Mechanical design drawings: They should know that....or should they? Part 1

As a member of MRBs (Material Review Boards) for many years, I've come to see many drawing omissions that resulted in discrepant parts and assemblies sent over by Inspection, Test, or Assembly personnel. Every Engineering department should have an up to date drafting standards book. Yet despite all the information it provides, we generally have quite a bit of leeway to add notes and symbols to clarify details that may not be obvious to machinists and process setup people here and in other countries.

A good example is "lead-in" countersinks for threaded holes. Many engineers and designers leave indication of this countersink out of the threaded hole callout. Some may say that a true machinist should know that this feature is necessary and even if they do add it to the MCAD software hole wizard's list of feature callouts, some software (like Solidworks) incorrectly places the chamfer callout after the thread callout. However, if the chamfer tool is not perfectly sharp, it can distort one or more of the first hole threads - those that were made prior to the lead-in countersink. That's why it is preferable to place the callout BEFORE the thread callout and after the tap drill designation. If the countersink callout is not included, the machinist may not know that it is necessary so does not include it. I have seen many rejected parts due to an inability of the assembler to install screws into threaded holes.

Most experienced assemblers know that getting the screw started into the hole can be difficult if the countersink is left out. If the threaded hole enters the outside diameter of a rod or shaft (to accomodate a set screw, for example), a milled flat surface should be shown and specified, as well as all of the hole information. Note that a 60 degree countersink can be created at the same time the center drill is making the initial hole before the tap drill hole. Otherwise there would need to be an additional tool change operation for an 82 or 90 degree countersink.

This is just one of many small but potentially frustrating issues dealt with by those downstream of the part's flow through Inspection to Assembly.
I'll review others in subsequent newsletters.
Dave