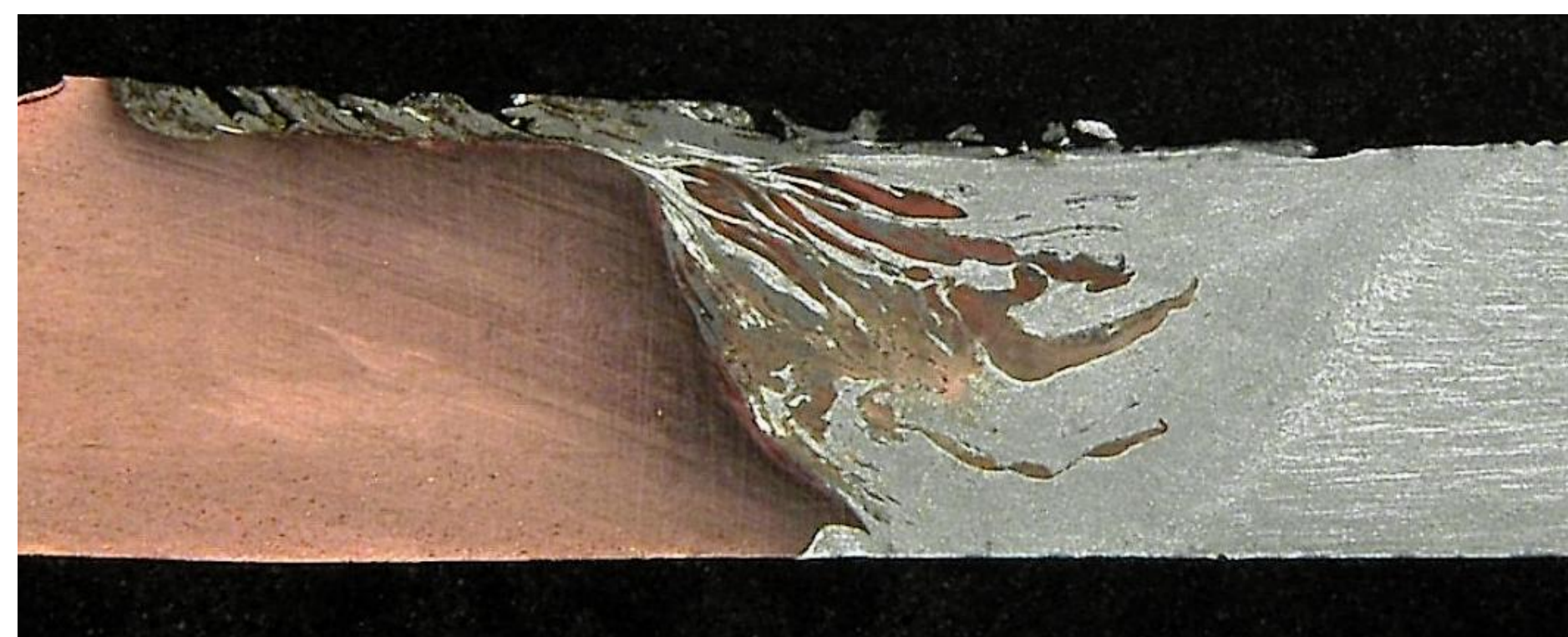


Fields of Competence

- Arc and Beam Process Simulation
- Arc Welding Process Diagnostics and Evaluation
 - Software tools for the determination of process stability values for different types of welding arcs
 - High-speed colour camera (20.000 images/s)
 - Image processing tools
- Laser (Vacuum) and Hybrid Welding
 - Welding with Modern, Brilliant Beam Sources
 - Process Development
 - Sensor Development
- Electron Beam Welding
 - Process Development
 - EBW with Filler Material
 - Beam Diagnosis
 - Sensor Development
- Resistance Welding
- Ultrasonic Welding
- Adhesive Bonding
- Friction Stir Welding



- Material Technology
 - Special Solutions for Specific Materials
 - Welding/Brazing of Material Combinations
- Work and Health Safety
 - Welding Fumes Analysis
 - Medical Studies
- Brazing
- Diffusion Welding

Equipment

- GMA welding power sources (TIG, SA, Plasma)
- Electro-gas, Electro-slag welding equipment
- Welding robots with turn tilt table
- Laser Beam Welding Machines (200 W – 16 kW)
- Electron Beam Welding Machines (40 W – 60 kW)



- Exposition Chamber for Medical Studies
- Fume Box for Welding Fumes Analysis
- Resistance Welding Machines for all industrially used Current Forms
- Robot-guided Spot Welding Guns
- Adhesive Bonding Equipment
- FSW Equipment
- Climatic Chamber for GMA welding (Temperature, Humidity)



Kontakt

Univ.-Prof. Dr.-Ing. Uwe Reisinger
Institut für Schweißtechnik und Fügetechnik
Pontstr. 49
52062 Aachen
Tel.: +49 (0) 241 / 80-93870
email: head@isf.rwth-aachen.de

Key Aspects of Research

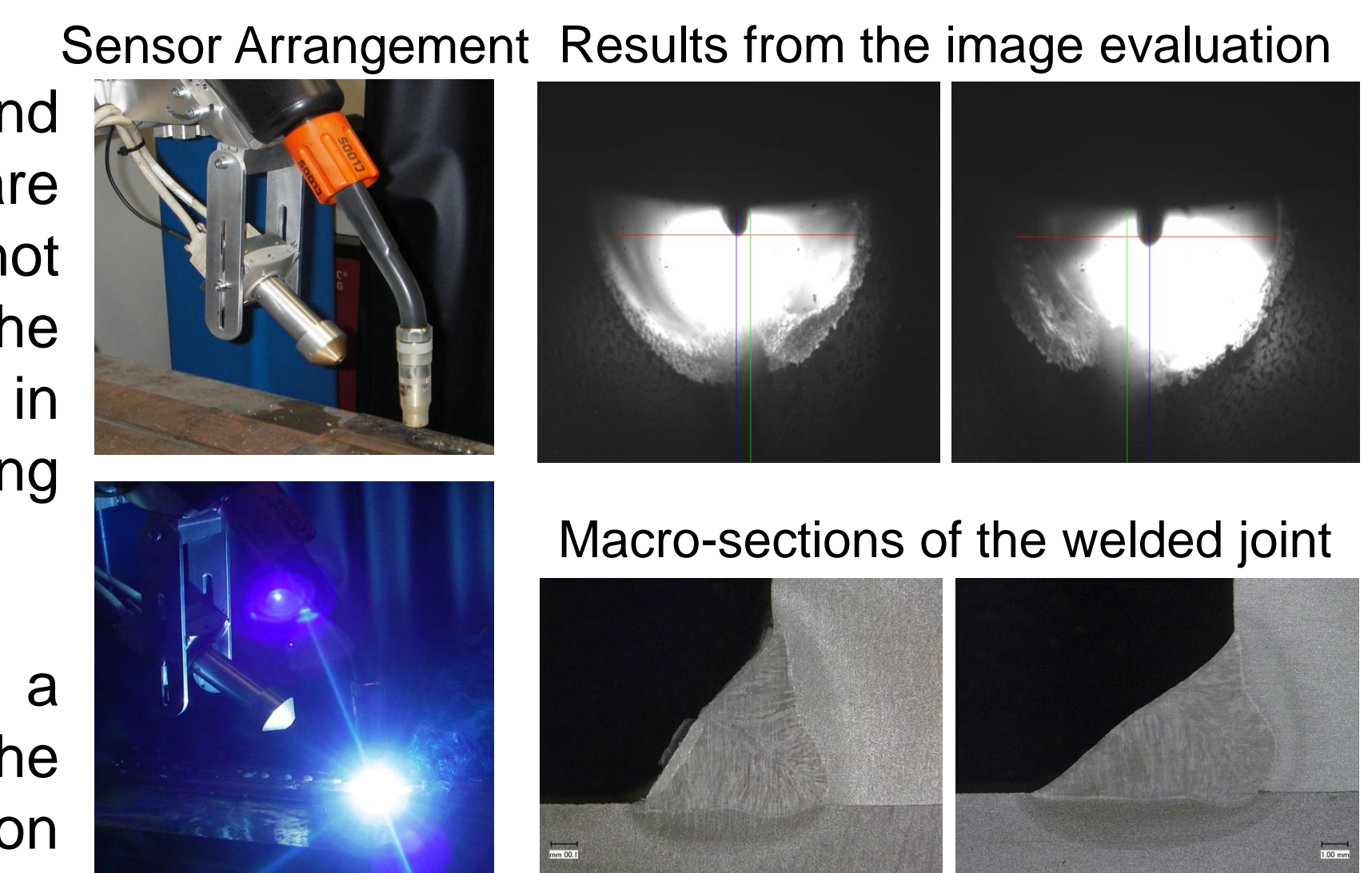
Weld Pool Diagnosis

Starting Situation

- Modern methods for process monitoring and for the assessment of the weld quality are using sensor information which have not been acquired directly at the point of the process. The sensors are arranged either in a leading position (Pre) or in a trailing position (post) to the welding torch.

Approach to Solution and Results

- Development and implementation of a molten pool diagnostics for the determination of the molten pool position and of the geometrical dimensions of the molten pool.



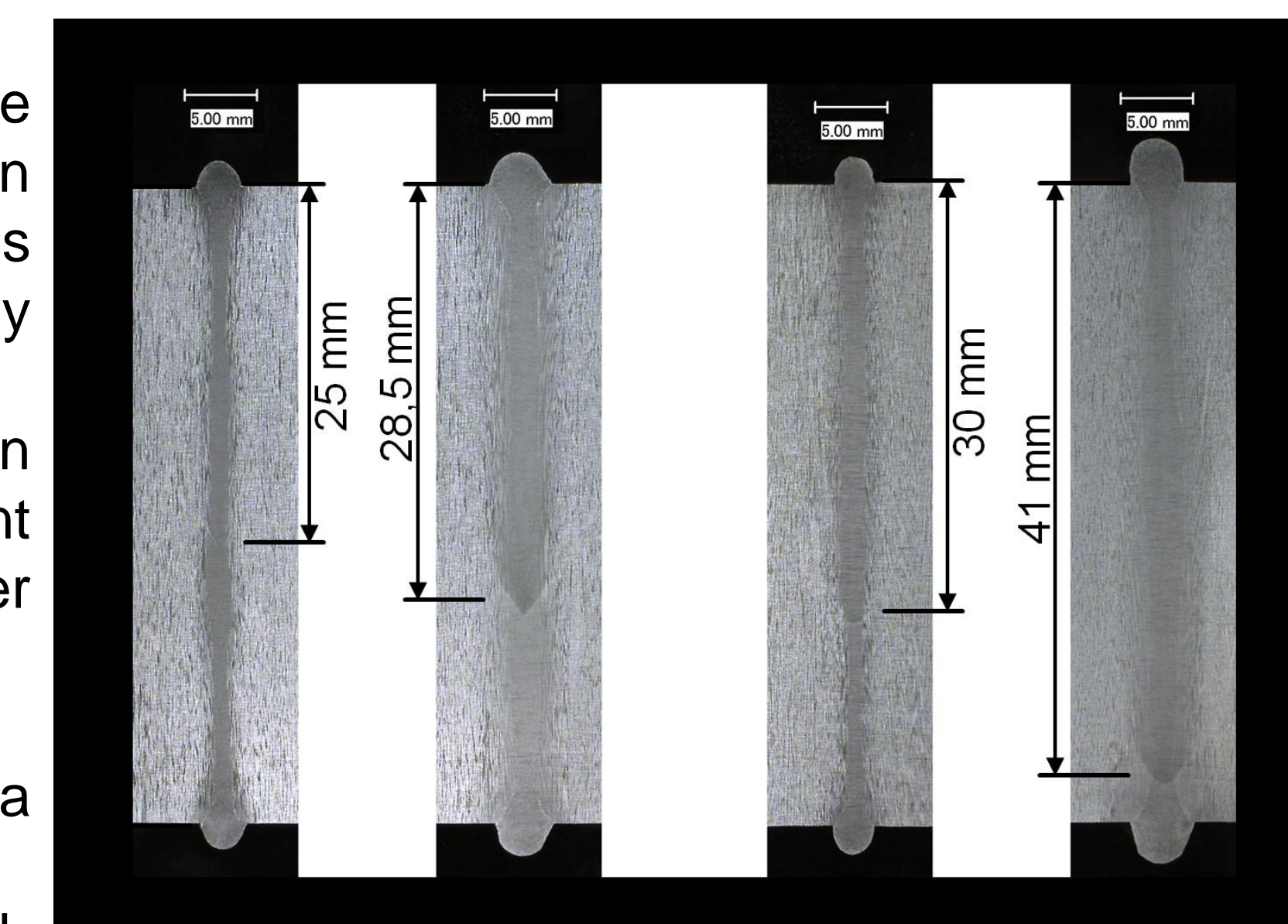
Laser Beam Welding under Vacuum of Heavy Plates

Starting Situation

- In the case of comparable parameters, the penetration depth which the laser beam in atmosphere is capable to achieve is not as deep as the penetration depth achieved by the electron beam.
- The reason is that the evaporation temperature is dependent on the ambient pressure. The lower the pressure, the lesser the required energy for evaporation.

Approach to Solution and Results

- The laser beam has been entered into a vacuum by modifications.
- Possible increase of the penetration depth by 300 %, weldable plate thickness 70 mm.
- Only rough vacuum (10 hPa) required!



High Speed FSW

Motivation

- For conventional Friction Stir Welding (FSW), especially for thicker plates, only a comparatively small welding speed can be realized.
- The reason for that is the principle of the process heat generation only based on the friction between the tool and the workpiece.

Approach and Results

- Support of the FSW-process through additional conductive heating by guiding high current through tool and workpiece.
- With conductive supported FSW the welding parameter field can be enlarged enormously.

