

**SIEMENS**

Up to 30% faster from the idea to the real machine with Integrated Engineering

# Virtual Commissioning – Hardware-in-the-Loop

# Time to commission a real machine can be slashed by up to 70% with a hardware-in-the-loop solution

## Challenge

- **Implementation of increasingly complex customized automation solutions** in the shortest possible time
- **Shorten commissioning time** (the most capital-intensive phase) of machine tools and **identify faults** at the earliest possible opportunity

## Solution

- **Linking the virtual machine model** with the real control system
- Enables **validation of the overall system** (CNC and automation system) at an early phase
- **Testing** machine designs **under real conditions**
- **First validation of the program for part production** in a virtual environment

As a single source supplier for production automation, Siemens offers an extensive and integrated portfolio of software and hardware – providing the optimum solution for virtual commissioning.



**Shorten time  
to market**



**Increase  
flexibility**



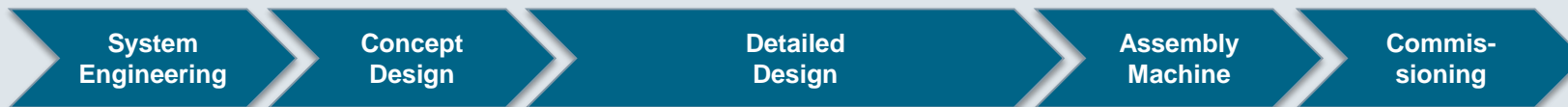
**Boost  
efficiency**

# Integrated Machinery Engineering by Siemens

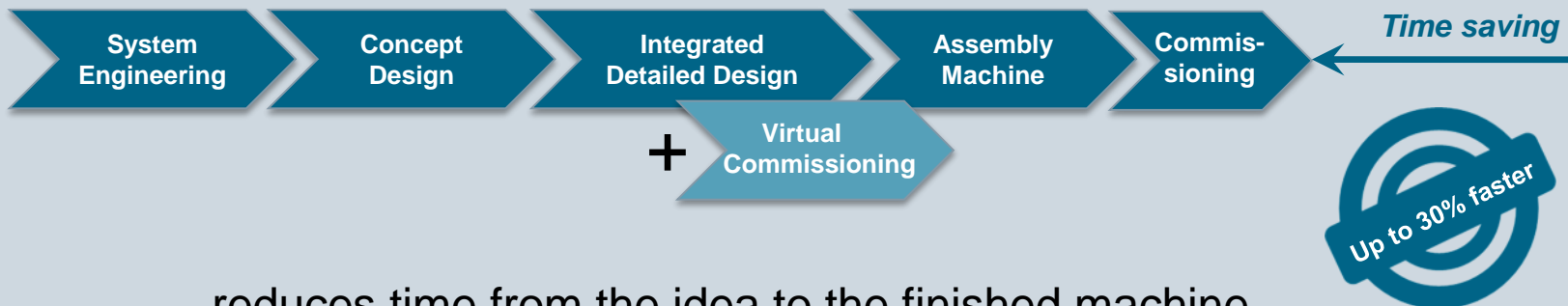


# Integrated Engineering

Without Integrated Engineering



With Integrated Engineering

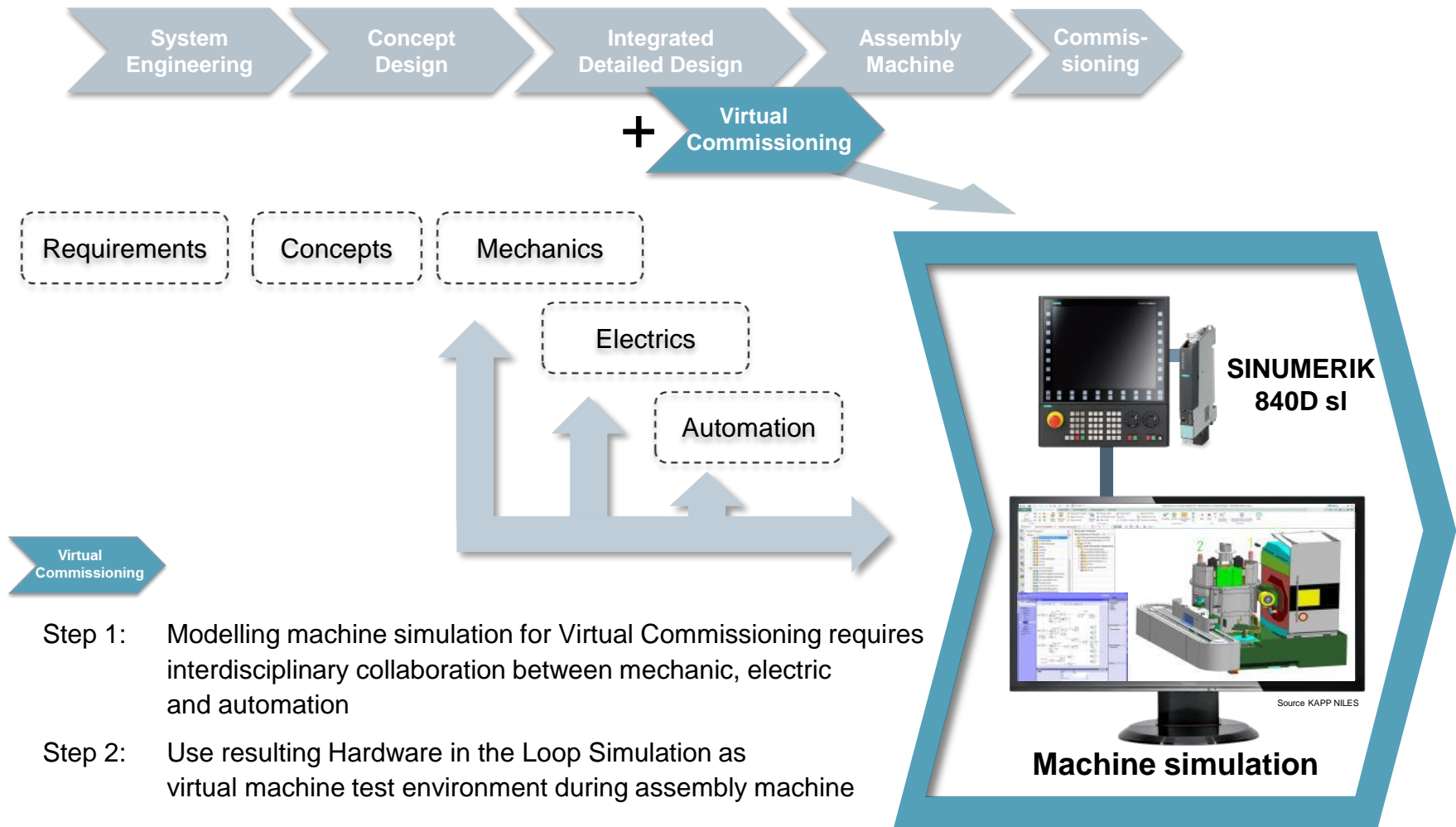


... reduces time from the idea to the finished machine

time

A horizontal arrow pointing to the right, representing the progression of time.

# Virtual Machine Commissioning as part of Integrated Engineering



# Mapping between Real and Virtual Siemens World

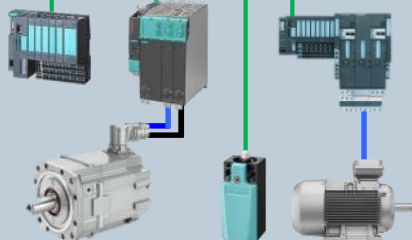
## Real World



SINUMERIK 840D sl

Automation  
System

*Profibus or Profinet*



IO devices /  
Actuators /  
Sensors /  
...



Source KAPP NILES

Machine

## Simulation World

Real Controller  
with SINUMERIK  
Integrate Run  
MyCC /ADAS



SINUMERIK 840D sl

Simulation of fieldbus

Simulation UNIT (SIMBA)



Simulation of  
automation  
behavior

SIMIT

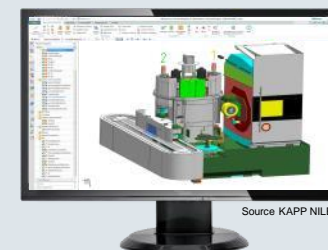


Fast and efficient  
machine design

+

Realistic simulation  
of technological  
machine behavior

Mechatronics Concept Designer



Source KAPP NILES



# Advantages



**Seamless engineering** from the idea (concept) up to commissioning



**Commissioning** - the most capital-Intensive phase - **slashed** by up to 70% **at the real machine**



**Damage to the real machine is avoided**



**First validation of the program for part production** in a virtual environment, essentially under real conditions



The joint development of mechanical and electrical systems along with the automation helps machine builders implement flexible machine concepts in the shortest possible time.

## Reference: Kapp Niles at EMO fair 2015



- A model configuration made up of a computer for simulating the machine and a CNC control connected to it
- Siemens products: Mechatronics Concept Designer software, CNC SINUMERIK 840D sl, SIMIT simulation software, SIMULATION UNIT (to connect the virtual machine model with the real automation system)

Customer: **Kapp Niles** (Coburg, Germany)

Industry: **Specialist in grinding machines and tools**

Machine: **Swivel loader used in the gear grinding machine KX 100 DYNAMIC**

### Requirements of the customer and results:

- Testing the design for absence of faults before delivery
- Reducing the time spent on commissioning in assembly from about three weeks to only three days



## Reference:

### Maier Werkzeugmaschinen at AMB fair 2014



- A model configuration made up of a computer for simulating the machine and a CNC control connected to it
- Siemens products: Mechatronics Concept Designer software, CNC SINUMERIK 840D sl, SIMIT simulation software, Simba (to connect the virtual machine model with the real automation system)

Customer: **Maier Werkzeugmaschinen** (Wehingen, Germany)  
Industry: **Specialist in CNC Swiss-type lathes**

#### Requirements of the customer and results:

- Testing the machine designs under real conditions by using the interaction between the CNC control and the machine - before building the real machine
- Optimizing the interaction between its design and automation departments by using one software tool

# Integrated Engineering by Siemens



## More information about Integrated Engineering:



SIEMENS AG  
Hall 3  
Booth E06/F03  
@ Engineering Lounge

- Reduced number of interfaces
- Consistent data management
- Fast and individual response to customer requests
- Simulation
- Interdisciplinary engineering

- Time saving
- Productivity
- Efficiency
- Flexibility

**Thank you for your attention!**



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