

# THE RELAXATION OF RESIDUAL WELDING STRESSES UPON PROGRESSIVE SECTIONING OF WELDS

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Residual stress measurements are often undertaken in reference samples which are sectioned from large components, yet it remains unclear to what extent the residual welding stresses are representative of those stresses present in the entire welded engineering component. This is particularly the case for neutron or synchrotron X-ray diffraction based residual stress measurements, as the samples have to be transported to the institutions, and fulfil the dimensional constraints of the individual beam lines. We present a systematic study using different materials and welding methods to produce butt welds that afterwards have been progressively sectioned and at each length the residual welding stresses were determined.

Significant relaxation of the residual stresses was observed when the weld length is reduced to a multiple of the width of the weld path, which in turn determines the width of the tensile zone of the residual welding stresses. We found that the stress relaxation behaviour can be described with a simple mathematical equation, based on the characteristic length scales of the weld, which is presented in this work.