Homework #2: Injection Molding

2.008 Design and Manufacturing II
Spring 2004

Out: February 18th
Due: February 25th

Problem 1:

What are the design considerations in replacing a metal container for carbonated beverages with plastic bottles? Think about the functional requirements and explain how the design of a plastic container differs from that of a metal can.

Problem 2:

Consider the injection molded L-bracket made of Polycarbonate shown in Figure 1. You are asked to find the mold design with the parting line that leads to the minimum possible clamping force to mold the part.

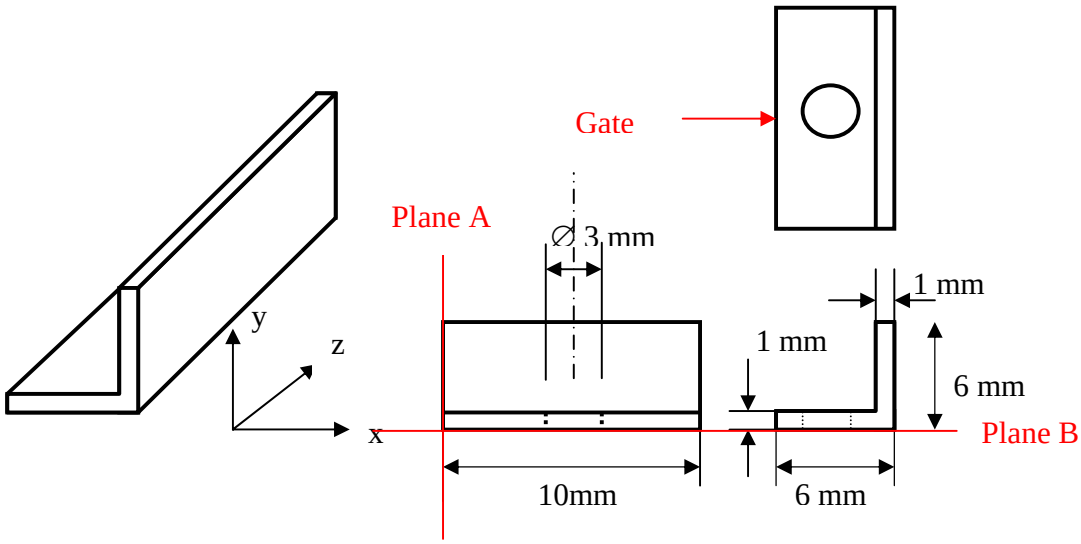

Figure 1: L-bracket part drawings

a) What would be the minimum clamping force required for this part? Indicate the location of gate and the location of parting line/plane for the minimum clamping force design. Assume that the peak injection pressure is 6,000 psi. Also discuss the potential problems in producing the part with this design.

b) You soon realize that the minimum clamping force is not as important as the quality of the part and productivity of the process (as long as the machine has enough clamping force). i) What would be a better position of the parting line/plane and gate and direction of injection molding? Why? ii) What is the clamping force required for the new design?

Problem 3:

The following pictures show one half of an injection molded housing. With the basic design rules for injection molding in mind, is this a good design? Explain why/why not and suggest any improvements you might want to make. If you would like to you can make a sketch to explain your thoughts.

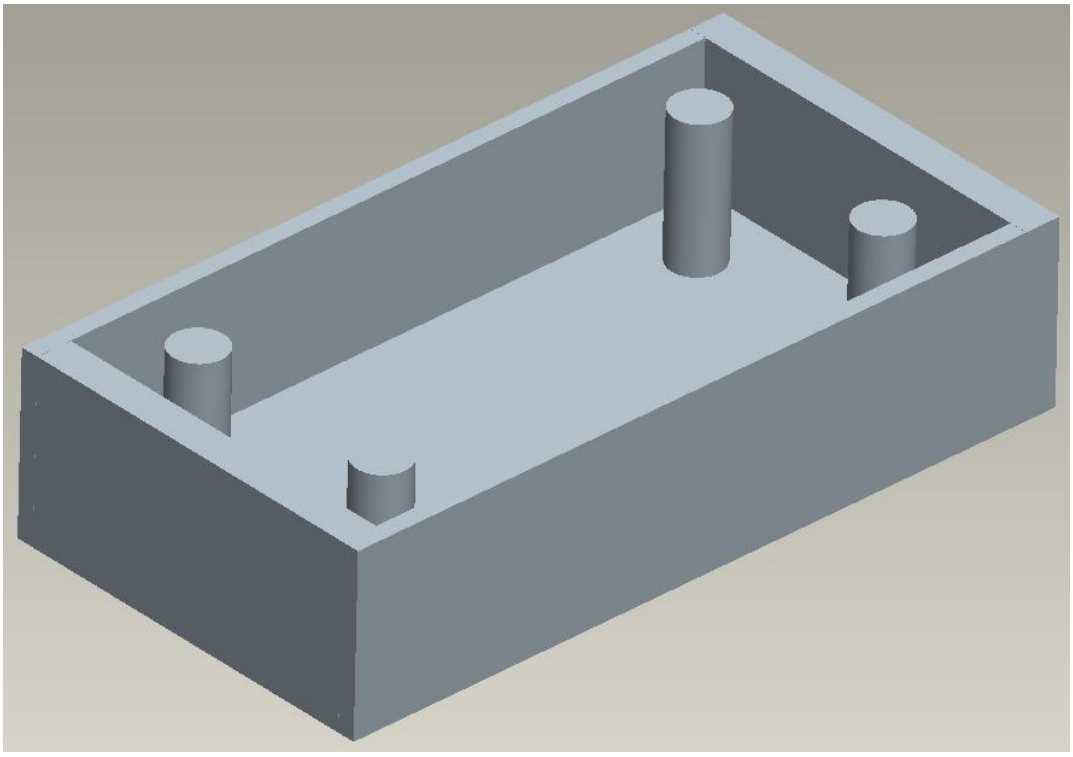

Figure 2

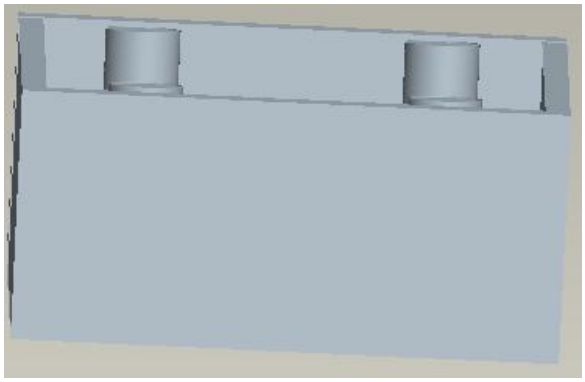

Figure 3

Problem 4:

You are going to make tools for your Yo-Yo in two weeks. You should define your functional requirements first before you seek design parameters, which meet the requirements. Please define the functional requirements of your own Yo-Yo and try to find design parameters that fulfill those requirements. Show the mapping process in-between “What” and “How” at the top two levels. This is not a single solution problem. In the world of design, you, as a designer, have all the power to explore any possible design (at least until it is proven to be a poor one). Feel free to sketch your design on a piece of paper.