

Residual Stress Determination



Residual Stress Determination as a Service - flexible and reliable

A modern X-Ray Stress Analyser in combination with robot technology allows for fast determination of residual stresses according to requirements.

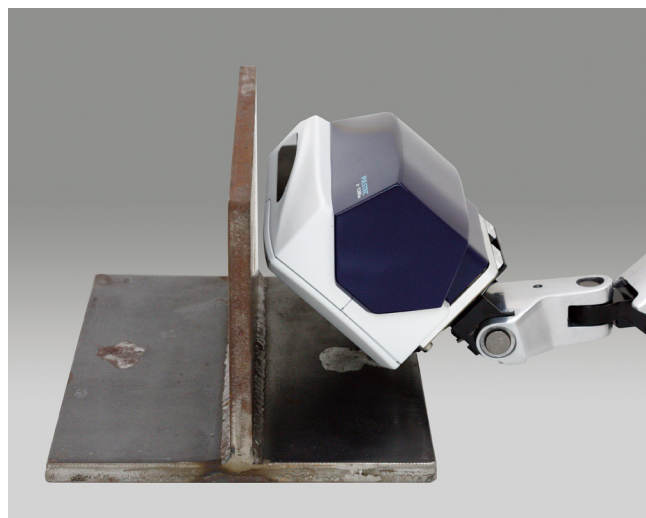
Compressive residual stresses induced to component surfaces of cyclically loaded parts by shot peening can considerably increase their service life. This enhancement results from the fact that crack propagation and thus component damage can be effectively suppressed in a compressive stress structure. For this reason, it can be immensely important to know the exact residual stress state of a part. Since residual stresses cannot be measured directly, more or less time consuming testing procedures are required.

X-Ray Diffraction (XRD) provides an established method to determine the existing residual stress via the non-destructive measurement of the atomic lattice spacing of the layers close to the surface. The method works in a non-contact and non-destructive manner for surface measurements. For residual stress depth profiles, the surface must be electro-polished to the desired depth at the measuring point.

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Equipment and Execution

sentenso is using the X-Ray Stress Analyser μ -X360s from Pulstec, Japan. This innovative device detects the entire Debye-Scherrer ring with its area detector and determines the residual stress using the cos-alpha method. The method provides short measuring times, which, together with the compact form of the device and the very low radiation emission, create the prerequisites for mobile measurements. In addition, many measuring tasks can be excellently automated.



For example, sentenso can use a robot and the StressEasy software extension developed in-house to quickly and precisely process a variety of automated measurement tasks, such as measuring several samples in succession. Furthermore, a residual stress mapping can be created, i.e. the two-dimensional distribution of the residual stress on a surface can be displayed. In addition, the complete residual stress tensor can be determined by taking measurements from different directions. By means of electro-polishing, a part of the surface can be removed, whereby residual stress depth profiles can be determined.

This service is carried out exclusively by trained and experienced specialists. They clarify the application with the customer and check the feasibility. sentenso provides a clear measurement report for every set of measurements. The measurements can be carried out in our own laboratory as well as in the field.



Beyond the measurement service, sentenso offers the X-Ray Stress Analyser including equipment accessories as well as its automation for purchase.



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