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Evolving "Into" Diecutting

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Evolving "into" diecutting

The two most commonly used diecutting methods employed today are "onto" (cutting onto a variably hard, flat or rotary surface) or "into" (cutting into a soft, or semi-soft, flat or rotary surface). In general, each method has its own common advantages and disadvantages.

Regarding "onto" cutting

Common advantages:

a. Ease of achieving and maintaining excellent dimensional accuracy.

b. Versatility of materials that can be cut.

c. Lower per inch die cost.

d. More equipment availability worldwide and a larger diversity of sizes and types of equipment.

e. More experienced operators available worldwide.

Common disadvantages:

a. Requires more cutting pressure, potentially causing limitations of the cutting surface or press tonnage available. This of course may reduce the number of "blanks" that can be cut with each impression. It also may limit the ability to cut certain types and or thicknesses of materials.

b. Can cause "crushing" of certain materials.

c. May produce product edges that might promote the possibility of paper cuts.

d. Often runs at lower press speeds.

e. Usually requires longer, more complex make-readies.

f. Often requires higher skill level of the press operator.

Regarding "into" diecutting

Common advantages:

a. In rotary, "into" diecutting, presses often run at higher speeds.

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- **b.** Normally requires less cutting pressure. This may allow more usable cutting areas and thus more blanks per impression and may also reduce edge crush.

- **c.** Can cut a wider variety of materials, especially materials not compatible to “onto” cutting, such as very heavy, thick corrugated, including honeycomb corrugated, even tough materials like Masonite and Homasote, a wide variety of thick foam and many materials that may be prone to “crushing” when diecut.

- **d.** Leaves a product edge that is less probable to create paper cuts.

- **e.** Usually requires shorter, less complex make-readies.

Common disadvantages:

- **a.** Difficulty in achieving and maintaining accuracy of diecut.

- **b.** Higher initial die cost.

- **c.** Less equipment available.

- **d.** Fewer operators available.

New “into” developments

Taking absolutely nothing away from the need, the excellence and the many ideal applications for “onto” diecutting methods, this article will focus on and discuss some new and exciting opportunities that are available due to the evolution of some unique “into” diecutting methods.

Several of the real and potential improvements of “into” diecutting have been made possible or enhanced by the recent development of new anvil or blanket materials. We can only specifically discuss the anvil company we have been working with for some time, the Dicar Company of Pine Brook, New Jersey. You may choose to contact whomever you currently purchase anvil or blanket materials from, to see if they have been doing any similar development work regarding advancements of “into” diecutting.

Press tonnage

In the September, 2005 issue of this magazine, the front-page article was entitled, “Calculating Diecutting Tonnage.” This article discusses various ways to estimate the tonnage a press can generate, citing many influential variables, such as the material type and thickness, the much tonnage will it take to cut the particular product in question?” and “will the press we want to use, generate enough tonnage to effectively do the cutting?” Since a press can only convert to the maximum tonnage that it can provide, if there were an easy way to significantly increase the potential press cutting tonnage, it would be possible that the yield of the press could also be significantly increased. This intriguing possibility was one of our major goals when we first began to test various super sharp serrated rules.

Super sharp serrated rule

One of the first sets of tests we ran regarding the potential improving of “into” diecutting concerned the use of a specialty, edge-hardened serrated rule such as QC100. Usually provided in 12 or 16 TPI, this rule is made in such a way as to provide both tooth points and gullets (valleys between the teeth) that are extremely sharp.

By employing a small hydraulic press with a built-in load cell monitor that measures cutting pressures, tests were able to determine that QC100 can often cut many types of materials with greatly reduced pressure, when compared to the use of conventional cutting rules, either serrated or non-serrated. We also determined that the use of a standard type anvil or blanket quickly caused damage to the super fine tooth points of this rule. We then employed a technique that allowed the blade to pass into slots or into “air,” after the teeth passed through the material. This solved the tooth damage issue, but posed a potential problem for the diemaker who would have to create this “female” slot to cut into. At this point, Dicar presented us with several new anvils that they had developed that accepted the super sharp teeth for cutting various densities of materials without damaging them. This potentially solved the problem of tooth protection and eliminated the need for a separate, time consuming creation of a “female” or slot to cut into.

On several of the materials we tested, including various types of foam, we found that the cutting pressure was so greatly reduced, that with the use of such super sharp serrated rules, we could estimate that the usable tonnage of a press could potentially be multiplied by 2 to 4 times or even more. For example, if a press were conventionally rated at 50 tons, the use of this rule could potentially increase the usable press tonnage to anywhere from 100 to 200 tons. Needless to say, this could potentially improve the performance and output of the press dramatically. Let’s assume that a particular 50 ton rated press normally allowed the running of a particular diecut part 8 up, while only being able to use up to 50% percent of the press’s cutting surface. The use of this rule in such an example, could potentially increase the press cutting surface usability by 100% (or even more) and therefore increase the output to 16 up, or more, per impression.

We found that the use of the new Dicar anvils, with differing durometers, maximized QC 100’s performance. We also found that there were direct correlations between the type of materials being cut and the hardness of the anvil that should be used for best results. In general, the harder the material being cut, the softer the anvil we could use.

Another major advantage of this type of cutting rule proved to be the reduction of product edge crush, especially on materials dangerously prone to crushing, such as honeycomb corrugated or various foams. For example, many foams, and honeycombs that normally required compression before they would begin to cut (often causing unacceptable "hourglass" or non-straight cuts on the diecut products) now began to cut virtually on contact with this rule and the straightness of the cuts was excellent.

We also found that the edges left by such rules are less likely to produce paper cuts, when handled by the consumer and that make-readies were faster and less complicated, because we were actually cutting well "past" the actual bottom of the stock being converted.

We also theorize that cutting "into," with these new products, may require a lesser skill level for the press operator.

These specialty rules can be used either flat or rotary (though most experience has been with flat applications) and were found to be effective on a very wide variety of materials, even such hard to cut material as plastic film.

We are currently speaking with several press manufacturers in attempts to develop the most advantageous ways of employing this unique product. The most obvious advantage they see is the potential to increase the usable press tonnage and the resultant increased output of the press, simply by changing the cutting rule employed. We are also testing a finer version of this type rule and creating ways that this rule could also act as a perforating blade, by controlling the teeth penetration depth.

Ultra shallow profile serrated rule

Another example of potentially improving "into" diecutting concerns the use of an extremely low profile (very shallow gullet or valley depth) serrated rule, such as Excalibur. This is a serrated rule that has a gullet depth of approximately .005" (.13 mm). In rotary or flat diecutting, this allows a finished cut in little more than .005" of actual penetration. As we know, dimensional accuracy is historically one of the biggest drawbacks when comparing rotary to flat diecutting. By using a rule such as this in rotary applications and significantly reducing the depth of penetration necessary, we move closer to achieving the accuracy of "onto" diecutting with in rotary diecutting, potentially approaching the accuracy that flat cutting provides. Other improvements that can add to the optimum performance of this rule for rotary use are the new blanket/anvil leveling systems that are now available. These systems provide even blanket wear and a consistently flat, uniform surface to penetrate into. The reduced penetration can also allow significantly longer anvil life. The product edge produced by an Excalibur type blade is less likely to cause paper cuts than an edge produced by conventional cutting rules. This rule has been used successfully in a variety of methods in Europe for several years.

Conclusion

There is a significant amount of work and experimentation left to do in order to achieve the optimum performances of products such as QC100 and Excalibur, but the potential advantages of each product would certainly indicate that the results could be very worthwhile. We would look forward to working with you if you have further interest in "evolving 'into' diecutting."

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