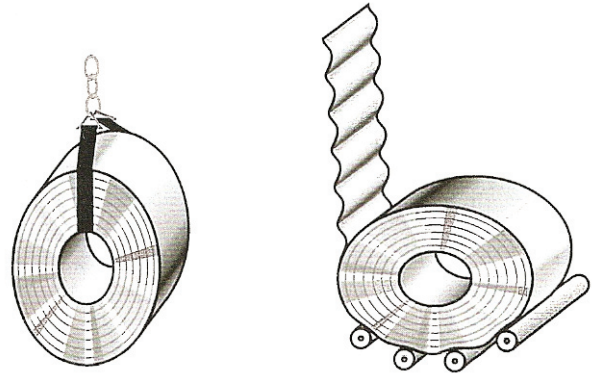
“Clockspring” is the tendency for the outer coil wraps to separate from one another in an uncontrolled manner, and spread outward around the coil diameter. In effect, the coil tends to “grow”. This tendency can exhibit itself in various degrees ranging from negligible to alarming. Excessive coil clockspring can represent serious hazards to personnel, and present a major obstacle to controlled operating conditions. The degree of clockspring is primarily a function of material specifications such as hardness, temper, yield strength thickness, and type.

Processing conditions can sometimes play a role in the degree of clockspring. Under moderate conditions, uncoiling from a cradle can help retard the tendency since the weight of the coil rests on each outer wrap. Reels can be equipped with coil hold downs or restrictors to minimize the tendency. Under the most severe conditions, special heavy duty restrictors need to be specified for reels and cradles. "Hands-free" threading capability with a peeler/threader/hold down system assures efficient coil threading and operator safety. It is important to know of any deviations in material conditions from basic mild steel standards which might lead to a clockspring tendency so that the proper coil equipment can be applied to the task.

or coil slings may be required for loading on reels. Tight winding procedures can eliminate this condition, even with very thin materials.



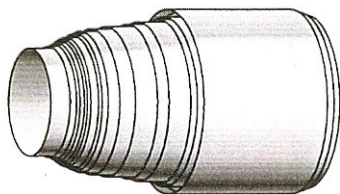
CLOCKSPRINGING



ELONGATED

Telescoping Coils

Coils can also tend to "Telescope", that is the tendency for individual wraps or groups of wraps to move sideways. This tendency can lead to damage of material edges, and significant operational problems in maintaining good alignment and a smooth material flow. Narrow coil keepers on reels and confining plates in cradles will only retard this tendency if it exists in the material. Severe cases will result in an interrupted operation and damaged material. Diligence at the coil processing stage, with proper tensioning and alignment, resulting in evenly wound coils, is the best cure.



TELESCOPING

Elongation of Coils

Thin or loosely wound coils tend to "elongate" during the handling process, particularly if furnished in heavy weights. Elongation can exhibit itself in squatting if the coil is loaded in a cradle, or difficulty in loading on a reel mandrel because the inside diameter of the coil becomes elliptical. Such coils are not suitable for cradle type uncoiling. Special loading provisions such as coil cars