SIEMENS

Elio Bergamaschi, Business Development Manager

Dal software all'automazione attraverso uno sviluppo integrato multidisciplinare

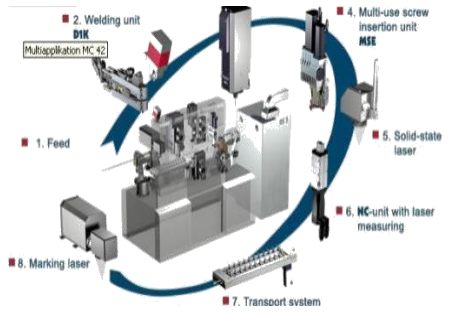
Decisioni Intelligenti, Macchine dedicate, Prodotti Migliori

Agenda

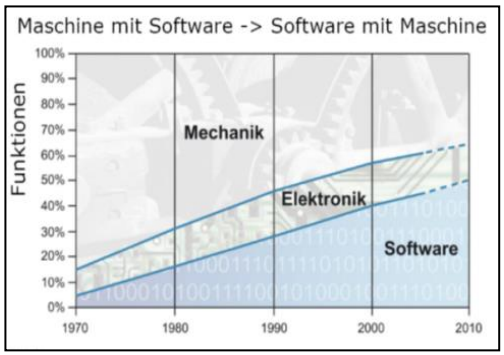
- **Market overview & challenges**
- How to build Mission-Driven Machines
  - Effectively managing design complexity
  - Enable complete product information visibility
  - Integrated development & production processes
- Bringing it all together: Achieving Advanced Machine Engineering
- Success with Siemens

Industrial Machinery Industry Challenges

Product configurations

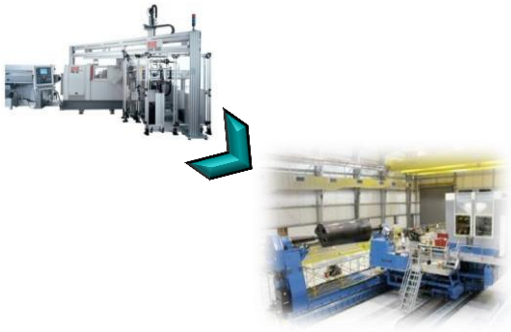


Increasing automation

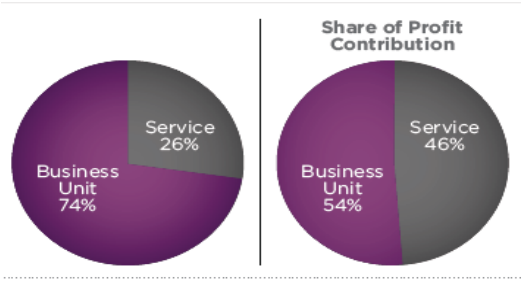


Energy and safety

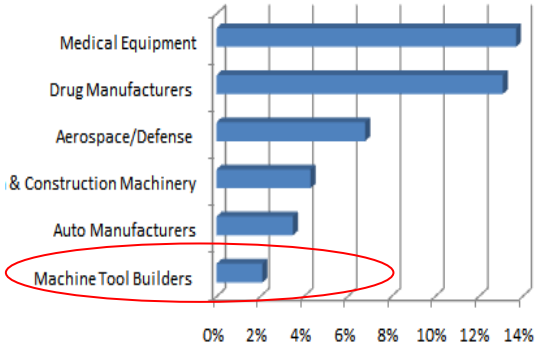
Turnkey Solution Integration



Service Profitability

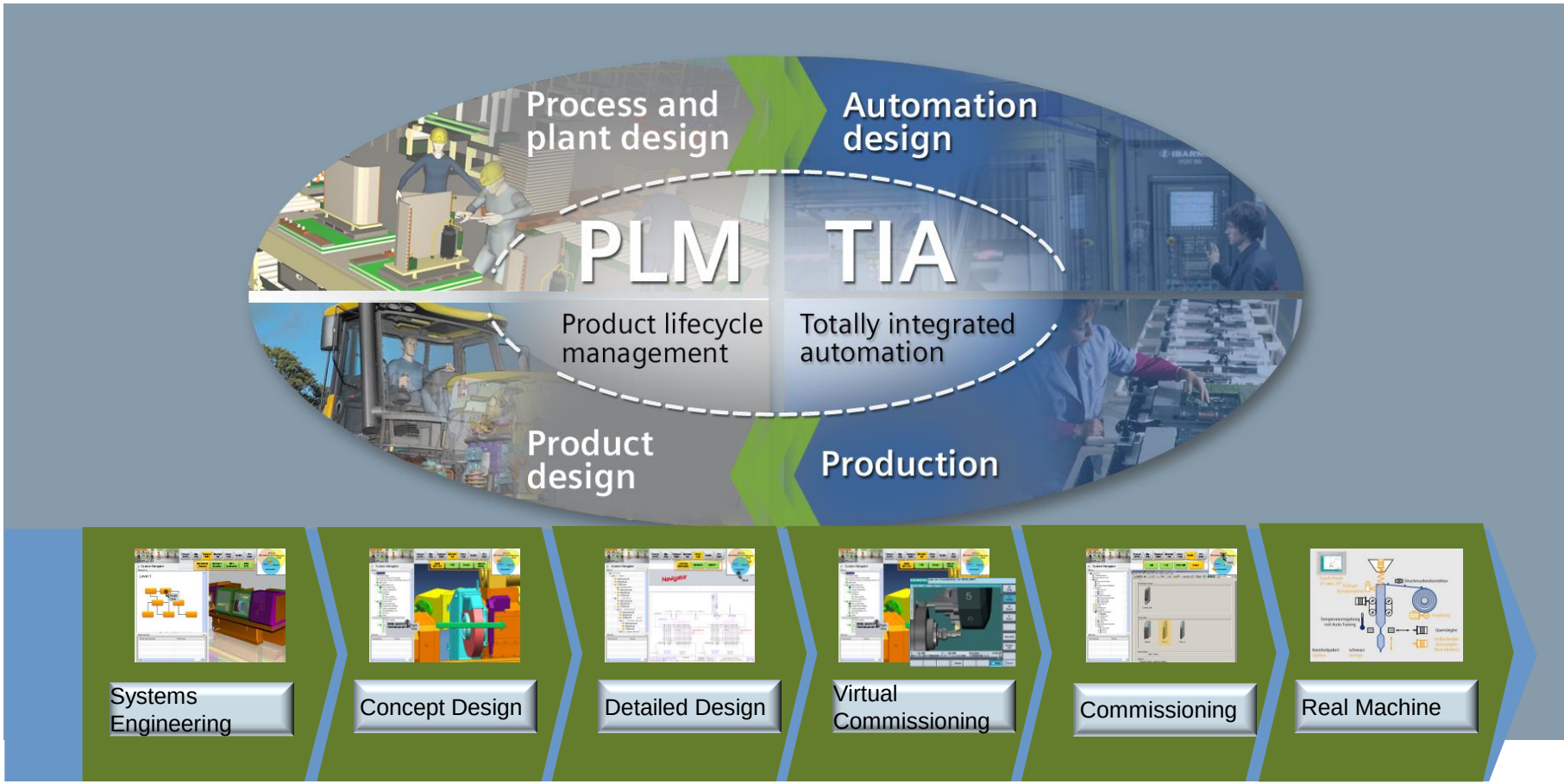


Low Profit Margins



Advanced machine engineering is possible through integration of the product and production lifecycles

Only Siemens can provide this



Faster “time to market” through focus on productivity, flexibility and efficiency

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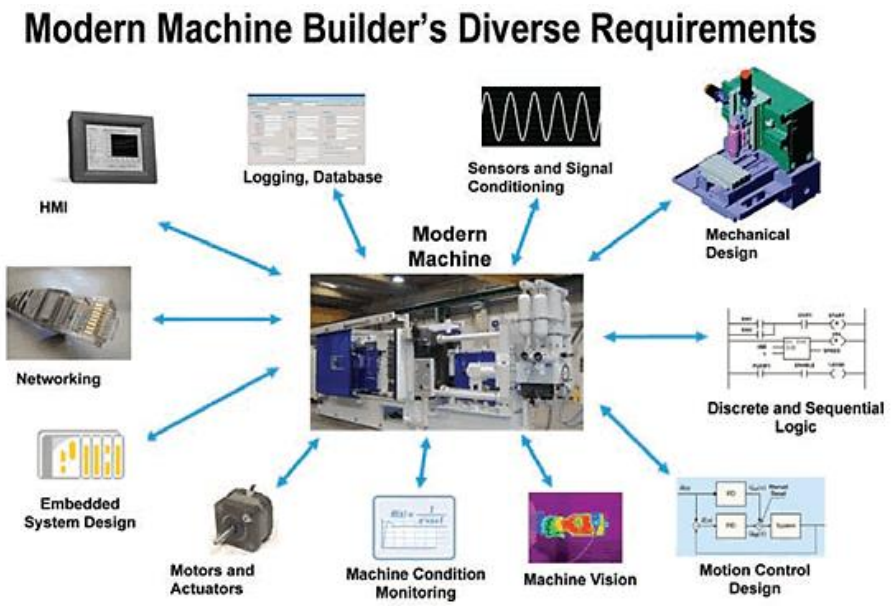
Why is designing a machine so complex?

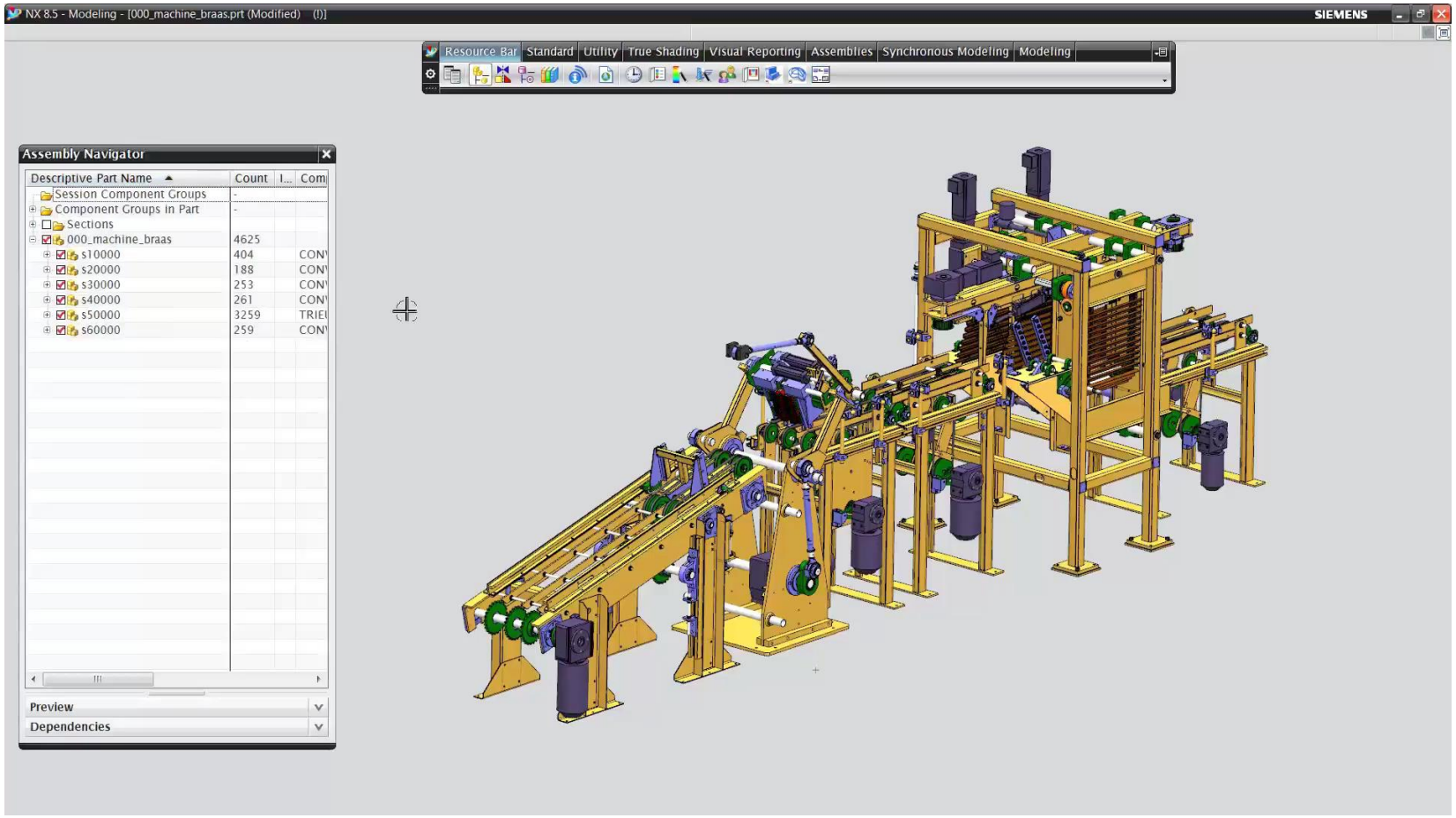


- Machine integration into complex production systems
- High performance achieved by complex drive control
- Increased use of electrical drives & functions
- Exploding number of machine axis to meet customer needs
- Multiplication of machine configurations to address markets
- Tougher, heterogenous safety & environmental legislation

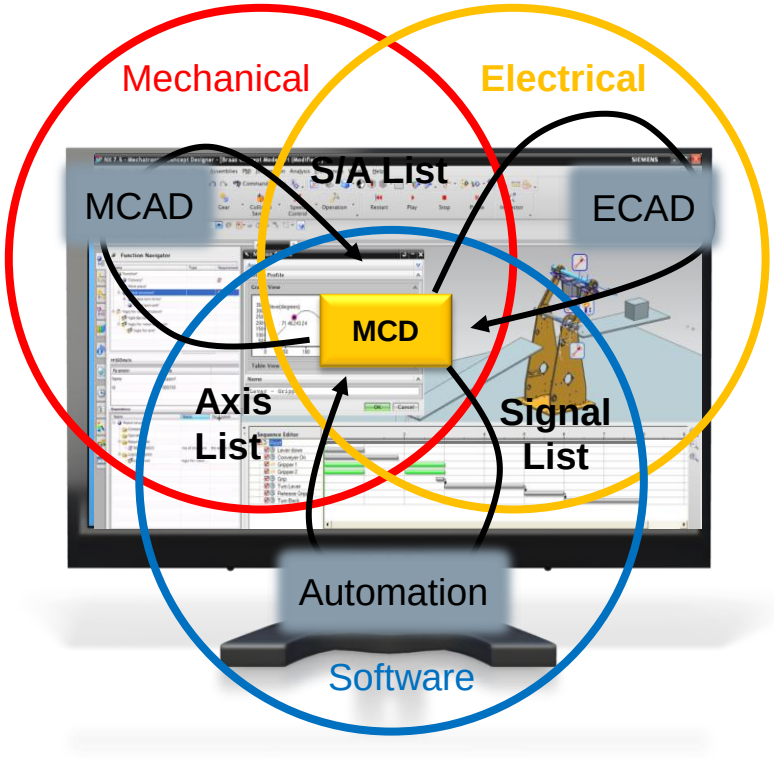
Source: National instruments via desktopengineering.com

Effectively manage design complexity

What does HD3D look like in industrial machinery?



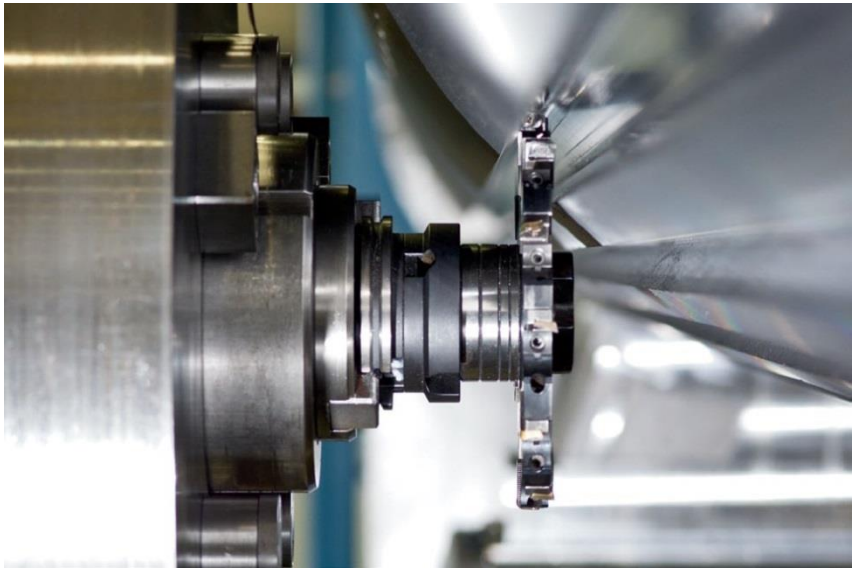
Effectively managing design complexity
NX Mechatronics Concept Designer (MCD)



- Unify requirements and enable systems engineering
- Select & size motors
- Electrical design with consistent sensors & actuators
- Create and validate electronic cams
- Create automation program based on sequence diagram
- Validate PLC program and co-simulation
- Validate simple NC operations

Effectively managing design complexity
Benefits

- Achieve early concept and mechatronic validation
- Reduce physical prototypes and validate early, validate often
- Enhance/enable multi-disciplinary collaboration



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Complete product information visibility

Capture, manage and share all this information and their dependencies within a single environment

Complete product information visibility

What If You Could Optimize These Attributes Across the Organization?

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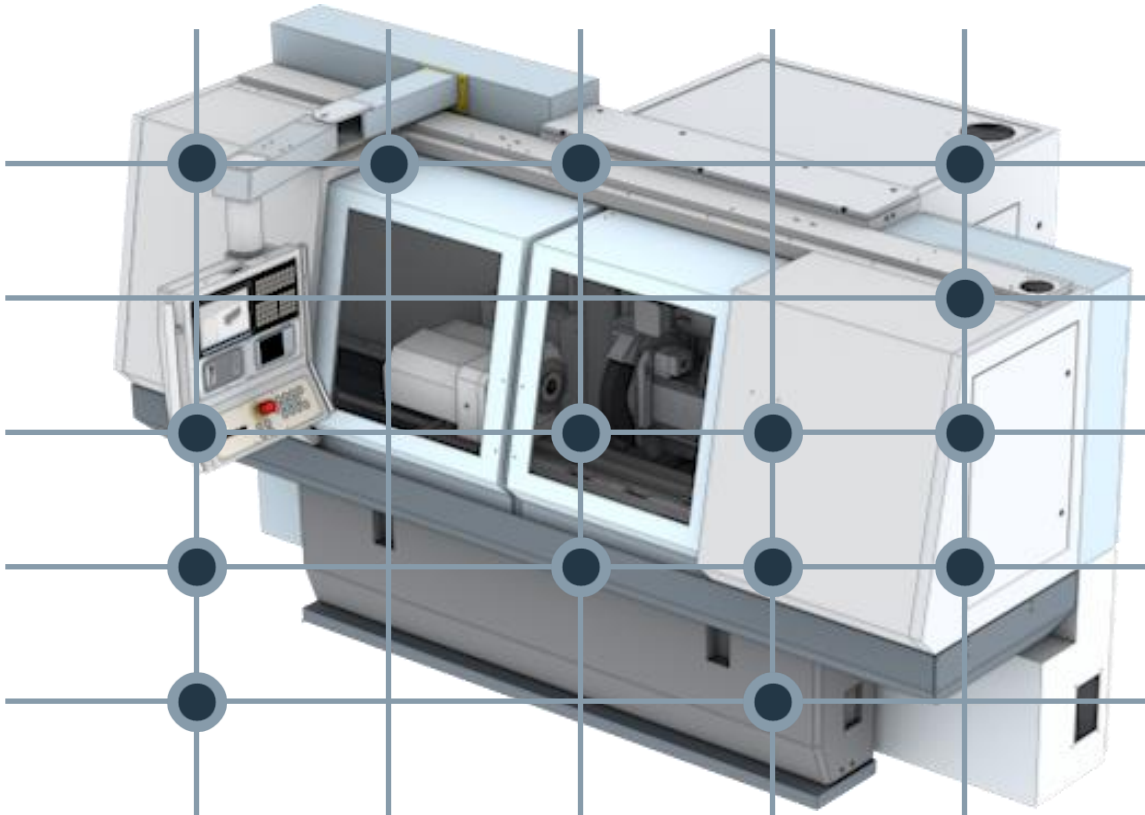


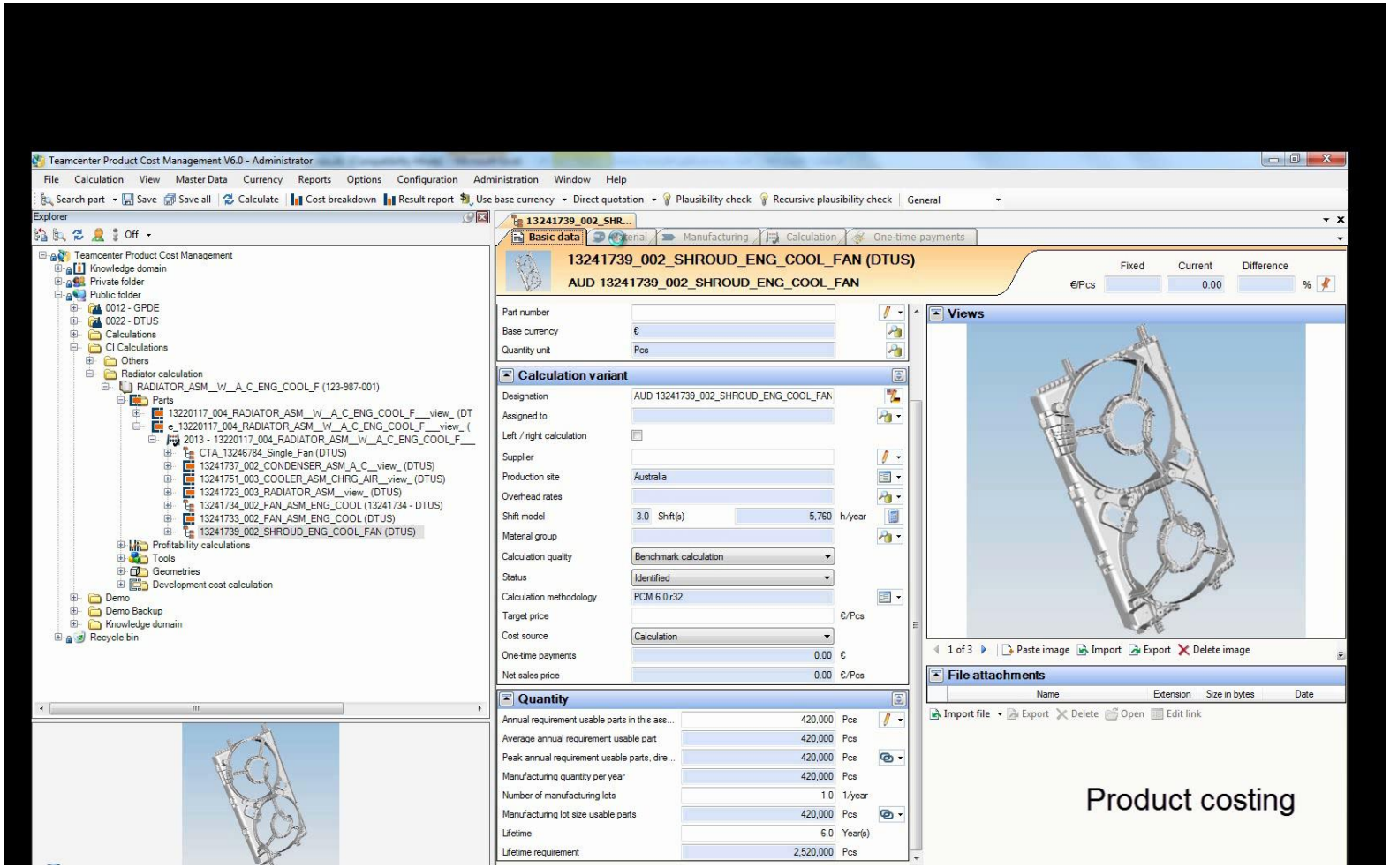
- NVH and Acoustics
- Durability
- Energy Management
- Safety
- Motion Dynamics

Automation Controls | Machine Frame | Drives | Electrical & Fluids | Full Machine

Multi-attribute balancing Machine integration

Complete product information visibility

How do I have visibility into my product costs?



Complete product information visibility
BOM & Configuration Management

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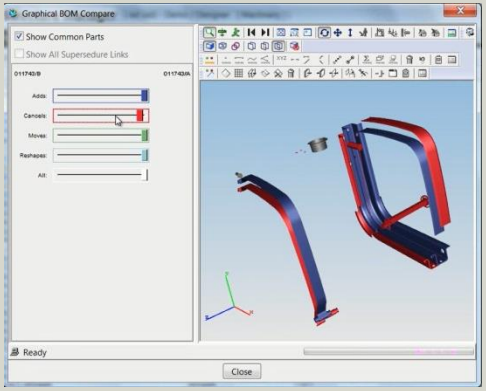
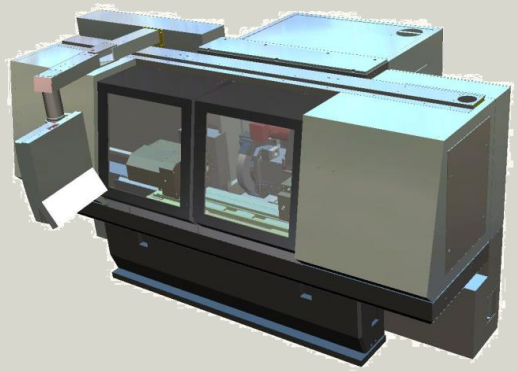
Define and Configure



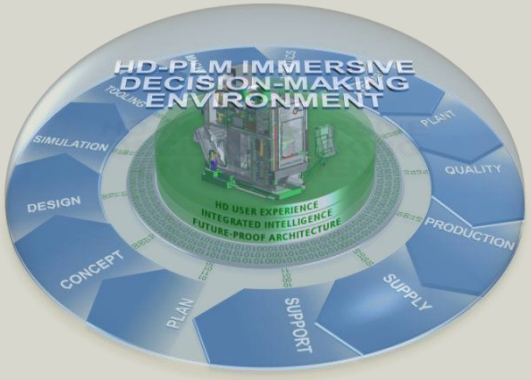
- Complete, accurate BOM definition
- BOM configuration management
- BOM analysis

Work in Context



- Flexible views of the BOM
- Context specific data and processes
- Digital validation

Extend BOM Support



- Virtual & physical alignment
- Leverage the BOM downstream
- Enterprise application integrations

Complete product information visibility

Integrated multi-domain tools and processes

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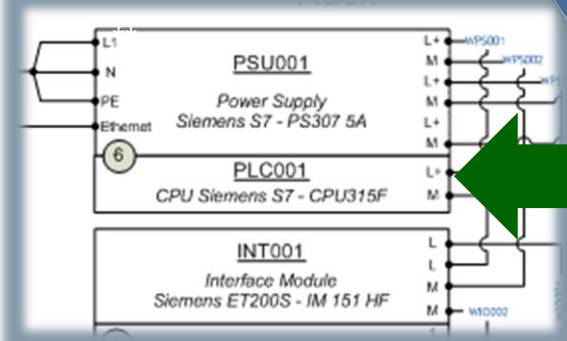
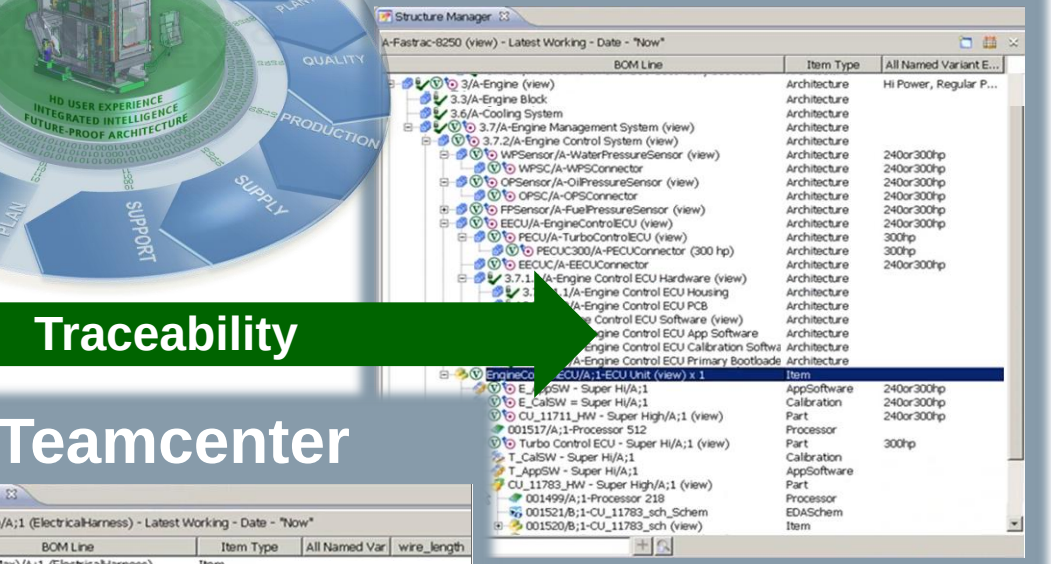
Direct integration
for electrical analysis

** ePLAN

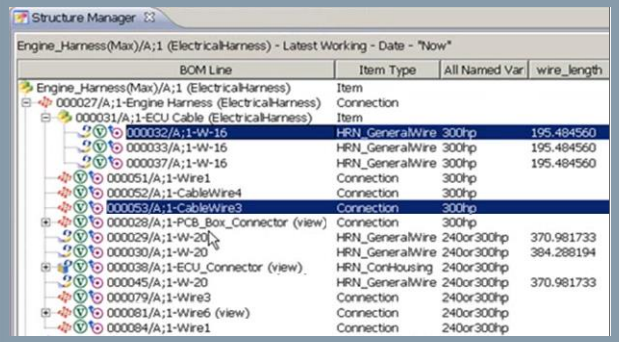


Traceability

Teamcenter



Teamcenter



Direct integration
Export Logical

Whole product BoM:

- Mechanical
- Electronics
- Software

Enable complete product information visibility
Benefits

- **Achieve rapid, smarter decision making**
- **Ensure alignment between the projects and the high level strategy of the company**
- **Reduce development, delivery risk, and costs**

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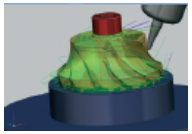
Integrated development & production processes

Part Manufacturing (End Customer)

Machine Building (OEM)

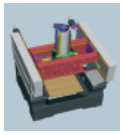
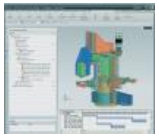
Systems Engineering | Concept Design | Detailed Design (MCAD / ECAD / Automation) | Commissioning | Training | Commissioning of part | Service

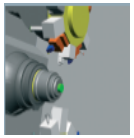
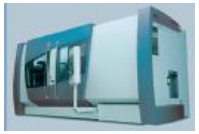
Part Design



- I Automatic configuration of CAM
- II Program validation and optimization
- IIa Non cutting move optimization

Manufacturing engineering

- V Simulation of a production line concept
- VI Setup of collision avoidance
- III Common tool definition

- I Technology Draft
- II Validate concept

- III Select and Size Motors
- IV Generate electrical BOM
- V Topology and Device alignm.
- VI Optimize Control loop
- VII Integrated Autom. Eng.
- XI Develop cycles

- VII Create MT driver package MT
- IXa Virtual Commissioning
- IXb PM Virtual Commissioning

Production

- IV Seamless manufacturing engineering
- VII Setup validation

- X Mechatronics Reuse
- XI Seamless and consistent collaboration

Integrated development & production processes
The CAD/CAM/CNC Process Chain

Software applications for planning and programming

Applications and equipment for production

The CAD/CAM/CNC Process Chain

Integrated development & production processes
Traditional process versus process chain implementation

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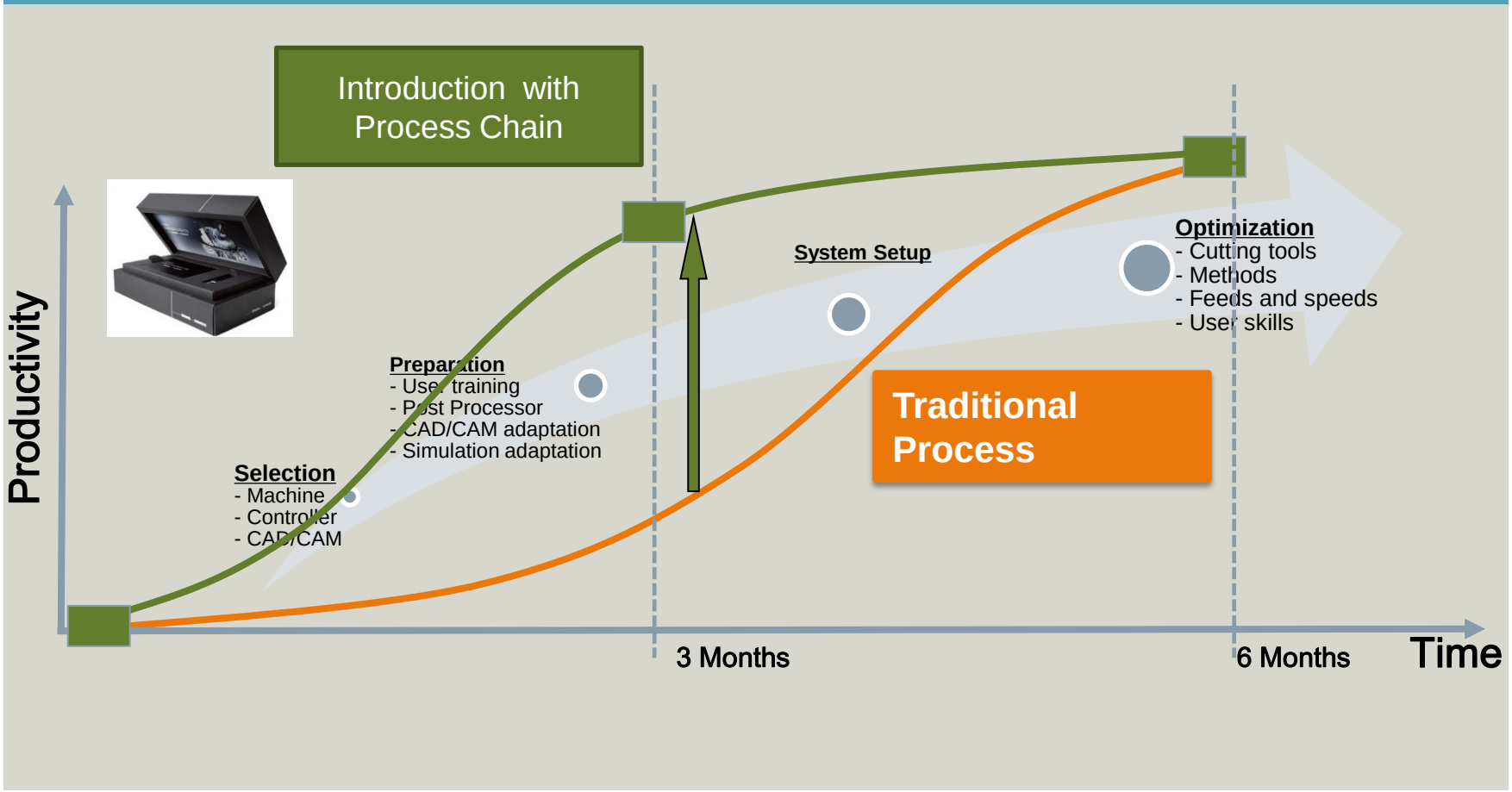
Introduction of a new machine tool with CAM and support kit



Integrated development & production processes
Benefits

- **Efficient communication of information across CAD/CAM/CNC process chain**
- **Control and optimize machine commissioning**
- **Improve energy efficiency and meet environmental needs**

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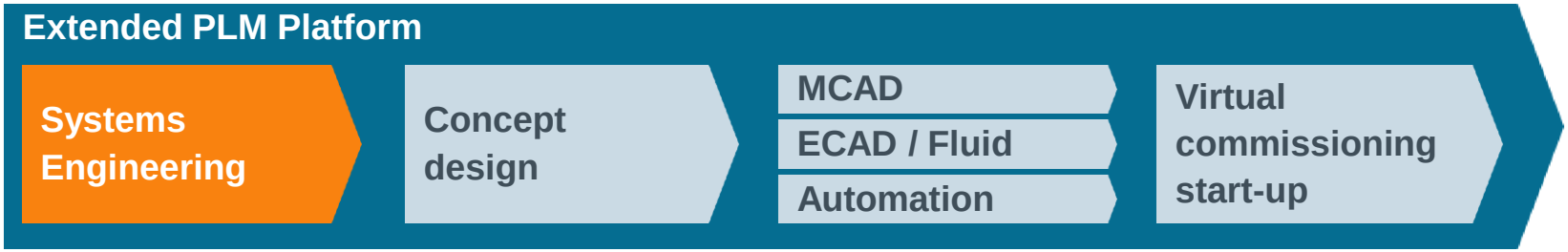
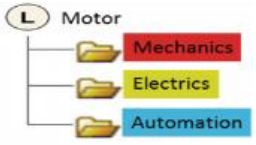
Capturing the design specification



A comprehensive approach to design

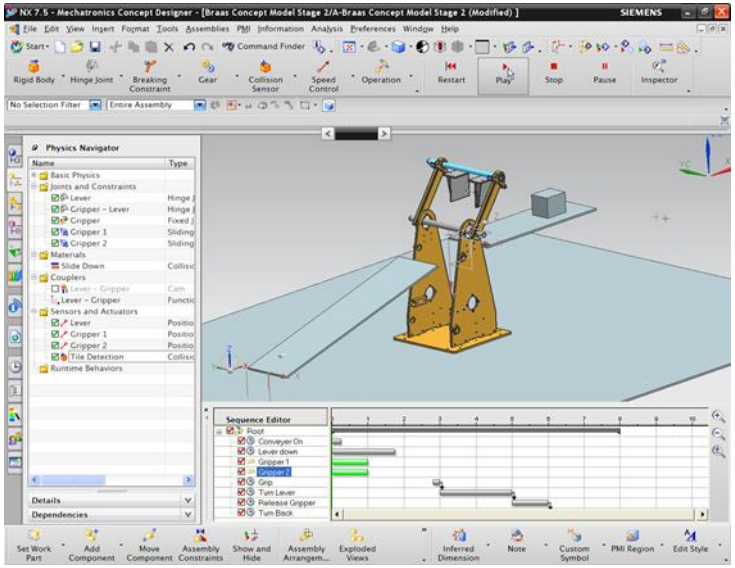
- Make customer requirements an implicit part of the design
- Ensure relevant regulations are adhered to
- Enforce requirements as the leading source for development
- Deliver full traceability for regulations affecting new designs and machines in service
- By focusing on requirements and functions, consider all design alternatives – mechanical, electrical, electronic and software
- Functional approach enables effective modularization of the machine



Making informed decision on smart concepts

Extended PLM Platform

Systems Engineering → **Concept design** → MCAD / ECAD / Fluid / Automation → Virtual commissioning start-up



Advanced Mechatronic concept

- Define sequence of operation
- Create list of sensors & actuators
- Associate events with signals
- Animate the machine
- Identify and specify critical information
- Simulate the concept
- Make an informed decision

Allowing effective multi-disciplinary collaboration

Extended PLM Platform

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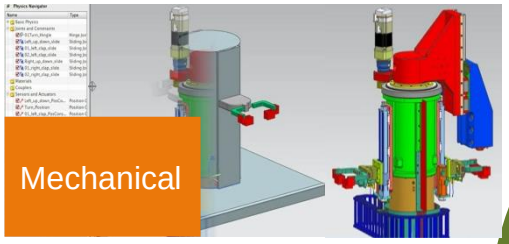
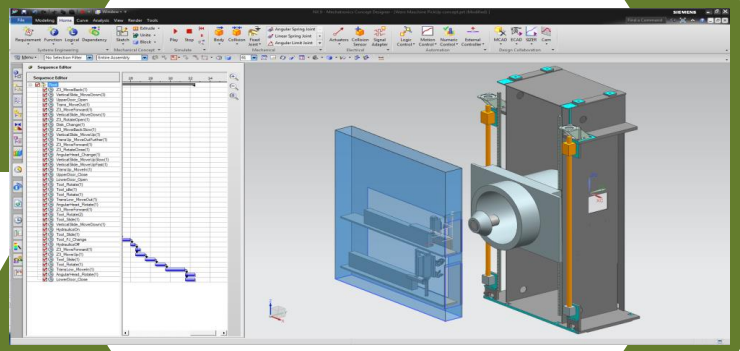
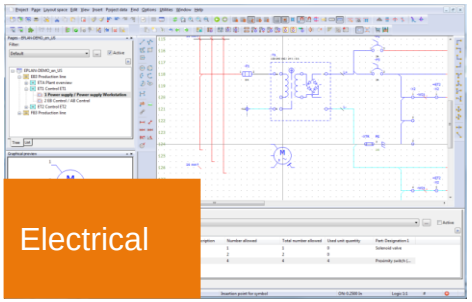
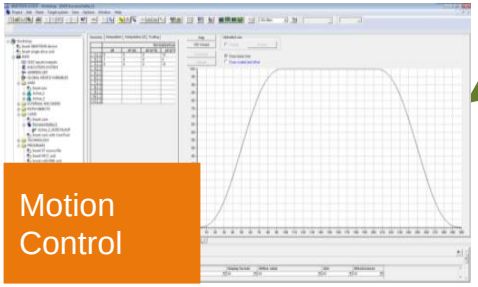


Mechanical

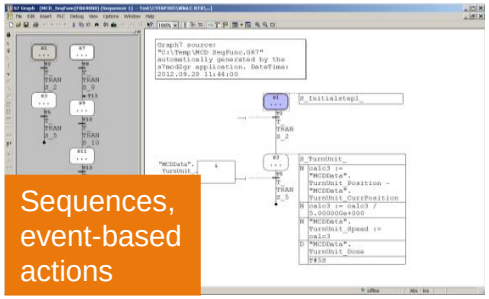




Electrical

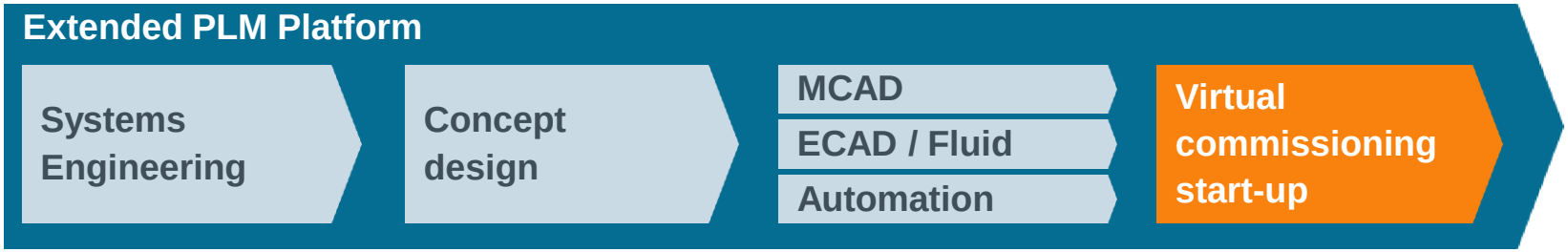


Motion Control



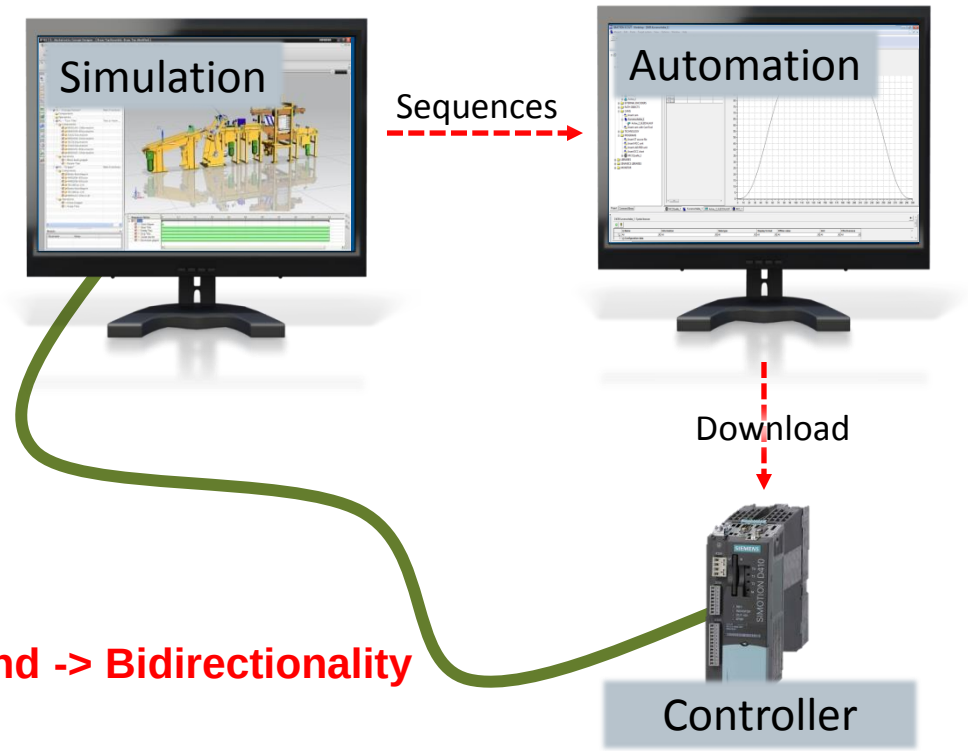
Sequences, event-based actions

Speeding up the commissioning process



Virtual commissioning

- Drive 3D model from production controllers
- Seamless progression from MIL, to SIL, to HIL
- Software validation part of the engineering activities
- Improve confidence in physical machine behavior
- Optimize machine performances



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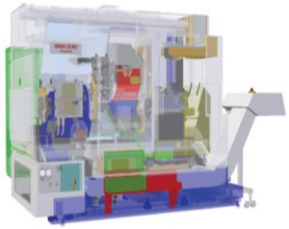
Advanced Machine Engineering Customer Benefits

Increased productivity	Greater Efficiency	Improved flexibilty
INDEX	MORI SEIKI THE MACHINE TOOL COMPANY	HEIDELBERG
Increased machine tool utilization for production work - Reduced setup times by up to 90%	Reduce development to prototype phase from 6 months to 3 months. Double new product development pace	Re-use of 3D data in FEA and kinematics speeds developments



…while enabling environmentally friendly products and operations

Grazie!