

# NON-DESTRUCTIVE EVALUATION OF WELDED JOINT QUALITY BY USING PASSIVE THERMOGRAPHY

Armen KLISCH<sup>1</sup>, Steffen KEITEL<sup>1</sup>

<sup>1</sup>*Schweißtechnische Lehr- und Versuchsanstalt Halle GmbH, Halle (Saale), Germany*

## Background

To assess the automatically produced weld seams quality is in the interest of the joint industry (e.g. pipe or automotive industry). Thermography testing is a contactless, non-destructive imaging method. It immediately gives a quality assessment after welding.

## Objectives

An instant process parameter correction takes place to avoid seam imperfections with the help of inline-coupled thermograms. Typical seam imperfections are cracks, pores, undercuts, or inclusions. Furthermore, there are additional geometric imperfections like linear or angular misalignments. The aim is to detect the imperfections automatically, determine their size, assess them and-if necessary-to correct the process parameters [i].

## Methods

Thermography is a technique to detect the local infrared radiation distribution on the measurement surface. The planar radiation distribution offers additional volumetric information [ii]. A distinction is made between active and passive thermography [iii]. A synthetic heat flow is required for active thermography. In contrary, passive thermography devotes the own object temperature-suitable for hot weld seams.

## Findings

Of seams with synthetic imperfections several thermograms were received during the process (MAG-, laser-, and hybrid laser welding). Different thermal signatures to identify the imperfections have been detected.

## Conclusions

There is the possibility to detect seam imperfections of several welding processes by means of passive thermography.

---

i Kammel: Einsatz der Infrarot-Thermografie als prozessintegriertes ZfP-Verfahren beim Schmelzschweißen von Stahl, Köthen, 2015

ii Bernhard: Handbuch der Technischen Temperaturmessung, Springer-Verlag Berlin, Berlin, 2014

iii Deutsches Institut für Normung DIN 54190-1:2004-08, Zerstörungsfreie Prüfung-Thermografische Prüfung-Teil 1: Allgemeine Grundlagen, Beuth, Berlin, 2004