

A detailed view of a Siemens industrial robotic arm in a factory setting. The arm is blue and white, with various cables and hoses attached. It is positioned over a work area with a metal component. The background shows other industrial equipment and a blue wall.

SIEMENS

Elio Bergamaschi, Business Development Manager

**Dal software all'automazione attraverso
uno sviluppo integrato multidisciplinare**
Decisioni Intelligenti, Macchine dedicate, Prodotti Migliori

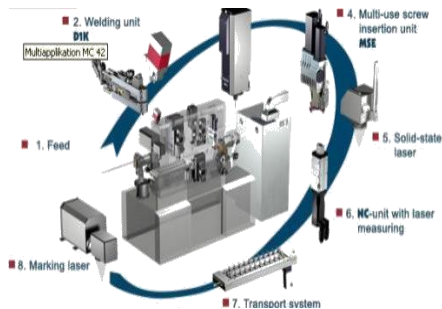
Agenda



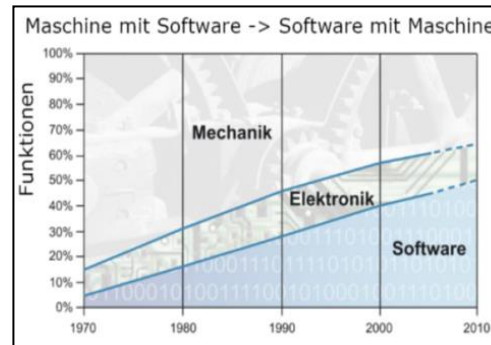
- **Market overview & challenges**
- How to build Mission-Driven Machines
 - Effectively managing design complexity
 - Enable complete product information visibility
 - Integrated development & production processes
- Bringing it all together: Achieving Advanced Machine Engineering
- Success with Siemens

Industrial Machinery Industry Challenges

Product configurations



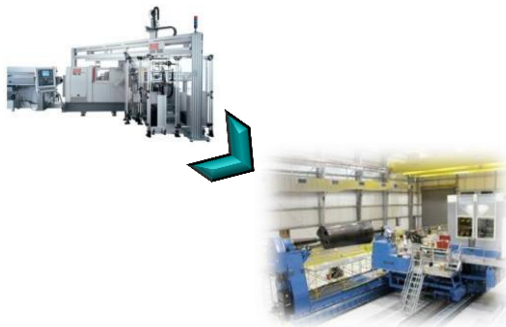
Increasing automation



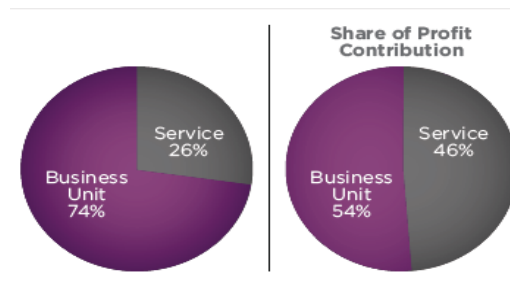
Energy and safety



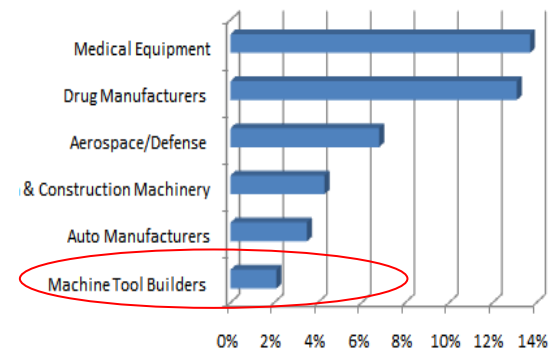
Turnkey Solution Integration



Service Profitability



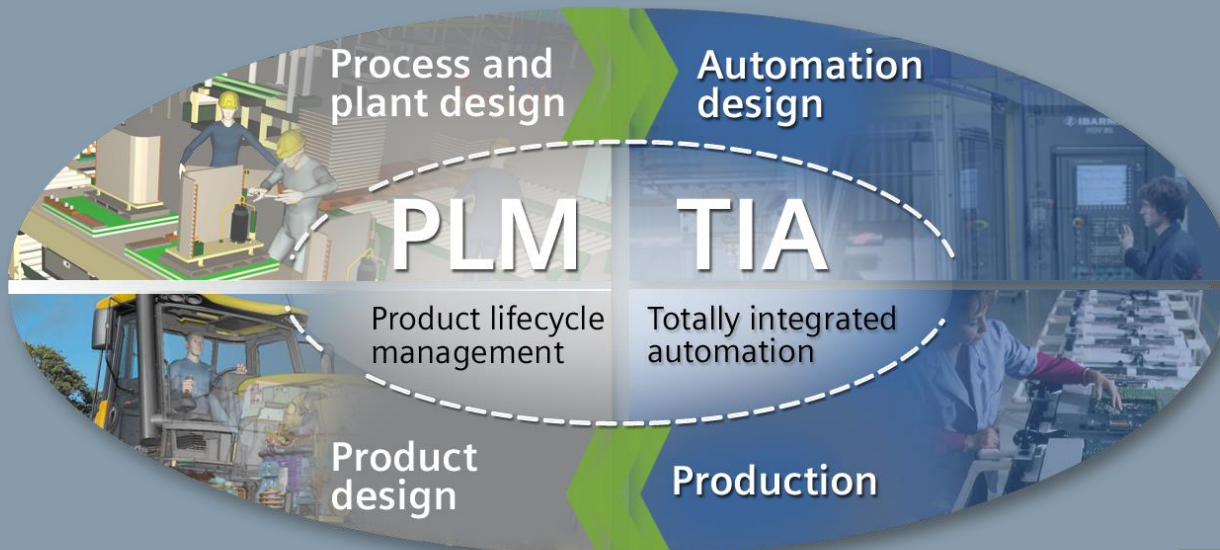
Low Profit Margins



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

Only Siemens can provide this

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Systems Engineering



Concept Design



Detailed Design



Virtual Commissioning



Commissioning



Real Machine

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

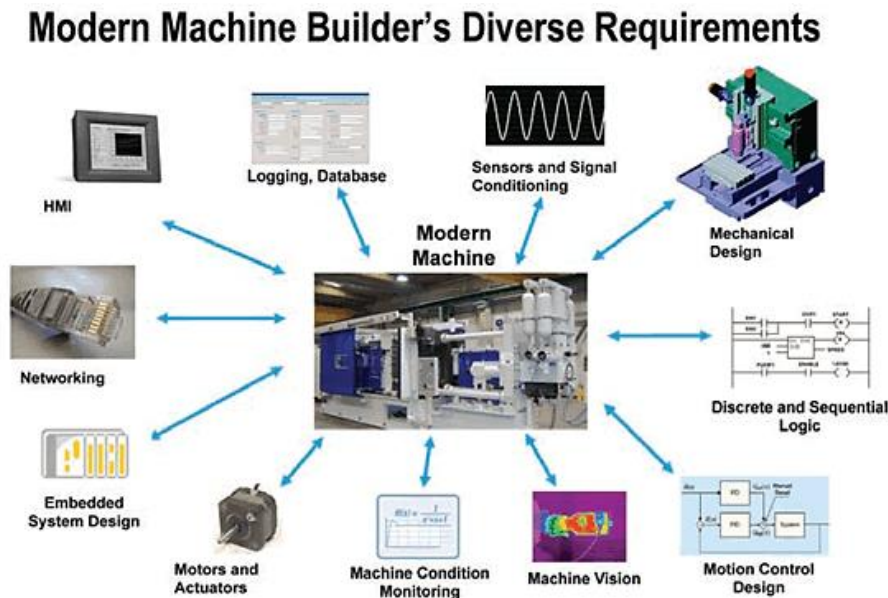
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Why is designing a machine so complex?

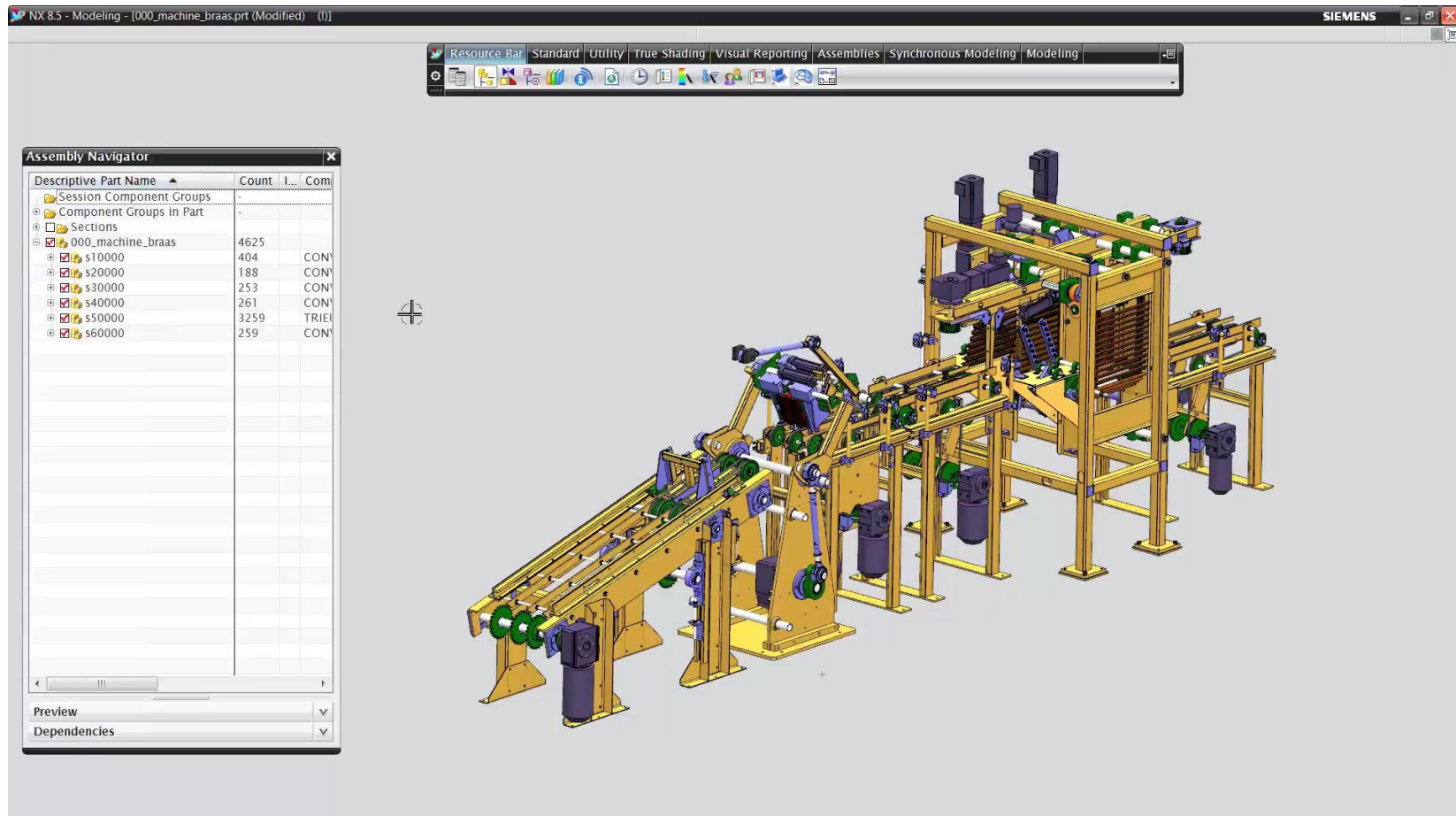
- Machine integration into complex production systems
- High performance achieved by complex drive control
- Increased use of electrical drives & functions
- Exploding number of machine axis to meet customer needs
- Multiplication of machine configurations to address markets
- Tougher, heterogenous safety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



Source: National instruments via desktopengineering.com

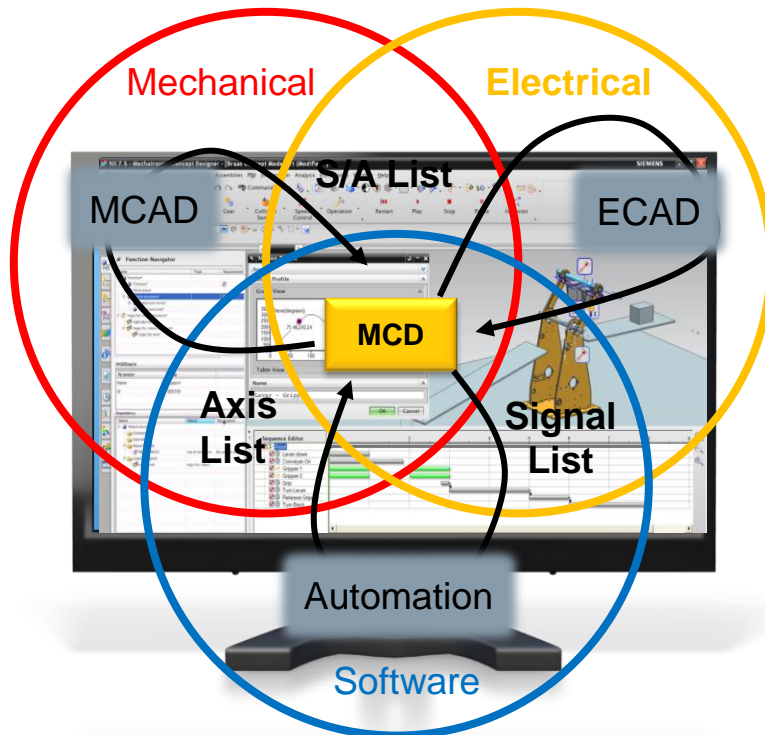
Effectively manage design complexity

What does HD3D look like in industrial machinery?



Effectively managing design complexity

NX Mechatronics Concept Designer (MCD)

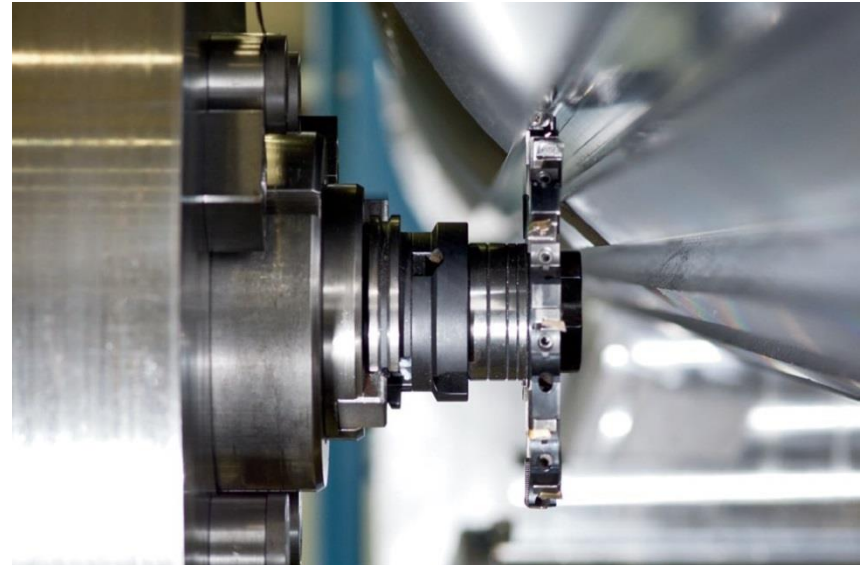


- Unify requirements and enable systems engineering
- Select & size motors
- Electrical design with consistent sensors & actuators
- Create and validate electronic cams
- Create automation program based on sequence diagram
- Validate PLC program and co-simulation
- Validate simple NC operations

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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 - **Enable complete product information visibility**
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- Achieving success with Siemens

Complete product information visibility

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

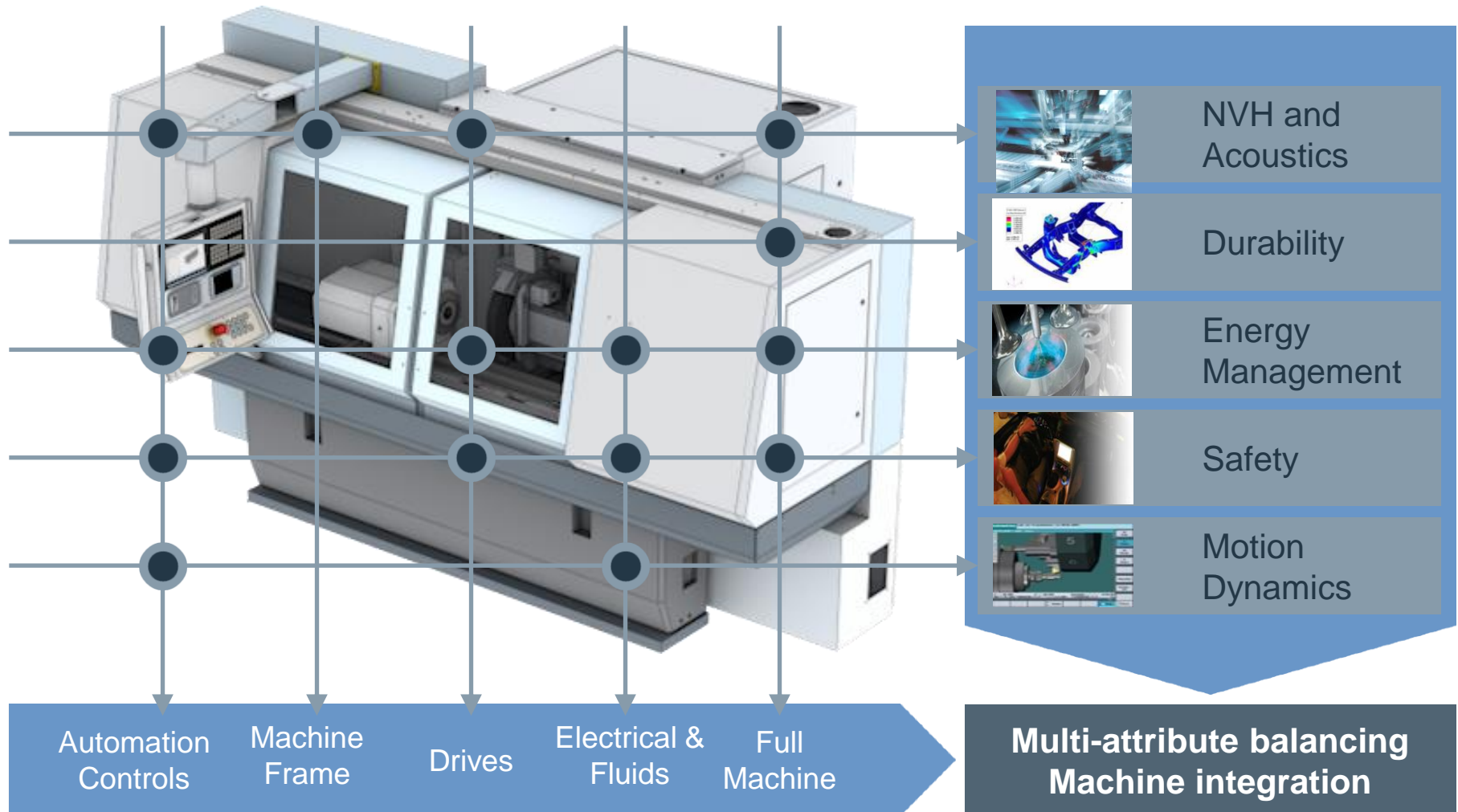
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Complete product information visibility

What If You Could Optimize These Attributes Across the Organization?

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Complete product information visibility

How do I have visibility into my product costs?

The screenshot displays the Teamcenter Product Cost Management V6.0 - Administrator interface. The left pane shows a tree view of the product structure, including folders for Knowledge domain, Private folder, Public folder, and various calculations. The main pane shows the 'Basic data' tab for the part '13241739_002_SHROUD_ENG_COOL_FAN (DTUS)'. The 'Calculation variant' section shows details such as Designation, Assigned to, Supplier, Production site, Overhead rates, Shift model, Material group, Calculation quality, Status, Calculation methodology, Target price, Cost source, One-time payments, and Net sales price. The 'Quantity' section shows various requirements and quantities. The 'Views' section shows a 3D model of the part. The 'File attachments' section shows a table of attachments.

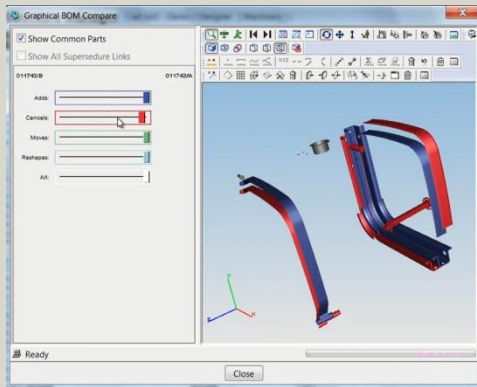
Quantity	Annual requirement usable parts in this ass...	420,000	Pcs
Average annual requirement usable part	420,000	Pcs	
Peak annual requirement usable parts, dire...	420,000	Pcs	
Manufacturing quantity per year	420,000	Pcs	
Number of manufacturing lots	1.0	1/year	
Manufacturing lot size usable parts	420,000	Pcs	
Lifetime	6.0	Year(s)	
Lifetime requirement	2,520,000	Pcs	

Product costing

Complete product information visibility

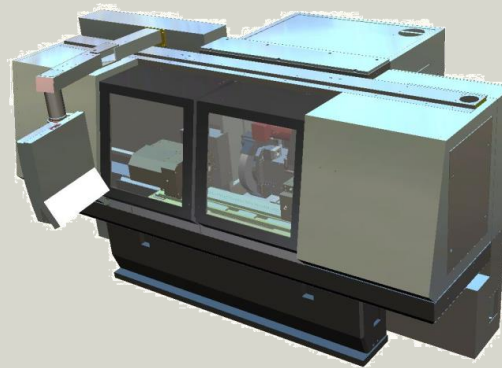
BOM & Configuration Management

Define and Configure



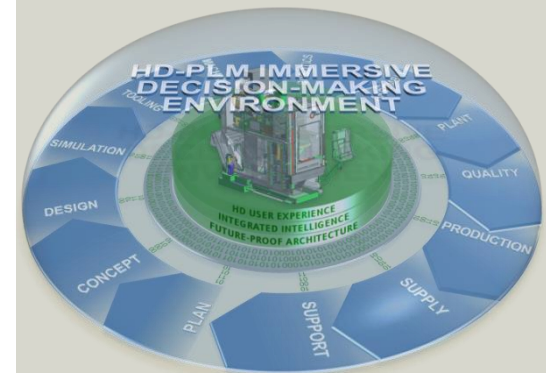
- Complete, accurate BOM definition
- BOM configuration management
- BOM analysis

Work in Context



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

Extend BOM Support

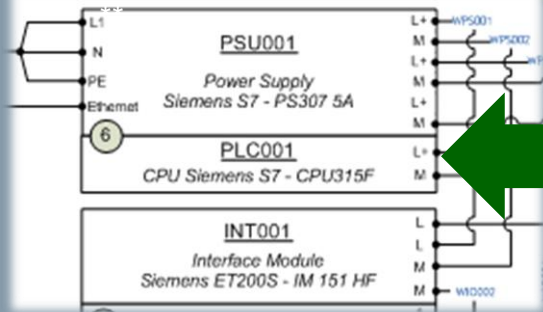


- Virtual & physical alignment
- Leverage the BOM downstream
- Enterprise application integrations

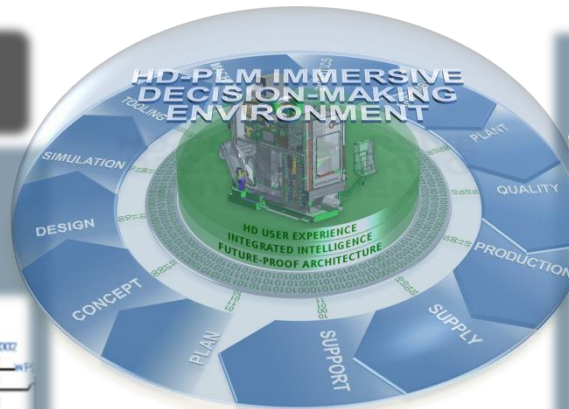
Complete product information visibility

Integrated multi-domain tools and processes

Direct integration
for electrical analysis



Direct integration
Export Logical



Traceability

Teamcenter

Teamcenter

BOM Line	Item Type	All Named Variant E...
3/A-Engine (view)	Architecture	Hi Power, Regular P...
3.3/A-Engine Block	Architecture	
3.6/A-Cooling System	Architecture	
3.7/A-Engine Management System (view)	Architecture	
3.7.2/A-Engine Control System (view)	Architecture	
WPSC/A-WaterPressureSensor (view)	Architecture	240or300hp
WPSC/A-WPSCconnector	Architecture	240or300hp
OPSC/A-OPSCconnector	Architecture	240or300hp
FPSC/A-FuelPressureSensor (view)	Architecture	240or300hp
EECU/A-EngineControlECU (view)	Architecture	240or300hp
PECU/A-TurboControlECU (view)	Architecture	300hp
PECUC300/A-PECUConnector (300 hp)	Architecture	300hp
EECU/A-EECUConnector	Architecture	240or300hp
3.7.1/A-Engine Control ECU Hardware (view)	Architecture	
3.7.1.1/A-Engine Control ECU Housing	Architecture	
3.7.1.1.1/A-Engine Control ECU PCB	Architecture	
3.7.1.1.1.1/A-Engine Control ECU Software (view)	Architecture	
3.7.1.1.1.1.1/A-Engine Control ECU App Software	Architecture	
3.7.1.1.1.1.1.1/A-Engine Control ECU Calibration Software	Architecture	
3.7.1.1.1.1.1.1.1/A-Engine Control ECU Primary Bootload	Architecture	
EngineCo.../A;1-ECU Unit (view) x 1	Item	
E_CalSW - Super Hi/A;1	AppSoftware	240or300hp
E_CalSW = Super Hi/A;1	Calibration	240or300hp
CU_11711_HW - Super High/A;1 (view)	Part	240or300hp
001517/A;1-Processor 512	Processor	
Turbo Control ECU - Super Hi/A;1 (view)	Part	300hp
T_CalSW - Super Hi/A;1	Calibration	
T_AppSW - Super Hi/A;1	AppSoftware	
CU_11783_HW - Super High/A;1 (view)	Part	
001499/A;1-Processor 218	Processor	
001521/B;1-CU_11783_sch_Schem	EDASchem	
001520/B;1-CU_11783_sch (view)	Item	

BOM Line	Item Type	All Named Var	wire_length
Engine_Harness(Max)/A;1 (ElectricalHarness)	Item		
000027/A;1-Engine Harness (ElectricalHarness)	Connection		
000031/A;1-ECU Cable (ElectricalHarness)	Item		
000032/A;1-W-16	HRN_GeneralWire	300hp	195.484560
000033/A;1-W-16	HRN_GeneralWire	300hp	195.484560
000037/A;1-W-16	HRN_GeneralWire	300hp	195.484560
000051/A;1-Wire1	Connection		
000052/A;1-CableWire4	Connection		
000053/A;1-CableWire3	Connection		
000028/A;1-PCB_Box_Connector (view)	Connection		
000029/A;1-W-20	HRN_GeneralWire	240or300hp	370.981733
000030/A;1-W-20	HRN_GeneralWire	240or300hp	384.288194
000038/A;1-ECU_Connector (view)	HRN_ConHousing	240or300hp	
000045/A;1-W-20	HRN_GeneralWire	240or300hp	370.981733
000079/A;1-Wire3	Connection		
000081/A;1-Wire6 (view)	Connection		
000084/A;1-Wire1	Connection		

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**

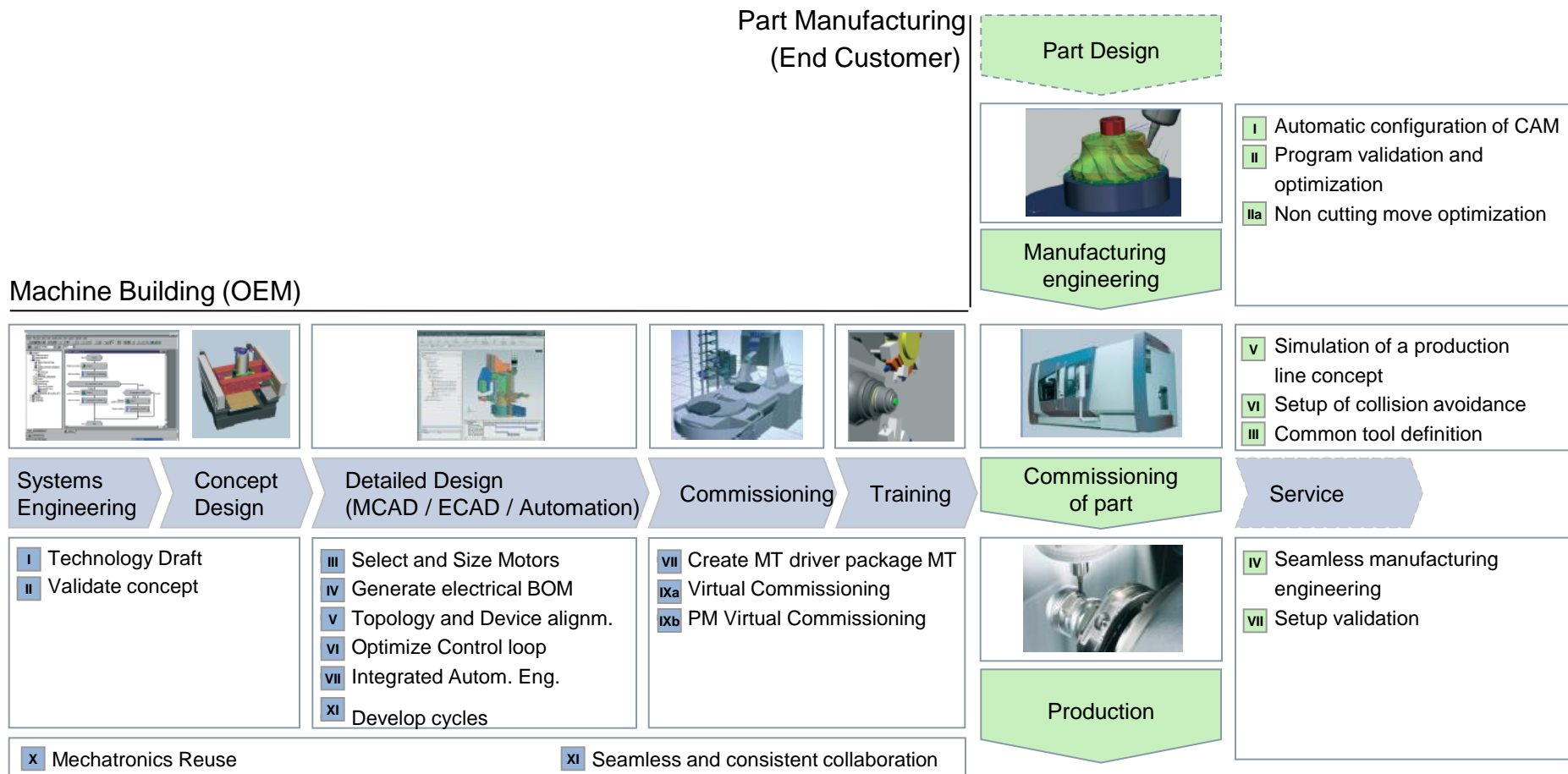


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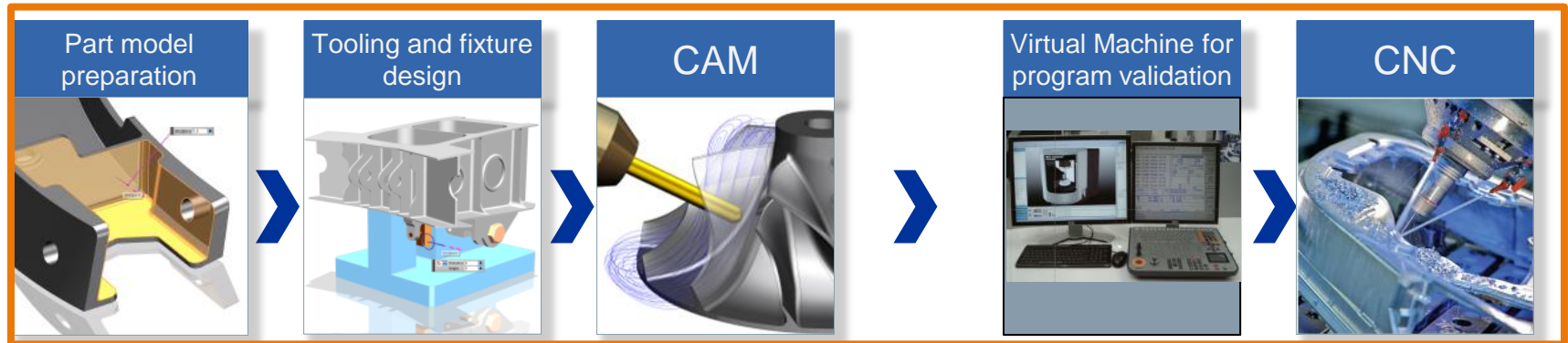
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Integrated development & production processes



Integrated development & production processes

The CAD/CAM/CNC Process Chain



Manufacturing Engineering

Shop Floor

Software applications for
planning and programming

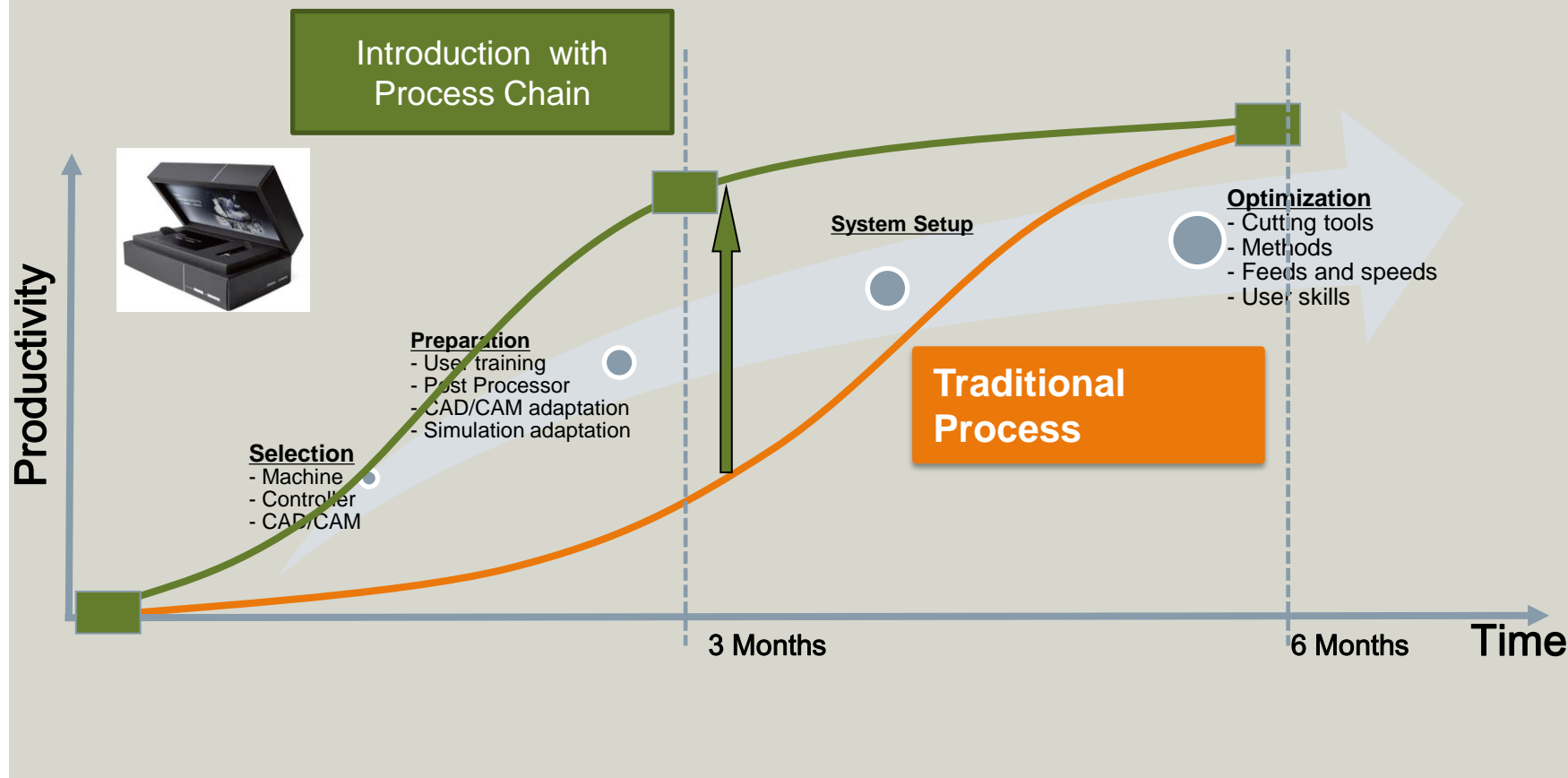
Applications and equipment for
production

The CAD/CAM/CNC Process Chain

Integrated development & production processes

Traditional process versus process chain implementation

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**

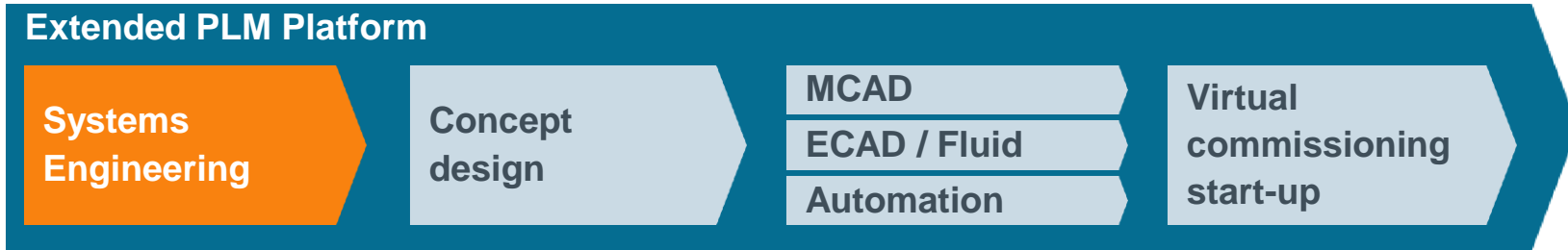


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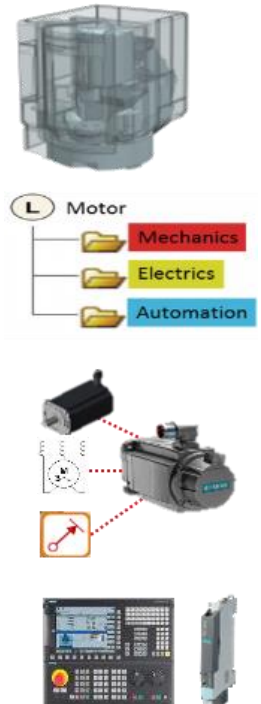
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Capturing the design specification



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

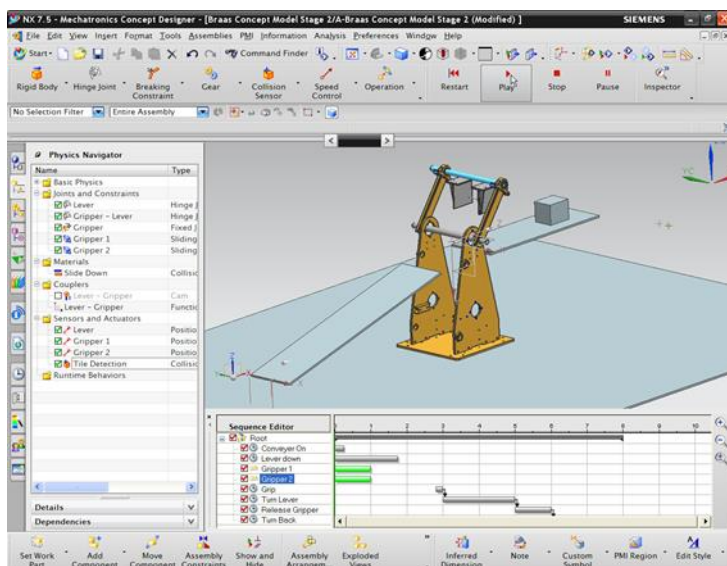
Concept
design

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

Systems
Engineering

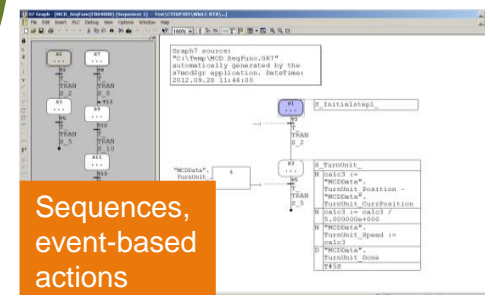
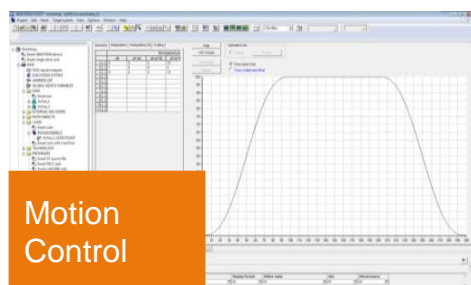
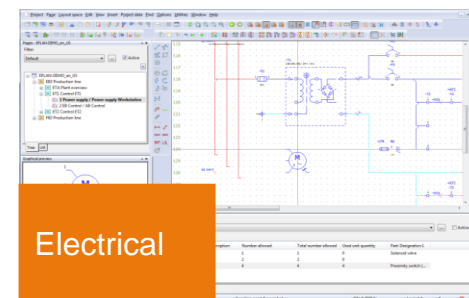
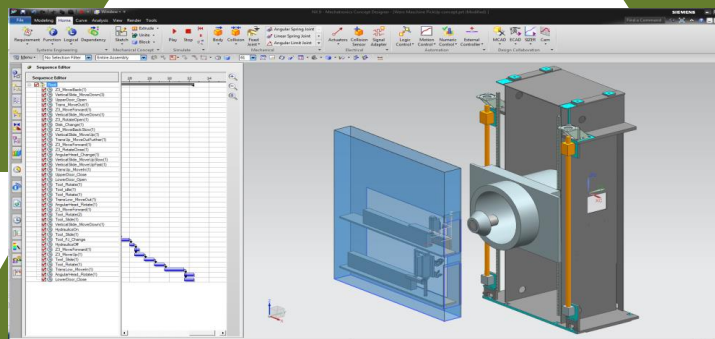
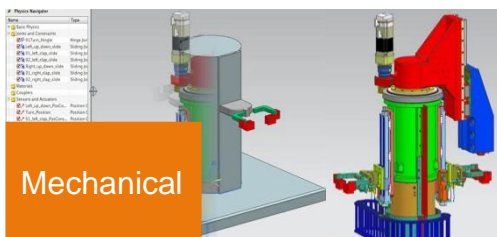
Concept
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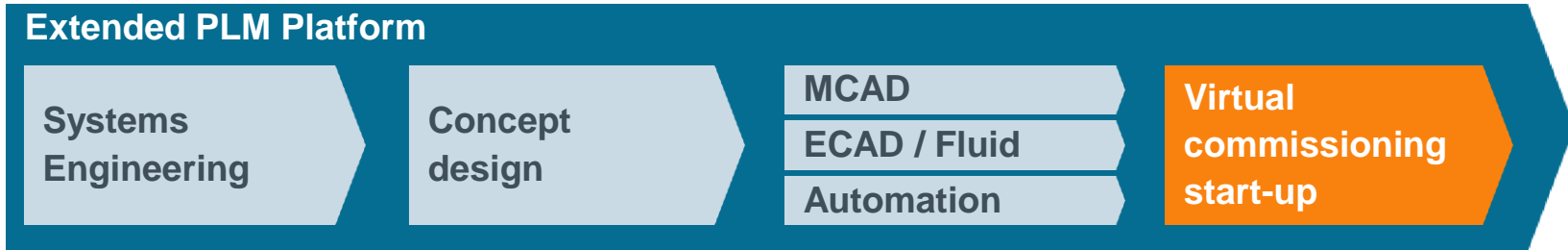
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Automation

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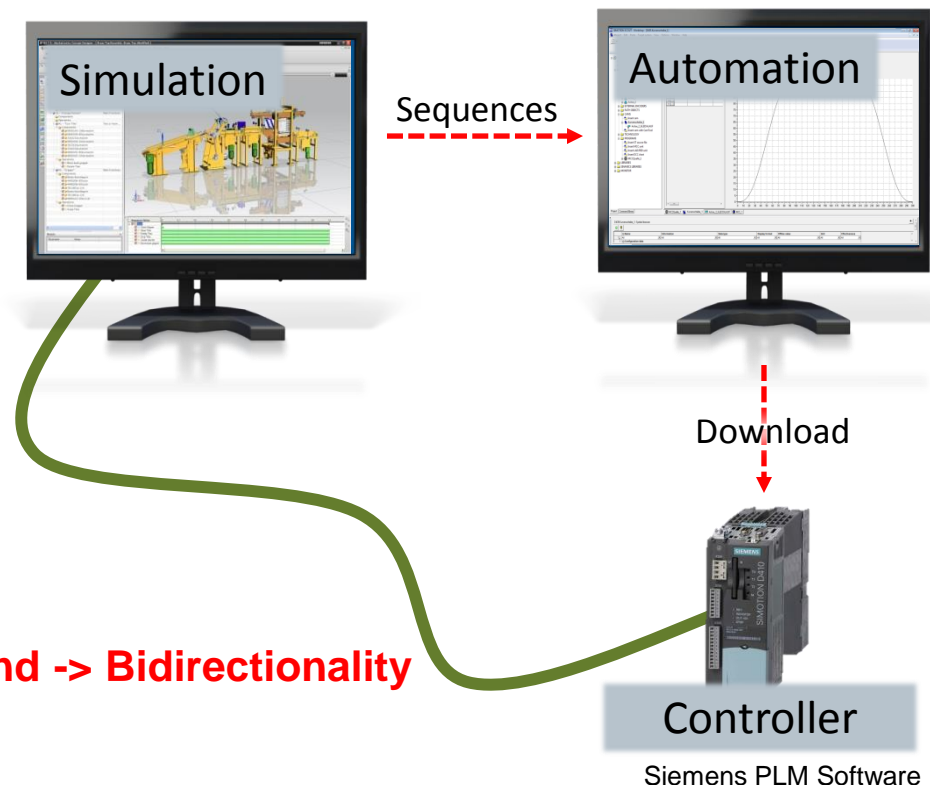
Speeding up the commissioning process



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

...and beyond -> Bidirectionality



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Advanced Machine Engineering Customer Benefits

Increased productivity

INDEX

Increased machine tool utilization for production work - Reduced setup times by up to 90%

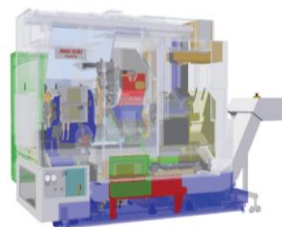


Greater Efficiency

MORI SEIKI

THE MACHINE TOOL COMPANY

Reduce development to prototype phase from 6 months to 3 months.
Double new product development pace



Improved flexibility

HEIDELBERG

Re-use of 3D data in FEA and kinematics speeds developments



...while enabling environmentally friendly products and operations



SIEMENS

A detailed photograph of a Siemens industrial robotic arm in a factory setting. The arm is blue and white, with a complex cable management system. It is positioned over a work area with various mechanical components and tools. The background shows more industrial equipment and a clean, well-lit environment.

Siemens PLM Software

Grazie!