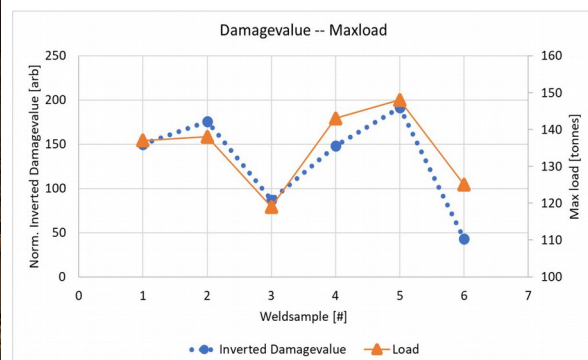
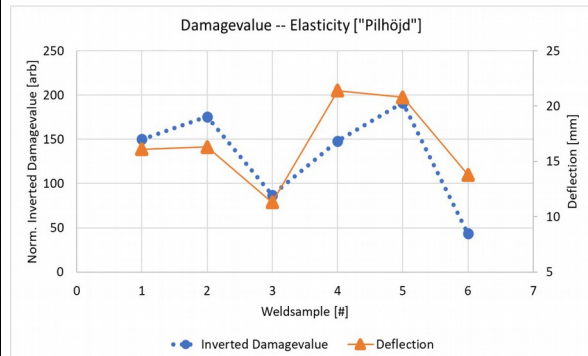


NAW[®]-inspection of railroad weld joints



Modern railroad is welded in field by certified welders creating durable weld joints with criteria withstanding high loads (112 tonnes), load changes, temperature changes in winter and summer, vibrations and compression.

One of the used welding processes is Thermite welding, where a mixture of aluminium and steel powder is set on fire developing extreme heat creating the weld joint. Inspecting these weld joints is just as challenging.

The quality of weld joints can be inspected nondestructively (NDT) using NAW[®]-inspection method. In field on a railway NAW[®] “listen” to the weld joint response signature. Using nonlinear acoustic waves (NAW[®]) sound energy is sent through the weld joint and defects are detected.

A damage such as a crack starts as rifts or tears in the materials grain structure. When these tears grow together a crack is developed. Cracks and rifts in a structure carries sound differently creating anomalies in sound that can be detected.

Sound is physically energy pulses causing vibration waves. To “hear” a crack buried deep in a weld joint the weld joint is vibrated with bursts of energy (sound) transmitted into with our transducer. When the inspected material conducts our energy pulses through its grain structure, the material's ability to hold together is provoked making any quality deficits as cracks, gaps or rifts in the grain structure “audible” and is detected.

The result from NAW[®] inspection is a mathematical calculated value we define as “Damagevalue”. A calculation of the amount of damage in the part that determines whether the weld joint is good or rejected. Low Damagevalue indicates good quality, high Damagevalue indicates damages.

Above graphs to the right shows NAW[®] inspection of 6 samples for welding qualification certification prior weld joints were loaded until failure determining elasticity and strength of the weld joint. Overlaying our inverted Damagevalue with resulting elasticity and strength, a perfect correlation is found between elasticity/strength and Damagevalue.