



General Design Guidelines for Fabrication

Laser Cutting

- Tolerance $\pm 0.005''$
- Maximum sheet size is 60"x120". Parts that fit into standard sheet sizes well are generally cheaper parts. Generally, a flat blank should have one dimension smaller than 30" or 60" to efficiently nest multiples in a sheet.
- Long narrow parts are more susceptible to distortion from internal material stress
- Laser cut hole diameter should be no less than 40% of material thickness
- Impact Fab Fiber Laser Capacity
 - 1" Mild Steel
 - 0.75" SS
 - 0.75" AL
 - 0.300" Brass and Copper

Forming

- Standard forming tolerances (tolerances increase as thickness and part size increases)
 - 3 place decimals $\pm 0.015''$
 - 2 place decimals $\pm 0.030''$
 - 1 place decimals $\pm 0.060''$
- Inside Radius is generally same as the material thickness for air bending
- Minimum flange length is generally material thickness X 5
- OD dimensions on drawings are easiest for operators to program with and to check the flat blank length.
- For best results, Aluminum lasered and formed parts should be 5052 series.
- Think about sheet size when adding bends to parts, see note above in laser section
- Holes on or near bend lines will have distortion. If possible, keep holes material thickness x5 away from bend lines.

Weldments

- Tolerance $\pm 0.062''$ to $\pm 0.125''$ depending on size and shape
- Shrinking welds cause distortion. Design to counteract if possible. (see example on tour)
- Weld symbols are very helpful. If they are not present, the welder chooses how to weld your part.
- Notes about finishing expectations are extremely helpful

- Specify areas where weld is not needed or wanted
- Thick materials are hard to weld to thin materials in Aluminum. For example, ¼" flange to 16 ga sheet metal

Waterjet

- Tolerance ± 0.010 , but depends greatly on material thickness and type
- Will cut anything except tempered glass and porcelain tile
- Has no thermal distortion because there is no heat from cutting. Material stress distortion still applies.

General Notes

- All of the above tolerances are general guidelines, they can all be manipulated better or worse on a case by case basis. Prices increase with complexity
- Missing information on drawings is the biggest challenge faced in a job shop setting.
- The drawing should relay the design intent. For example, if the part is a guard that must mate up to another part, the mating dimensions should be the ones that have the tolerances associated to them.
- All details that can be added to the part level model should be, adding holes in the wrong level of a SW model causes manufacturing problems

Please feel free to contact us with any questions!

Ross Haan rhaan@impactfab.com

Justin Haan jhaan@impactfab.com