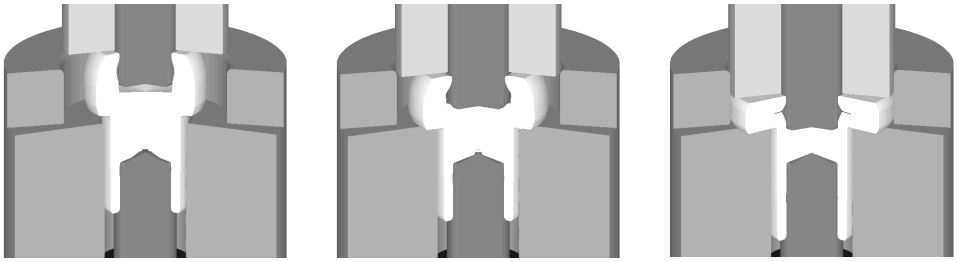
Fastener Lap

Background:

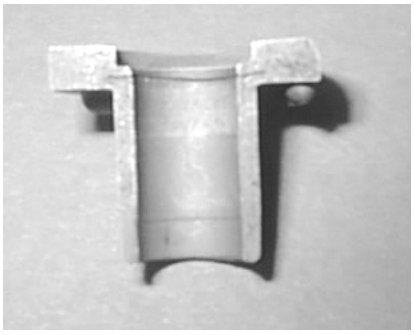
During the development of a heading progression, the designer typically balances many complex parameters to accomplish a workable process. These parameters include the number of intended operations, required volumetric displacements, final part geometry, starting material size, available forming equipment and the behavior of the workpiece. Frequently, variations have existed between the designer's concept of the progression and the actual shop trial. When unexpected metal flow occurs, this can result in a part with unfill, excessive loads, die breakage, laps, ductile fracture or other production problems. All of these problems are very costly.

Fastener Lap:

In one case, a fastener manufacturer noted a small defect during the shop trial of an automotive part. The process was simulated using DEFORM™. The simulation reproduced this superficial defect and helped the manufacturer to understand the root cause. Additionally, the simulation, revealed a severe lap, which had gone unnoticed thus far. When the trial parts were cut up, this defect was present as predicted.



During the heading station, an annular upset resulted in a severe circumferencial lap on the inside diameter of the finished part, as shown in the above progression



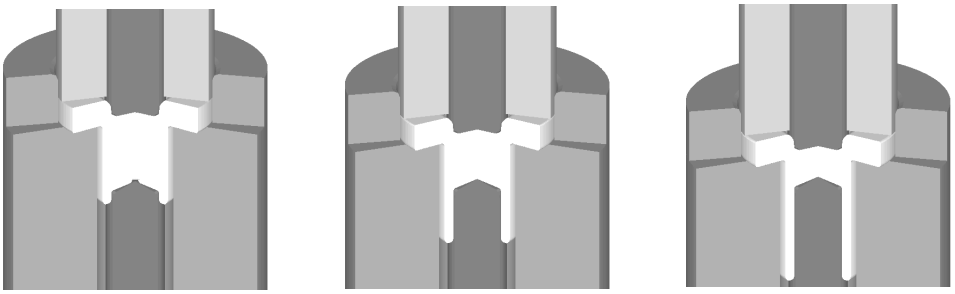
photograph of actual part with lap

DEFORM™

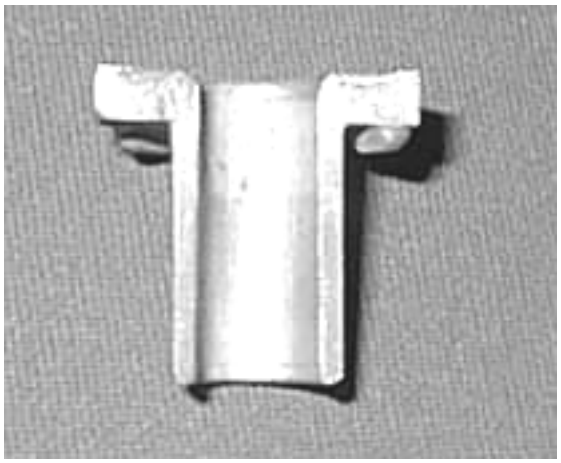
Design Environment for FORMing

Solution:

In this case, the cause of the lap was apparent from the simulation. Through the use of simulation, there was no doubt about the root cause of the initial defect. As a result of this, the redesign included the use of process simulation as the design was being developed. Each station was analyzed prior to the shop trials. At the end of the design process a second shop trial was performed with successful results.



The progression was changed to form the head, then extrude the shaft (bottom) section. Upsetting the cyllindrical section was eliminated to avoid the lap.



The revised progression eliminated the lap.

Scientific Forming Technologies Corporation
5038 Reed Road
Columbus, Ohio
43220-2514
Tel: (614)451-8330
Fax: (614)451-8325
www.deform.com
email: sales@deform.com