

# 5 PITFALLS TO AVOID WHEN IMPLEMENTING SMED

*Getting that die changed out in the quickest manner requires education and organization*



By Drew Locher

One of the most formidable impediments to efficient production flow in many stamping environments is changeovers or setups. Besides the obvious waste of time and capacity, operators generate other “wastes,” such as part defects, rework, and scrap, during changeovers. This usually occurs during the trial-and-error process of ensuring everything is in position to form the part correctly when production commences.

To avoid multiple setups, stampers sometimes lean toward larger lot, batch, or run sizes, which in turn creates more inventory and reduces the company’s flexibility. Meanwhile, the trend in recent years has been for customers to ask for smaller, more

**Figure 1**

Keeping very large dies close to the press can reduce changeover times. The die storage racks at this appliance manufacturing facility are close to the door stamping line. The racks stand four bays tall and five bays wide. Eighteen bays are used for die storage, and two other bays are used for die staging and holding recently removed dies. Photo courtesy of Wayne Trail Technologies.

frequent deliveries from suppliers. This has put more pressure on metal forming companies to reconsider past “big-batch” practices.

Shigeo Shingo, an industrial engineer who worked with Toyota, recognized this problem more than 30 years ago and developed his single-minute exchange of dies (SMED) concepts. Shingo wanted to reduce the changeover time involved in switching out the large dies in the transfer presses. The original process called for stopping production, using overhead cranes to move the

very heavy dies, putting the dies into the press relying on eyesight to determine placement, and then using crowbars to adjust the dies during the trial phase. The entire process took more than 12 hours.

After observing the process more closely, Shingo and his engineers introduced the use of precision instruments to eliminate the incorrect placement of dies; created a more intelligent schedule for die changeouts, which helped to minimize setups; scheduled overhead crane use so no one had to wait to use the

material handling tool; and moved necessary tools near the stamping press. As a result, the Toyota team was able to reduce the changeover time to less than 10 minutes per die. (“Single minute” refers to the goal of reducing setup time to a single-digit number of minutes—anything less than 10 minutes.)

Today the term SMED has a broader meaning. The concepts can be applied to many changeover processes, even those that do not involve a die. However, many companies have yet to put them into practice or have been unable to sustain them over time.

The key concepts are really straightforward. First, *externalize* all activities related to a changeover process. In other words, complete changeover activities that can be performed while the equipment is running. For example, the die is positioned nearby in a staging area (see **Figure 1**) or in an overhead crane ready for placement, and instructions for the next job have been prepared and reviewed. The same items for the current job can be put away after the next job is up and running.

Streamlining both external and internal activities is another key

concept. *Internal* activities are those activities that must be performed when the equipment is stopped. The means to streamline will depend on the nature of the process. Often it involves modest changes—such as the introduction of hydraulic clamps to lock the die into place quickly—which make the process easier. In other cases, it involves standardizing on best practices for the setup process itself—the step-by-step approach to be followed.

To make SMED concepts work, stampers—and manufacturers in general—need to avoid five common pitfalls:

1. Fail to organize
2. Fail to establish standard work
3. Fail to maintain equipment
4. Fail to make the right equipment investments
5. Fail to determine the value of equipment time

## 1 FAIL TO ORGANIZE

Experience has shown that as much as 50 percent of the opportunity to reduce changeover time involves getting better organized. As previously mentioned, activities that can be externalized must be identified. Once this has been done, an impor-

tant question must be answered: Who will perform the external activities? Will it be the press operator? Will it be somebody else, such as a dedicated setup person? Will it be a combination of individuals? The answer will depend on the nature of the process and the external activities that must be performed.

For example, with highly automated presses and long cycle times, the press operator may be able to perform all of these activities. For more traditional presses, others must perform these duties. Unfortunately, such additional help not associated with equipment operation often is considered indirect or non-value-added, which usually means that management is reluctant to assign someone to such a role. However, companies must consider the *value* that such individuals provide, which typically far exceeds their cost.

Proper organization also involves effectively arranging areas around equipment as well as storage areas for tooling and materials to improve accessibility. Point-of-use storage concepts—storing tooling at the equipment—are applied whenever possible. At the very least, staging areas for dies and other materials to be used for the next job must be identified nearby (see **Figure 2**). In this case, a person should be able to locate a die within 30 seconds.

Safety is also an important consideration here. Eliminating heavy lifting and unsafe movements, such as climbing ladders, always should be a goal.

## 2 FAIL TO ESTABLISH STANDARD WORK

Interestingly, few companies have effectively defined standard work for their changeover processes. And if they have, they do not always insist that all personnel follow it. The result is a highly variable process that



**Figure 2**

When storage racks can't be located near a stamping press, die carts that can accommodate the previously used die and the new die are useful and eliminate multiple trips to a storage rack. Some die carts, such as this one, also can elevate to align the deck with the press bed. Photo courtesy of Green Valley Manufacturing Inc.

depends greatly on the person performing it. For some reason, company management is reluctant to direct people on how to set up, leaving it up to each individual to figure it out for him- or herself.

Accuracy in this context refers to meeting the quality expectations for

the stamping job that is being set up to run. One person might be able to complete the trial processing and adjustment step quickly—perhaps even in one iteration. Another person might take multiple iterations—and more time—for the very same setup.

Stampers must define standard

work processes, including the best known sequence of steps and the expected time for each. In the case of die changeovers, the standard work should be developed as a team activity—engaging everybody involved with the setup—to identify best practices and ultimately get agreement on them. The result is often a small playbook of procedures for different types of setups. These are referred to before each changeover as a reminder of how it should be done.

The need for standard work is particularly important when multiple people are involved in the process. Clear roles and responsibilities must be identified to minimize the changeover time. Such coordination has been referred to as the *pit crew ballet*—achieving the same precision as a pit crew in the midst of a heart-pounding race.

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### **3 FAIL TO MAINTAIN EQUIPMENT**

A strong correlation exists between the time required to change over a piece of equipment and the condition of that equipment. Make no mistake, it will be more difficult to set up a stamping press that has not been maintained properly over time. The ability to achieve the accuracy required will diminish. More experienced and skilled employees will be required to perform the changeover process.

Too many companies inadequately

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maintain their equipment and tooling. Much like setup personnel, maintenance technicians are viewed as overhead and have been reduced in cost-cutting efforts. In other companies, maintenance personnel are not given accessibility to the equipment to perform preventive maintenance because of the desire to keep the equipment running. Whatever the case, the practice becomes "run to failure," which can seriously affect equipment condition and lead to longer changeover times.

#### **4 FAIL TO MAKE THE RIGHT EQUIPMENT INVESTMENTS**

Some companies attempt to achieve the objective of more flexibility by making significant investments in new equipment or technology to add capacity. Now, such investment may well be worth pursuing, but it may not be necessary. Much can be gained by working with existing equipment.

As previously mentioned, up to 50 percent of real improvement associated with a SMED program involves getting better organized. Frankly, if stampers currently are not managing the changeover process properly, what makes them think that they will do any better with new equipment?

Also, this is not a shop floor issue. Lack of effective organization and standard work are management issues.

When it comes to new equipment or software, bigger and faster are not always better. Too often the technology purchased requires different skill sets than those available in the organization. Insufficient training is provided, and the full benefits of the new investment go unrealized.

In other situations, the changeover process becomes more complicated. This is particularly the case with highly automated forming operations in which multiple processes have been combined into one line.


Not all equipment manufacturers have learned about SMED, nor have they incorporated the concepts into their machinery designs.

#### **5 FAIL TO DETERMINE THE VALUE OF EQUIPMENT TIME**

A common reason that stampers do not always make the proper decisions with regard to the first four points lies in how they look at equipment time. When asked what the value of the equipment time is, the usual response is the hourly wage for the operator. On rare occasions the employees' benefits are added. However, this is looking at the *cost* of running the equipment, not the *value*. The value that the equipment can generate far exceeds the costs.

When the true value is recognized, stampers realize that the investment required to avoid the first four pitfalls is really quite reasonable and provides substantial and timely returns. Stampers need to ask themselves this question and then look at the time lost to changeovers. They might view it in a different light then, and find greater motivation to do the right things when it comes to changeover.

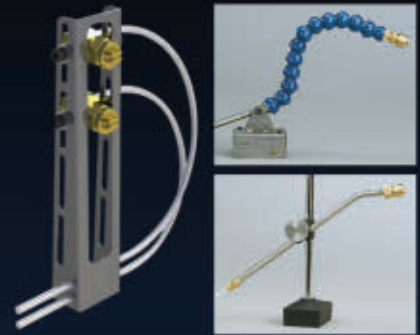
Achieving and sustaining SMED concepts is as much about attitude as it is about the concepts themselves. Over time a stamping company must maintain a persistent focus on changeover and continually emphasize its importance.

By the way, the biggest pitfall to implementing a successful SMED effort is worth a mention: Failure to act. Not doing it means it will never get done. 

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