

# **Non-destructive ultrasonic measurement of residual stress in metallic materials**

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Residual stresses in metallic materials occur to a varying degree depending on the process stages and different process parameters. The residual stresses may become problematic not only when the material is further processed down-stream in the value chain, but also affects the performance of the final product negatively due to impaired fatigue properties. Today there is no measuring technique that is fast, reliable, and robust enough to measure the residual stresses, which impede process developments due to that no feedback to the operators is available. The overall purpose of the project is to develop a new measuring technique for detection of varying levels of residual stress in the material, which would lead to a drastically increased knowledge on how different processes and parameters affects the final stress state. By using a non-destructive method suited for on-line monitoring, the dynamic changes can be evaluated and enable real-time feedback to the operators. This will be achieved by developing a model that correlates the birefringence in ultrasonic data to the stress level and applied as an electro-magnetic acoustic transducer (EMAT) based on-line measurements demonstrator, in the steel works environment. The non-contact EMAT probe will be installed close to the plate leveling to measure the ultrasonics response before and after leveling. The results from this on-line measurement campaign will be presented.