

Specialty Rules Solve Diecutting Problems

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For over 45 years, National has developed specialty steel rule products for the diemaking and diecutting industry that have helped to solve some very specific problems in both flat and rotary diecutting. While most diecutting requirements are met with a very small percentage of the many rules that are available, one of the most important keys to success for special applications is selecting the most appropriate rule from the thousands that are available.

Choosing the correct rule height and thickness

One of the first aspects of steel rule that catches most people's attention is the large assortment of heights that are available. Heights range from a low of 1/4" up to 6 inches. Regarding point size (one point = .014") or thickness, rules range anywhere from 1/2 point up to 8pt. There are literally thousands of different machines on the market that require almost every rule size imaginable. Higher rule is required when you are diecutting material that needs a greater amount of clearance, such as when cutting blister packages, or other products where any excessive compression could damage the product. In choosing the rule thickness needed, one must consider that heavier rules, such as 6pt and 8pt, while obviously having greater beam strength when cutting heavier stocks, will sacrifice ease of bending and ejection of the diecut part.

Cutting foam and plastic film.

Flat die cutting historically encounters its share of problems that standard cutting rules simply cannot solve. One of the best examples of this is cutting foam. When converting foams, standard cutting rule may not produce acceptable results. Standard serrated or flat die rules, when used to cut thicker foams, often create a serious problem with concavity (an hour glass shape, instead of a straight cut) on the cut sides of the product. By using either "Deep V" serrated rules such as 13, 12, 11.5, 6,5, 4.6 and 2.7 tooth, or a family of products created specifically to cut foams, called QC100, the problem of concavity can be greatly reduced. Making the proper choice from the many tooth configurations available is often based on the desired results for the material being cut. The more teeth per inch on the rule, the more smooth the cut edge will appear and feel. The less teeth per inch, the less the necessary cutting pressure will be. Balancing the two factors of cutting pressure and edge appearance to best suit your needs will often lead you to the right choice of rule to employ in a specific application.

Another arena where "Deep V" and QC100 serrated rules are used is in cutting and or perforating plastic film, such as your common supermarket bag. If you were to use standard cutting rule and a cutting plate to attempt to cut multiple sheets of plastic film, fusing may occur. Fusing means that the cut edges of the plastic have attached or fused to each other, making it impossible to separate the individual pieces. "Deep V" product patterns such as 8,11, 11.5 and 13 tooth and QC100 in an 8 or 12 tooth pattern, are very effective to cut films because the piercing action used to create the cut eliminates the fusing problem and also prevents the stretching and distortion often created by standard type rules. Certain tooth configurations such as the 4.6 tooth were specifically designed with bending in mind so that the teeth will consistently line up when cutting a hand hole on a bag. Occasionally, the diecutter does not want to cut completely through the film so the bag will be partially cut but will hold together. Essentially this is a type of perforating and a good example of this is exhibited in plastic bags on a roll, as those used in most supermarkets.

Folding chipboard and thick plastic

One unique application we have observed is the need for easier folding for heavy plastics and solid fiber. Use of a product called Combination Cut & Cut has provided a solution to this problem. This rule was specifically designed for the folding of chipboard and thick plastic. Normal combination perforating rule provides a primary cutting height and a secondary scoring height for easier folding. Combination Cut & Cut provides the same primary cutting height but offers a secondary cutting height for slit scoring as opposed to regular creasing.

Advances in Combo Cut Crease Rules

Combination cut crease rules have long been produced with a “sharp” corner on the “crease” portion of the rule. Recent innovation has made possible the rounding (creating a small radius) of those corners to provide a more effective product that is less likely to crack the stock being converted. Additionally, it is now possible to produce a new product called “Counter Combo,” also a rounded gullet combo rule but specifically created for use with steel counters. This product has a crease height that is only .002” higher than the cut height. This is a product that eliminates the need for “dovetailing” crease and cutting rule, the way that this affect was previously created.

Overcoming creasing problems

Certain problems are more prevalent in certain styles of cartons. For example, slight variations in the dimensions of a box caused by scores running with the corrugation create problems in the body in cover cartons commonly used for produce. To overcome this problem, we designed a special creasing rule that has a bead running down the center that provides a crease with precise definition, resulting in a more accurate fold. This bead is centered on an eight on four point laser crease, so cracking is minimized, yet there is no need to jig or laser an 8pt line. This product is called Tru-Fold Crease. Another creasing innovation for dealing with difficulties in creasing, is called MicroTrak. Available in 8,13 and 100 TPI, these unique crease rules can be used on both paper and plastics (cold scoring on plastics). On paper, the rule eliminates or significantly reduces all score cracking and provides for easier folding, but increased stock strength and integrity. It also aids when creasing over a thick, dark ink laydown. In rotary applications, in addition to the benefits described previously, MicroTrak greatly increases sheet control in the machine direction.

Mitering

Some specialty products have been developed to specifically save time and improve performance for both diemakers and diecutters. As the rotary industry changed from side bevel to center bevel rule, many diemakers complained about the need to miter all of the trim knives. To solve this problem, we developed a line of pre-mitered trim breaker knives, designed to eliminate the time required to miter each blade, as well as improving productivity on the diecutter. Each blade is cut to a uniform 1.5 inches and has a precision miter that precisely matches the angle of the cutting rule. The rules are designed so that the height of the curved miter blade exactly matches the height of the lead and trail edge, while the straight blade exactly matches the vertical knives. Another feature of the curved blades is that they are made from no-notch curved rule, which eliminates the chance of the blade backing away from the lead edge due to the back notch sliding over the stop.

Advancements in Display, Retail Ready and Bundle Breaker Rules

What might easily be referred to as “just” perforation rule “with math”, is clearly more than that. Today’s corrugated converting market, driven by the big box stores demand for easy access and ready to use packaging designs, has encouraged the need for perforations to be created and used in a scientific way. The PERFormaX line of rotary rule products serves this purpose. Similarly, new high volume rotary machinery and sheet handling equipment has introduced a need for a manageable way to connect and hold multiple out box arrangements together through the die cutting section as one unit. This ganging of individual box designs as one large sheet unit results in high yield per revolution maximizing the rotary die cutter throughput. Subsequently, past the die cutter the ganged sheets will be neatly stacked, mechanically clamped and hinged to break the connected stack of parts back into easily palletized individual units again. The whole process is called “bundle breaking”. The PERFormaX Line of products addresses everything from the lightest hold requirements like bundle breaking applications to the more sturdy conditions required from retail ready tear off flaps and tear out window designs. All of this is done mathematically by managing the cut portion and gap portion of the perforation rule. Convertors now can control and manage the resistance and ease of the tear/break systematically. Limiting the gap sizes (and other special features) across the entire family of PERFormaX products, results in a consistent, uniform cosmetic appearance and feel along the tear line.

Communication- The key to future rule advancements

These are just a few examples of the many specialty products that are available for those out of the ordinary die cutting applications. Rule manufacturers offer an incredible variety of tempers, bevels, tooth configurations, heights

and edging technologies. Many of the successful specialty rule products were developed as a direct result of effective communications between diemakers, diecutters and rule manufacturers. Over 45 years ago, our founding partners here at National, who were originally diemakers, created and developed many of our original serrated products to specifically address issues or concerns that they recognized were prevalent for the diecutters of their era. Now, as always, it is that kind of open communication that most often leads to products that can effectively solve diecutting problems. We are always open to hearing what diemaking and diecutting issues you would like to see us address to potentially create the next generation of steel rules.