Evaluation / Optimization of Pad Balancer Design Function in Flanging Operations

Overview
Stamping is one of the most common operation in auto industry, in which exterior Parts of the car are made. Pad balancers are part of the die set which serve as a tool to align the die as it falls on to the bottom. Pad balancers can fracture unexpectedly causing that specific part to shut down production.

Objectives
- Identify location of greatest stresses and deformations in order to understand failure and locate fracture locations.
- Model the effect of shimming on the pad balancers and find maximum levels of shimming before fracture.
- Suggest possible improvement to the current design.

Approach
- The team visited the plant in order observe stamping operation.
- Costumer needs we gathered from various employees at the stamping plant.
- Analysed CAD model provided to begin Finite element analysis.
- The original model could not be meshed correctly using Abauqs software.
- The CAD model was intended for manufacturing process.
- A new CAD model was made that simplified the original model’s features.
- The new CAD model was within the project capabilities.
- A FEA test was run on the recreated CAD model highlighting high stress points.
- A new test was conducted on the new CAD model to measure shimming limits.
- Results of stress concentration matched expectation of the employer

Outcomes
- The highest recorded stress was around 1 MPSI.
- Shimming limit was found to be between 2mm and 3 mm
- This simulation is an approximation of the original model, with assumptions of a pure cast and use of a static FEA model instead of a dynamic one.
- The max stresses were mostly found on the outer sides of the balancers.
- Adding a fillet on the corner where high stress are found would help reduce the resulting stress.