Expertise in making

The Comau trademark is Expertise in Making: robots, automation, machines and total solutions delivered as turnkey systems.

Grounded in diverse business realities, we apply key technologies to improve time to market, optimizing capital investment.

We live by the success of our clients.
OUR KEY FIGURES

**Turnover per area**
- NORTH AMERICA: 33%
- EMEA: 36%
- APAC: 19%
- LATAM: 12%

**People**
- Employees: 9300
- Age Average: <40
- Graduate Education +: 1800
- Millennials: 3300
- Certified PMI Project Managers: 200
- Electrification Specialists: >200

**Activities (Last 3 years)**
- Comau #projects: >250
- Comau #product launches: >20
- Client #products with Comau technologies: >150
OUR GLOBAL FOOTPRINT

14 Countries

8 Manufacturing Plants

7 Innovation Centers

5 Digital Hubs
Process Technologies for Battery Assembly

COMAU Technology Integration

LASER SOURCE

ROBOT

WELDING HEAD

PROCESS CONTROL

BIG DATA PLATFORM

COMAU Lhyte

COMAU NJ-Family

COMAU Custom Head

COMAU Hybrid Thermography

COMAU In.Grid
Process Technologies for Battery Assembly

Hardware Selection

- **C5G**
- **Application Software**
- **MIG/MAG Power Source**
- **NJ110 + Robot Dressing**
- **Optical Welding Head**
- **Thermal Cameras**
- **Cameras controller + Local Server**
- **Thermography**
- **Big Data Analysis Server Center**

Software:
- **C5G NJ110 + Robot Dressing**

**Process Technologies**:
- **Hybrid Welding Head**
- **Media Panel**
- **LHYTE**
- **MIG/MAG Power Source**
- **Optical Welding Head**
- **Thermal Cameras**

**Classification Level**: CONFIDENTIAL
### Battery Assembly Process Validation

#### Tab Laser Welding

<table>
<thead>
<tr>
<th>Test</th>
<th>Tensile Strength (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>800</td>
</tr>
<tr>
<td>B</td>
<td>500</td>
</tr>
<tr>
<td>C</td>
<td>800</td>
</tr>
</tbody>
</table>

#### Battery Tab Welding

- ACW2

#### Battery Case & Bus Bar Welding

- BCW1

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**Classification Level:** CONFIDENTIAL
Battery Assembly Process Validation

Temperature on base plate
Max 60 °C

![Temperature on base plate graph]

![Battery Assembly Process Validation diagram]

![Battery Assembly Process Validation text]

Temperature on base plate
Max 60 °C
Hybrid Thermography
Neural network welding analyzer

Giovanni Di Stefano
A customized solution starts from a watchful eye.

Discover MI.RA, the Machine Inspection and Recognition Archetypes by Comau. An intelligent, flexible and customizable industrial vision systems portfolio empowered by Artificial Neural Network.
Hybrid thermography

- Line integration
- IR Acquisition
- GUI
- Analytics
- Report
- Performance

- Trigger from robot or PLC
- Feedback on HMI
- Integration with logistic data
Hybrid thermography

- Line integration
- IR Acquisition
- GUI
- Analytics
- Report
- Performance

- Infrared military cameras
- Low cost cameras
- Melting pool inspection
Hybrid thermography

- Line integration
- IR Acquisition
- GUI
- Analytics
- Report
- Performance

Easy to use interface
Comau family feeling

COMAU Hybrid Thermography

Made in Comau
Hybrid thermography

- Preprocessing
- Features extraction
- Neural network

Line integration
IR Acquisition
GUI
Analytics
Report
Performance
Hybrid thermography

- Line integration
- IR Acquisition
- GUI
- Analytics
- Report
- Performance

- Module/Battery ID Filtering
- Welding ID/Station Filtering
- Feedback result filtering
Hybrid thermography

DATASET
- No defective: 98%
- Defective: 2%

Confusion Matrix
- Target Class: No defect, Defect
- Predicted Class: No defect, Defect

- No defect: 3471, 3
- Defect: 241, 46

Conservative approach: prefer to predict more samples as defective

Accuracy: 94%
COMAU
Motor behind imagination