



## MAGNETIC PULSE WELDING BRINGS TOGETHER WHAT BELONGS TOGETHER

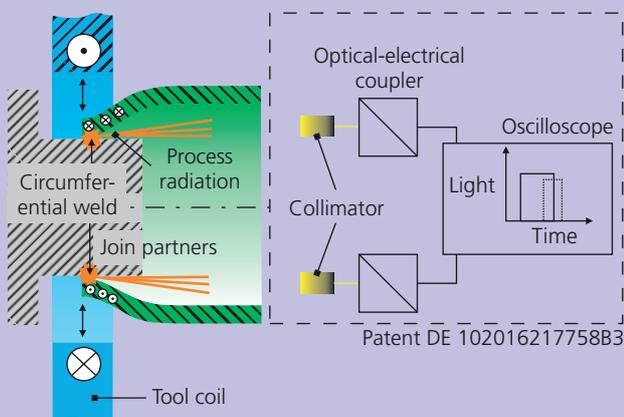
Future multi-material design concepts require material-locking bonding of different metals. Magnetic pulse welding is outstandingly suited for this task, and is therefore increasingly interesting for production planning engineers. Researchers at Fraunhofer IWS now provide a new method for precise welding process monitoring and parameter optimization for this cold-welding process.

Magnetic pulse welding is based on the controlled collision of two joining partners, whereby thermal energy input is clearly lower than in fusion welding. This means that researchers can achieve joint strength values at the level of the weaker base material and avoid brittle intermetallic phases. Strong magnetic fields from 20 to 30 Tesla and process times of a few microseconds complicate the recording of process-relevant physical parameters during magnetic pulse welding. Consequently, adjusting the process has been so far very difficult, and direct metrological monitoring has practically not been possible at all. Engineers at Fraunhofer IWS developed a device to record and

analyze the process flashing phenomenon typical of collision welding processes (patent DE102016217758B3). They have already verified the device's potential in several projects with industrial partners. Its applications range from quickly identifying suitable process parameters to quality assurance in production. The system reliably detects defects in positioning the joining partners or unintentional contaminations of the surfaces to be joined.

- 1 *Flashing luminescence in magnetic pulse welding illuminates the process area.*
- 2 *Magnetic pulse welding is suitable both to fabricate hybrid pipe joints, in this case between steel and aluminum 80 mm in diameter, and to weld metal sheets.*

### Schematic representation – magnetic pulse welding and metrological photoflash measurement



In magnetic pulse welding, controlled collision causes two pieces to be joined in a cold weld. An emerging characteristic flash of light is converted into electrical signals by phototransistors and then evaluated.

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