

STUDY OF THE STRAIGHTENING PROCESS ON METAL PROFILES THROUGH FINITE ELEMENT MODELS.

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Abstract

One of the most important consequences of steel profiles failures is the residual stress. These stresses are essential because they influence the propagation of cracks. Residual stresses are those stresses that are locked in the object without the application of any service or external loads. They influence mechanical properties of structural material. Residual stresses are generated first as a result of manufacturing processes, such as hot-rolling, roller-straightening, etc. Then, in service, i.e. the running surfaces of rails are subjected to repeated rolling-contact stresses through contact with the train wheels. These stresses are usually high and they can cause plastic deformation around the contact surface and modify the stress field near the running line and internally in the railhead. In this paper we study the formation of the residual stress in the straightening process through a realistic numerical simulation for the roller straightening process. This is achieved using a 3D Finite Element Model developed with ABAQUS®.

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