



DFM FOR CNC MACHINING CHECKLIST



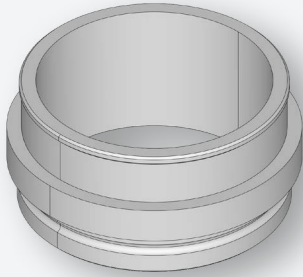
LEAST EFFORT DESIGNS

TOLERANCE

- Design to ISO 2768 medium standard

GEOMETRY

- Design around a stock material
- Remove as little material as possible
- Design for 3-axis machine without using 3D machining
- Use a maximum of 2 setups
- Design so that there are parallel surfaces for each set up



PART SIZE

- Keep part size between 0.25in X 2in X 2in and 6in X 6in X 6in

MATERIAL

The following are the best least effort material options for their respective categories:

- Plastic – [Delrin](#)
- Soft Metal – [6061 Aluminum](#)
- Hard Metal – [1018 Steel](#)

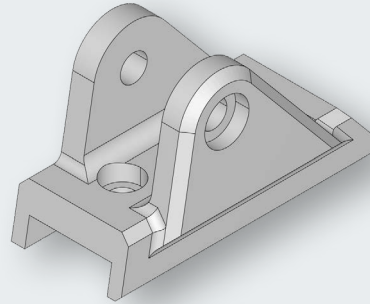
LOOK AND FEEL

- Specify a surface roughness of 63µin Ra or 1.6µm Ra
- Define only intrinsic fillets
- Size fillets to largest tool size possible
- Specify “break all edges” for all other external edges in your drawing

INCREMENTAL EFFORT

TOLERANCE

- Limit narrow tolerance to only the critical dimensions
- Eliminate error sources, like soft jaws



GEOMETRY

- Simplify geometry to avoid 5-axis machining
- Limit sets up by limiting the number of faces that need machining

PART SIZE

- Leave one dimension within 6 inches, so that the machinist can use a standard fixture

MATERIAL

- Go as low as possible on the material effort chart, while still meeting the design requirements.
- Align material characteristics with highest priority design requirements

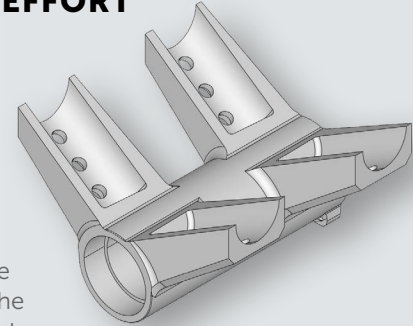
LOOK AND FEEL

- For surface finish, look at other processes, such as electroplating, that may be lower effort.
- Prioritize fillets by their effort: internal vertical, external horizontal, internal horizontal, compound edges.
- Avoid engraving. If required, use the manufacturers standard font.

MAXIMUM EFFORT

TOLERANCE

- Define tight tolerance for only for critical dimensions
- Maximize the stiffness of the machine-tool-fixture-part system
- Select maximum tool sizes
- Minimize cut depth



GEOMETRY

- Manufacturing effort jumps significantly for geometries that require a 5-axis CNC machine. Any subsequent increase in complexity only incur an incremental effort increase.
- Edge and surfaces multiply exponentially increase deburring effort.

PART SIZE

For large parts

- Break large parts into assemblies reduces effort
- Design part around existing stock material

For small parts

- Minimize cut depth
- Design parts around existing stock sizes
- Design surfaces for fixturing

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