Residual Stresses in the Nose of Worn Manganese Steel S&C

By using a novel synchrotron X-ray technique, we have been able to measure the distribution of local residual strains deep inside the nose of an S&C made of manganese steel. The S&C had been in service for 5 years on a major railway line in Denmark carrying both freight and passenger trains. To our knowledge, this is the first time ever synchrotron X-rays have been employed to measure strains inside a manganese steel nose. The measurements reveal significant compressive strains at a depth of 6.5 mm from the wheel contact surface due to the severe deformation by rail-wheel interaction. Such residual stresses are important to consider when choosing the S&C materials and when evaluating damage initiation and evolution.

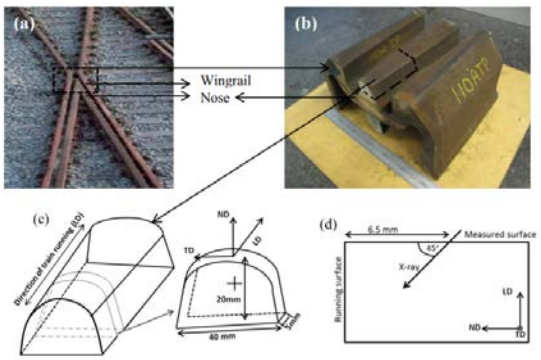

Fig 1 : Illustration showing where the measurements were done.

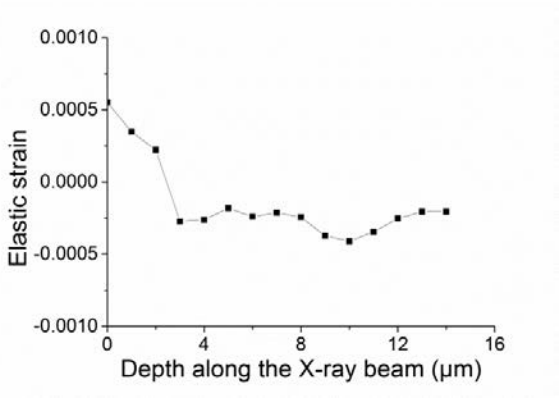

Fig 2: The residual strain along longitudinal direction at a depth of 6.5mm.

For further details please see: S. Dhar, Y. Zhang, H.K. Danielsen and D. Juul Jensen (2017) 38th Risø International Symposium on Materials Science, IOP Conf. Series: Materials Science and Engineering 219, 012016, doi:10.1088/1757-899X/219/1/012016