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ROLL-KRAFT PROFIT POINTERS

Profit Pointer for Solving Pipe and Tube Production Problems

Profit Pointer for Tech Tips for Solving Tube and Pipe Production Problems
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Several problems can occur during the production of tube and pipe. These include marking, tube splitting, irregular sizing and poor welds. All too often, though, these problems are the result of incorrect tooling and mill setup, as well as poor maintenance practices. In other words, many of the difficulties that are encountered during production can be prevented.

This Profit Pointer focuses on tube and pipe production problems and solutions.

Problem #1:

The strip rolls from side-to-side, or the rolls ride high on one side in the breakdown section.

The entry table is loose; check the integrity of the entry table.
The strip is not centered going into mill.
The driven stands are loose; check the integrity of the driven stands (loose bearings and bearing blocks; check the top adjustments for the top shafts).
The breakdown rolls are not parallel.
The breakdown rolls are worn beyond tolerance; replace the rolls.
The side roll boxes are loose; check the integrity of the side roll boxes.
The side rolls are not set to the metal line.
The side rolls are not set to the setup chart.
The tie bars are not installed on the side roll passes; as a result, the rolls float instead of controlling the strip.
Install the lock edge design in the side roll passes.
Analyze the design for extreme light or heavy gauges.
Camber from slitting.

Problem #2:

Marking of the tube in the breakdown section.

The wrong strip width is being run.
The strip is not centered going into the mill.
The driven rolls are not properly adjusted to the gauge.
The driven stands are loose; check the integrity of the driven stands (loose bearings and bearing blocks; check the top adjustments for the top shafts).
The driven rolls are not parallel.
The driven rolls are not centered with the side rolls.
The driven rolls are not set to the metal line.
The drive RPM (speed) is not coordinated with fin and sizing passes RPM (speed).
The side roll boxes are loose; check the integrity of the side roll boxes.
The side rolls are not set to the metal line.
The side rolls are not set to the setup chart.
Analyze design for extreme light or heavy gauges.
The rolls are worn beyond tolerance; replace the rolls.

Problem #3:

Marking of the tube in the fin section and weld box.

The strip width exceeds specifications (too wide).
The driven roll setting adjustments are incorrect (too tight).
The driven rolls are not parallel.
The driven stands are loose; check the integrity of the driven stands (loose bearings and bearing blocks; check the top adjustments for the top shafts).
The driven rolls are not set at proper metal line.
The drive RPM (speed) is not coordinated with the breakdown and sizing passes RPM (speed).
The fin blade is worn beyond tolerance.
The side roll setting adjustments are incorrect (too wide).
The side roll boxes are loose; check the integrity of the side roll boxes.
The side rolls are not set to metal line.

The side rolls are not centered with the driven rolls.
The side rolls are not parallel.
Check the tube size between each driven and side roll pass; compare to the setup chart.
Analyze the design for improper forming.
The weld roll setting adjustments are incorrect (too tight).
The rolls are worn beyond tolerance.

Problem #4:

Marking of tube in the sizing section; trouble keeping the tube straight.

The driven roll setting adjustments are incorrect (too tight).
The driven stands are loose; check the integrity of the driven stands (loose bearings and bearing blocks; check the top adjustments for the top shafts).
The driven rolls are not centered from pass-to-pass.
The driven rolls are not parallel.
The driven rolls are not set to the metal line.
The drive RPM (speed) is not coordinated with the breakdown and fin passes RPM (speed).
The roll shafts are bent.
The side roll setting adjustments are incorrect (too wide).
The side roll boxes are loose; check the integrity of the side roll boxes.
The side rolls are not parallel.
The side rolls are not centered with the driven rolls.
The side rolls are not set to the metal line.
Check the tube size between each driven and side roll pass.
Check the location of the rolls; are the rolls installed on the correct stands?
The tube is not cooling properly; the tube must be normalized in the weld zone before entering the sizing section.
Turkshead roll settings adjusted too tight.
Rolls are worn beyond tolerance.

Problem #5:

Unable to weld the tube properly due to poor forming.

The strip width is below specifications (too narrow).
The breakdown and fin pass rolls are not centered.
Incorrect settings in breakdown and fin pass sections.
The fin pass is not working the strip.
The fin blade is worn beyond tolerance.
The weld box is not centered with the fin pass section.
The weld box is not set to the metal line.
The weld roll setting adjustment is incorrect (too wide).
The mill speed is excessive (too fast) for the welder.
The weld rolls are worn beyond tolerance.

Problem #6: Weld chatter

Weld chatter results from the inability to achieve a clean cut of the outside weld bead. The scarf knife chatters and produces a ribbed, or rough, cut on the O.D. of the tube. The causes of weld chatter are:

Insufficient upset, or weld bead, for the scarf knife to cut.
Cold weld; insufficient weld power to forge the weld properly.
The distance between the scarf stand and the weld box is excessive; the weld bead must be red hot to be cut effectively and smoothly; move the scarf stand closer to the weld box.
The weld is cooling too fast after the tube leaves the weld box, or before the tube enters the scarf stand; the weld bead must be red hot to be cut effectively and smoothly.
No support under the scarf stand; install a V style roll under the scarf knife; the stand will stabilize the cutting process; without the support roll, the tube can drift, jump and chatter.
No ironing pass after the scarf stand; this stand does what the name implies – it irons out any hot imperfections the scarf knife may leave behind; the ironing stand also stabilizes the scarfing operation.
Move the induction coil upstream a bit, away from the weld rolls; this setup will help temper the edges of the strip by preheating the edges before welding resulting in a more malleable material, which is softer, and easier to cut with the scarf knife.
Check the cutting angle on the scarfing knife; the heel of the scarf knife should be ground to an angle of 18 degrees from the horizontal, and the tool should be set at an angle of 15 degrees from the vertical; these settings will provide the proper clearance to avoid dragging the knife on the tube or pipe; a straight up and down application to the tube or pipe invites chatter.
Improper radius of the scarf knife; the insert, or knife, used should have a radius that is slightly larger than the O.D. of the tube; this will provide a clean, concentric cut.
The insert, or cutting knife, is dull.

Problem #7:

Splitting of the tube in the weld zone and the creation of pin holes in the weld.

Check the strip width; if the strip width is below specifications (too narrow), there is insufficient material to forge a good weld.
Check the alignment of the tube.
Check the setup of the mill.
The fin passes are not working the strip sufficiently to prepare the edges properly for welding.
Poor slit edge.
The strip is off center approaching the weld box and as a result, the forging does not occur between the weld rolls; the strip is rolled over and not at the 12 o'clock position before entering the weld rolls.

Mismatched edges; the edges are not parallel going into the welder.
Improperly matched weld power for the speed of the mill.
Poor quality steel (bad chemistry).

Problem #8:

Irregular size in the sizing section.

The weld size is not correct according to the setup chart.
The weld size is not round.
The strip edges are not parallel; there should be no step between the edges when the tube enters the weld rolls.
The weld scarf is not smooth.
The presentation of the tube entering the weld rolls is poor; check the alignment of the driven and side rolls in breakdown and fin sections.
Check the setup in the breakdown and fin section; for example, is the fin section working the edges of the strip, preparing the edges for the weld rolls?
The rework shims, used to maintain the metal line, are not installed under bottom driven shafts.
The driven shaft spacers are the incorrect size (thickness and/or length).
The shafts and tooling are not running true; check for bent shafts, oversized bore on the tooling, or undersized shaft O.D.
The bearings and bearing blocks are tight.
Check the integrity of the side roll boxes. (loose bearings and bearing blocks; check the top adjustments for the top shafts).
The side rolls are not parallel.
The tube is not being cooled properly.
The drives are not coordinated and adjusted to match the rework of the tooling.
The chemistry/properties (hardness) of the material has changed.

Problem #9:

Items that cause lost mill time during changeovers and normal operation.

No written procedures for setup. Written procedures must be available for operators. Written procedures also provide a tool for troubleshooting when problems arise. You cannot afford to have each operator set the tube mill up by his or her own feel. The machine, as well as the tooling, are fixed factors in the mill setup equation. The only variable is the human factor. This is why it is so important to have written procedures in place.
No setup chart. Setting up by the seat-of-the pants approach, or tweaking the mill, costs valuable setup time. You must work the tooling the way it was designed. This means setting up the mill to the parameters on the setup chart.
Lack of formal training. Formal training helps develop the procedures for tube mill operation and maintenance. Training helps operators perform uniform procedures.
Ignoring the numbers from the last setup. Use the numbers from the previous setup. This can be done with the SPA feature. If the tube mill was setup by the setup chart and procedures outlined, simply write down the numbers from the digital readout on the SPA units and setup the mill to where you left off when the strip ran out. Setting up to the numbers can save as much as 75% on your total setup time, provided all the other items listed in this document are in order.
Mill in poor condition. Does your mill have a good maintenance program? Is your mill in need of a rebuild, or upgrade? Setting up and operating a poorly maintained mill will cost valuable time in setup and scrap during production. The mill must be dependable in order to chase mechanical problems during normal operation and setup.
Poor mill alignment. 95% of all tube-related problems are attributable to mill condition, setup, and tube mill alignment. Most mills are aligned at least once a year.
Tooling in poor condition. Do you have a tooling maintenance program? You must know at all times how much life is left in the tooling before the next scheduled rework. Running the tooling until it cannot produce tubing anymore will not only waste valuable mill time, but also produce scrap and affect delivery schedules.

Cost-saving example:

Do you know the per-hour rate on your tube mill? Any of the above-listed items can have varying degrees of value, depending on the severity of the conditions. The fact of the matter is, fewer problems with the mill and tooling translate to less mill down time during setup, changeovers and production. Let’s say your mill rate is $2,000 per hour. If the mill is in good shape and proper written procedures are in place, you can save 75% on setup time just by having the SPA feature on the mill. Assume the standard setup time is 4 hours ($8000 of mill time). If you can save 75% of this time, setup costs are reduced to $2000, a savings of $6000! Furthermore, reducing setup time by only 15 minutes will save $500.

Summary

The following checks and practices should be a part of a standard mill maintenance and production program:

Check the O.D. of the shafts, driven and idle.
Check the bearings, bearing blocks and shafts (loose?).
Check the shafts (bent? check the O.D.).
Check the parallelism of the shafts.
Check the shoulder alignment.
Check the integrity of the entry table, drive stands, side roll boxes, weld box and turkshead units.
Piano wire the mill to check for the proper metal line in the side pass stands.
Align the mill at least once a year.
Install the correct rolls on the correct stands.
Use a setup chart.
Follow the written operating procedures.
Measure the tube size between each pass.
Know the chemistry and Rockwell of the material being used in the mill.
Check the strip width and thickness before feeding the strip into the mill; document the strip properties.
Most importantly, establish a standard that everyone can follow.

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