MOTIUS
WE R&D.

Weld Detection

Motius GmbH
December 08, 2025 14:26 (4711561)

Weld Detection

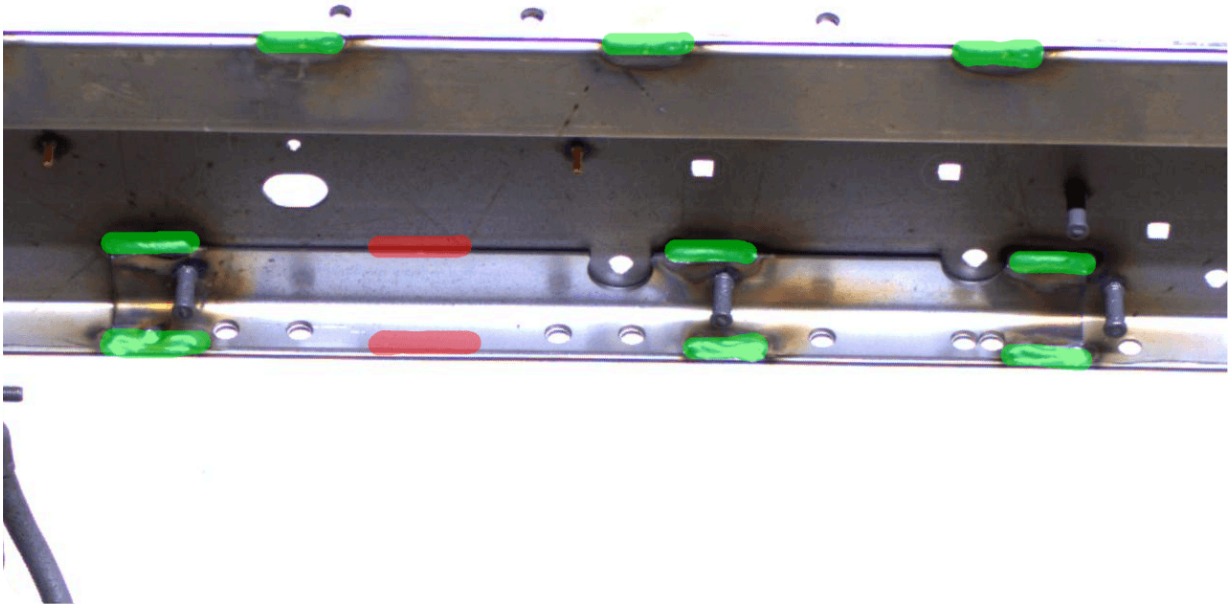
Heavy Machinery | Computer Vision

We developed a reliable computer vision solution for detecting welds on undercarriages and chassis of agricultural machinery. Out system can determine if welds are missing or in the wrong position. By detecting these defects on undercarriages while they were still in their welding fixtures, the time spent on revisions can be cut by 90%.

- **Reliable detection of welds** on large undercarriages to identify **missing or misaligned welds**
- Enabled **early defect detection** while parts were still in welding fixtures, allowing **90% reduction in revision time**.

Approach

A cloud-based Computer Vision model and industrial-grade cameras next to welding tables enabled detection of **missing or misplaced welds** on undercarriages **before they left the welding fixture**, drastically reducing costly rework and delays.



Missing welds on input data marked in red → no match found with the CV algorithm

Computer Vision Solution

- The team trained a **Computer Vision model** to detect welds in equipment imagery
- **We evaluated multiple sensor types** to optimize image capture quality
- Synthetic images **augmented training data** to improve accuracy
- An algorithm compared model predictions to **expected ground truth** weld positions based on CAD/equipment specifications

Cloud Backend Solution

- We built **scalable cloud infrastructure** on Azure
- Users interact with a **customized UI** that also allows monitoring
- Integrated **data analytics** for performance tracking and insights
- Designed a **modular, scalable backend** to support future extensions

Original image	Labeling	Ground truth mask
		

Technologies

- **Blender** for generating photorealistic synthetic data of possible defects
- **YOLO** for Computer Vision during development
- **Azure AI** Vision for production use

Architecture

Application at Your Company

This approach can be applied to smaller components at Your Company as well:

- [ ] **Checking completeness of assemblies**: Detecting whether components were missed during manual assembly steps
- [ ] **Welded assemblies**: Ensuring completeness of complex welded structures, from frames to batteries
- [ ] **Increasing automation** of QA: Reducing manual inspection effort and increasing reliability