

## IMPLEMENTATION, EVALUATION AND ASSESSMENT OF TENSILE TESTS ON COLD-FORMED HIGH-STRENGTH TUBES

### Content

The determination of crucial material parameters such as yield strength, tensile strength and fracture strains can be conducted on tubes by using different methods according to DIN EN ISO 6892-1. In the case of cold-formed high strength tubes (until S960) with small diameters and wall thicknesses, this turns out to be a special challenge, as the small dimensions impede a reasonable test-geometry and the welding seam itself is a further inhomogeneity.

In the scope of this thesis, first different geometric and experimental concepts should be investigated and considered for the high strength tubes. Eccentricities that might appear should be investigated numerically, i.e. using ANSYS, and thus a method to trace the experiment back to a pure tensile test should be derived. Afterwards, the experiments should be conducted and evaluated. Additionally, the influence of the welding seam should be considered in the investigations. Finally, the results of the different testing concepts should be compared and a recommendation for most accurate method should be given. With an already existing Python-script at the Chair of Metal Structures, a material-law in the format of a Ramberg-Osgood-curve should be implemented.

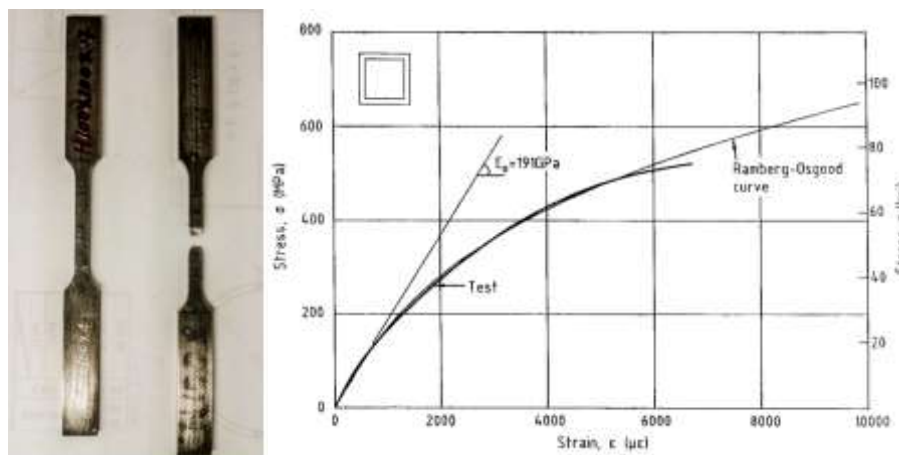


Figure 1: Left: tensile tests on cut-out coupons<sup>1</sup>;right: depiction of a Ramberg-Osgood-curve and the experimental stress-strain-diagram<sup>2</sup>

### Tasks

- Literature study tensile tests
- Derivation of geometry and experimental concept
- Numerical investigations (eccentric load, no full surface contact at clamping)
- Execution and evaluation of tests
- Comparative evaluation and implementation of a material law

### Processing period

From now on

### Prerequisites

Interest in steel structures and experiments

<sup>1</sup> Jia-Lin Ma , Material properties and residual stresses of cold-formed high strength steel hollow sections

<sup>2</sup> Rasmussen , Design of cold-formed stainless tubular members

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