Smart #1 SMT Factory
Our Smart Move to Industry 4.0
Sunil Chhabra, ASM Assembly Systems
Agenda - Industry 4.0 and the Smart #1 SMT Factory

- Introduction Industry 4.0
- Industry 4.0 vs. Smart Factory
- Smart #1 SMT Factory – Our Solutions for …
- Summary
What is Industry 4.0?

Is it a Product ???

Is it a System ???

Industry 4.0 is a campaign
What are the factors influencing Industry 4.0?

Higher quality requirements for production processes and products
- Higher safety standards
  - e.g. driver assistance systems

Increasing demand for individualized products
- Automotive industry
- IT industry with servers, PCs,...

Shorter product lifecycles
- Shorter innovation cycles
- Higher complexity of products
Is Industry 4.0 limited to the order or manufacturing process?

Industry 4.0 shall not be limited to the manufacturing process

Use of new media after the manufacturing process

- Finished and shipped products and systems communicate with the manufacturer and send status and trouble reports
- The manufacturer can start processing returns from the field before the products actually arrive ...
Industry 4.0, Industrial Internet, IoT, Smart Factory – any difference?
Introduction Industry 4.0

Industry 4.0 vs. Smart Factory

Smart #1 SMT Factory – Our Solutions for …

Summary
Seeing the competitive advantage through the Hype: Smart SMT Factories in the age of Industry 4.0

Smart SMT Factories

- **Innovation drivers**
  - Best in class equipment
  - Reducing manual work for smart operators
  - Zero defects
  - Automated material supply

- **Innovative software systems**
  - Advanced production capabilities
  - Automation
  - Process integration
  - Material logistics

- **Smart supply chain**

- **Smart SMT factory**

- **Smart end customer**

**INDUSTRY 4.0**

- Social media
- BIG DATA
- Cooperative robotics
- Cyber-physical systems
- Cloud computing
- Internet of things
- Wearables

**ADVANCED PRODUCTION CAPABILITIES**

**AUTOMATION**

**PROCESS INTEGRATION**

**MATERIAL LOGISTICS**

**Smart supply chain**

**Data**

**Material**

**Smart SMT factory**

**Products**

**Data**

**Smart end customer**

**1 2 3 4**

**10/21/2017**

ASM Assembly Systems
How does an ideal communication with Cyber-Physical Systems look like?

**Vision of Industry 4.0**

- Product or component features all **necessary information** for its production requirements
- Self-organization of networked production facilities taking the entire value chain into account
- Production process is planned **flexibly**, based on the current situation

Decentralized Cyber-Physical Systems communicate and interact with each other via embedded and internet-based technologies.
Industry 4.0 – understanding “Smart Factory”

1. Multi CPS, working interactively
   – Fully Process Control & optimal balance among Throughput, Quality and Inventory.

2. Integrated System which has capability to Learn & Improve
   – continuous process optimization among different systems

3. Pre-defined logics with Expert Knowledge
   – able to handle process Variants

4. Closed loop Control in single production step
   – long-term, reliable process

5. All Repeated Processes which can be automated
   – Throughput and Quality

6. All Manual Work which has to be done by people
   – the most cost-effective way
Factory Overview
– Walk through the process flow of a factory
Smart Factory
Mapping the Level of each Process Step
Smart #1 SMT Factory
Re-optimize the Process, fit the Product into the Process
Smart #1 SMT Factory
Re-optimize the Process, fit the Product into the Process
System Integration
Unified and defined interfaces for all products and business logic

Past
- Each application is made for specific version of our interfaces
- Different technology (COM, .NET, database views, files)
- Missing technical features (eventing, LineControl, material control)

Today
- Development only based on OIB services (Based on Service Oriented Architecture and Standard Web Services WS*)
- Unified interfaces for all products
- Less complexity of integration projects
- Clear integration for good service support
Remote Smart Factory Connectivity

Suppliers Site

Central Server

Service Ticket

Service Cockpit

Customer Site

Customer LAN

Machine LAN

Plug&Work box

Service Request

Customer Cockpit
Prerequisites for implementing Industry 4.0 in a smart factory

Suitable and standard interfaces for networking

- Machines and systems from different vendors
- Workpieces
- Material logistics
- People

Proper identification of workpieces and end devices

- For example, RFIDs with ability to store information locally

Only standard interfaces of workpieces and machines allow seamless integration.
Prerequisites for implementing Industry 4.0 in a smart factory

Suitable human interfaces

- Web Browser based User Interfaces
- Consideration of mobile devices
- Google glass
- Voice and gesture controls
- ...

Flexible production equipment

Fast setup and changeover capabilities

- Allow production of jobs with small lot sizes
- Enable quick changeovers
- ...

Mobile devices will play a major role in a smart factory to allow immediate reaction; independent from the current location.
Prerequisites for implementing Industry 4.0 in a smart factory

**Ability to rapidly process large amounts of data**
- Display important information in real time

**Cloud capability**
- Hosting of data and applications on virtual servers
- Avoid having to build your own IT infrastructure
- Allow implementation for small and medium size companies

**Data security**
- Prevent unauthorized access to sensitive company data

IT systems need to be able to process much more data than today. Ensuring data security will be a major challenge with today's Internet based communication.
Industry 4.0 and a Smart #1 SMT Factory

Introduction Industry 4.0

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Smart #1 SMT Factory – Our Solutions for …

Summary
Innovation Fields are the base for the Smart #1 SMT Factory

Get the Proof: We are on the Smart Move!
Our Roadmap is focusing on the Smart #1 SMT Factory

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<thead>
<tr>
<th>ADVANCED PRODUCTION CAPABILITIES</th>
<th>SPEED, ACCURACY, SCALABILITY</th>
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<tr>
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<td>Best-in-class equipment</td>
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<td>MATERIAL LOGISTICS</td>
<td>AUTOMATED MATERIAL SUPPLY</td>
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<td>From store to pick-up position</td>
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Powerful solutions for your electronic production

DEK PRINTING SOLUTIONS
COMPLETELY MODULAR

ASM ProcessExpert
OPTIMIZES AUTOMATICALLY

SOFTWARE
FOR ALL WORKFLOWS

SIPLACE PLACEMENT SOLUTIONS
HIGHLY PRECISE AND SUPER FAST

ADVANCED PRODUCTION CAPABILITIES

SPEED, ACCURACY, SCALABILITY
Best-in-class equipment
Boost your productivity with smart operators

- DEK ProFlow ATx
  FOR STABLE PRINTING PROCESSES

- SIPLACE Material Manager
  100% VISIBILITY OF ALL SMT PARTS IN YOUR FACTORY

- SIPLACE Vision System
  TEACHING ON THE LINE

- SIPLACE Smart Pin Support
  PERFECT SUPPORT ACROSS THE BOARD

- SIPLACE Line Monitor
  TOTAL TRANSPARENCY

- SIPLACE MATERIAL Tower
  MATERIAL PROVISION DIRECTLY ON THE LINE

- SIPLACE X-Feeder
  INTELLIGENT AND RELIABLE

- SIPLACE BulkFeeder X
  NO TAPE; NO SPLICING

FLEXIBLE SETUP CONCEPTS FOR ALL APPLICATIONS

REDUCE MANUAL WORK AT LINE
Less but smarter operators
**ProcessExpert:**
Enter a new dimension

ASM ProcessExpert

**OPTIMIZES AUTOMATICALLY**

The ASM ProcessExpert is the world’s first self-learning inline expert system for electronics manufacturing. SMT lines learn and optimize themselves.

For printing parameters like:
- XY correction
- Cleaning cycle
- Print speed
- Print pressure
- Separation speed
...

(*) Design for Manufacturability

**SMART PROCESS CONTROL**

“Zero” defects
Production processes and material management perfectly synchronized.
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**Smart #1 SMT Factory – Our Solutions for…**

**Industry 4.0 vs. Smart Factory**

**Introduction Industry 4.0**
Vision of Industry 4.0 in a Factory
Self-optimizing production processes

**Today**
Automation of production processes

**Future**
Optimization of production processes by innovative software systems and technologies

**Vision**
Self-optimization of entire production by cyber-physical systems

Implementation of Industry 4.0
Thank You

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