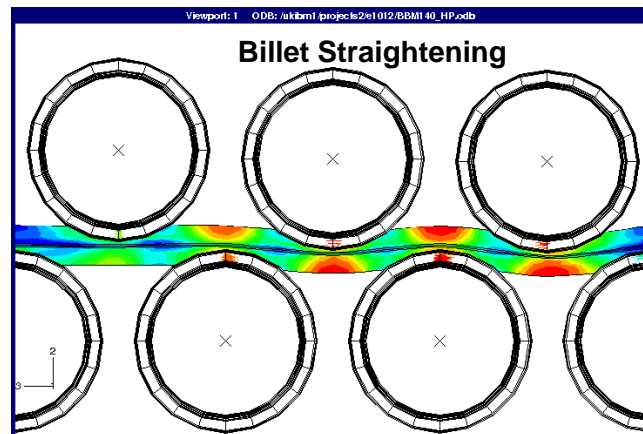


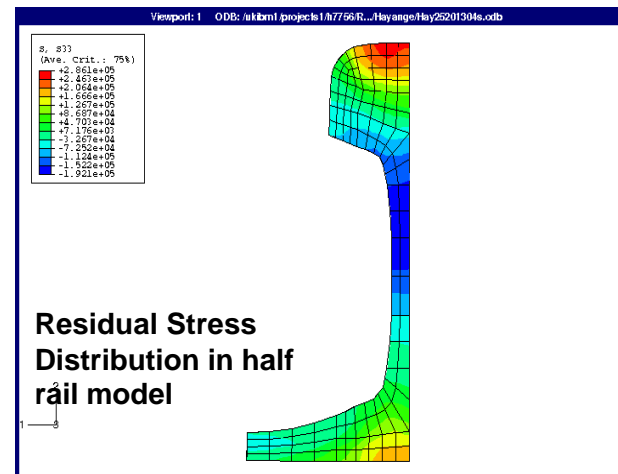
RSM Solutions Using Finite Element Modeling

Swinden and Teesside Technology Centres have over many years developed expertise in modeling of Roller Straightening Machines (RSM). Finite Element models using the commercial package ABAQUS have been developed to investigate and optimise Roller straightening of a range of products covering rail, structural sections, special sections, billet and plate.

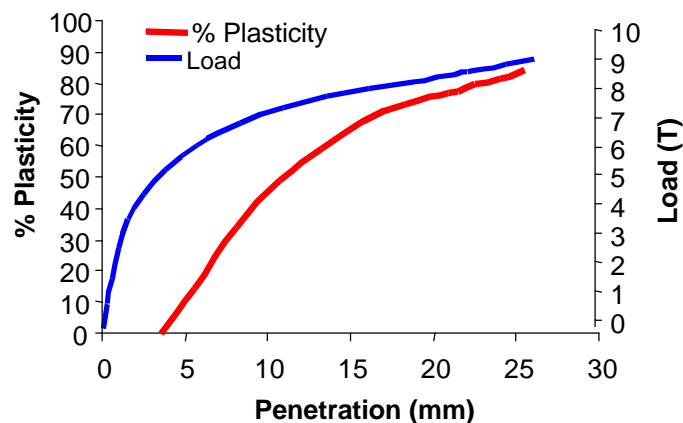
Residual stress is an increasingly important design parameter for customers of many long products but particularly rail. Finite Element models have been used as an aid to ensure the delivered product consistently meets the customer requirements for residual stress. This type of analysis is particularly valuable where the parameter of interest e.g. residual stress, is difficult to measure accurately and therefore the effect of RSM changes are difficult to assess.



Practical solutions to problems such as reducing web stretch and optimising penetration settings for robust straightening have been achieved without the need to resort to extensive plant trials. Improving the performance of the roller straightening process involves analysis of a range of set-up parameters often specific to a product and plant. A wide range of cases can be compared relatively quickly to find the best compromise for a specific application.



Increasing the size range of a roll straightener may place significantly increased loads on the machine. Rolling loads can be predicted for a new product size or section enabling the risk of machine damage to be assessed. The extent of plastic deformation may also be predicted to determine if sufficient is available to remove the worst out-of-straightness and residual stress.



Potential Benefits of Finite Element Analysis of Roller Straightening :

- Greater consistency and increased understanding of the process.
- Increased productivity and reduced re-work.
- Increasing the range of sizes that can be roller straightened