



# The ABC's of Diemaking & Diecutting

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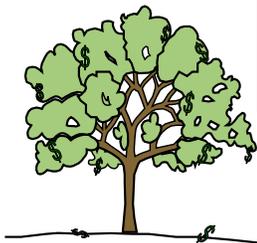
## The ABC's of...

One of my favorite quotes about training is from Thomas Mann; "Order and simplification are the first steps toward the mastery of a subject... the actual enemy is the unknown."

In training, problem solving, and coaching we generally focus on specific issues, as we are always racing against the clock. When I attempt to explain the *What, Who, When, Where & Why* of a breakdown in quality or productivity, I am told to show them how to fix the problem, and they promise to learn the "why" later. Of course "later" never comes, and it is remarkable, how a repetition of an "almost" identical problem, is impossible to resolve, because there is no consolidation of principles.

With this new DieInfo publication my goal is to provide the building blocks of knowledge, and to extrapolate the information in the form of Basic, Intermediate, and Advanced articles, webcasts, and publications. The publication will contain summaries for complex subjects, and the full article will be accessible on the DieInfo Web Site.

Currently my other favorite training quote is a Chinese Proverb: "If you are planning for one year, grow rice. If you are planning for a decade, plant trees. If you are planning for a lifetime, educate people."



I hope you find the latest DieInfo Publication to be helpful in surviving the business of converting! If you have any comments, suggestions, or questions, you can contact me at the email address listed below, or call me directly.

I would recommend visiting the *DieInfo Web Site* at [www.dieinfo.com](http://www.dieinfo.com), and review all of the innovative services we provide.

## How to Optimize Productive Output in Platen Diecutting?

The reason we find ourselves struggling to increase speed, to lower cost and to improve consistency, is because we have ignored the most important element of manufacturing control. *Time!* Our practice is to concentrate on hours and not minutes, and certainly not seconds. How many times have you heard someone say, "It will only take a few minutes to find the tools?" Everything we do is measured in *Activity Time and Elapsed Time*, and seconds do count. It is because we do not really value and measure, and conserve time, that we have fallen behind the productivity curve. In practice, we hold technology and equipment in higher regard than we do people, and while we concentrate on machine efficiency we generally ignore work area efficiency and people efficiency.

In developing a strategy for productively integrating teamwork and teambuilding into a more effective diecutting system of manufacturing, there are eight options to consider. These are:

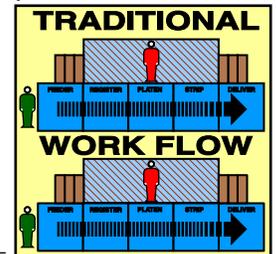
- ⇒ Level One: Implement Press Customization
- ⇒ Level Two: Add One Changeover Specialist
- ⇒ Level Three: Add Two Changeover Specialists
- ⇒ Level Four: Implement the Advanced Workflow Layout
- ⇒ Level Five: Implement the Just-In-Time Workflow Layout
- ⇒ Level Six: Implement the Modular Workflow Layout
- ⇒ Level Seven: Implement the Integrated Workflow Layout
- ⇒ Level Eight: Implement the Comprehensive Workflow Layout



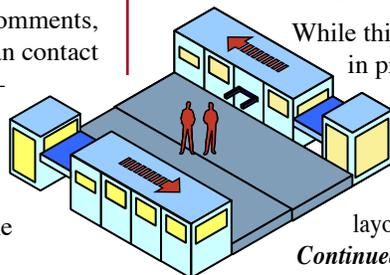
Is this Step Adding Value or is it simply Adding Cost?

## An "Effective" Diecutting Operating System

The full 10 page article covering these eight advanced operating disciplines in detail is stored on the DieInfo web site as, *DIE.01.06*. The disadvantages with the current operating structure can be summed up in a single word. *Isolation!* This seemingly logical layout of equipment and technology, and the missing interaction between key players in the converting operation, severely undermines teamwork and teambuilding. In practice, the standard layout of diecutting presses does not bring people together, but it drives them apart. See above.

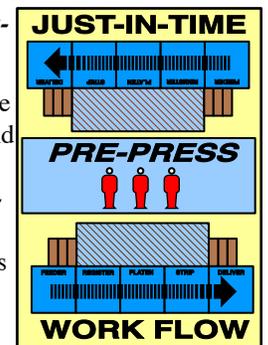


The equipment certainly looks impressive as each press is aligned and oriented in the same direction. But this is not a showroom, a monument or a museum. It is a system of manufacturing which is completely reliant upon the team of people who bring it to life. The traditional layout is a clumsy attempt to conform the work team to the technology, rather than the more practical and productive option of conforming the technology to the work team. The solution is to change the layout of the equipment from the *Traditional Workflow*, to the far more effective *Level Four: Advanced Workflow Layout*. See left.



While this may seem a radical change, the increase in productivity and quality, and teamwork and cooperation, is extraordinary. The next logical step is to adopt *Level Five: Just-In-Time Workflow Layout*, which incorporates *Pre-Press*. See right. As in the previous layout this results in productive acceleration!

Continued on Page 2, Column 2.



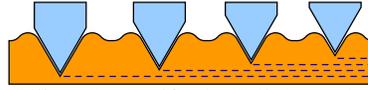


# The ABC's of Diemaking & Diecutting

"There is no substitute for knowledge, nothing else matters, it is the most important ingredient." Dr. W. Edwards Deming

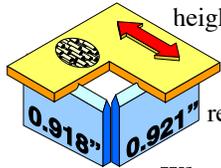
## How to Optimize Scoring Performance?

To take full advantage of the use of scoring techniques in converting, it would be useful to start with basic principles, which lead to practical applications.

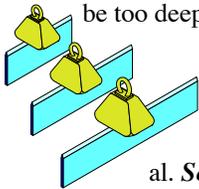


Different Depths of Scoring Knife Penetration

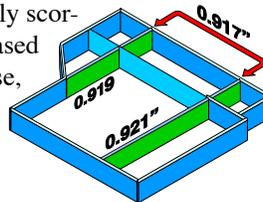
The most important factor to address is the degree of penetration into a substrate. Although the "standard" set-up specifies 50% penetration, this is only a guideline, and a crude one at that. It is obvious the degree of penetration can be increased and the degree of penetration can be reduced, simply by modifying the height of the scoring knife used. *See above.* Obviously, greater knife edge penetration will generate a score which requires less force to fold, and lower knife edge penetration will generate a score which requires more force to fold.



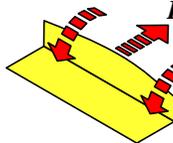
**Where would this be useful?** The most obvious example is when scoring parallel to, and at right angles to the paperboard grain. It requires more pressure to cut across the fibers, than parallel to them or between them, therefore, the scoring rule at right angles to the paperboard grain must be higher than the scoring knife parallel to the paperboard grain. *See above.* If we fail to make this adjustment, the score depth at right angles to the grain would be too shallow, and the score depth parallel to the grain would be too deep. *See right.*



We know the degree of pressure in diecutting, or more accurately the measurement of resistance in penetrating each material is a function of the length of the knife penetrating that material. *See left.* How would we use this information? If we were using scoring knife in a simple shape, and to make it easier, we are only scoring in one grain direction, then as the scoring knife length increased in the design, the height of the score knife would have to increase, to counter the increased resistance to penetration. *See right.*

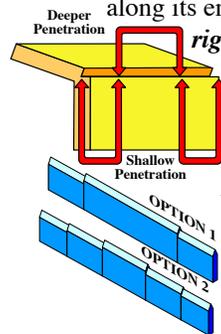


### How else could we use this information?



It is a common phenomena that when creasing or scoring long narrow panels, the panels have a tendency to bow outward in the center of the fold, where the resistance to folding is greatest. *See left.* Clearly we need greater resistance at the ends of the panel, and we need less resistance at the center of the fold. If we are using scoring, we would simply increase the height of the scoring knife in the middle portion of the fold, to increase score penetration depth, and to lower the resistance to folding. *See right.*

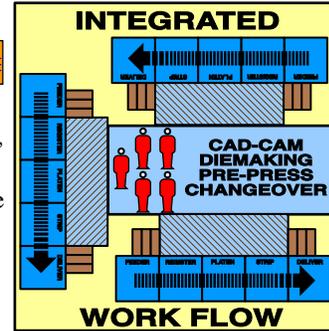
This will cause the narrow flap to fold squarely and evenly along its entire length, without bowing. *See below right.*



One final point on the subject of pressure, resistance and penetration. There is one addition tool which can be used to control the depth of score on press, and that is the ejection material. In the standard pressure formula, every square inch of rubber generates 25 pounds of resistance for every square inch of ejection material added to the steel

Continued from Page 1...

You can see where this is going when you examine *Level Seven: Implement the Integrated Workflow Layout.* See below.



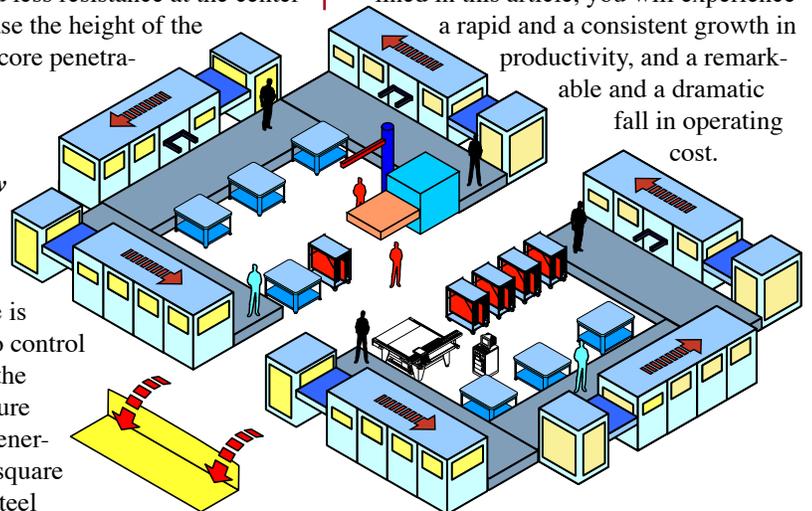
Level Seven is a progression from Level Five and Level Six, however, the primary benefit of the

integration of the diemaking team is the improvement of the tooling as a result of the knowledge gained by participating in press changeover, and in pre-press activities.

The final step in this progression is to create a layout similar to Level Seven, however, the major innovation in this system of working, is the introduction of a CAD-CAM Work Station, and the introduction of a CAD CAM Technician to the work team.

This system of working closes the knowledge loop in diecutting, as the CAD-CAM technician and the diemakers are directly involved in the system of manufacturing they design and fabricate tools for. The rapid education of every member of this team leads to almost daily innovation in structural design, in layout, in toolmaking, in press-changeover, in press production, and in converting quality.

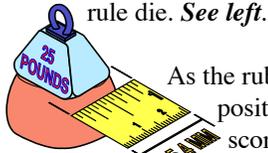
It is my experience that by committing to the diecutting organizational changes outlined in this article, you will experience a rapid and a consistent growth in productivity, and a remarkable and a dramatic fall in operating cost.





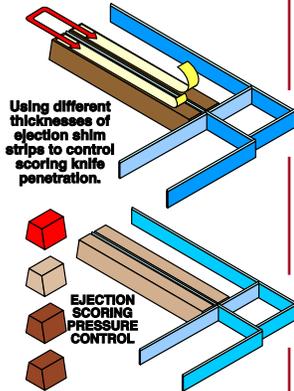
# The ABC's of Diemaking & Diecutting

"Knowledge is of two kinds; we know a subject ourselves, or we know where we can find information about it." Samuel Johnson



rule die. See left. As the rubber is usually positioned next to the scoring knife; by simply changing the height of the rubber; adding shims to the top of or under the ejection strips, by increasing or decreasing the durometer of the rubber; or the proportion of the rubber; next to all or individual or portions of a scoring blade, enables us to regulate the degree of penetration on press. See right.

Naturally, it is important to consider the implications to the overall pressure balance of the steel rule die, and the potential impact on surrounding components of adding ejection material, which has a potential to create other problems when solving the scoring issue. However, when used with care this is an effective adjustment option.



The full text of this article can be found at the DieInfo Web Site, with the identification number DIE.03.06.

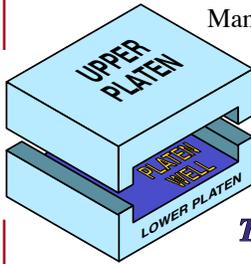
**"Are You Tired of Fighting Changeover Fires?"**

DieInfo releases a New Publication... **"The ABC's of Fast Press Changeover"**

"This technical training program represents the cornerstone for an effective organization strategy, as it provides a detailed guide to 25 key disciplines or building blocks, which ensure a foundation for fast press changeover success. It is an essential reference tool for every professional diecutting operation." for details visit ... [www.dieinfo.com](http://www.dieinfo.com)

## Platen Well Maintenance

"Never trust to general impressions, my boy, but concentrate yourself upon details." Sherlock Holmes



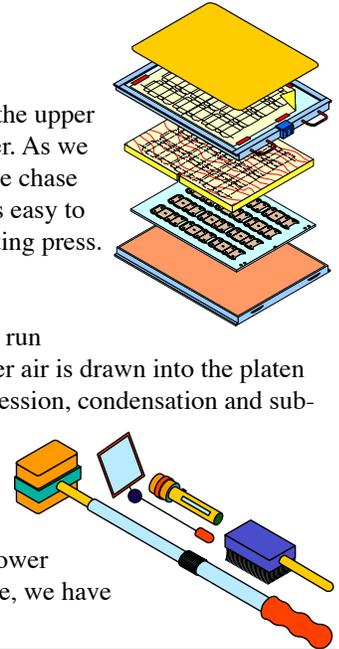
Manufacturing success is all in the details, and if you overlook a key detail, the entire process will be compromised. In platen diecutting an easy detail to overlook is the condition of the platen well, see left, and the condition of the platen stack, see below, with all of the tools, which play an important role in every impression.

### The Platen Well

The platen well itself refers to the insides of the upper platen and tool holder, and the lower platen and tool holder. As we rarely remove the lower sliding platen and only remove the chase and die, when changing over from one job to the next, it is easy to ignore this crucial, but vitally important part of the diecutting press.

#### What could become a problem?

The Platen Well is a heat sink, which builds up heat as the run progresses. As every time the press opens and closes cooler air is drawn into the platen well and then pumped out, when the press closes on impression, condensation and subsequent rust are a persistent problem. Given that grippers and chains fly through the platen every impression, there is a problem with an oil and grease build up on all of the internal surfaces, and particularly on the underside of the lower sliding platen. When dust and loose fiber, ink and power residue, tape and waste materials, are added to this mixture, we have the potential for a severe problem.



As there are no specialized tools made for this task, it is necessary to assemble your own. See right. These should include a lightweight telescopic rod, which has a fitting at the end to accept a fiber and a wire brush, a scraper (a soft metal such as brass or copper), a sponge, a flashlight and an adjustable mirror to help with seeing the underside of the upper platen. There is a tendency to use compressed air to clean the platen well, and this is OK as long as the air line has an effective filter system to remove excess moisture.

It is also important to examine the Four Sacrificial Surfaces of Diecutting. See top of middle column, page 4. These include the lower sliding platen, the cutting plate, the chase back plate, and the patch-up cover sheet. Continued on Page 4, Column 2

### Checking Laser Cut Kerf

**NOTE** the position of the tester center line in relationship to the original insertion centerline point.

This demonstrates where the tester is pivoting; at the top, at the bottom, or in the middle of the kerf! This enables a precise relationship to the standard width specified.

When the tester pivots at this center point it means the bottom of the kerf is wider than the width of the top of the kerf.

When the tester pivots at the lower center point it means the bottom of the kerf is narrower than the width at the top of the kerf.

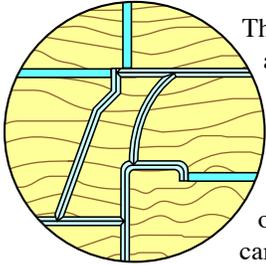
When the tester pivots at the middle center point it means the middle of the kerf is narrower than the width at the top of the kerf.





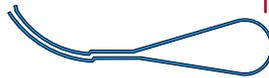
## Curved Rule Grinding

One of the challenges of diemaking is the need to grind an undercut miter joint into one end of a short curved knife. *See below.*

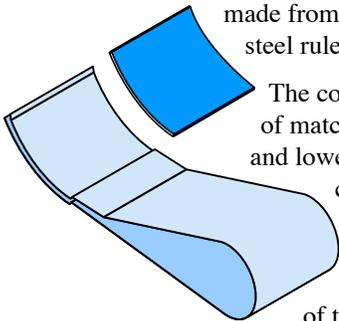


This requires using a bench grindstone and holding the rule in the tips of the thumb and forefinger of each hand, to carefully grind the undercut. However, this is

both difficult, the knife often gets hot, and the fingers get very close to the face of the grindstone. To provide greater safety, greater grinding precision, and greater speed, a simple Jig is



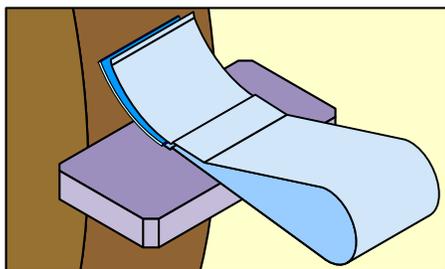
made from off-cuts of steel rule. *See above.*



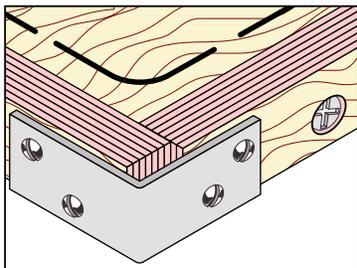
The combination of matched upper and lower curved clamps, are pressed together by the shape of the curved

end of the rule clamp. *See above.*

The Curved Rule Jig is simple to fabricate, but it is remarkably effective in use.

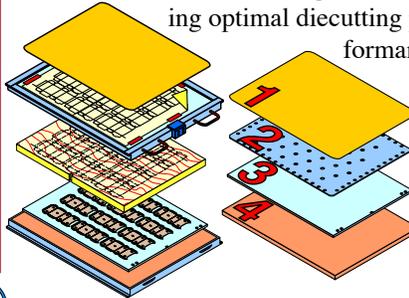


Several should be made with different radius rule clamps to accommodate different curved rule shapes and sizes.



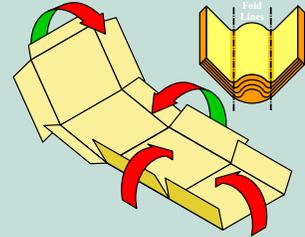
## Summary

It is important to schedule platen well maintenance on a weekly basis, as this will prevent the build up of damaging accumulations of dirt and debris. Effective manufacturing is about a consistent and a vigilant attention to detail, and platen well condition is a critical detail in achieving and sustaining optimal diecutting performance.



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## "The ABC's of Creasing & Folding"

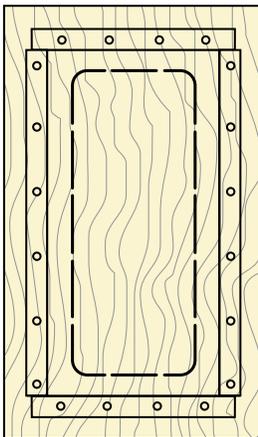


"How to design Reduced Bead Creasing; how to integrate curved creases; how to eliminate folding problems; and how to exceed customer expectations"

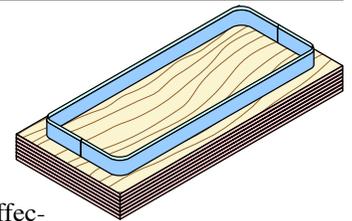
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## Rotating Dieboard Stiffener

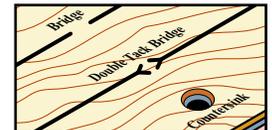
Many of the steel rule dies used in the Converting Industry are not locked into a chase or fastened into a press, but are used free standing on presses where the die is



positioned to the material being diecut. *See right.* This is very effective, however, because these dies take somewhat of a beating they are liable to many accelerated failures. These include a warped dieboard, fractured bridges, loose rules and rules being plucked from the die, and rapid damage to the cutting edges. To strengthen these tools many companies adopt the **Rotating Dieboard Stiffener Technique.**

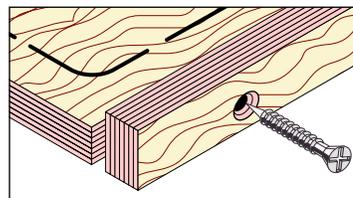


When the dieboard is lasercut or routed, the profile of the dieboard has rails cut out, *see left*, which are designed to be rotated through 90 degrees and screwed into the side of the dieboard. The bridges in the design, the tack bridges, and the holes for the screws all align with each



other. *See above right.*

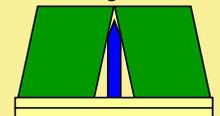
When these rails are rotated through 90 degrees they are screwed into the side of the dieboard, and each screw is perfectly aligned with each



bridge. *See right.* When the rails are screwed into position on all four sides of the dieboard, and some people also add the precaution of gluing in addition to screwing, the dieboard is far stiffer, and highly resistant to the type of damage previously described. To further strengthen the dieboard, and to convert the rails into a rigid frame, many add metal corner brackets, *see left*, for a powerful finishing touch.

This technique is simple to execute, it is fast and straightforward, and as a value added feature, it is highly effective.

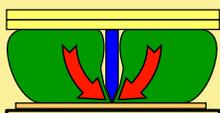
## This Ejection



Shape



Eliminates



FLAKING

