

Recognizing When to Replace Cutting Dies

Rick Putch, Dicar Consulting Services Worldwide, Pine Brook, NJ, USA

I have been in the corrugated converting industry for well over 30 years and still have yet to find the magic button to push, telling a press operator when the cutting die he is running has seen better days. We have used labels to track the number of impressions and even installed rotation counters like an odometer in an attempt to get the most mileage from our tooling. While these methods are helpful, neither is foolproof to guarantee there is “one more run” left in the tank for that cutting die.

The risk of stretching your luck one too many times can result in a customer reject or significant downtime on press. On the other hand, replacing tooling is typically a plant expense that is not passed on to the ultimate customer; whereas new cutting die costs often can be recovered. For that exact reason, converters understandably press their luck and hold their breath for the “one more run.”

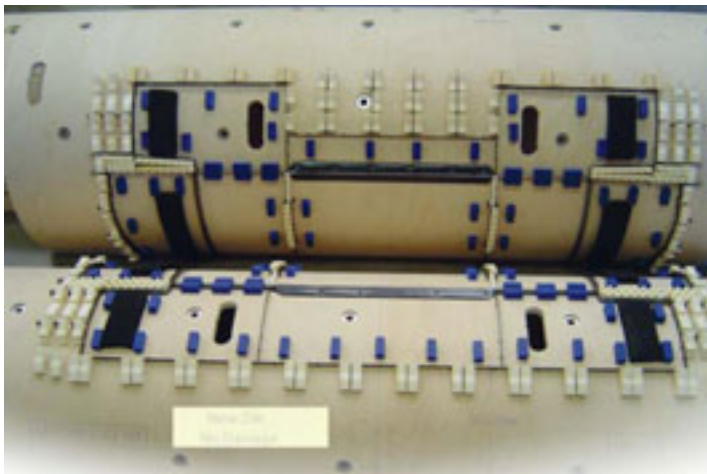
Flatbed cutting dies which cut onto steel plates give us warning signs that things are going south in the way of “angel hair” clinging to the units. This is caused from the steel cutting rule losing its sharp edge and becoming dull and flat. Fortunately, the units can be brushed, most of the “hair” removed and the cartons can often be salvaged. The cut-

ting die rule is replaced and you’re back in business. Increasing impression slightly in an effort to improve cutting will result in a very loud and ugly “crunching sound” of the steel rule slamming onto the steel cutting plate.

Soft anvil rotary dies are not quite so easy to recognize the signs of wear, however it is possible if you look closely. The main reason rotary dies are often used beyond their effective performance condition is they cut into a soft urethane surface. Adding slightly more impression into urethane does not give the same loud warning signs of dies that cut onto steel plates, but doing so results in damage to the dies, cartons and even the machine.

The four basic components of a conventional rotary soft anvil cutting die are the plywood shell, steel rule for cutting creasing and perforations, ejection material, and miscellaneous pre-fabricated items such as seamless punches and Perf-A-Type letters. These parts do not wear at an even pace, therefore unless there is major failure of a compo-

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RECOGNIZING

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ment, the press can continue to rotate and produce inferior product or possibly rejected product.

Cutting dies are in their best condition when they are initially delivered. Many times the condition deteriorates to the point of being obvious, however that transformation did not happen overnight. The key is recognizing the signs early enough before the entire die needs replaced.

Basic components

- **Plywood Shell:** The plywood is the “chassis” of the carton design. If it fails then the steel rules are no longer in the right position or supported enough to remain stable and rigid. To successfully cut or crease the corrugated board, the steel rules must not flex or fold over on impression.

If the plywood delaminates, then it is not uniform enough to support the ejection material. Shimming of the lead edge is a clear indicator failure is immi-



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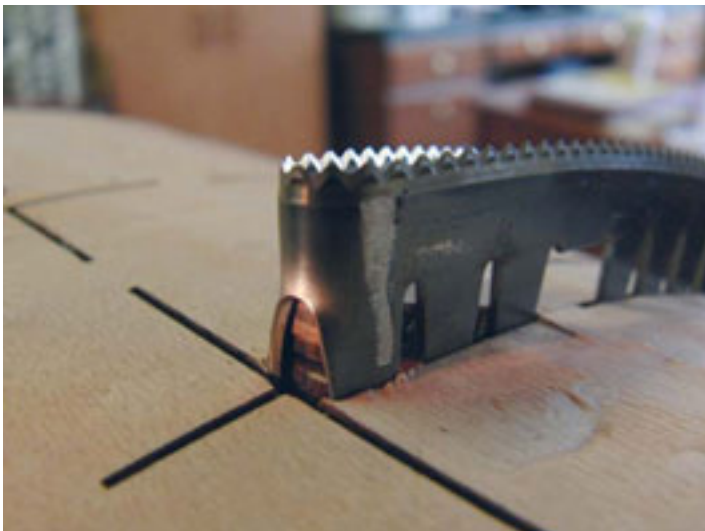
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ment. Removal of one piece slots prior to cutting them at the radius often causes delamination of the plywood.

- **Steel Rule:** Cutting, creasing and perforating rules stamp out the shape of the box and strategically place folds or perforation lines to bend and/or detach flaps and panels within the design. If there are gaps in the knife, complete cutting is not possible and scrap will remain in the finished unit. Adding impression is often a perceived solution to complete the cutting and stripping. A small gap of only 1/16" (1.5mm) on a knife such as a small vent hole cutout is trouble. The section of waste within the cutout is so small and lightweight, it cannot be shaken or fall



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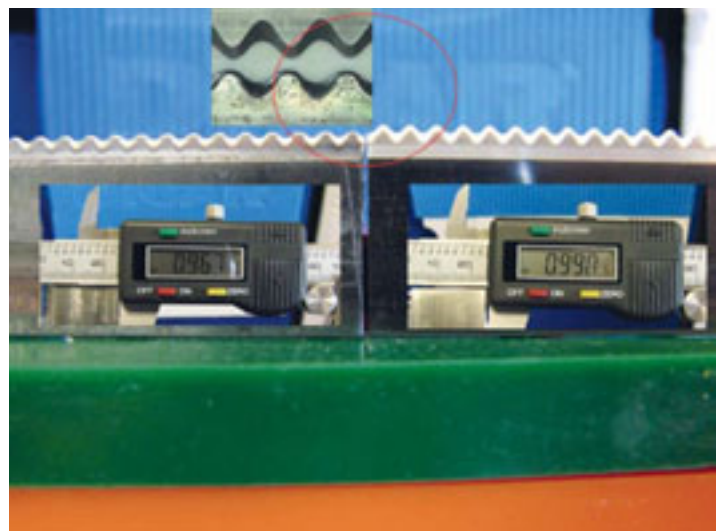


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off with gravity. Do not add impression to resolve this issue—repair or close the gap.

We often overlook the abrasive properties of the paper being diecut and the wear it places on the cutting rules. While most recycling facilities can sort metal banding and other metallic items at the pulper, some items other than kraft paper unfortunately make their way into the reclaimed board. In addition, metallic inks and foil laminated combined board can significantly reduce the cutting rule height and alter the tooth geometry.

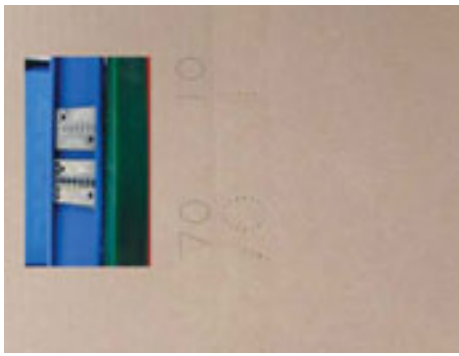
This is very hard to detect as it happens gradually and the rule still looks “serrated.” Adding impression to compensate results in crushed edges and score



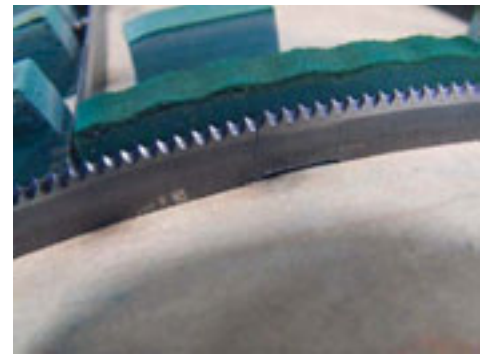
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Perf-A-Type Letters are molded zinc letters and numbers that "pin-prick" the inner liner, allowing identification without printing.



Cracked rules, particularly on corners and near bridges

cracking. One way to check the wear is to caliper a scrap knife. They are easy to remove and reinstall.

- **Ejection Material:** This generally comes in the form of rubber blocks or custom cut shapes conforming to the design. Mechanical plastic and metal ejectors can be used as well. Regarding rubber, it serves as a sheet stabilizer, waste ejector and a transfer device all within a split second. Heat, compression and abrasion are the biggest enemies of rubber products on the cutting dies. Over compressing certain rubber products destroys the cells within the rubber.
- **Miscellaneous:** Perf-A-Type Letters are molded zinc letters and numbers that "pin-prick" the inner liner, allowing identification without printing. These little characters are less than a couple bucks each, but if ignored can cost tens of thousands of dollars in rejected, misidentified product.



Paper trim packed around the knife

Walk the floor of your plant, and look around for the signs, such as:

1. Paper trim packed around the knife
2. Damaged rubber that has been worn down or stacked double up and
3. Cracked rules, particularly on corners and near bridges

Just as your car needs maintenance, so do cutting dies. Shutting down a multimillion dollar press or being late for delivery to a multimillion dollar customer because of a cutting die failure can often be prevented. 📌



Damaged rubber that has been worn down or stacked double up

Rick Putch is Managing Director of Dicar Consulting Services Worldwide™ headquartered in Pine Brook, N.J. He may be reached at 1-412-979-3775 or by email at rickp@dicarinc.net.