Plastics & the New Industrial Revolution
New business models with remote maintenance

Andrew Cowey – Head of Digitalisation
Digitalization changes everything.
Our customers have essential requirements – throughout the manufacturing industry

- Speed
- Flexibility
- Quality
- Efficiency

Security

Driving the Digital Enterprise for discrete industries
Digital Enterprise is our portfolio of solutions for the digital transformation – in both discrete industry and process industry.
Integrating and digitalizing the entire value chain is key to staying competitive in the future.
Integrating and digitalizing the entire value chain is key to staying competitive in the future.
Integrating technical domains into ONE data model

Digital Twin of the product

Digital Twin of the production process

Digital Twin of the equipment

Driving the Digital Enterprise for discrete industries
Publishing the optimized Digital Twin to all stakeholders, including suppliers, with the collaboration platform Teamcenter.
Our holistic approach
Specific for end customers and machine builders
Holistic approach
Specific for end customers
Realizing innovation with 3D simulation
Human simulation to simulate, analyze, and optimize assembly processes and ergonomics
Simulate, visualize, analyze, and optimize production systems and logistics processes
Mechatronics Engineering and Virtual Commissioning

1. Product design
2. Production planning
3. Production engineering
4. Production execution
5. Services

Digital Twin of SIMATIC S7-1500

Driving the Digital Enterprise for discrete industries
Efficient engineering of all automation components using the TIA Portal

| Product design | Production planning | Production engineering | Production execution | Services |

Driving the Digital Enterprise for discrete industries
MES and TIA coordinate the manufacture of individualized products.
Plant performance with MindSphere

Digital Performance Twin

Digital Product Twin

Digital Production Twin

IDEATION

REALIZATION

Lifecycle and Data Analytics

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Driving the Digital Enterprise for discrete industries
With Siemens’ integrated technologies, Maserati was able to reduce development time considerably while increasing production output.

- **Reduction in development time**: 30% shorter development time
- **Close integration of suppliers**
- **Enhanced output**: Ghibli available in 70,000 combinations
- **Increased production**: 3 times more cars produced than before
- **Integration**: Integration of two new assembly lines into existing factory

**Product design**
- NX CAD
- NX CAE
- LMS
- CD-adapco Star-CCM+
- Teamcenter

**Production planning**
- Tecnomatix Teamcenter

**Production engineering**
- SIMATIC

**Production execution**
- SIMATIC
- SIMATIC IT
- SINUMERIK
- SCALANCE
- SITOP
- SIRIUS

**Services**
- Uptime
- and sparepart services

Driving the Digital Enterprise for discrete industries
# Holistic approach for machine builders

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<th>Step</th>
<th>Stage</th>
<th>Description</th>
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<td>Machine concept</td>
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<td>2</td>
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Driving the Digital Enterprise for discrete industries
Machine concept with Mechatronics Concept Designer

1. Machine concept
2. Machine engineering
3. Machine commissioning
4. Machine operation
5. Machine services

Driving the Digital Enterprise for discrete industries
More efficiency in machine building for the plastics industry

Plastics Toolbox: digital solutions for standard applications

**MOT – technological motion control**
This block provides technological motion control functions. It facilitates high-precision, granular positioning of electric and hydraulic axes, including with a synchronous operation function.

**PCO – wall thickness control**
The PCO block implements the position control technology required to regulate wall thickness. In blow molding machines, it is used for precise control of the desired tube profile. The moisture supports both machines with continuous material feed and accumulator feed machines. Additional functions, such as tube length and fill level control, round off the practical functionality of this block.

**DRV – drive package for extruders**
The DRV block makes it possible to control and regulate any number of extruders. It includes all the required monitoring and control functions and facilitates synchronous speed adjustment and/or synchronous throughput or pressure control of several linked extruders where required.

**TCP – high-precision temperature control**
The TCP temperature control package ensures high-precision temperature control and is optimized for the requirements of the plastics industry. It offers an outstanding level of control accuracy for heating and cooling processes and integrates all the key-monitoring functions, such as automatic controller optimization, coolant monitoring, group switching, and startup timer, and other important functions.

**ACL – configurable sequence control**
Beyond the basic functionality of the blocks and standard applications that have already been created, developers at Siemens' application center in Cologne are currently working on a block for flexible sequence control of cyclic processes: a modular and configurable automatic cycle. The integrated, step-based sequence system is scalable and can even be configured via the operating system where required. This allows the definition of flexible machine sequences that are adapted to suit the product – with a greatly reduced development time for the overall system.

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**1 Machine concept**

**2 Machine engineering**

**3 Machine commissioning**

**4 Machine operation**

**5 Machine services**

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Driving the Digital Enterprise for discrete industries
Machine engineering with Automation Designer and PLC code generation for TIA Portal

1 Machine concept
2 Machine engineering
3 Machine commissioning
4 Machine operation
5 Machine services

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Driving the Digital Enterprise for discrete industries
Machine commissioning with Mechatronics Concept Designer and PLCSim Advanced

Digital Twin of SIMATIC S7-1500

1 Machine concept 2 Machine engineering 3 Machine commissioning 4 Machine operation 5 Machine services

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Machine operation with the TIA portfolio

1. Machine concept
2. Machine engineering
3. Machine commissioning
4. Machine operation
5. Machine services
Geiss was able to introduce the first thermoforming machine driven by servomotors – smaller footprint, optimized processes, shorter cycle times, and reduced energy consumption.

- Faster commissioning and installation
- Higher product quality
- Reduced energy consumption. Productivity Cycle times reduced up to 50%

1. Machine concept
2. Machine engineering
3. Machine commissioning
4. Machine operation
5. Machine services

Driving the Digital Enterprise for discrete industries
MindSphere enables customers to create new data-driven services in only two easy steps

**STEP 1: Connect**
Get MindSphere user-account, receive and integrate Connector Box into machine / equipment

**STEP 2: Configure**
Configure data acquisition, connectivity and Visual Analyzer via MindSphere

**Run the Service**
Monitor e.g. health status of all assets in MindSphere with Fleet Manager and drill into details using Visual Analyzer
MindSphere – The cloud-based, open Internet of Things ecosystem

### MindApps
- Asset transparency and analytical insights, e.g. predictive maintenance
- Subscription based pricing model
- Fleet management

### MindSphere
- Open interface for development of customer specific apps (MindApps)
- Various cloud infrastructures: Public, private or on-premise

### MindConnect
- Open standards (e.g. OPC UA) for connectivity (also to 3rd party products)
- Plug and play connection of Siemens products

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Optimized performance of assets, energy and resource consumption, maintenance, services ...
MindSphere Open Partner Ecosystem

Exemplary Set of Partners

Predefined Partner Roles

- Consulting/Strategy Partners
- Connectivity Developer
- Application Developer
- Technology Provider
- System Integrator
- Iaas Provider
**Gehring**

**Profile**
- Globally operating machine tool company in the area of honing technology (market leader)
- Technicians support located in China, Brazil, India, the USA, France and Germany

**Challenge**
- Digital Service Vision: “We want to convince our customer of the value of our services worldwide.”

**Solution**
- Connection of machines via S7
- 6 Data Points on Honing machine (End customer Weber Automotive)
- Data Point Sampling range 30 sec
- Creation of rules for failure alarming at Fleet Manager / Visual Analyzer at MindSphere

**Customer benefit**
- Out-of-the-box digital service offering for end-customers
- Insights about usage of machines
Digital Enterprise Suite – Siemens’ answer to digital transformation

- MindSphere
- Totally Integrated Automation
- Product Lifecycle Management
- Teamcenter
- Manufacturing Operations Management

Cloud-based, open IoT ecosystem: MindSphere

Driving the Digital Enterprise for discrete industries
Plastics

& the

New Industrial Revolution

Thank you

siemens.com/plastics