# Forging Data

[Radial forging](#) is widely used in industry to manufacture components for a broad range of sectors including automotive, medical, aerospace, rail and industrial. The Advanced Forming Research Centre (AFRC) at the University of Strathclyde, Glasgow, houses a GFM SKK10/R radial forge that has been used to generate this dataset.

The process use two pairs of "hammers" operating at 1200 strokes/min, and providing a maximum forging force per hammer of 150 tons, the radial forge is capable of processing a range of metals, including steel, titanium and inconel. Both hollow and solid material can be formed with the added benefit of creating internal features on hollow parts using a mandrel. Parts can be formed at a range of temperatures from ambient temperature to 1200∘C.The AFRC's radial forging process was used to produce a total of 81 parts over one day of operation. The process of manufacturing each of the 81 parts was recorded by 99 sensors. The dataset contains .csv files named from "Scope0001" to "Scope0081" that each recorded the production of an individual part.
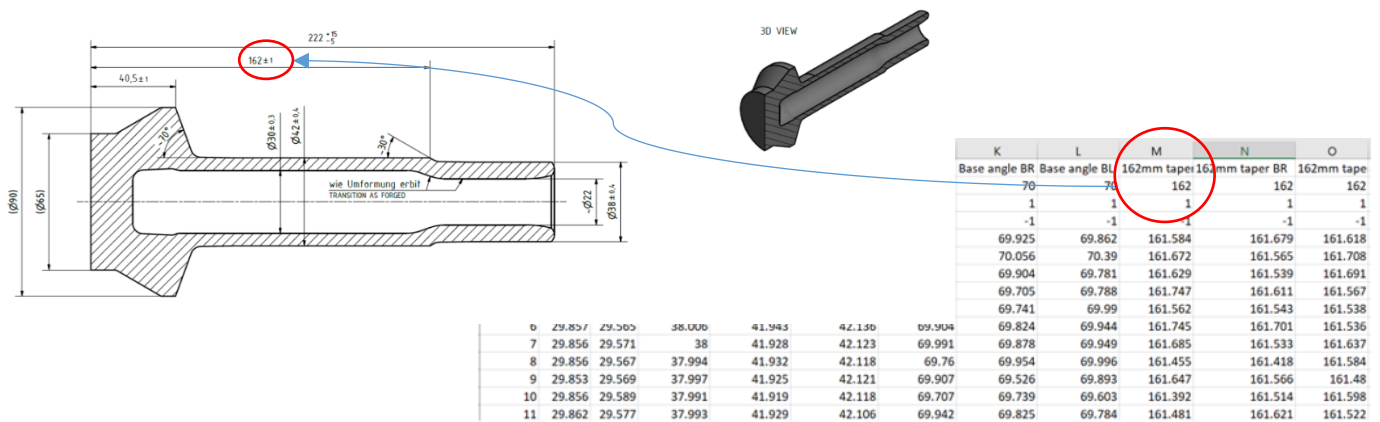
Each forged part was then measured using a Coordinate Measuring Machine (CMM) that recorded the size of 16 key dimensions (and their nominal specification and tolerances) for each of 81 parts forged. Possible objective after review of this dataset could be:

0) Describe the data cleansing and preparation steps require to enable the following tasks.

1) Propose, and justify, a combined metric (i.e. a single none binary value) that characterises the quality of the part based solely on the CMM data.

2) Rank the sensors you judge most important in order of their influence on your quality metric.

3) For the 5 highest ranked sensors illustrate how their variance correlates with your quality metric.

4) Discuss the results and suggest which 3 process parameters (i.e. sensor values) should be most tightly controlled to ensure high quality parts.

Note that in addition to describing what you have done, a report should also explain why you have made assumptions or adopted particular forms of analysis or visualization.