TRUMPF Smart Factory

TRUCONNECT - INDUSTRY 4.0

TruConnect Team
TRUMPF is...

Family business since 1923

Close to its customers with 73 subsidiaries

Technology leader in two business divisions

Innovation promise – holistically and constantly
Megatrend Digitization

Papal election 2005

Papal election 2013
Connectivity is creating new business opportunities

50 billion connected „things“ in 2020

Source: Cisco
The 4 Industrial Revolutions

1.0
Mechanization
by introducing mechanical production facilities using water and steam power

End of 18th century

2.0
Electrification and mass production
by labor-sharing serial production using electric energy

End of 19th century

3.0
Digitization and automation
by using CNC technology to further automate production

Beginning 70's

4.0
Digital Networking
through computerization of manufacturing technology and the development of digital business platforms

Today

Smart Factory
The smart phone – networking at 4 levels
Unlimited possibilities thanks to intelligent data exchange

Level 1: Sensors/actuators (GPS, camera, motion sensor, touchscreen) record data and enable interaction.

Level 2: The smartphone processes data such as photos, videos, scans or music files and enables an abundance of apps.

Level 3: In private environments, the smartphone interacts with other devices and exchanges data via apps.

Level 4: The society is increasingly networked in integrated systems that include everything from shopping to logistics and means of transport to social media.

Image source: Apple
The Smart Factory – networking at 4 levels
Intelligent data exchange provides unlimited possibilities

Level 4: All partners involved in the value chain have their business processes networked in a single ecosystem via suitable platform solutions.

Level 3: Machines, work pieces and software services communicate with one another in the factory and provide transparency over all process steps.

Level 2: Machines incorporate data to form an adaptive system that guarantees robust, customized and self-sufficient machining processes.

Level 1: A multitude of data is collected by sensors/actuators to optimize machine operation.
Need for action in sheet metal fabrication is increasing
Motivation for Industry 4.0/Typical customer statements

"I will never change my software solutions...
...you'd have to provide me with a comprehensive solution to get me to do that."

"It'd be really useful to know where my jobs are in real time."

"My average lead time is ten days...
...a part only spends 60 seconds of that time in the laser machine."

"Offer preparation takes too much time."

"Standard sequence planning is becoming less and less useful. Things turn out differently than planned anyways!"

"I've digitized nearly all of my processes.
But I have to resort to printing again just to negotiate the interfaces."

Technology change
Costs on the rise
Increasingly smaller lot sizes
Increasingly shorter response times
Documentation obligation increasing
Example: Trend towards smaller lot sizes...
Customer challenges outside of the machines
Many challenges in the indirect processes independent of manufacturing

= Challenge
TruConnect
Your Smart Factory

Solution = Hardware + Software + Service

Your solution provider for the Smart Factory in the sheet metal world.
To the Smart Factory level: Step by step

Start easy
Easy tools facilitate the work

Tailor step by step
Individual solutions based on consulting

Fully connected
The complete Smart Factory

Start easy, then tailor for individual customer success
Step 1: Easy tools facilitate the work

**Benefit**

- Immediately detect events of malfunction
- Increase machine utilization rate
- Transparency of production status
- Enabling active shopfloor management
- Historical data shows comprehensible effect of changes
- Available capacity can be utilized efficiently

→ **Starting with easy to implement products leads to positive effect**
Step 2: Individual solutions including consulting

Benefits

- Tailored potential analysis
- Custom-made solutions
- Benefit oriented consulting
- Developed especially for sheet metal fabrication
- Modular implementation
- Intensive support of TRUMPF and partners from consulting to implementation
Step 3: The complete Smart Factory

Benefits

- Complete solution from one source
- Consideration of all specific requirements of the sheet metal world because of TRUMPF know-how
- Strong alliance of TRUMPF and partner companies
- Planning based on optimal overall process
- Safeguarding of compatibility of all installed machines and software products
- Intensive support of TRUMPF and partners from consulting to implementation
TRUMPF Smart Factory Chicago
# Vision of the TRUMPF Smart Factory

## Process Focus
Focus on entire customer process. Demonstration of all Industry 4.0 solutions of TRUMPF & Partners

## Solution Provider
Consulting on entire solutions with specialized team and enhanced disciplines.

## Trigger for Development
Continuous, direct customer feedback on issues and solutions on live system.
TRUMPF Smart Factory Building

Factory with Catwalk

Lobby

Control Center

Offices and Auditorium
The Factory
The Factory Layout
The Factory Layout - Equipment

- **TruBend Center 7030**: Semi-automatic panel bending
- **TruBend 5130**: Flow with manual processes
- **TruBend 7036**: Flow with manual processes
- **TruBend Cell 5000**: Automatic bending
- **TruLaser Center 7030**: Full-service laser machine
- **TruLaser 5030 fiber + LiftMaster Compact + PartMaster**: Small automated cell
- **TruLaser Weld 5000**: Complete process chain
- **TruLaser 5030 fiber + LiftMaster Compact + PartMaster**: Small automated cell
- **TruMark Station 7000**: Complete process chain
- **TruPrint 1000**: Complete process chain
- **TruMatic 6000 fiber + SheetMaster**: Automatic cutting with sorting
- **TruPrint 1000**: Complete process chain
- **TruPrint 1000**: Complete process chain
- **Picking Tower**: Stacking raw material in the right order for processing
- **Full Logistics Center**: State of the art storage system

Logistics solutions, supplemental processes

Commissioning, Quality Inspection, Deburring

- **Cutting Bending Welding Marking / Printing Logistics / other processes**
Control Center for full transparency and control
Digital shop floor for live system and process information
Live machine status, order tracking and production queue
Live machine status, order tracking and production queue
### Smart Factory Solutions

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<th>TruTops Fab</th>
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<th>Sorting Assistant</th>
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<tr>
<td>TruTops Fab App</td>
<td>Condition Guide</td>
<td>BeSpoon live tracking</td>
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<td>Smart Glasses</td>
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<td>Visual Online Service</td>
<td>VarioCarts</td>
<td>LISSMAC, Virtek</td>
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The entire process is managed by Axoom and TruTops Fab