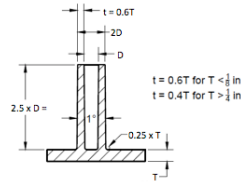


*Lean*

Everybody  
Everyday  
Everywhere

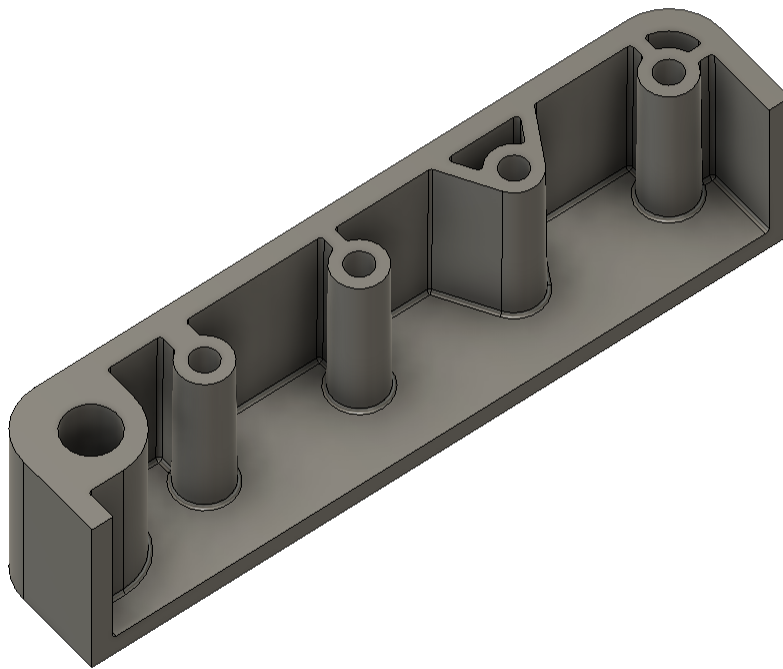
Continuously  
Improving  
Your Designs



MATH IS OUR SECOND  
LANGUAGE

**GAP**  
IMPROVEMENTS

# BOSSSES



## Boss Design

Bosses are part features that are used for the assembly of components or to provide structural support for molded components. Consequently, there is a compromise between aesthetics and strength which may result in sinks on the visual surface.

The most common effect that a boss has on a part is the creation of a sink mark on the opposite of the boss or its supporting ribs.

Designers often  
include bosses  
but fail to  
consider its effect  
on the external  
surface of the part

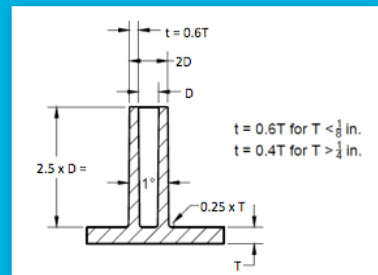
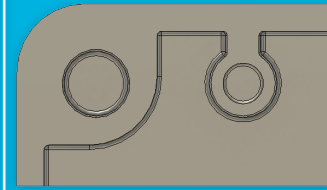
# Geometric Dimensions Rules

Following are the mathematical relationships that can improve the aesthetics of the part:

1. Outer diameter of a boss = 2 to 2.5 x hole diameter
2. Height of a boss = 2.5 x hole diameter
3. Boss wall thickness = 0.5 to 0.75 x nominal wall thickness
4. Radius at base of boss = minimum 0.25 x nominal wall thickness
5. Draft, OD Boss =  $0.5^\circ$
6. Draft, ID Boss =  $0.25^\circ$
7. ID creating core pin = the pin should include a 0.010in (0.25mm) radius that extends into the nominal wall to reduce the turbulence during cavity filling
8. Boss location = minimum 0.120in (3mm) from external wall and attached with a rib
9. Multiple Boss placement = Bosses should be placed a minimum of 2 x nominal wall thickness apart
10. Fasteners for PC/ABS Bosses = to minimize radial stresses, use thread forming screws with a rack angle of  $30^\circ$

## Design Notes

Thick walls create sinks



# Trouble-shooting

Following are trouble-shooting suggestions to improve an existing part that has the following issues.

Issue	Cause	Correction
Voids	Thick wall sections	Core out thick sections in order to maintain rule 1
Gas burns	Insufficient venting	Add venting to core and/or sleeve
Bosses break-off during de-molding of the part	Insufficient radius where bosses attach to walls normal to the boss	Add or increase radii to boss wall interfaces
Sinks	(1) Boss wall thickness is too large (2) Placement too close to wall or each other	(1) Decrease wall thickness (2) Move bosses further apart
Boss deformation	Insufficient ejection	Increase ejector diameter or add sleeved ejection