



IIT Kharagpur



Artificial Intelligence based welding automation

Installed industrial scale welding facilities



Robotic Friction Stir Welding

Salient Features :

- Industry 4.0 enabled FSW machine
- Suitable for **micro-size** jobs & **dissimilar** materials
- **6D force sensor** for monitoring forces and torque in all three directions
- **Current and speed sensors** for monitoring current consumption and variation in rotational and welding speed

Robotic TIG and MIG Welding



Salient Features :

- **Current and voltage sensors** for process monitoring
- **Flow level, flow rate and pressure sensors** for health monitoring
- Capability of welding **similar** and **dissimilar** materials up to 0.5 mm thickness

Robotic Spot Welding

Salient Features :

- **Current, voltage and force sensors** for process monitoring
- Capability of welding **similar** and **dissimilar** materials

3-Axis Job Positioner



Salient Features :

- **One revolving axis**, and **two rotational axes**
- **Payload** of 250 kg
- Capability of moving **in synchronization** with TIG and MIG robots



Robotic Laser Welding



Salient Features :

- **6 kW fiber laser**
- Infrared and optical cameras for process monitoring
- Capability of welding **similar** materials
- Mounted with **cladding head**

Probable solutions based on image processing and artificial intelligence

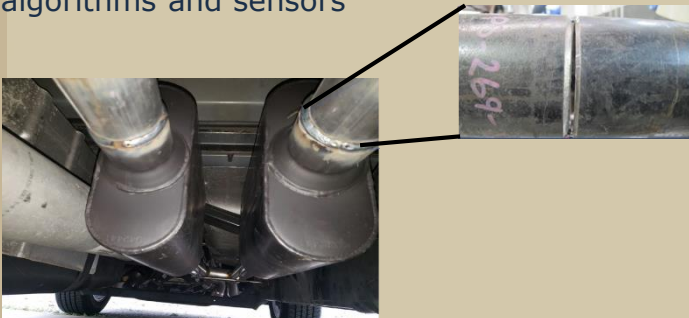
Automated detection of any arbitrary weld path



- Ability to detect various weld profiles using optical and laser sensors

Real time process parameter optimization for gap

- **Real time** weld gap identification and control of process parameters using AI / ML algorithms and sensors

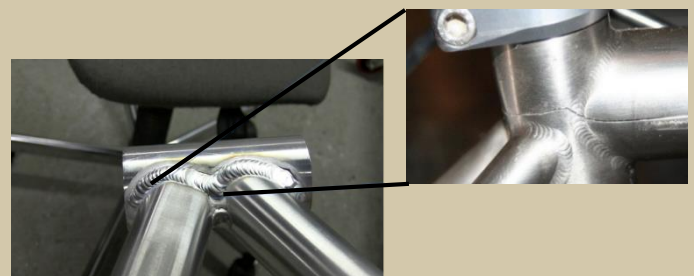


Robot co-existence : TIG & MIG



- **Coordination** between two robots where both TIG and MIG welding are used

Weld defect classification



- Classification of **surface** and **internal** defects using vision and laser sensors and deep learning based model for real time defect monitoring and control

Patents filed on weld defect monitoring and control

- Real-time surface defect analysis and correction in friction stir welding process by image processing (**Patent filed ref. no: 201831035477**)
- Cloud based remote manufacturing with machine learning based real time control, (**Patent filed ref no: 201831024813**)
- A system for real time monitoring, prediction and control of weld quality in friction stir welding (**Patent filed ref. no: 202031000072**)
- Method and system for multi sensor fusion using transform learning (**Patent filed ref. no: 202021036163**)

Reach us :

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