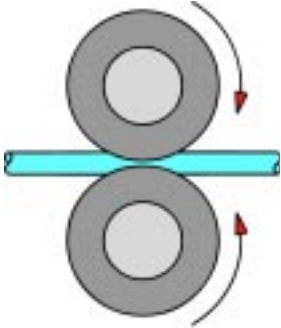
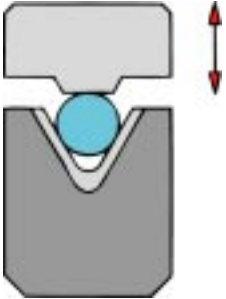
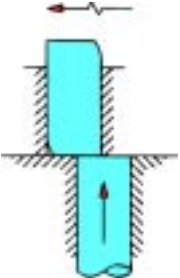


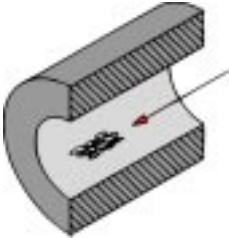


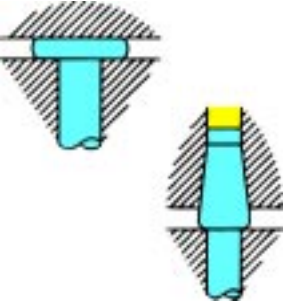
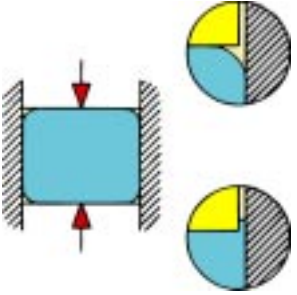

COLD FORMING TROUBLE SHOOTING GUIDE

Problem Area	Problem / Possible Cause Or Solution
<p>FEED ROLLS</p> 	<p>Wire Slippage / Short Feed</p> <ul style="list-style-type: none"> • Feed Roll Pressure (Not Enough / Too Much) • Quill / Cutter ID Too Small • Quill / Cutter Misaligned • Quill Land Too Long • Wrong Or Worn Wire Grooves • Too Much Oil On Wire • Kinks Or Gouges In Wire • Coil Too Large Or Tangled Wraps • Wire Coating Packed In Quill Area • Power Feed Rolls Still Clamped <p>Wire Distortion / Scratching</p> <ul style="list-style-type: none"> • Too Much Feed Roll Pressure • Wire Coil Not Centered To Machine • Wire Straightener Improperly Adjusted
<p>FEED (FX)</p> 	<p>Wire Slippage / Short Feed</p> <ul style="list-style-type: none"> • Feed Grip Pressure (Not Enough / Too Much) • Quill / Cutter ID Too Small • Quill / Cutter Misaligned • Quill Land Too Long • Worn Feed Grips • Too Much Oil On Wire • Kinks Or Gouges In Wire • Coil Too Large Or Tangled Wraps • Wire Coating Packed In Quill Area • Cutter Lever Not Returned To Down Position <p>Wire Distortion / Scratching</p> <ul style="list-style-type: none"> • Too Much Feed Grip Pressure • Wire Coil Not Centered To Machine • Wire Straightener Improperly Adjusted
<p>CUTOFF</p> 	<p>Short Cutoff / Short Feed / Inconsistent Length</p> <ul style="list-style-type: none"> • Wire Slipping - See Feed Problems • Inconsistent Wire Diameter <p>Distorted Cutoff</p> <ul style="list-style-type: none"> • L/D (Length To Diameter) Ratio Too Small • Too Much Cutter To Quill Clearance • Quill / Cutter ID Too Large • Wrong Stock Gage Tip (When Applicable) • Hitting Stock Gage Too Hard (When Applicable) • Wire Straightener Improperly Adjusted <p>Bad Shear / Cutoff Slivers / Scrapping / Rubbing</p> <ul style="list-style-type: none"> • Incorrect Quill / Cutter Clearance / Diameters • Quill / Cutter Misaligned • Dull Or Incorrect Cutting Edges • Distorted Wire

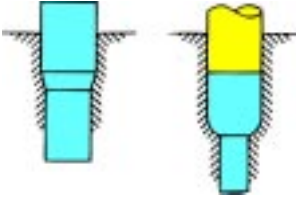
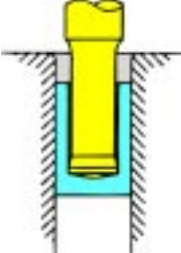
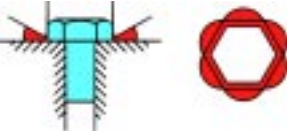
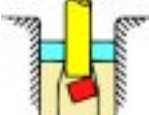
COLD FORMING TROUBLE SHOOTING GUIDE

Problem Area	Problem / Possible Cause Or Solution
<p style="text-align: center;">DIE FAILURE</p> 	<p>Die Splits (Longitudinal)</p> <ul style="list-style-type: none"> • Insufficient Interference Fit • Insert Outside Diameter Too Small <p>Die Breaks (Transverse)</p> <ul style="list-style-type: none"> • Too Much Interference Fit • Insert Outside Diameter Too Large <p>Die Breaks Prematurely</p> <ul style="list-style-type: none"> • Corners In One Piece Die • Trapped Lube In Unvented Die • Incorrect Interference Fit • Mis-Transfer • Improper Die Segmenting • Overfill Of Enclosed Upset • Improper Support Behind Die Insert • Poor Die Ratio • Die Material Too Soft / Hard
<p style="text-align: center;">PIN / PUNCH FAILURE</p> 	<p>Head Breaking Off</p> <ul style="list-style-type: none"> • Mismatch Between Punch / Case Radii • Back Of Head Or Filler Out Of Square • Punch Head Clamped Tight In Case • Head Too Large / Missing Relief On Rear End <p>Forming End Breaks Off</p> <ul style="list-style-type: none"> • Punch Body Bound Tight • Punch Is Off Center • Mis-Transfer • Improper Heat Treat Or Material • Poor Concentricity • Punch Going Solid When Cycling Machine Empty <p>Corner Chipping / Galling</p> <ul style="list-style-type: none"> • Corner Too Sharp • Trapped Die Lube • Area Reduction Is Too High / Low
<p style="text-align: center;">GALLING (Pick Ups)</p> 	<p>Die Insert Bore Galls</p> <ul style="list-style-type: none"> • Insufficient Die Lubrication • Incorrect Die Lubrication • Die Material Too Soft • Clearance Of Blank To Die Is Too Close <p>Die Insert Outside Diameter Galls</p> <ul style="list-style-type: none"> • Too Much Interference Fit • No Assembly Lubrication • May Require Tapered Insert Design <p>Formed Blank Galls</p> <ul style="list-style-type: none"> • Poor Wire Coating • Incorrect Die Lubrication • Too Many Extrusion Passes • Clearance Of Blank To Die Is Too Close • Transfer Not On Center

COLD FORMING TROUBLE SHOOTING GUIDE

Problem Area	Problem / Possible Cause Or Solution
<p style="text-align: center;">UPSETTING</p> 	<p>Concentricity Control / Punch Nib Breakage</p> <ul style="list-style-type: none"> • Preliminary Cone Off Center • Final Upset Tool Off Center • Too Much Stock To Upset With Bowed Grain Flow (Use Sliding Tool) • Upset From Larger Stock Size • Additional Upset Blows • Transfer Fully Loaded • Circular Rings On ace Of Upset Insert • Punches Fit Too Loose To Holder • Trapped Oil • Poor Transfer Finger Control <p>Inconsistent Fill / Or Height</p> <ul style="list-style-type: none"> • Sliding Tool Sticking • Trapped Oil
<p style="text-align: center;">PART FILL</p> 	<p>Corner Won't Fill</p> <ul style="list-style-type: none"> • Trapped Corners In A One Piece Die • Vents Too Large And Plugging Up • Vents Are Too Small • Vents Do Not Have An Exit • Poor Die / Tool Polish • Fit Of Blank To Die Is Too Tight • Blank Coming In Has Improper Shape • Too Much Die Lube • Die Lube Too Thick • Wire Is Too Hard From Over Drawing <p>Corner Overfills</p> <ul style="list-style-type: none"> • Blank Coming In Has Improper Shape • Too Much Stock • Wedge Set Too High
<p style="text-align: center;">TRANSFER</p> 	<p>Dropped Blanks / Finger Bent / Broken / Worn / Gouged</p> <ul style="list-style-type: none"> • Blank Not Kicked Clear Of Die • Incorrect Kick Out Stagger (Clipping Kickout Pin) • Incorrect Gripping Notch • Incorrect IFO Cam Setting • Bent Or Broken Finger • Loose Friction Drag / Broken TKO Spring • Blank Kicked Into Back Side Of Fingers • Fingers Interfere With Punch Or Tool Case • Finger Break Away Hole Too Large • Finger Material Too Soft / Hard <p>Scratch Marks On Part</p> <ul style="list-style-type: none"> • Finger Notch Edges Too Sharp • IFO Cam Closing Too Early / Opening Too Late • Incorrect Finger Grip Notch

COLD FORMING TROUBLE SHOOTING GUIDE

Problem Area	Problem / Possible Cause Or Solution
<p style="text-align: center;">EXTRUSION FORWARD</p> 	<p>Will Not Extrude</p> <ul style="list-style-type: none"> • Extrusion Land Too Long • Insufficient Venting • Tight Kickout Pin Or Intermediate Kickout Pin • Too Slow - Parts Only Jogged • Poor Wire Coating / Die Lube / Die Polish • Area Reduction Too High <p>Bowed (Bent) Extrusion</p> <ul style="list-style-type: none"> • Tool Is Off Center (Open) • Uneven Extrusion Land / Relief Off Center • Too Much Clearance Of Blank To Die • Memory Of Wire - Must Use Wire Straightener <p>Chevron Formation (Internal Bursting)</p> <ul style="list-style-type: none"> • Extrusion Die Design (Angle / % Reduction Area) • Material Structure / Work Hardening Effects • Number Of Extrusion Passes
<p style="text-align: center;">EXTRUSION BACKWARD</p> 	<p>Concentricity Control / Depth Variation</p> <ul style="list-style-type: none"> • Preform Indent Not On Center • Punch Is Off Center / Punch Nose Off Center • Preform Blank Fit To Die Too Loose • Hole Is Too Deep • Uneven Land Or Extrusion Relief Off Center • Punch Is Bent (Even Tungsten Carbide) • Face Angle Too Large (Punch Wandering) • Improper Lube Placement ("Picks Up" One Side) • Poor Punch Polish / Coating <p>Poor Punch Life</p> <ul style="list-style-type: none"> • Trapped Die Lube • Incorrect Die Lubrication • Extrusion Corner Too Sharp • Improper Material • Bottom Web Too Thin
<p style="text-align: center;">TRIM</p> 	<p>Burr / Poor Trim</p> <ul style="list-style-type: none"> • Dull / Bellmouthed Trim Insert • Incorrect Trim Timing <p>Trim Die Life</p> <ul style="list-style-type: none"> • Trim Chip Too Thin • Trim Land Too Large / Corners Too Sharp • Incorrect Insert Material / Coating • No Relief In Trim Insert
<p style="text-align: center;">PIERCE</p> 	<p>Burr / Poor Pierce Out</p> <ul style="list-style-type: none"> • Dull / Worn Piercer Or Marking Pin • Mark Diameter Too Small • Slug Too Thick <p>Piercer Life</p> <ul style="list-style-type: none"> • Piercer Corner Too Sharp • Incorrect Piercer Material / Coating / Geometry • Slug Too Thick