

Category: Design for Manufacture and Assembly (DFMA)

Example: Redesign of O-ring lead-in to eliminate roll-out defect during assembly

Situation: Automotive fuel vapor handling systems have tube connections with valves, etc., inserted into the canister that temporarily stores gasoline vapor – preventing emissions. These systems are assembled manually.

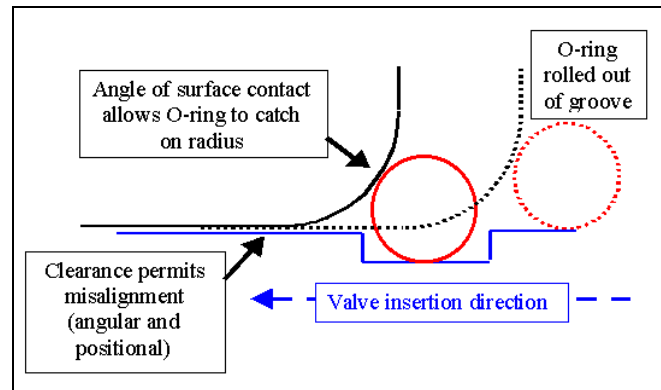


Image 1: O-Ring can catch on radius

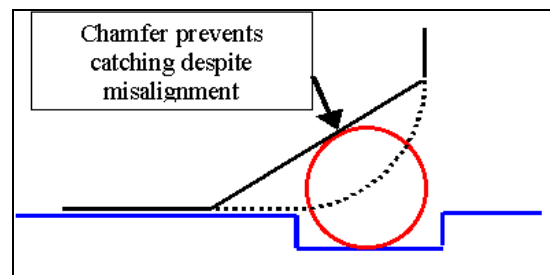


Image 2: Chamfer eliminates roll-out

Problem: O-ring roll-out created a leak path in a multiple-connection assembly. The failure mode was difficult to detect as the roll-out was internal to the assembly, and required substantial labor time to troubleshoot.

Action:

1. Examined physical product and read Design Guideline handbook
2. Lead-in (Image 1) was a pure radius; small misalignments during insertion could allow O-ring to catch on radius in shallow angle area
3. Studied change to chamfer design (Image 2); O-ring still on angled surface despite any misalignments
4. Recommended change to chamfer
5. Mold insert changed to form chamfer – trial run

Result:

1. Trial indicated elimination of roll-out problem
2. Recommended change be propagated throughout product line
3. Feedback sent to Design group to modify Design Guidelines