The
ABC's of Diemaking & Diecutting

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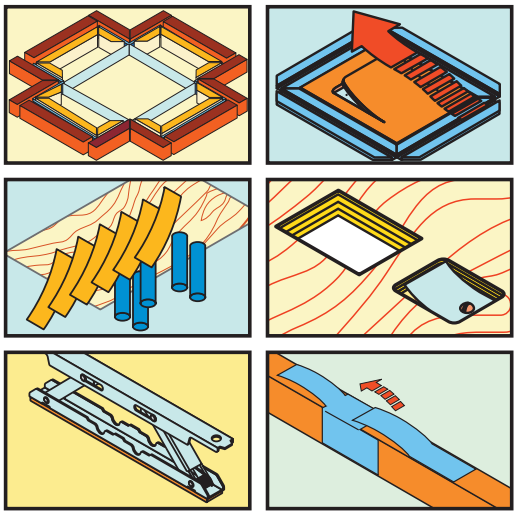
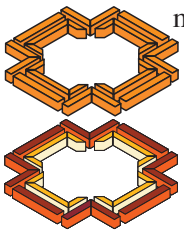
The Purpose of Ejection in Platen Diecutting?

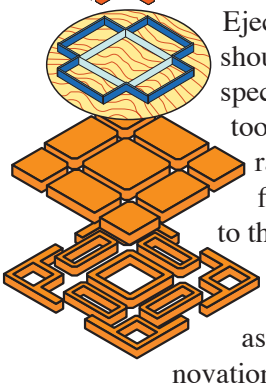
"It is in changing that things find purpose." *Heraclitus*



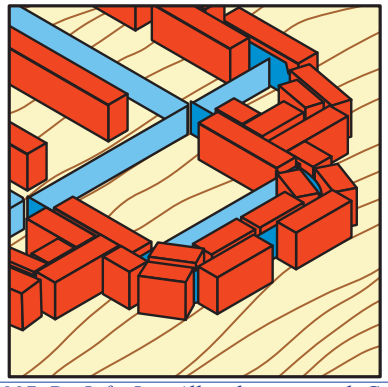
To routinely generate fast press make-ready, to consistently maximize speed and yield, to repeatedly produce exceptional quality diecut parts, we need to apply every skill, every piece of knowledge, and every degree of experience gained from every converting cycle. One of the most undervalued disciplines in Platen Diecutting is the use of Ejection Materials, Tools, & Techniques. To generate great performance in platen diecutting it is essential to use ejection on every tool, from the steel rule die to the counter/matrix; to the male and female stripping tool, and to the male and female blanking tool. It is a serious mistake to regard ejection materials as simply a method of pushing the diecut sheet clear of the steel rule die after every impression.



Ejection Materials, Tools, & Techniques should play a key role in the analysis, specification, and the design of every tool. In practice, planning for ejection is rare, and the application of ejectors to finished tooling is usually delegated to the least experienced person in the operation. Some would point to an investment in WaterJet Technology as proof of a commitment to ejection innovation. However, the waterjet cutter is simply a tool for cutting ejection to size and shape, and while it does a great job, if the design and the programming of the ejectors are not well thought out, and are not carefully matched to the needs of the diecutting job, the investment is largely ineffectual.



To maximize productive performance in platen diecutting it is essential to take advantage of the myriad ways ejection can be used to productively impact speed and quality in diecutting. In practice, the ignorance of the power of ejection often leads to the materials and techniques being improperly applied, with the net result they undermine performance!



Ejection Materials, Tools, & Techniques should not be an after thought, but they should be integrated into the machining and fabrication of every converting tool, and play an important role in the methods and practices used to prepare the tools for diecutting success.

The Eight Key Disciplines of Ejection

Ejection Materials, Tools, & Techniques can and should play an important role in the speed, the performance, and the productivity of platen diecutting, however, it is important to have a clear understanding of the what these tools can do, and how to integrate ejection tools into every aspect of the converting process.

Ejection can mean the difference between success and failure. There are eight ejection disciplines to consider in diecutting tool analysis, specification and design. These are:

- ***: Secure Clamping***
- ***: Control Lateral Force***
- ***: Resilient Ejection***
- ***: Pressure Balancing***
- ***: Sheet & Part Management***
- ***: Air Management***
- ***: Diecut Part Deflection***
- ***: Safety***

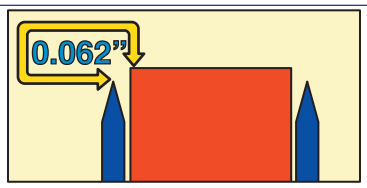
The key principles of each discipline include:

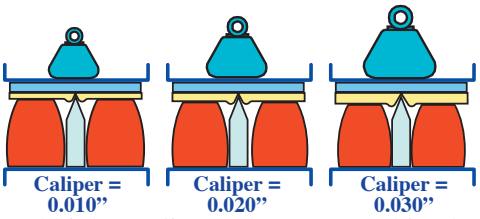
Secure Clamping

In any form of precision machining the work to be converted is clamped securely to prevent premature movement, which would undermine cutting performance. Therefore, the first goal of ejection is to stabilize the material immediately prior to the

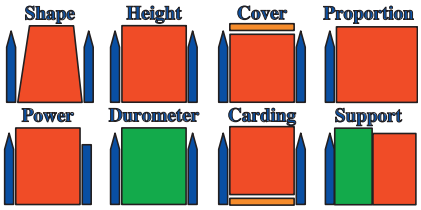
Contact Kevin @ **1-909-337-6589 - 1-909-273-0958 cell**

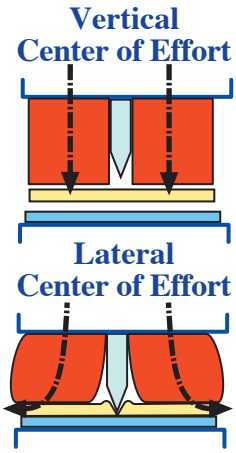
cutting action. This may seem simple, but it is surprising how often this is done incorrectly. The first decision is the height the rubber protrudes above the cutting edge of the knife, prior to compression. ***See above***. Although this is often defined as a ***"standard"*** why would either the height or the durometer be changed to reflect different degrees of compression? ***See left***. If you ignore this problem, the increased resistance of the knife bevel angle penetrating a higher and higher caliper substrate, combined with the increased compression-resistance of the ejection material as the caliper is increased, adds to the press leveling difficulty!



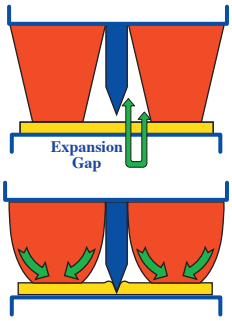


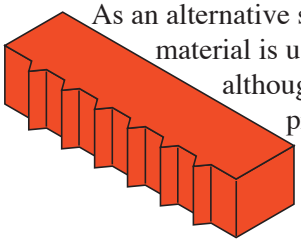
Although we will cover this subject more extensively in the Pressure Balancing section of this article, it is an appropriate time to define the various methods to control the degree of compression-resistance of an ejection material. ***See above***.



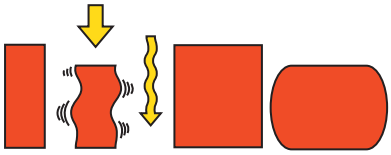


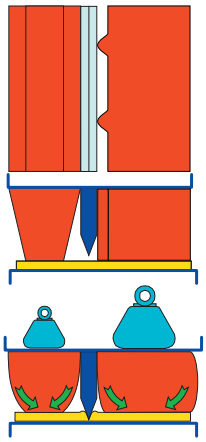
Once the most effective method of determining the compression-resistance of the ejection material has been selected, it is important to consider the compression alignment of the effort. For example, when ejection material is positioned against the knife, the compression effort is deflected laterally, to both increase the resistance at this point and to add damaging lateral distortion. This is often resolved by using Trapezoidal shaped ejection material, which provides an expansion gap to prevent lateral distortion under compression. ***See right***.



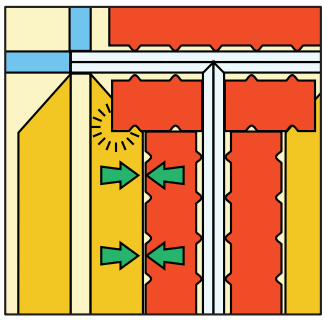


As an alternative specially shaped material is used, which although it has a square profile, an expansion gap is provided by using protrusions on one or both sides of the ejection strip. ***See left***. While this option provides an expansion gap, it requires using an excessively wide strip of rubber, to minimize compressive distortion. ***See right***.

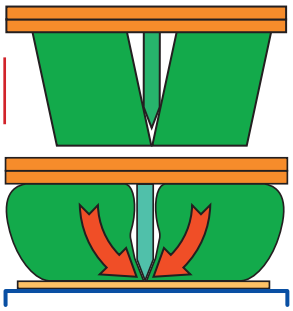




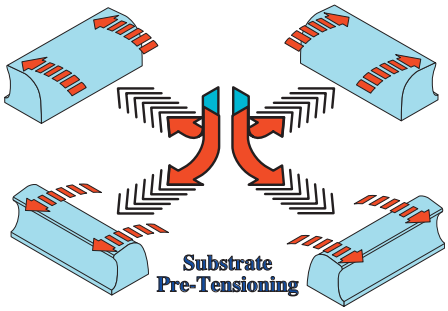
When compared to Trapezoidal ejection material, this strip adds a great deal more pressure, ***see left***, and when the panels are narrow it often causes an overlap with the matrix strips or counter tool. ***See below***, However, the narrow upper strike surface of the trapezoidal ejector eliminates this problem.



Although excess lateral movement of the ejection material under clamping force is generally considered a disadvantage, there are occasions when it is exactly the result needed. For example, by cutting the ejection material at an angle, it is possible to convert the compressive vertical force into a horizontal push toward the knife. In this example this effect is used to both clamp the substrate and to counter the displacement force of the knife, to eliminate flaking. ***See left***. A similar technique is used to provide identical clamping control using ***"Profile Rubber"*** with nicked cutting rules.



When cutting very thin material it is useful to position specially shaped profile rubber at the boundaries of the design or the layout. By making these ejectors slightly higher than the standard ejectors, the lateral movement under compression will tension and flatten the sheet, to eliminate wrinkles and creases caused by trapped air, ***see below***, prior to full standard ejection clamping. To get these shapes to make contact with the substrate first, simply requires adhering paperboard of sufficient thickness to the dieboard, under each tensioning rubber strip.



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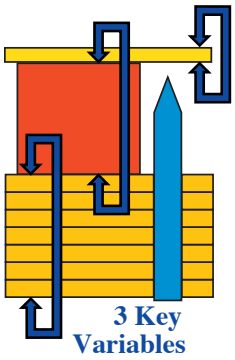
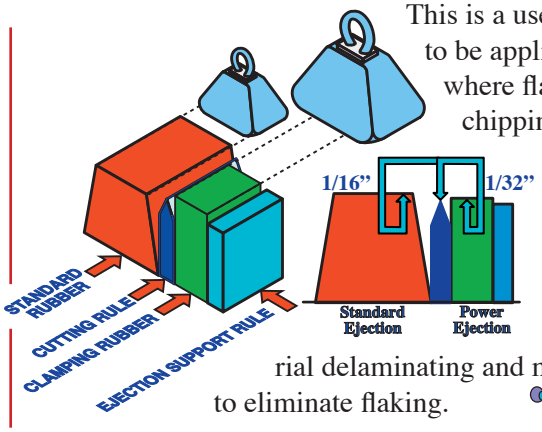
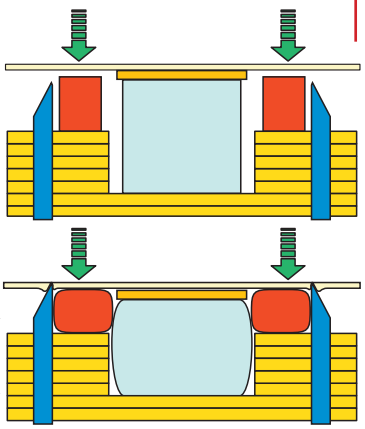


When attempting to determine the compressive resistance or clamping force of the ejection material, it is important to remember all three materials, the dieboard, the rubber, and the substrate being diecut, have tolerances, which can cause variation in their thickness. ***See left***. While in most cases it may not be a critical factor it is essential to consider these potential variables in any pressure calculation.

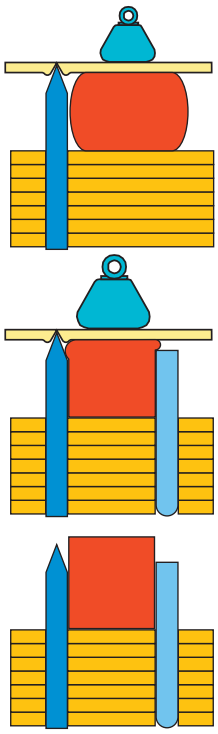


This is a useful technique to be applied to knives where flaking and edge chipping are likely. ***See left***. The additional compressive force applied by this method prevents the material delaminating and moving laterally to eliminate flaking.

If fast, positive ejection is required and there is clearance between the steel rule die surface and the cutting plate or anvil, and/or gripper bars, it is an advantage to employ ***Multi-Level Clamping***. This usually consists of a large routed recess in the surface layers of the dieboard; the use of a softer, more resilient ejection material or foam; and a flexible or rigid cover on the surface of the ejector. ***See above***.

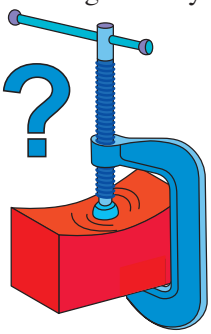


In practice this has much lower clamping force than the standard ejectors, however, the foam insert is far more resilient than the standard ejectors and the difference in height between the two materials, means the multi-level ejector will fire the diecut part clear of the die faster than the standard rubber. By using a balanced pattern of these ejectors the multi-height ejector and the standard ejectors work in concert to provide optimal clamping force, and resilient high speed ejection.



In some instances it is necessary to increase the clamping force around certain knives in the die to a compressive level which is higher than standard ejection. This is accomplished using ***"Power Ejection."*** When ejection materials are compressed they absorb the stress by expanding laterally. However, if that expansion is constrained by support rules on one side and a knife on the other, the compressive resistance of the constrained rubber is several times higher than the unrestrained ejection. ***See left***.

Ejection Summary



Ejection Materials, Tools, & Techniques should play a key role in the analysis, the specification, and the design of every tool. Unfortunately the diemaker and the diecutter consistently underestimate the productive power of ejection in platen diecutting. In practice ejection can make the difference between success and failure, with unfortunately the most common output being failure.

Because the potential of effective ejection is poorly understood, the discipline is badly organized; specification and design of ejection tools is crude; selection of materials is limited; and while machining is improving the positioning of ejectors on the die, stripping, and blanking tools, contribute minimally to productive improvement.

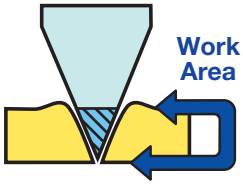
The problem is, ejection is not regarded as a critically important discipline in either diemaking or diecutting, which is why this activity is usually relegated to the least experienced person in the operation. In practice the specification and design of an effective ejection pattern requires as much knowledge and skill as it does to specify and design the steel rule die.

Ejection Materials, Tools, & Techniques are critically important in diecutting, in stripping, and in blanking, and naturally, they should represent the pinnacle of diemaking professionalism.

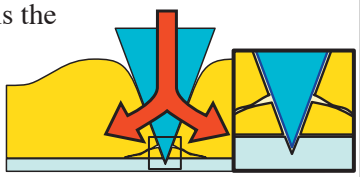
The balance of this article, focused on the ***Eight Key Disciplines of Ejection,*** will appear in successive editions of this publication.

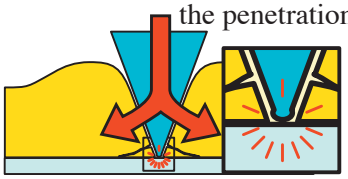
Question: Why is it Important to Check Steel Rule Seating in a Steel Rule Die?

"The last time I saw him he was walking down lover's lane holding his own hand." *Fred Allen*



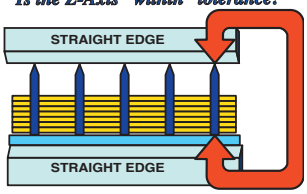
In diecutting the steel rule knife is the tool and the dieboard is the toolholder. And while we focus on the entire steel rule, it is only the tip of the knife which penetrates the substrate to split and separate the material that is the working area of the tool. ***See above***. If the knife over-penetrates the material using a thin plate, it will significantly increase the displacement action of the knife with the probability of causing flaking, ***see above***, and if the knife over-penetrates using a hard steel plate, the edge will suffer compressive damage, and the penetration of the increased wedge width will have the same impact by increasing displacement force to failure levels. ***See left***.

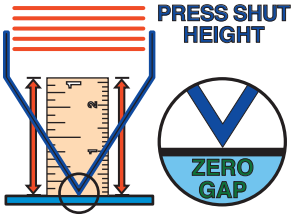




Therefore, the most important requirement of a steel rule die is to control the Z-Axis dimension of every rule in the steel rule die, ***see below***, and it is the requirement of the diecutter to set the Travel Distance of the press or the Platen Gap, so the cutting plate or anvil surface, barely kisses the tips of the knife cutting edges. ***See below.***

Is the Z-Axis "within" tolerance?

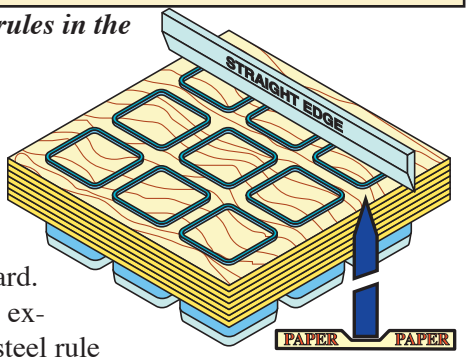




The Diemaking Process

This degree of precision requires making the dieboard to match the height tolerance of the cutting knife, which is ***plus or minus 0.001."*** So when someone asks how much warp is acceptable in a steel rule die, the answer is ***plus or minus 0.001!"*** Why make a dieboard, which detracts from the potential accuracy built into every knife?

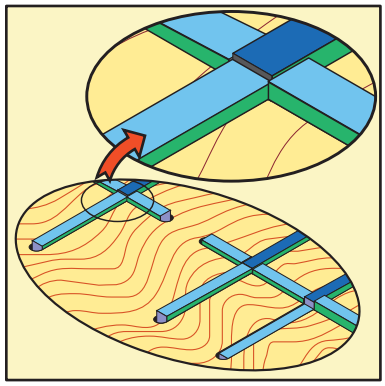
The greatest challenge to making a precision steel rule die is in 1, not using a Calibrated Ruling Table; 2, not bolting the dieboard to the surface of the table; 3, not using protrusion paper so the rules slightly protrude through the back of the dieboard, see next page top right; and 4, in not inspecting the back of the dieboard to check the level seating of all of the rules in the dieboard. See below.



Summary

It is easy to underestimate the importance of rule seating in the dieboard. However, when you examine any finished steel rule die, and even steel rule dies which have completed several production runs, you will be able to detect many steel rules which are too high, some rules which are below the surface of the rear of the dieboard, and some rules which are skewed from one end of the rule to the other. ***See below***.

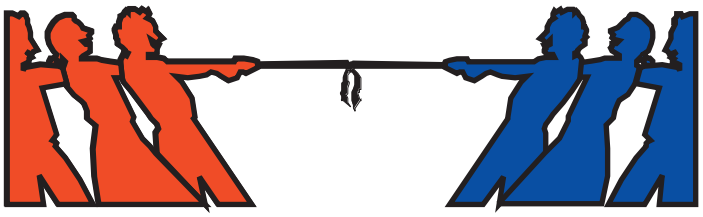
It is very easy to dismiss this degree of precision as unnecessary, but when you examine the role of the steel rule die, the customer has every right to expect a level and a calibrated dieboard. Why do you think steel rule dies are regarded as commodities in the marketplace? ***Because no matter who makes the die, it is a struggle to set and sustain a kiss-cut impression on-press!***



Editorial: Why is Alignment Critical to Success?

"Just as your car runs more smoothly and requires less energy to go faster and farther when the wheels are in perfect alignment, you perform better when your thoughts, your feelings, your emotions, your goals, and your values are in balance with the direction and the mission you and your colleagues are working toward."
Brian Tracy

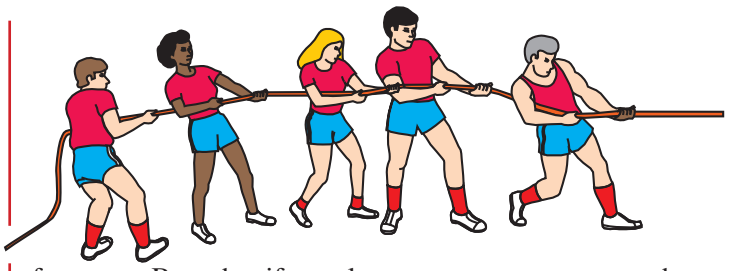
Every organization uses mission and goal statements, and clear project objectives to focus a work team on a specific outcome. These descriptive tools are designed to ensure every team member has a clear picture of the outcome, the time frame, and how success will be measured. While a clearly stated goal is essential to any endeavour, it does not however guarantee every team member fully understands their role and responsibilities and how to coordinate and align their actions with those of their colleagues, for maximum benefit and gain.



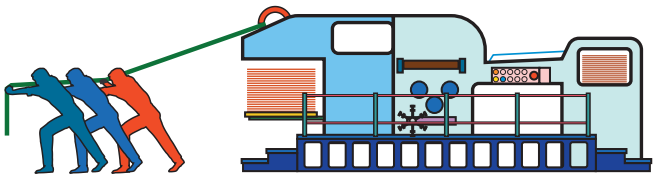
The best example of alignment is a Tug-of-War Team. When the rope is tensioned by the pull of the other team it is difficult to step out of line or pull at a tangent to the opposing force, and everyone's effort, large and small is concentrated in a single direction. This is perfect alignment of the entire team with the outcome, but is this type of singular focus as clear to the work teams in your operation?

Driven by pressure, by enthusiasm, and often by unrealistic goals, there is a tendency to assume everyone understands the goal, ***(surely it is obvious to everyone)***, with the result there is insufficient time or preparation expended in discussing, brainstorming and clarifying the goal, to ensure everyone has a detailed, a comprehensive and a consistent understanding of what to do, when to do it and how to do it. Like the tug-of-war, the most effective method of achieving the outcome required in the time desired is to combine everyone's efforts into a single direction.

For example, in the tug-of-war team, if everyone pulls in the same direction, at the same time, you have the best chance



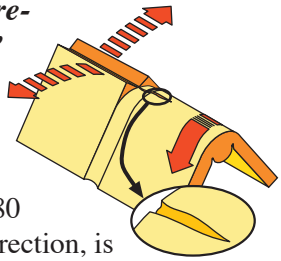
of success. But what if people start too soon, or not at the same time, and what if some team members arrive late? In this example, the goal, the outcome and the impact of a combined effort are obvious to everyone involved. But what happens when there are several projects, with multiple milestones, with sometimes conflicting objectives, which must be integrated with daily production activity?



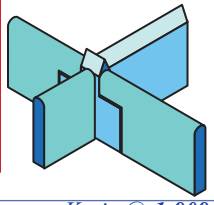
If every team member has even a slightly different interpretation of the goals of the project, the plan of action, the schedule of events, the timeline, and the measurement of success, they may expend maximum effort but it is unlikely the results will be coordinated and precisely directed. When creating a project team to accomplish a task, it is vital to spend sufficient time in planning, in discussion, and in clarification of the plan of action, to ensure everyone has a detailed and complete understanding of their role and how their activity is to be coordinated with each and everyone of their colleagues. How are you currently planning, organizing, and executing projects? And how can you be sure everyone involved is perfectly aligned with the outcome?

Problem Solving: Crease End Splitting?

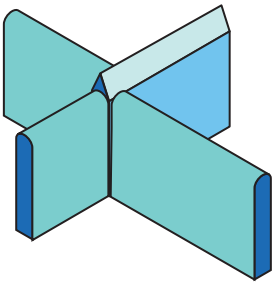
"I hear and I forget. I see and I remember. I do and I understand."
Confucius

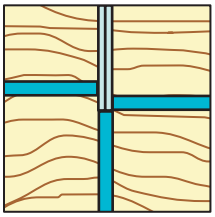


One of the common problems of creasing and folding paperboard, particularly when the fold angle is 180 degrees at 90 degrees to the grain direction, is an intersecting knife will cause the spine at the end of the crease to split apart. ***See above***. The solution to this problem is to insert a cut/knife at the intersection between the end of the crease and the end of the knife. ***See left***. This simple technique is effective at eliminating the splitting as it isolates the displace-



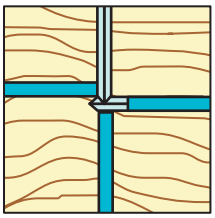
ment action of the knife bevel faces, from the stretching action of the crease spine. However, when there is an offset between the intersecting creases, ***see right and below left***,

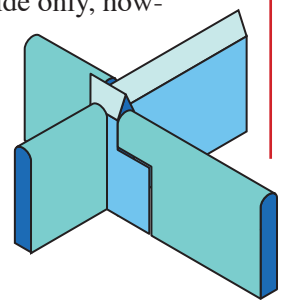




a slight variation on the T-Knife is employed.

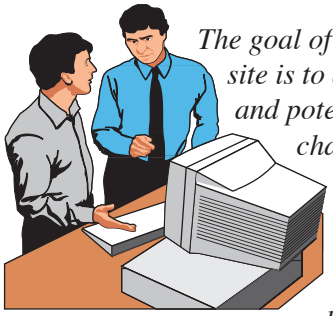
To compensate for the inability to run the knife through as before, the T-Knife is inserted from one side only, however, the end of the knife is mitered so it projects into the other side of the central crease. This is a simple alteration to the design and it provides exceptional performance so the crease can fold without splitting or crazing of the end of the crease spine.





The DieInfo Web Content Service

Communication, Education & Sales Tools for increasing On-Line Commercial Activity.



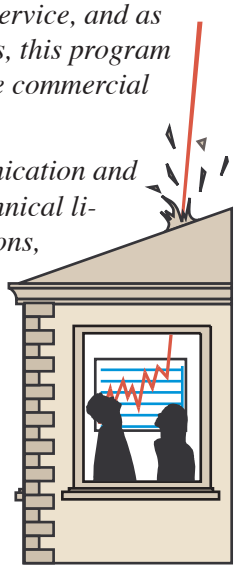
The goal of an effective commercial web site is to attract and retain customers and potential customers, with constantly changing, high-value content, to stimulate, to develop, and to consolidate on-line commerce. The primary weakness of most web sites is a lack of up-to-date content, however, ***imagine a web site with...***

... constantly upgraded communication tools, education resources, and solutions to critical problems; an extensive library of application articles about products and services, and how to most effectively use them in the converting/diemaking process; a forum for answering technical questions, for providing technical support, and for solving problems and issues; a series of how-to articles, tips and suggestions, and innovative methods and practices; a learning, training and coaching resource reflecting specified needs and requirements; and a series of success stories and testimonials...

... imagine a steady flow of press releases; innovative product and service data sheets; adverts, advertorials and sales tools; special promotions and direct email distribution; product usage guides and recommended practices; a distributed monthly publication; ordering, inventory management, and specification/selection guides; and the constant training and development of the customer service team...

Marketing is a combination of Communication & Education.

This customizable program, delivering superb technical content is the ultimate in value-added service, and as it is essential to reduce the cost-of-sales, this program is a powerful vehicle for driving on-line commercial activity.

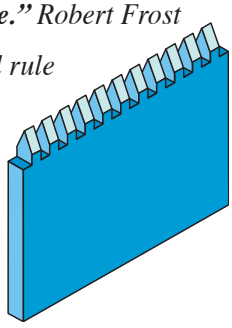


The provision of an interactive communication and education resource in the form of a technical library, training tools, application solutions, work specification, sales and marketing tools, and a question and answer forum is the ultimate customer benefit. This resource will attract, it will retain, it will consolidate and it will expand on-line commerce. ***For more information call Kevin at 1-909-337-6589.***

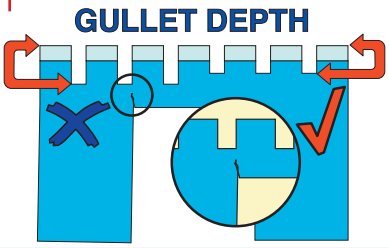
"Enthusiasm can only be aroused by two things: first, by an ideal which takes the imagination by storm, and second, by a definite, intelligible plan for carrying the ideal into practice."

Depress Bridges to Protect Perforating

"Education is the ability to listen to almost anything without losing your temper or your self-confidence." *Robert Frost*



One of the most common features of a steel rule is the use of various forms of perforating rule. ***See below****. It is usual to try to avoid bridging this type of knife as the distance between the top corner of a bridge and the lower corner of reach gullet make a fragile point which will often fail during diecutting.* ***See below****.*

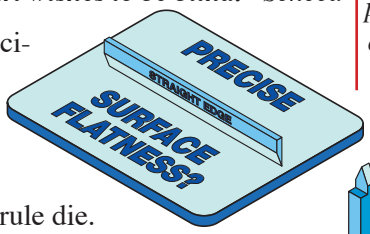


Naturally, this point of weakness will become far more fragile as the thickness of the plywood increases.

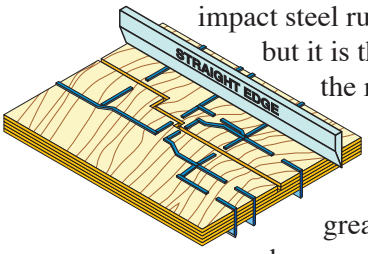
The most effective method

Press Make-Ready: The Importance of a Calibrated Ruling Table?

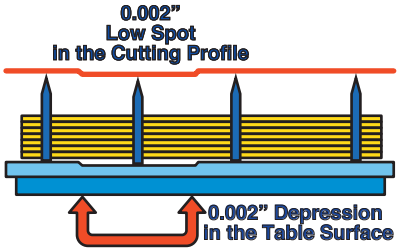
"Eyes will not see when the heart wishes to be blind." *Seneca*



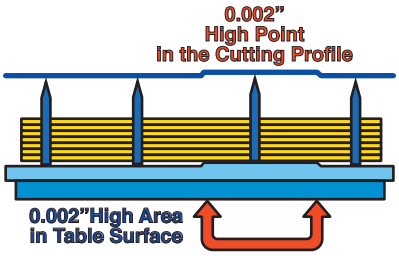
One of the most important principles in converting is the practical reality that press make-ready is primarily completed in the specification, the design, and the fabrication of the steel rule die. Certainly the actions and the activities of the press team impact steel rule die on-press performance, but it is the selection of parameters, the machining of components, and their fabrication and assembly into the cutting finished tool, which has the greatest impact on fast press changeover.



One of the most important components in this process, and a component whose impact is consistently unseen and under-estimated is the flatness of the steel rule die ruling surface. ***See at the top of the column***. When you consider the importance of precise and consistent ***Z-Axis Seating*** of every blade in the steel rule die, ***see above***, any variation will generate on-press knife edge damage and extend the make-ready time.



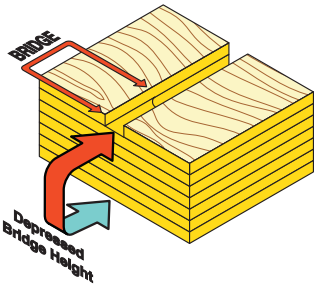
For example, if the ruling table has a depression in the surface, the insertion of the knives will mirror this profile, and the diecutter will struggle with a low pressure zone in the on-press cutting make-ready. ***See above***. Similarly, if there is a high area in the ruling table surface, the seating of the knives will mirror this profile, and the diecutter will struggle with a high-pressure zone in the on-press cutting make-ready. ***See above***.



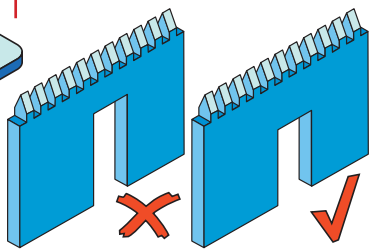
Summary

It is vital to the diemaker and to the diecutter that they are assured that the die was assembled and finished on a calibrated, precisely ground table, and the diemaker is prepared

Depress Bridge Article ...continued...



of eliminating this problem is to program the laser to automatically depress each bridge in the dieboard where the perforation knife will be used. ***See above***.



This then results in the ability to use a much lower bridge in the perforation rule, which considerably strengthens a potential weak point in the knife. ***See above.***

Diecutting Resource Exposition & Conference: Fall Tour 2007

"You don't drown by falling in the water; you drown by staying there."

On page eight there is a registration form for the ***DREC Fall Tour***, which will be in ***Kansas City, October 30th., Denver, November 2nd., and in Salt Lake City, on November the 5th.*** Clint Medlock and I will be the Workshop and Clinic Leaders, and we will be delighted to meet you, to answer your questions, and to discuss the future of the Converting Industry. I hope you are able to attend.

Fall 2007 Tour

The D–R–E–C Line

To News & Information From
Diecutting Resource Exposition & Conference

visit drec on-line at www.drec.org

Upcoming Shows

Tuesday
October 30th
Hilton Kansas City Airport 8801 NW 112th St
Kansas City, MO 64153
Hotel Phone
1-816-891-8900

Friday
November 2nd
Holiday Inn Denver International Airport
15500 East 40th Ave.
Denver. CO 80239
Hotel Phone
1-303-375-1808

Monday
November 5th
Radisson Downtown Salt Lake City
215 West South Temple
Salt Lake City, UT 84101
Hotel Phone
1-801-531-7500

The Conference...

DREC (The Diecutting Resource Exposition and Conference), which has been received with tremendous success in cities throughout America, will be holding a one day technical education and training conference in ***Kansas City, M0; in Denver, CO; in Salt Lake City, UT.***

The program is sponsored and supported by a group of innovative suppliers, who are committed to education, productive improvement, and diemaking and diecutting success.

The Technical Programs

The heart of the conference are the seminars presented by Clint Medlock of Stafford Cutting Dies and Kevin Carey of DieInfo. Both presenters are experts in their fields and will be available during the entire program for one-on-one discussions, and for problem solving and trouble shooting.

There will be two technical presentations each day. The morning seminar will consist of presentations focused on Rotary & Platen Diecutting, while the afternoon session will focus on Rotary & Platen Diemaking. Each presentation will be followed by a Technical Clinic, where attendees can ask more detailed questions.

Technical Support from the Sponsors.

The sponsors have great technical knowledge and experience also, and they will be ready to answer questions, solve problems, and provide technical assistance to every attendee.

Remember to bring samples and examples of converting problems or diecut parts, as the assembled team of experts is there to provide innovative technical guidance.

Visit us on-line www.drec.org or call 1-877-227-7528

A Key Resource

This education initiative, when combined with the ability to discover what is new in diemaking and diecutting tools, materials and technology, is a unique productive opportunity. By combining the leading suppliers to our industry, and integrating their knowledge, their experience, and their innovation, with the technical education provided by our speakers, the Diecutting Resource Exposition and Conference provides an intense, education, training, and value added experience.

Don't miss out on this great opportunity. We all look forward to meeting with you.

visit drec on-line at www.drec.org

The Schedule

08:00 Trade Show Opens

10:00 Technical Seminar

12:00 Complimentary Lunch

01:30 Technical Seminar

03:30 $100.00 Prize Drawing!

DREC is FREE to all Diemaking and Diecutting Companies!

The Benefits...

- ***Attend Technical Seminars on Platen & Rotary Diemaking & Diecutting***
- ***Discover the latest products and services available in the industry.***
- ***Participate in a Problem Solving & Trouble Shooting Clinic***
- ***Visit with the Leading Supplier/Innovators in the Industry***
- ***Improve your Diemaking & Diecutting Knowledge and Ability***
- ***Learn New Techniques to make your job Simpler & Easier.***

• Adams Technologies • Advanced Die Supplies • Anderson International • Bar-Plate Manufacturing • CCM Die Supplies / Channel Creasing Matrix • CIMEX • Conway Machine • Diansuply • Diversified Graphic Machinery • IADD • Iberica • Marco Die Supplies • Monroe Rubber & Plastic • The Rayner Company • Shreiner Creasing Matrix • Wagner Die Supply • Zimmer Industries

visit drec on-line at www.drec.org