



## Felss Systems Technology / Rotary Swaging

### Machine design

Rotary swaging is a special kind of cold metal forming, which principally can be described as a high-speed multi-hammer process. The hammering process is especially applicable for the forming of hollow, thin-walled, and light-weight parts with high strength arising from the work hardening of the part material. The inner geometry is obtained by inserting and positioning internal mandrills during the swaging process. In other words, rotary swaging is designed as a cost-efficient alternative to traditional metal forging and machining operations.

Rotary swaging allows for the following part tolerances: For the outer part diameter, the tolerance range is 0,01 – 0,1 mm, of which the tolerance becomes larger with increased part diameter. The tolerance of the inner diameter of the part is approx. 0,03 mm when formed over a mandrill.

Two types of rotary swaging exist, namely in-feed swaging and recess swaging. High-precision swaging is achievable with the method of recess swaging with a mean value up to Ra 0,1  $\mu\text{m}$  in surface roughness. For in-feed swaging the surface roughness would be in the range of Ra 1,0  $\mu\text{m}$ . Felss is offering rotary swaging machines with standard sizes covering a part range of  $\varnothing 0,4$  -  $\varnothing 120$  mm for hollow components, and  $\varnothing 0,4$  –  $\varnothing 65$  mm for solid (bar/wire) components.

The swaging units are offered as stand-alone machines or as units for integration into a production line / cell, or the complete transfer line itself. The new Generation E machine, is a fully NC controlled stand-alone machine (or flexible connected machine cells) that can be applied for parts with  $\varnothing 5$  –  $\varnothing 45$  mm for hollow components, and  $\varnothing 5$  –  $\varnothing 30$  mm for solid components. The Generation E machine offers improved flexibility, easy and fast programming and part setting, and easy and quick tool change.

### Use in industry

The technology of rotary swaging was first adopted by the European automotive industry for mass production of a broad variety of parts. Examples of such parts are steering upper and lower shafts, steering input shafts, drivetrain side- and intermediate shafts, transmission main-, input- and output shafts. The rotary swaging technology has over the years matured for efficient handling of smaller, customized batch sizes and now developing into new, non-automotive applications.

STRECON is the official agent for the Felss Group in Scandinavia.



Example of the tools setup in the rotary swaging machine



Single-station rotary swaging machine



Hollow steering shafts