WEEK 4 – URBAN LEGENDS, MYTHS AND HALF-TRUTHS

This week’s questions are based on a Tooling by Design column (written by Pete Ulintz) that appeared in the March 2011 issue of MetalForming magazine. Don’t have a copy of that issue? Find it in the archives at metalformingmagazine.com.

Congratulations to Ian from Beckett Thermal Solutions for winning week 4!

1. **The maximum acceptable burr-height limit for metal stampings is 10% of material thickness**
   
   a. TRUE  
   b. **FALSE**  
   
   This statement might hold true if all stampings were less than 0.050” thick. When burr heights approach 0.003” they start to become noticeable. In some instances, burr heights greater than 0.005” can be dangerous, having the potential to cut or harm assembly workers who encounter them. DIN 9830 (German) and NF E81-010 (French) are two European standards that classify acceptable burr heights relative to the work material thickness and its tensile strength. It is interesting to note that most of the published burr-height limits in these standards are far less than 10% of material thickness. Reference Tooling by Design in the August 2013 issue of MetalForming for more information regarding these two standards.

2. **The smallest hole diameter that can be punch into sheet metal must be equal to or greater than the sheet metal’s thickness**
   
   a. TRUE  
   b. **FALSE**  
   
   Hole diameters less than material thickness are routinely punched in metal stampings. This can be accomplished with quill punches in a supporting body or the use of high-precision die components in conjunction with guided strippers, point guides and floating punches to assure accurate alignment and support of the punch point.

3. **The minimum radius for bending sheet metal is equal to the sheet thickness**
   
   a. TRUE  
   b. **FALSE**  
   
   There are instances where this is true. But this statement is often recited as an all-encompassing universal rule. If that were true, we would never be able to form hems - material that is formed flat onto itself - on any products.
4. The corner radii specified on the part drawing for a deep drawn shell must be at least equal to the minimum punch nose and die entry radii required in the die to successfully draw the part

   a. True
   b. False

   It is true that a tight (small) radius may fracture as the material is deformed. This is due to the high restraining forces caused by bending and unbending of the sheet metal over a small radius. Still, producing a drawn shell with tight product radii is entirely possible. First, the shell is drawn slightly deeper than the final product dimensions using the required punch and die radii to carry out the deep drawing process. In a subsequent operation, the shell height is reduced in height by compressing it and forcing excess material to flow into the tight corners; thus, producing a tighter part radius.

5. The maximum press speed for deep drawing must remain within the published draw speed limits (specified in feet per minute) found in die engineering handbooks for the specific sheet metal type you are working with

   a. True
   b. False

   The forming speeds found in many die design handbooks are the same as that found in E.V. Crane’s book, Plastic Working of Metals and Non-Metallic Materials in Presses (Wiley & Son, 1939). These “speed limits” were first reported in 1931 and are based on galling criteria; conditions created by lubricants, tool steels, sheet metal, and tool making practices of the time.