Guidelines to assist in "Zero Dimple" goal for Custom Tooling

Objective – Recognize what factors can/cannot be controlled as corrugated board is not a generic substrate. The cause of dimpling is simply the force of the rubber is a greater value than what the medium can support. However, there are additional factors which can influence the performance of the rubber and lend to dimpling of the corrugated board being die cut.

What you can control:

- *Rule Profile:* Select the best cutting rule profile for flute and basis weight to minimize impression.
- *Wood thickness:* Use the thinnest wood possible while maintaining adequate rule support perhaps 12mm or 3/8" on rare occasions.
- *Rubber density:* Select a rubber that offers enough "lift" while when compressed, but has a lower compression/deflection value than the Flat Crush Test (FCT)DIN EN ISO3035 or TAPPI T 825 for the medium on this specific job.
- *Rubber height:* You can recess rubber to provide a greater range of motion before complete densification.
- *Rubber area:* Larger blocks disperse force over more flute tips. We see this practice in Europe where light weighting is more prevalent. Incorporate custom lifter features with rubber shapes or aux. plastic parts.
- *Rubber volume:* Any rubber in contact with the finished product is a potential threat. Remember the original guidelines of rotary die cutting - "First *9" back from lead edge"* needs ejection, physics of rotation will take care of the rest.
- *Proper glue viscosity:* match the viscosity with rubber porosity avoiding a layer of crystallized adhesive essentially reducing the functional range of motion.
- *Bolt Holes:* Provide ample bolt holes near critical locations.
- *Rule Quality:* Avoid rusting the rule by using the proper accelerant for super glue.

What you can't control:

- *Corrugated board Profile:* Flute is only geometry, however is a factor. E flute will have the greatest FCT resistance, A flute the least. General specs are E flute is 1.5mm (.059") thick, B is 3mm (.118"), C= 4mm (.157"), A= 5mm (.197").

- *Corrugated Medium:* Basis weight is a factor. Traditionally 26# semi-chem was the standard. Today 23 and even 20# may be presented. Fiber content matters. Recycled medium will have the lowest value Semi Chem next, Power Flute the greatest resistance to flat crush. Creative aspect ratio on DW is a discussion for another time.
- *Flute Formation:* "Leaning Flutes" will have a lower FCT value.
- *Flute orientation:* Cross corrugation is much more difficult to release than vertical corrugation direction.
- *Design:* any horizontal cutting rule, parallel with the lead edge is a potential snagging point. Design vent holes to be angular or circular rather than parallel & rectangular. Avoid narrow double knives parallel with corrugation.
- *Physical size:* Wider format dies can take as much as .187" of impression depth for complete cutting.
- *Scheduling:* Uncured board off the corrugator requires more force to die cut due to higher moisture content temporarily but drastically reduces flat crush values. Since Corrugated board is hydroexpansive: when it absorbs moisture it expands, when it dries it shrinks.
- *Secure Fastening of the die:* whether bolting or mechanical quick mounts, if the die pulls away from cylinder while rotating the vertical distance between the nip lessens and can increase rubber ejection forces since the rubber is being subjected to higher compression. Posi lok and Serrapid need checked and maintained. Poorly mounted 2 pc dies often will be over impressed in an effort to cut the side trim cleanly.
- *Anvil firmness:* Just because a machine has a trimmer, it may not be functioning properly.
- *Anvil parallelism:* Often overlooked, one of the largest contributors to dimpling.
- *Anvil Concentricity:* Same as above.
- *Anvil Oscillation:* Same as above.
- *Die maintenance and handling:* Poorly transported & maintained tools take more impression necessary between parallel knives for different flutes.