Flexible Conveyors for the Flexible Metalformer

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Quick Die Change
The Process

Sure, suppliers aplenty stand ready to provide stampers with a slew of products designed to expedite die changes. But to ensure the money is spent wisely, first carefully plan the process and organize the shop floor.

BY LEE ELLARD

Quick die change is a snappy buzz phrase often associated with hardware including hydraulic clamps, die rollers, bolster extensions and die carts. However, also required to minimize downtime from the last good hit on one die to the first good hit on the next die is a well-formulated, efficient die-change process.

The beautiful thing about developing a successful quick-changeover process is that although it does require some intense thought and effort, most of the plan can be accomplished with minimal cost. Most shops can trim changeover time to less than 20 to 30 min. with little cost. Then, to get die changes done in as little as 5 to 20 min., capital investment may be required.

All job changeovers entail similar activities:
• Clear the press area.
• Unclamp, remove and store the die.
• Retrieve the new die, and locate it and clamp it in the press.
• Set up the workplace (coil line, bins, conveyors, etc.)
• Achieve first part approval.

When planning a die-change procedure, entrust the people directly involved with changeovers—foremen, operators, setup people—with the responsibility of developing and implementing the plan. Put together a core team to:
• Analyze the current job-change process—Videotape a few job changes.
• Identify the problem areas—Have the team watch the video and identify the problem areas, such as waiting 15 min. for a forklift to move a scrap bin or for someone to find and retrieve the next die or the next coil. Breaking the process down into time blocks might look something like this:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear the press area</td>
<td>8 min.</td>
</tr>
<tr>
<td>Unclamp die</td>
<td>4 min.</td>
</tr>
<tr>
<td>Remove die</td>
<td>2 min.</td>
</tr>
<tr>
<td>Store old die and retrieve new die</td>
<td>10 min.</td>
</tr>
<tr>
<td>Place die in press</td>
<td>4 min.</td>
</tr>
<tr>
<td>Clamp die</td>
<td>14 min.</td>
</tr>
<tr>
<td>Adjust shut height</td>
<td>3 min.</td>
</tr>
<tr>
<td>Adjust air counterbalance pressure</td>
<td>1 min.</td>
</tr>
<tr>
<td>Set up workplace (conveyors, bins, feed-up coil stock, etc.)</td>
<td>20 min.</td>
</tr>
<tr>
<td>First-piece approval</td>
<td>10 min.</td>
</tr>
<tr>
<td>Fully man the job</td>
<td>5 min.</td>
</tr>
<tr>
<td>Total</td>
<td>81 min.</td>
</tr>
</tbody>
</table>


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On the Shop Floor

An efficient pressroom layout is a must. While rearranging the shop may not be possible, at least make it clean and cluttered, to allow employees to move about quickly and safely during job changes. Immediately following the last hit on the current die, move parts and scrap bins, unloaders, and other apparatus out of the way, so as to not impede the rest of the process.

Locate staging areas for tooling, coils and the like close to the press and have items prestaged in those areas well in advance of the last hit of the current die or coil. And, when not in a press or a staging area, store dies and coils close and convenient to the press area, with easy access to the dies by the transport vehicle. Keep the transport vehicle quickly available. Since the vehicle is often a forklift, which tends to get borrowed for other tasks throughout the plant, consider dedicating a forklift just for die changes. Or, buy a dedicated die cart.

Strive to have all dies designed with the same clamping height; better yet, mount all of the dies on subplates standardized for clamping height as well as left-to-right and front-to-back dimensions. Standardization allows use of the same size clamping fixture for all dies. And, with standardized subplates, fixed die-locating pins can be used in the press bed for quick, accurate die locating. Placing of clamps can be easier or possibly even automatic.

To standardize die mounting:

- Add external blocks (such as ears) to existing dies to obtain a standard clamping height.
- Machine die-clamping surfaces to a standard clamping height.
- Mount dies on subplates of a standard thickness.
- Mount dies on subplates of a standard thickness and standard dimensions, or perhaps develop a few standard sizes covering your complete range of die sizes. For example, establish a small subplate (60 x 30 in. perhaps), medium (84 x 48 in.), and large (144 x 60).

- Use locating pins or die guides on the press bolster to allow consistently quick and accurate die setting.
- Standardize shut heights or, as an alternative, install automatic shut-height adjustment through your press control. Another related time saver is use of automatic air counterbalance adjustment.

Shopping for QDC Hardware

Once a stamper has implemented all or most of the above processes, congratulations! Now we can talk about what should be one of the last steps to improve job-changeover efficiency—the hardware.

Control box—A simple, compact, enclosed control box mounts where it’s most convenient, and controls hydraulic die lifters and clamps with just a key switch and a few illuminated buttons.

Hydraulic power units—The proper power unit supplies not only the correct pressure, but also the number of circuits for the required or desired safety level for equipment, tools and people.

Die lifters—Individual or array type, spring, air or hydraulically actuated die lifters lift and assist movement of dies on the press bed.

Bolster extensions—Dies can be rolled from the press bed onto removable, pivoting, or swing-down bolster extensions for easy retrieval by die-transport vehicles.

Hydraulic clamps—Although conventional clamp straps and bolts are inexpensive and adaptable, they take a lot of time to set up and do not consistently deliver high clamping force. A better solution often is use of hydraulic clamps, and metalformers have a wide variety from which to choose.

Ledge clamps can be placed manually in T-slots or bolted to the bolster or slide, and clamp directly on a flat clamping surface.

- Rod clamps must mount in T-slots on the bolster or slide and U-slot cutouts on the clamping surface.
Complete this Application Form
...to collect and record most of the information needed to evaluate QDC hardware.

Estimated timetable of project (installation):
☐ 30 – 60 Days  ☐ 60 – 90 days  ☐ 90 – 120 days  ☐ more than 120 days

Press information:
MFG: _______  ☐ New  ☐ Existing  ☐ Retrofit  ☐ Rebuild
Model: _______  Style: ☐ OBI  ☐ Straightside  ☐ Other
Stoke rate: _______  Shut Height: _______
Press tonnage: _______
Tonnage, strip force: Ram: _______
Tonnage, strip force: Bolster: _______

Press bolster information:
Bolster size: _______  F – B: _______  L – R: _______  Thickness: _______
Does the bed have T-slots: ☐ Yes  ☐ No
T-Slot orientation: ☐ F – B  ☐ L – R  ☐ Other, attach drawing
Do the T-Slots run the entire length: ☐ Yes  ☐ No, attach drawing
Number of T-slots on bed: _______  Spacing: _______
Dimensions of T-Slots: _______
Bolster height from floor: _______

Press ram information:
Ram size: _______  F – B: _______  L – R: _______  Thickness: _______
Does the ram have T-slots: ☐ Yes  ☐ No
T-Slot orientation: ☐ F – B  ☐ L – R  ☐ Other, attach drawing
Do the T-Slots run the entire length: ☐ Yes  ☐ No, attach drawing
Number of T-slots on ram: _______  Spacing: _______
Dimensions of T-Slots: _______

Standardization program implemented? ☐ Yes  ☐ No
□ Clamping height: _______
□ Shut Height: _______
□ Subplate size: _______

Die Information:
Maximum Weight: _______ Upper _______ Lower
Die set material: _______ Upper _______ Lower
Dimensions:
Maximum _______ F – B x _______ L – R
Minimum _______ F – B x _______ L – R
Tool Shut Height _______ Maximum _______ Minimum
Type of clamping currently used: _______
If bolts, number of bolts used to clamp dies: _______  Bolt size: _______
Dies are loaded from: ☐ Front  ☐ Back  ☐ Left Side  ☐ Right Side
Are dies on parallels? ☐ Yes  ☐ No
Total number of dies involved: _______
Average number of die changed per shift:
Currently: _______
Objective: _______

Application information:
Type of Process: ☐ Stamping  ☐ Molding  ☐ High-Speed  ☐ High Temperature
Type of Stamping: ☐ Blanking  ☐ Drawing  ☐ Deep Draw  ☐ Forming
Type of Operation: ☐ Manual Transfer  ☐ Auto Transfer  ☐ Progressive

Die lifters:
Select extension type:
☐ Quote  ☐ Recommend  ☐ Not Required
☐ Hydraulic  ☐ Mechanical  ☐ Rollers  ☐ Balls

Die support rails (bolster extensions):
Select bolster extension type:
☐ Quote  ☐ Recommend  ☐ Not Required
☐ Removable  ☐ Pivoting  ☐ Drop Down

Clamping for the bolster:
☐ Quote  ☐ Recommend  ☐ Not Required

Clamp Type:
☐ Fixed Position  ☐ Removable

Clamping for the ram:
☐ Quote  ☐ Recommend  ☐ Not Required

Clamp Type:
☐ Fixed Position  ☐ Removable

Metalformers have a wide variety of hydraulic clamps from which to choose, including ledge clamps (top), which can be placed manually in T-slots or bolted to the bolster or slide, and clamp directly on a flat clamping surface; and rod clamps (bottom), which mount in T-slots on the bolster or slide and U-slot cutouts on the clamping surface.

- Roto-Escam clamps hide beneath the press bed or inside the slide. The clamping rods rotate 90 deg. and retract below the bolster and slide plate, completely escaping the die area and allowing for clear access when loading and unloading a die. They can clamp in a T-slot or in a special machined hole.
- Swing clamps release the die by tilting 30 deg. to one side, and must have U-slot cutouts in the clamping surface.
- Traveling clamps use a driven chain mechanism or an air cylinder to automatically travel down a T-slot to reach the clamping surface.

A final suggestion: For any QDC hardware you purchase now, try to visualize how it might affect the future use of your basic pressroom equipment. For instance, consider any plans to add peripheral equipment such as transfer systems, feed lines and conveyors when deciding what type of QDC hardware to buy and how and where to install it.  

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