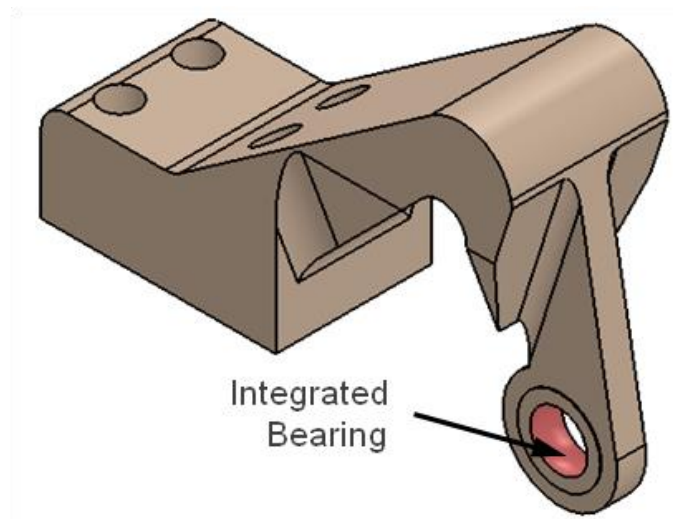
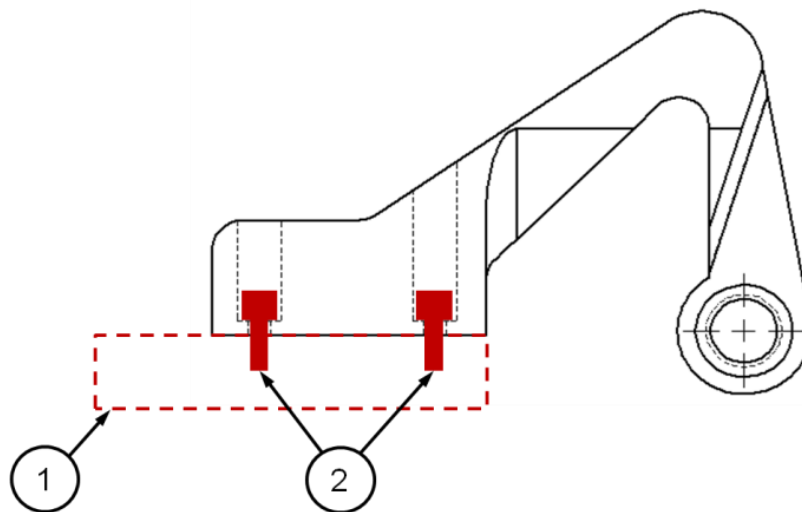


Challenge Requirements and Work Envelope



Part work envelope available for download in STEP format

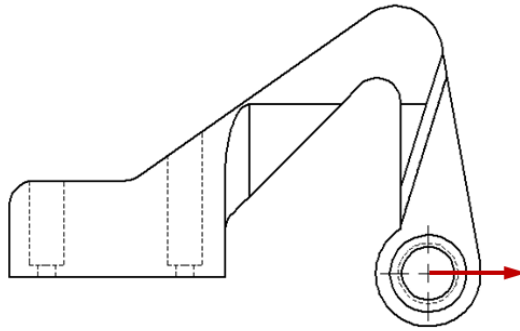
Boundary Conditions



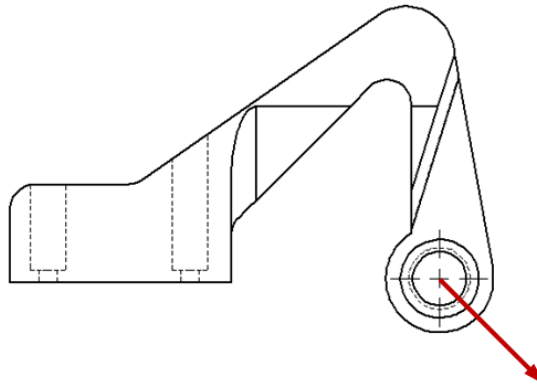
1. Part is simply supported by a stiff plate
2. Part is fastened by four high strength bolts (#10-32)

Loading Conditions

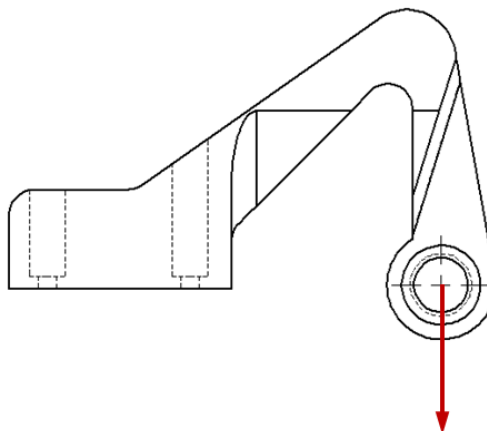
Load case 1: Horizontal load 1,250 lbf



Load case 2: Inclined load 1,875 lbf 45 with the horizontal



Load case 3: Vertical load 2,500 lbf



In all load cases, the loading shall be applied statically, through a stiff spherical bearing with .3125in in diameter.

Requirements

- Entries must be submitted in STEP format.
- The design must fit entirely within target envelope described in the specifications.
- Design material: 15-5PH per AMS5862
 - Elastic Modulus (E) = 29,000 KSI = 200,000 MPa = 200 GPa
 - Poisson Ratio (ν) = 0.27
 - Yield Stress (σ_y) = 145 KSI = 1000 MPa
 - Density (ρ) = $0.283 \text{ lb/in}^3 = 7833 \text{ kg/m}^3$
 - Material is assumed to be linear elastic
- Minimum geometric feature: .025 in
- Minimum wall thickness: 0.045 in.
- Note that the STEP file geometry is in inches, and as a reference the width of the envelope geometry is 1.50 in = 38.11 mm.
- Parts shall be optimized for minimum weight with the following boundary and loading conditions:
 - Base support: The part is bolted against a matting plate of high stiffness
 - Bolts interface: The parts is fastened with four #10-32 high strength tension rated bolts as indicated in the specifications
 - Bearing interface: The part is loaded through a high stiffness spherical bearing with three load cases:
 1. A load of 1,250 lbf applied horizontally
 2. A load of 1,875 lbf applied 45 degrees from the horizontal
 3. A load of 2500 lbf applied vertically
- Parts are intended to be additively manufactured via a laser/powder bed system. Participants shall indicate in their entries the intended printing direction/orientation