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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



A good first step to quickening the pace of die changes: create an efficient press-room layout, and store dies close and convenient to the press area, with easy access to the dies by the transport vehicle. Photo courtesy of Green Valley Mfg.

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.

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All job changeovers entail similar activities:

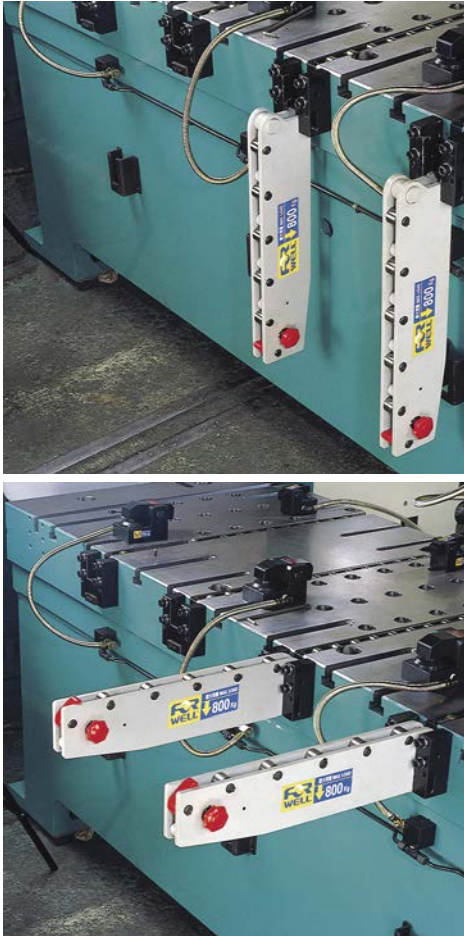
- Clear the press area.
- Unclamp, remove and store the die.
- Retrieve the new die, and locate it and clamp it in the press.
- Set up the workplace (coil line, bins, conveyors, etc.)
- Achieve first part approval.

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:

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



Bolster extensions such as the pivoting type shown here allow dies to be rolled on and off of the press bed for easy retrieval by die-transport vehicles.

Develop a list of specific improvement goals—The above times may seem extreme, and hopefully your change-overs occur more quickly than 81 min., but most stampers have room for improvement.

Assign responsibility—Make someone, such as the press operator, setup person or foreman, responsible for implementing each improvement idea.

Train the other personnel—During the planning phase, ensure that the core process-improvement team receives input from others involved in change-overs, to engage them in the process. After planning, document and post the proper procedures and conduct training sessions for all involved.

Track the improvements—Keep written, posted records of before and after results.

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 uncluttered, 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 clamp pieces and store them with the dies or on the press.

- 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

Stroke 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: _____

Dimension 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

Quick Die Change



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. MF