CRAFTSMAN'S CRIBSHEET

NUMBER 21

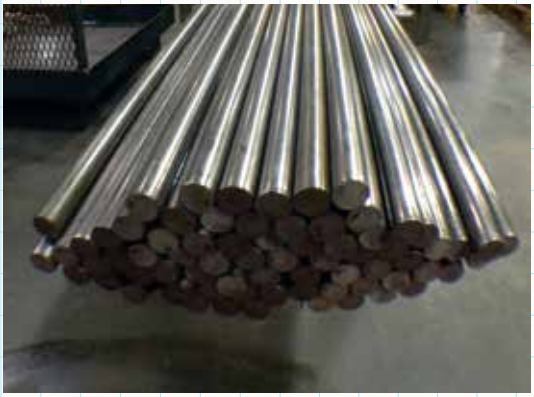
Miles Free – Director of Technology and Research

☐ Technical ☐ Regulatory ☐ Quality ☒ Management

MATERIAL SELECTION FOR MACHINED PRODUCT APPLICATIONS

Here is a checklist for selecting materials for making parts by precision machining.

- ☑ The material must meet the explicit design requirements, regardless of ease of machining. If the requirement involves a maximum magnetic permeability, electrical conductivity, minimum yield strength or other explicit physical, mechanical or chemical property, that requirement must be met.
- ☑ The material must be commercially obtainable. It does not matter if somewhere in the world someone has designed the "perfect" recipe for a material for your customer's application, if that material cannot be purchased, legally imported or is otherwise unavailable to you in your market, it is no longer a suitable material.
- ☑ The material that is chosen must be suitable for both your production machining process and any additional processing that your customer may perform on your parts after receipt (typically cold work such as crimping, staking and swaging; but could also include brazing, welding or other processes).
- ☑ The material chosen may have implicit properties or characteristics that could interfere with the customer's processing, while not affecting your original production. Implicit in the material's thermo-mechanical processing are factors such as amount of reduction in hot rolling, percent of cold work in drawing and chemical differences due to different melt processes or supplier scrap charging practices.
- ☑ Only when you have assured that the material selected will not have a deleterious effect on the customer's process, can we address further optimizing it for our processes.
- ☑ There are two cost components to a precision machined part. The first is the raw material cost; the second is the cost to fabricate the finished part from the raw material. Purchasing agents concentrate on lowering the raw material cost per pound. That can throw additional costs into fabricating the part by causing decreased efficiency, reducing uptime and necessitating more frequent tool changes, etc.



- ☑ The material that results in the highest number of conforming parts without creating production issues at the end of the day is the optimum material. It may not be the least expensive per pound.
- ☑ Once you arrive at a material that works for a particular application, do not increase the variation that your shop operators face by changing suppliers. Even if you are purchasing from service centers, it is important for you to determine the original producer of the material, and any processors, such as cold finishers, so that you can understand and control the process path and minimize variability to your shop and customers on subsequent production runs.
- ☑ The same kind of thinking can be applied to tooling; sure the jobber drills are cheaper per drill, but what is the cost per drilled hole using the cheapies, versus an engineered better-coated tool? How many holes do you get from each? Would a special combination tool provide even greater savings to your cycle time or reduce variation on tied dimensions?
- ☑ Economy in production must be looked at over the entire production and use life cycle. Optimizing for any one step, such as for machining, can result in not only higher costs, but also possible failures in further processing, assembly and end use by implicitly sabotaging the properties needed for those steps.