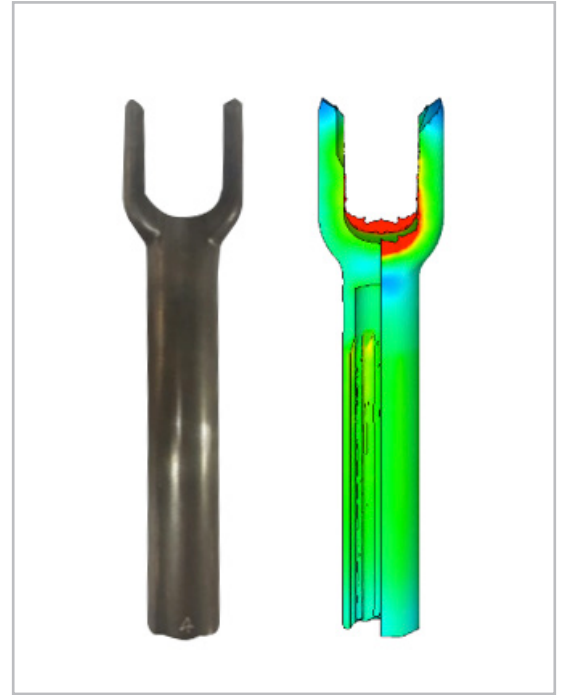


SUNGJIN FO-MA Uses AFDEX to Improve Quality and Productivity of Automobile Component Precision Forgings



SUNGJIN FO-MA Inc. believes in constant and strategic innovation for achieving sustainable growth. As a global company specialized in cold forging, customer satisfaction is the top most priority. Having an established corporate presence since 1986, the company acquired SQ Mark certificate from Hyundai and Kia Motors – Forging in 2001. Because of its heavy emphasis on innovation and expertise in forging technology, the Korean government awarded the INNO-BIZ certificate. As a recipient of various technical excellence awards over the years, SUNGJIN FO-MA strongly advocates the use of simulation technology to achieve the best quality at a competitive price. Consumers, employees and technology are the three main reasons for the sustainable long-term success of the company. SUNGJIN FO-MA Inc. supports and develops teams to achieve its strategic objectives and thereby create breakthrough technologies and products.

The Challenge

Conventional forging processes are followed by cutting or trimming to achieve the final shape of the desired product. However, in the case of precision forging where tight tolerances are a must, the phenomenon of springback has to be considered during process design as it has a significant influence on the final shape.

The Solution

Being a competitive tech company in forging, SUNGJIN FO-MA realized the importance of FEM simulation of forging processes long back and now, they wanted to utilize the elasto-plastic module of AFDEX through the Altair Partner Alliance to accurately predict the springback phenomenon to tackle this challenge. The forging process of intermediate yoke, which is a critical steering component, was simulated using AFDEX. The yoke usually consists of a stem and two ears.



Industry

Forging and machining of automobile components

Challenge

Prediction of precision forging processes with springback

Altair Solution

Elastoplastic module of AFDEX via the Altair Partner Alliance

Benefits

- Reduction in product development time
- Highly accurate predictions of deformation
- Increased component quality through optimal process design

The springback phenomenon is predominant in the region between the two ears. This was a 6-stage cold forging process. During the unloading of the punch (5th stage), the two ears came closer towards each other by virtue of springback. This springback amount was predicted and compared with experiments and it was found that the simulation results matched very well.

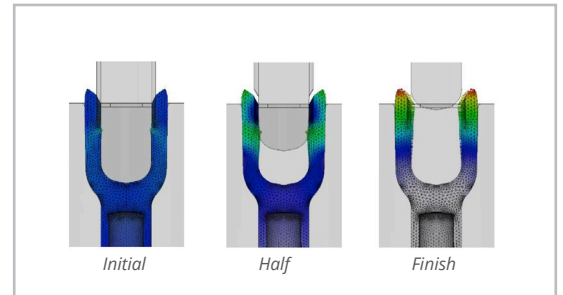
“Unlike other software, AFDEX has a user-friendly interface. Especially, by generating finite element mesh automatically, it saves much time in finite element analysis, and very accurate analysis results are obtained which results in cost reduction. Recently, finite element analysis results using elasto-plastic modules showed remarkably more accurate results than previous ones, so we can predict real life of die as well as the product shape.”

Conclusions and Outlook

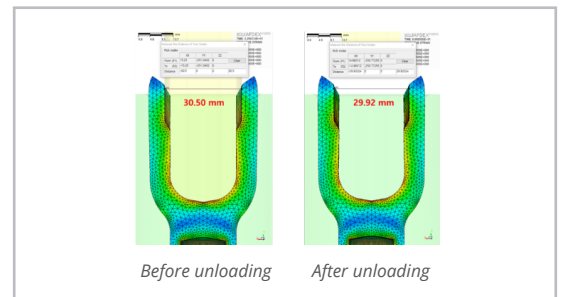
SUNGJIN FO-MA's work on predicting the springback on the cold forging process of an intermediate shaft yoke resulted in a better process design, increased productivity and high-quality components. “The ability to use the software easily without spending a lot of time learning it and being able to accurately predict the physical phenomenon in forging process is very important for us a technologically competitive company. We continuously use AFDEX to evaluate our process design, come up with innovative ideas and make our customers satisfied and happy” says Mr. Taemin Hwang. SUNGJIN FO-MA's technical team looks forward to continuously improving their process design and forging processes to remain on the top of the business in the coming years and remain a globally competent cold forging company.



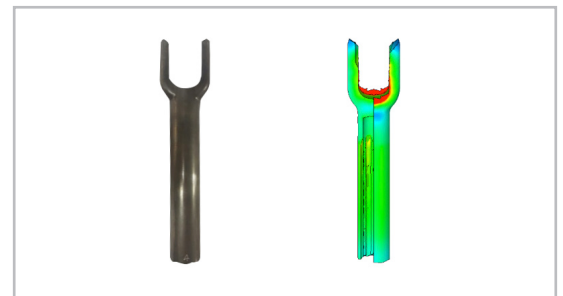
Yoke with a stem and two ears – To be cold forged



Returning of the punch in the 5th stage



Measurement of distances between measuring points at ears before and after the punch returning process



Experiments: 0.50 mm Predictions: 0.58 mm

Visit the Altair Library of Customer Stories at altair.com