HILMA application information

CUSTOMIZING QUICK DIE CHANGE SOLUTIONS

Introduction

The concept of quick die change is simple: minimize the time from the last good hit on one die to the first good hit on the next one. How quick the die change process is executed is what can be difficult, for there is no one answer to a particular problem. Each manufacturing situation is unique and requires, in effect, a customized solution that deals with *all* the factors at hand.

Reaching the right die change solution requires analysis of the current die process for a stamping procedure, goals for improving the process, implementing a plan for achieving those goals and follow-up evaluation. Surround yourself with expertise to make it all happen.

Team Up

A variety of equipment and process choices must be made to develop an effective die change system. These choices are best made by the QUICK DIE CHANGE team. The team should involve management, manufacturing and tooling engineers, production and maintenance supervisors, setup people, press operators, even accountants.

The most appropriate method to be used for each press is determined by carefully examining all production requirements and related data. Look closely at the press room layout and which presses are involved. How many dies are used in each press? What are their size ranges and weights? Examine the present clamping method and clamping points.

Review your present method of changeover. Analyze every step and sequence required to make a die change. How much time is required for each step? Who is involved in the die changing process? What tools and materials are required? The objective is to minimize the steps required and not to duplicate work.

Start your improvements with things that are simple and low-cost. Have new dies prepared and staged in advance near presses. Limit raw material handling,

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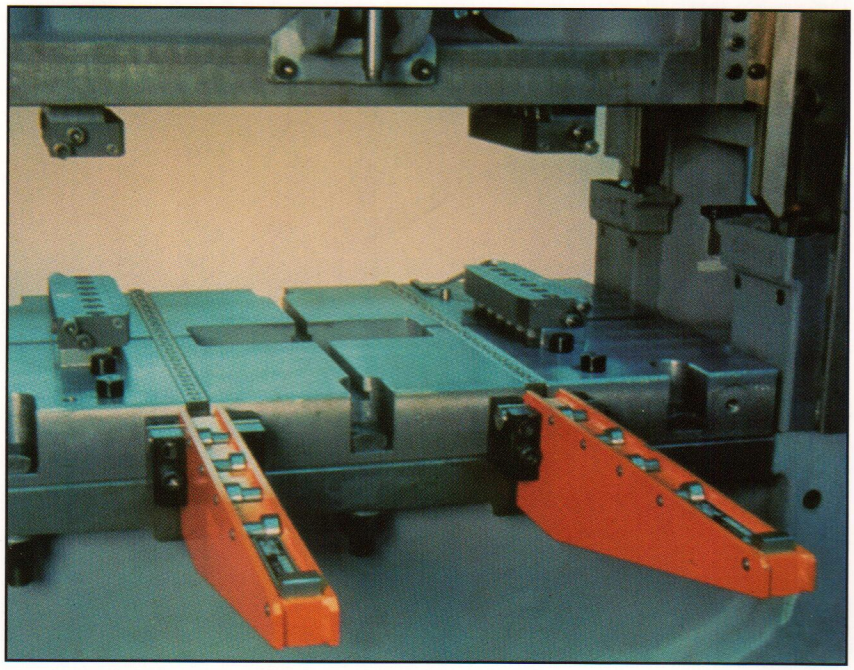

Die supports can be removed after die change. Side rollers guide the die on the bolster. Hydraulic die lifters allow for easy die change on the bolster. Once in place, ledge clamps with pilot-operated check valves securely hold the die in place.

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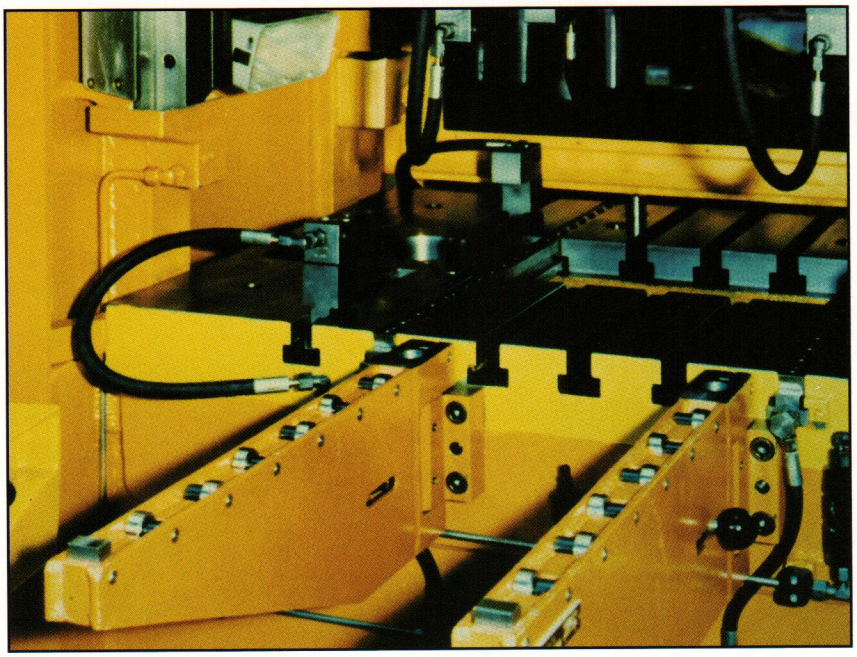
Lit. no. H008 11/02

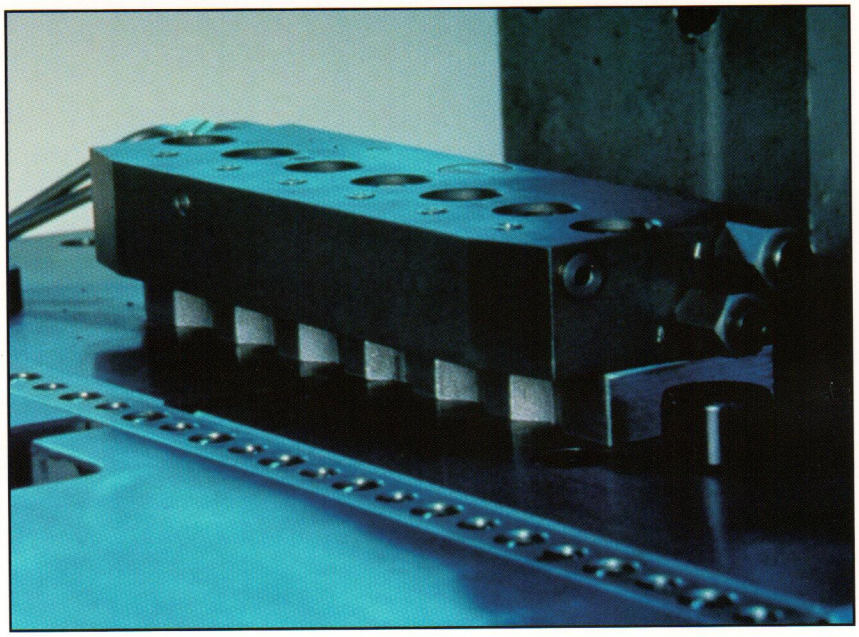


Sliding T-Slot clamps with die supports and hydraulic die lifters.

but always have clamps and dies prepared before shutting down for a die change.

Standardize

When it's time to consider equipment changes, it soon becomes clear that most older dies were not designed for standardization. One very useful method of standardization is the use of subplates.



Ledge clamp, used externally with hydraulic die lifters for die movement.

Common subplates reduce die change time by providing for a common height and location for clamping, a standard size for locating the die and the ability to pre-stage dies while the press is running other parts. Since the bottoms of the subplates are smooth and free of holes, the die is ready for movement on lifters.

Choice of die movement is another consideration. After the die has been transferred to the bolster via die carts or to die supports by means of a crane or a forklift, the die can be rolled in. Die movement on the bolster can be accomplished on balls or rollers that are supported either with springs or with hydraulic pressure. Once the die is in position and located, it can be manually or automatically clamped in place.

Clamping Options

Although conventional clamp straps and bolts are simple, inexpensive and adaptable, they repeatedly take time to set up and can't deliver consistently high clamping force. For faster, more reliable action, powered die change components become a significant element to consider for optimized die change systems.

External Clamping

External clamps are adaptable and easy to retrofit since they clamp along the edges of the die. Compact external T-slot clamps, with clamping forces from 4,000 to 24,000 pounds, are suitable for large or small presses. Because these sliding clamps can be manually located or automatically positioned with a chain or electric drive, T-slot clamps accommodate various die sizes and save the cost of standardized subplates.

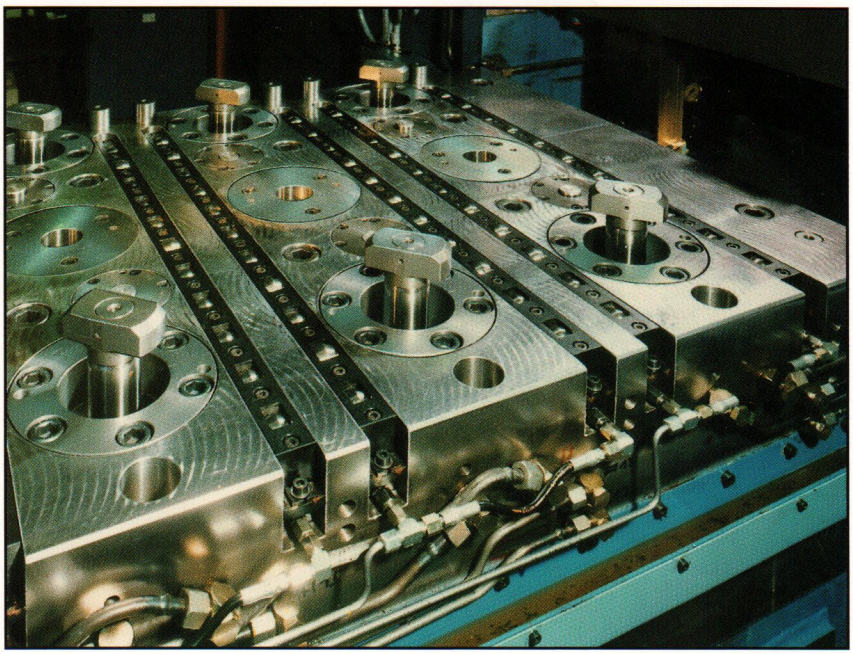
Fixed mounted clamps are bolted directly to the bolster or slide. Clamping on standard subplates means no clamp movement, which reduces die change time. Mechanically locking wedge clamps clamp on parallel or 20-degree tapered surfaces. When unclamped, their heads retract fully into their housings for unobstructed die change. They are used on all types of stamping and hot forging, injec-

tion molding, and die-casting machines. Wedge clamps offer very high clamping forces.

Internal Clamping

Internal clamps, which are integrated into the bed or slide, are located closer to the forces which can cause die deflection. They are often used in high speed applications, deep draw dies, progressive dies and lamination dies. Although internal clamping can be costly and more difficult to install than external systems, the benefits can often be justified.

Swing clamps locate and hold the upper tool on press slides. They can be recessed in pockets machined in the press slide or, when used with an extended shaft, can be mounted above the slide ledge. Proximity switches monitor their clamp and unclamp positions. Typical clamping forces range from about 14,000 to 38,000 pounds.



Six swing clamps are used for internal clamping. During die change the die is guided with side rollers and supported with hydraulic ball lifters.

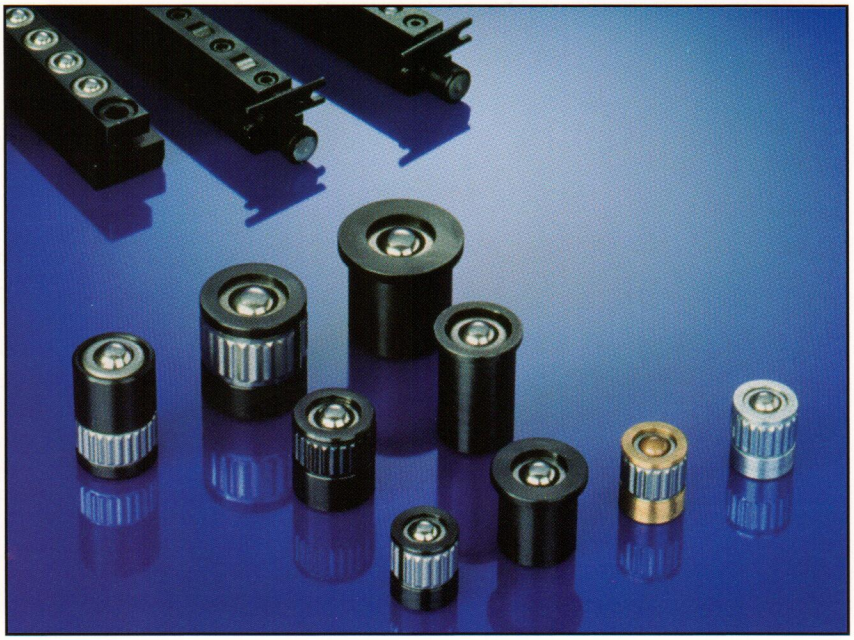
Swing sink clamps operate on the press bed or slide. The clamps provide unobstructed die movement since the clamping head pulls below the surface during die change. Proximity switches also monitor this type of clamp. These clamps can be provided with a mechanical locking mechanism. Typical clamping forces for swing sink clamps range up to 50,000 pounds.

Internal pull clamps have a simple inward pulling motion which can deliver up to 38,000 pounds clamping force. They can pull on a slot cut in the subplate or on T-clamping bars attached to the die or subplates.

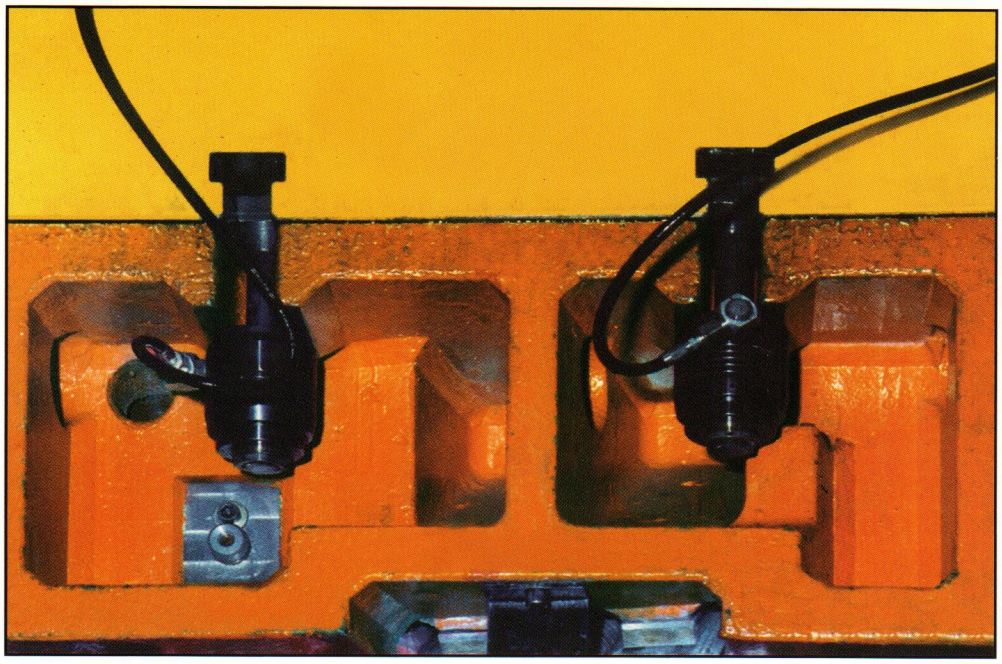
Safety Circuits

After the clamping method and required clamping forces for an application are determined, safety circuits and integration into press controls must also be reviewed. Separate pilot-operated check valves for each clamp provide a very high safety level. Check valves providing a dual diagonal hydraulic safety circuit also ensure safe clamping for either the bed or slide.

Depending on the level of automation desired, different electrical controls to press and clamp controls may be required. The type of signal is determined by the pressure switch, clamp position, tool position, slide position, continuous/run, setup and press enable.



Spring loaded or hydraulic lifters, available in ball or roller type, can be installed in the bolster for easy die movement.



Hollow-piston clamps used in the press' existing T-slots can be positioned manually and installed in holders during die change.

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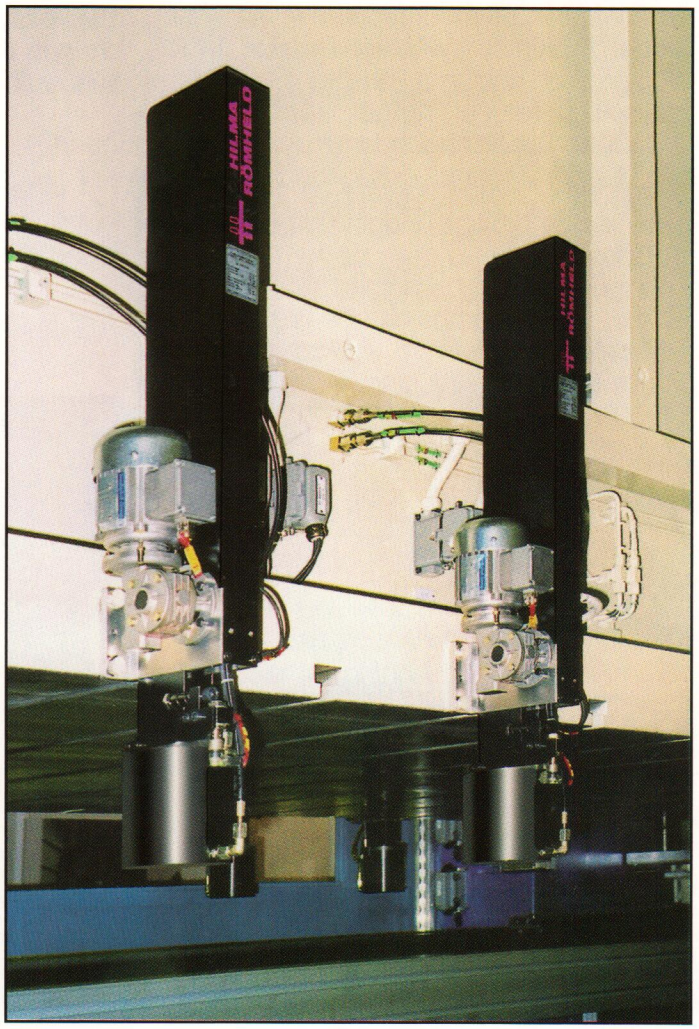
Evaluation

Once a suitable die change system has been installed, it must be evaluated by the die change team. Are the new principles for die change and movement providing the desired results? Is the clamp system safe, effective and reliable? Can the new die change time be improved more?

Based on labor savings, increased press utilization, lowered inventories, reduced scrap and increased safety, project the cost savings for a one year period. If your "payback" is as expected, it's time to repeat the process and move onto the next press or presses.

Remember, the world is shrinking. Manufacturers now not only have to compete with the plants across town but also those across the ocean. Through the implementation of an efficient, quick die change system, however, they can remain competitive and even gain in the worldwide market.



Auto positioning clamps advance the clamp to the die with an electrical motor and chain drive mechanism.

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