



Virtuální provoznění (zaměřeno na pohony)

Siemens Drives Days 2021, Dolní Morava

| Kdo prezentuje

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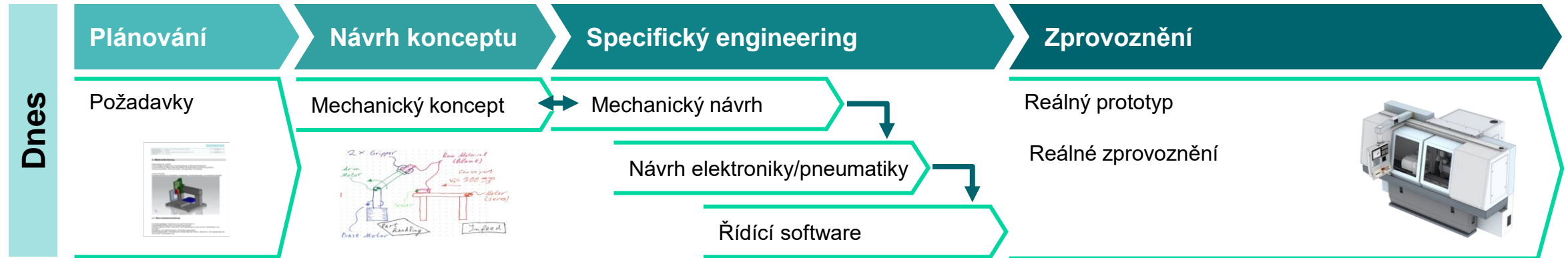
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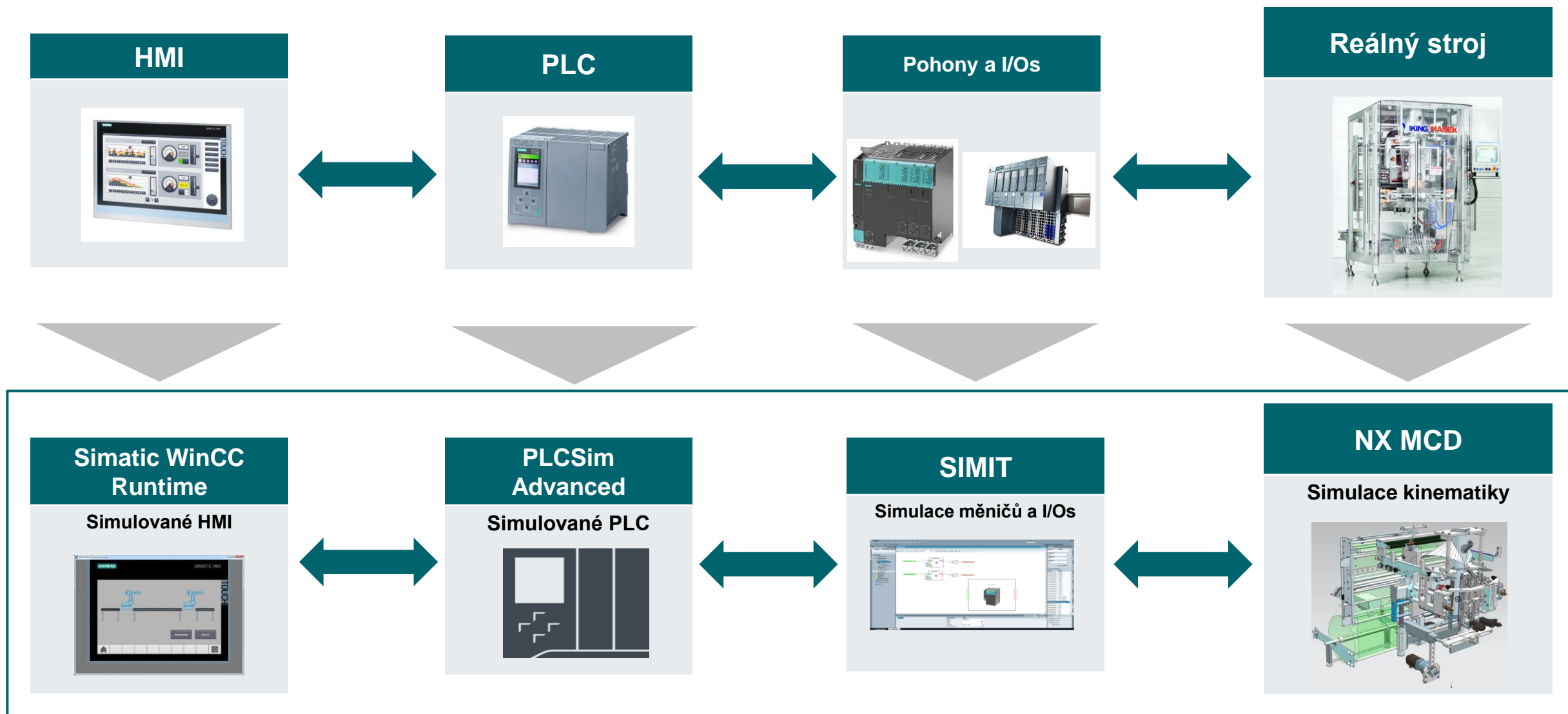


Workflow tradičního návrhu výrobního stroje

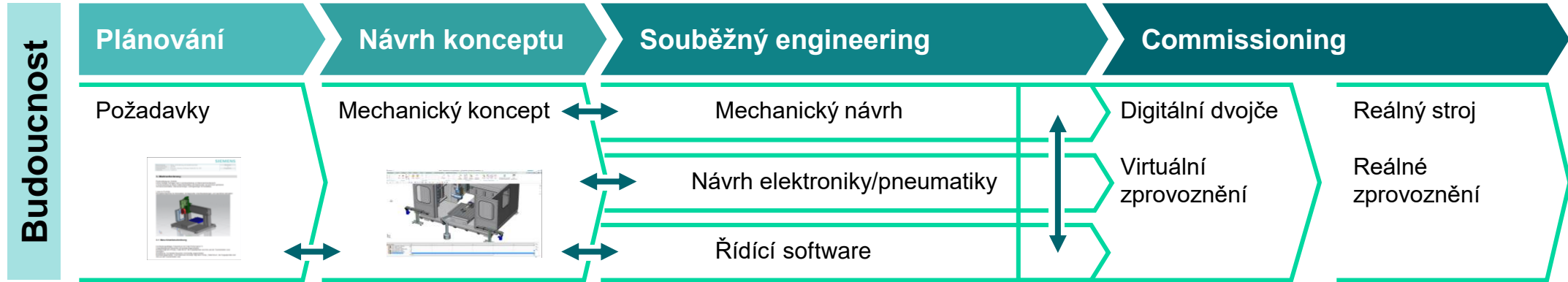


1. Mechanický návrh – tvorba konstrukce stroje v CADu
2. Návrh pohonů – výpočet předpokládané zátěže motorů pro vhodnou volbu
3. Elektronika/pneumatika – návrh a rozmístění světelných, koncových čidel, atd.
4. Řídící software – tvorba PLC programu a HMI
5. Reálné zprovoznění – testování PLC programu a bugfixing

Virtuální zprovoznění stroje – digitální dvojče



Workflow návrhu výrobního stroje při využití virtuálního zprovoznění



1. Mechanický návrh
2. Návrh pohonů
3. Elektronika/pneumatika
4. Řídící software
5. Reálné zprovoznění

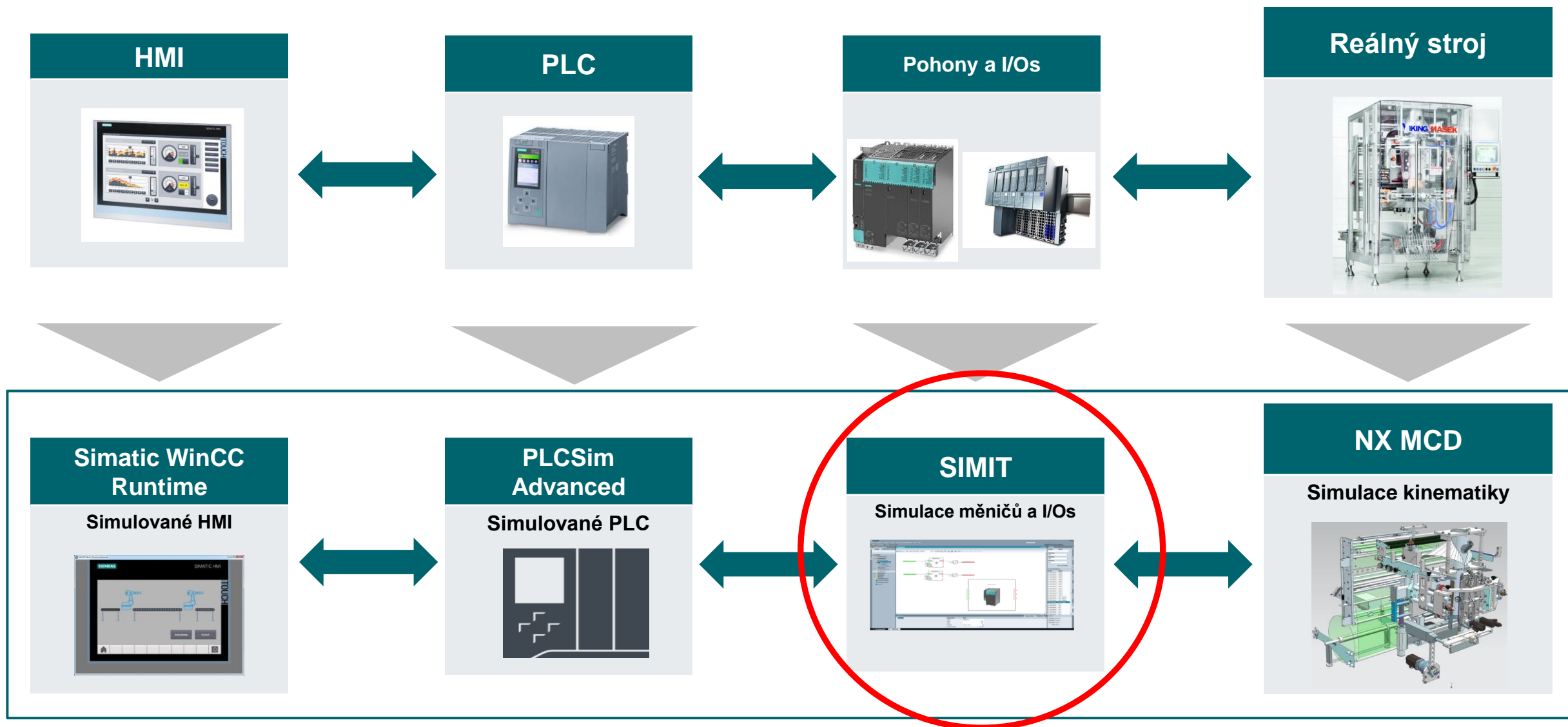


- Mechanický návrh
- Návrh pohonů
- Elektronika/pneumatika
- Řídící software
- Virtuální zprovoznění



Reálné zprovoznění

Virtuální zprovoznění stroje – digitální dvojče



DRIVES Behavior Library for SIMIT knihovna pro simulaci komunikace s pohony

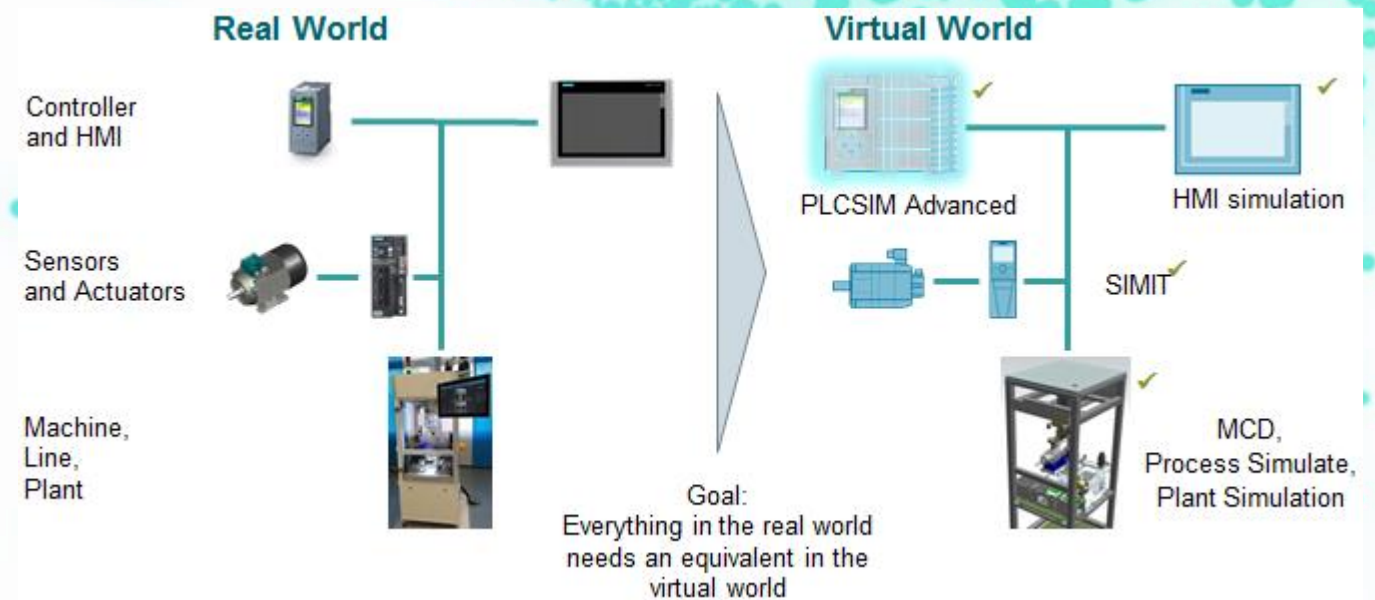
Simulační bloky simulují chování pohonů dle odpovídajících telegramů (SIOS ID: [109793203](#) nebo [109761007](#))

Podporované telegramy z knihovny

- enkodéry pro pohony – tel. 81, 82, 83, 84
- Enkodéry do PLC – tel. 860, 861
- Safety – tel. 900, 901, 902, 903
- Pohony – tel. 111, 750

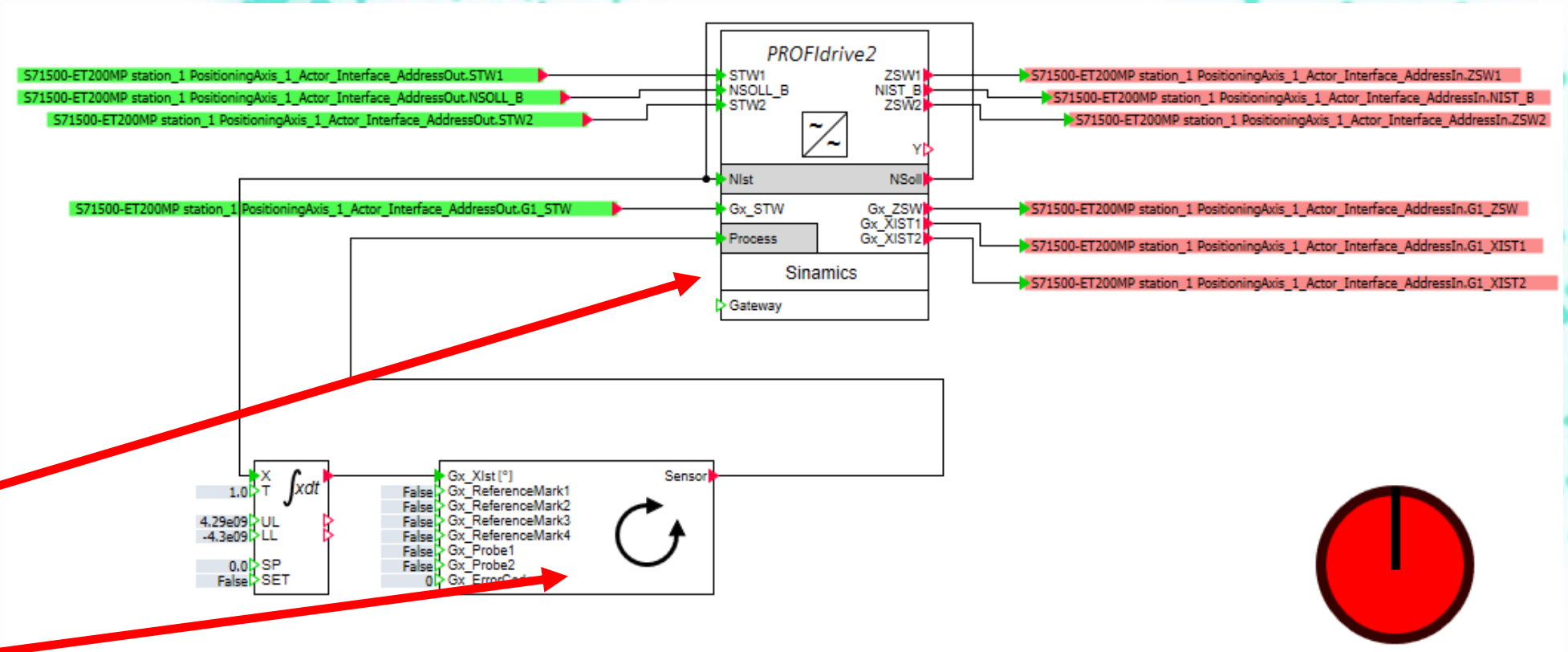
SIMIT PROFdrive library (10.2)

- Safety – tel. 30, 31, 32
- Pohony – tel. 1, 2, 3, 4, 5, 6,
102, 103, 105, 106
- Další – tel. 370, ...



SIMIT PROFdrive library (10.2)

- Components
- Basic components
 - CHEM-BASIC
 - COMMUNICATION
 - CONNECTORS
 - CONTEC
 - DRIVES
 - DriveP1
 - DriveP2
 - DriveV1
 - DriveV2
 - DriveV3
 - DriveV4
 - Motor
 - PROFdrive
 - DataAdaption
 - DynamicServoControl
 - GeneralDrive
 - PROFdrive1
 - PROFdrive2
 - Safety30
 - Safety31
 - Safety32
 - SafetyProcess
 - Sensor
 - SensorProcessLinear
 - SensorProcessRotatory
 - Universal
 - Siemens
 - SIMOCODEpro
 - FLOWNET
 - SENSORS
 - STANDARD

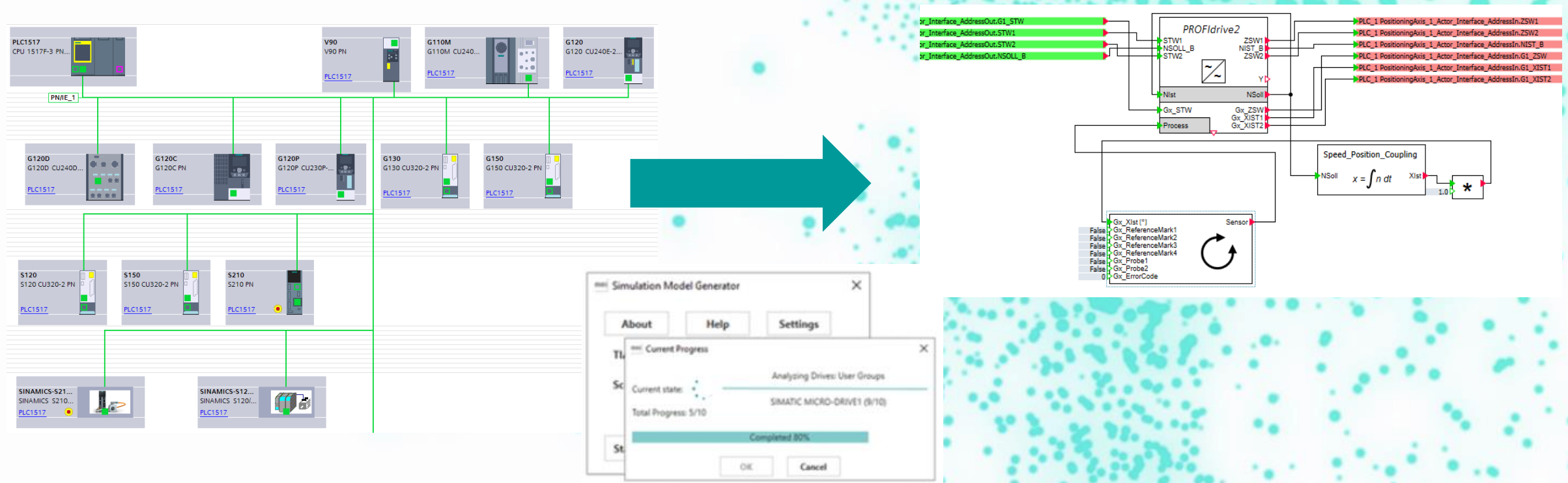


-> Ruční vložení z knihovny a napojení na PLC-signály



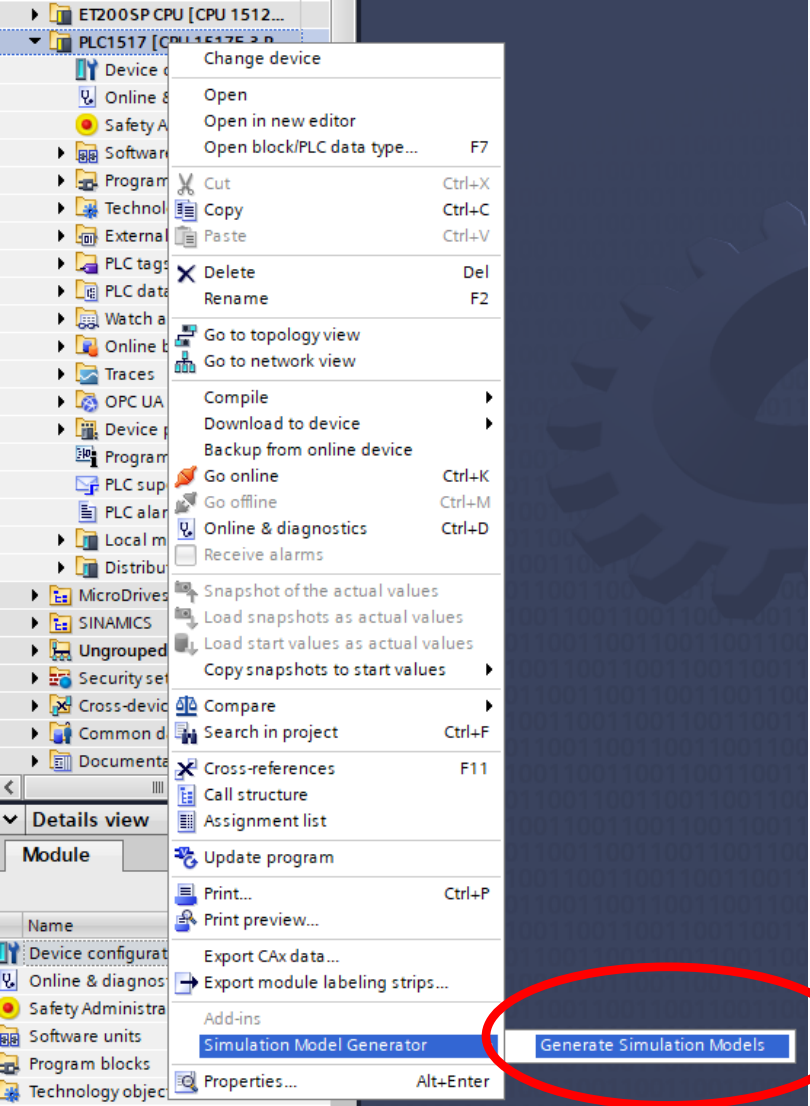
Simulation Model Generator

Doplněk TIA Portalu, který umožňuje uživateli automaticky vytvářet simulační modely pro SIMIT na základě konfigurace produktu TIA Portal. ([SIOS ID: 109780391](#))

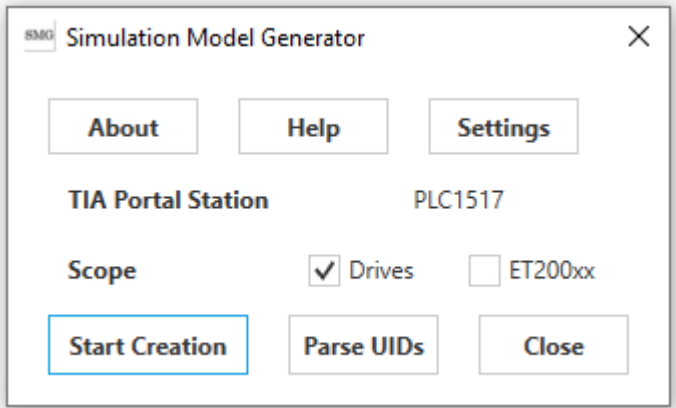


Automatické vygenerování simulačního modelu s využitím knihovny SIMIT PROFdrive library (10.2)

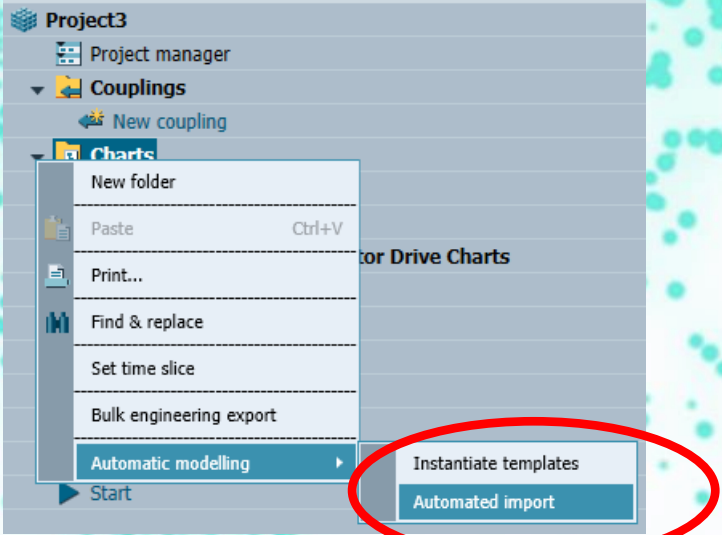
Simulation Model Generator



- 1. Instalace doplňku do TIA portalu
- 2. Generate Simulation Models

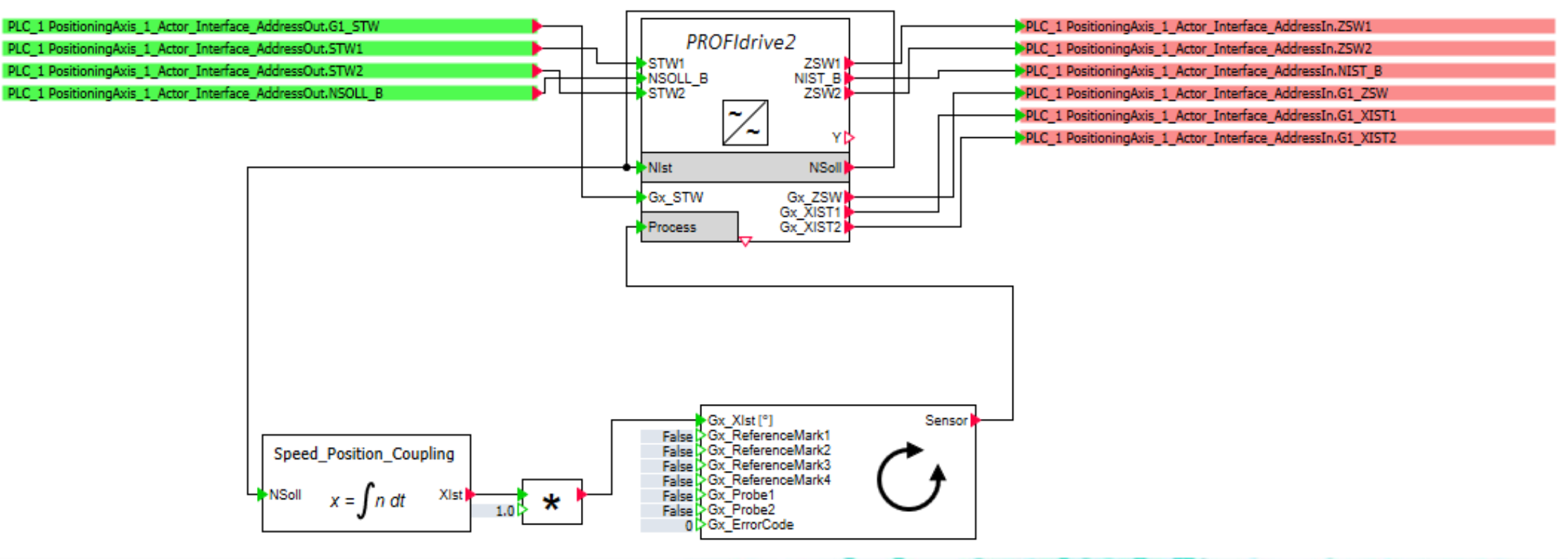


- 3. Import XML-souboru (Automated import)



Simulation Model Generator

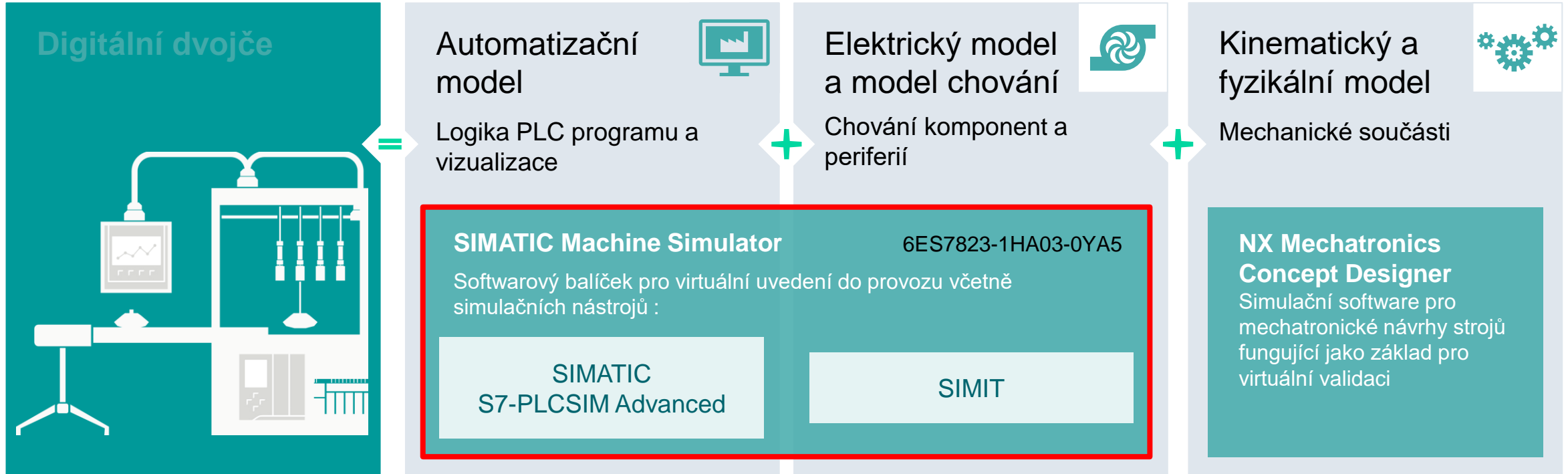
Vygenerováno automaticky z projektu v TIA portálu



Knihovny pro simulaci pohonů v prostředí SIMIT porovnání


	SINAMICS DriveSim Basic	SIMIT PROFIdrive library (10.2)	SIMIT Drives behavior library
Telegrams motor module	Následující prezentace	1, 2, 3, 4, 5, 6, 102, 103, 105, 106	111, 750
Telegrams Safety		30, 31, 32	901, 902, 903
Telegrams Encoder		-	81, 82, 83
Validated against ...		PROFIdrive specification	PROFIdrive specification
Parameter definition		generic	generic
min. sample rate load model		1ms	1ms
Speed controller		no	no
Model variants		10	8
Tool independent		no	no

Digitální dvojče stroje je kombinací tří různých simulačních modelů

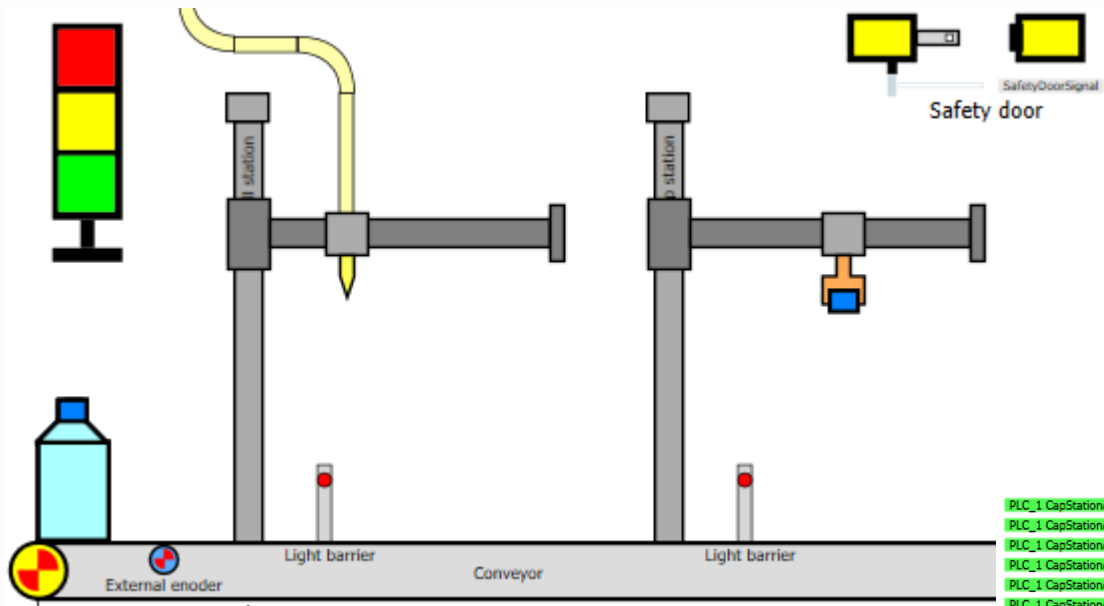


Integrované softwarové prostředí umožňuje simulovat a ověřovat stroje
- od jednoduchých až po složité technické specifiky strojů.

SIMATIC Machine Simulator Ordering

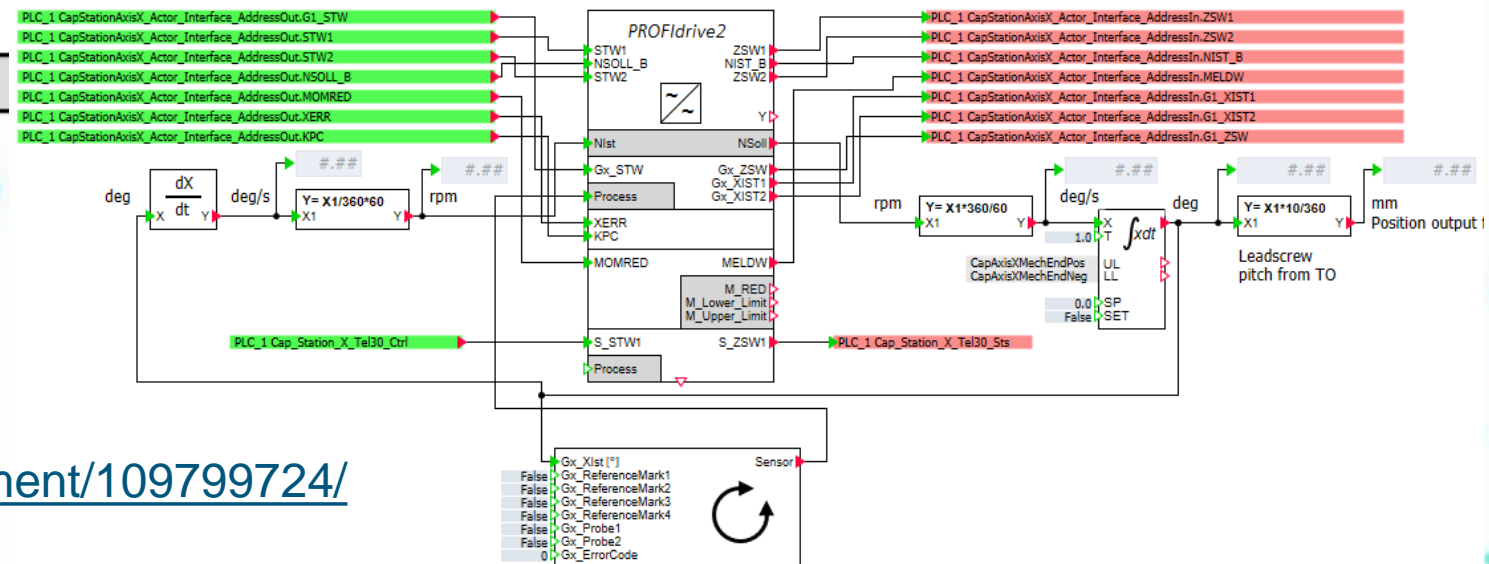
Software Package 	MLFB	Package contains	Typical use-case
SIMATIC Machine Simulator S	6ES7823-1HA03-0YA5	SIMIT Engineering S V10.2 SIMATIC S7-PLCSIM Advanced V3.0	simple machine design
SIMATIC Machine Simulator M	6ES7823-1HA13-0YA5	SIMIT Engineering M V10.2 SIMATIC S7-PLCSIM Advanced V3.0	Medium-high complexity of machines
SIMIT Engineering S V10.2	6DL8913-0AK20-0AB5	SIMIT Simulation Platform V10.2 SW Engineering S Floating License for 1 user	simple machine design
SIMATIC S7-PLCSIM Advanced	6ES7823-1FA02-0YA5	SIMATIC S7-PLCSIM Advanced V3.0, Floating License	

SIMATIC Machine Simulator Virtual Commissioning with SIMIT and PLCSIM Advanced



- Komplexní vzorový příklad
- Simulace komunikace s pohony
- Schematická vizualizace stroje
- Bezpečnostní funkce

Cap station Axis X Telegram 105 + Telegram 30



<https://support.industry.siemens.com/cs/document/109799724/>

Virtual commissioning of machines

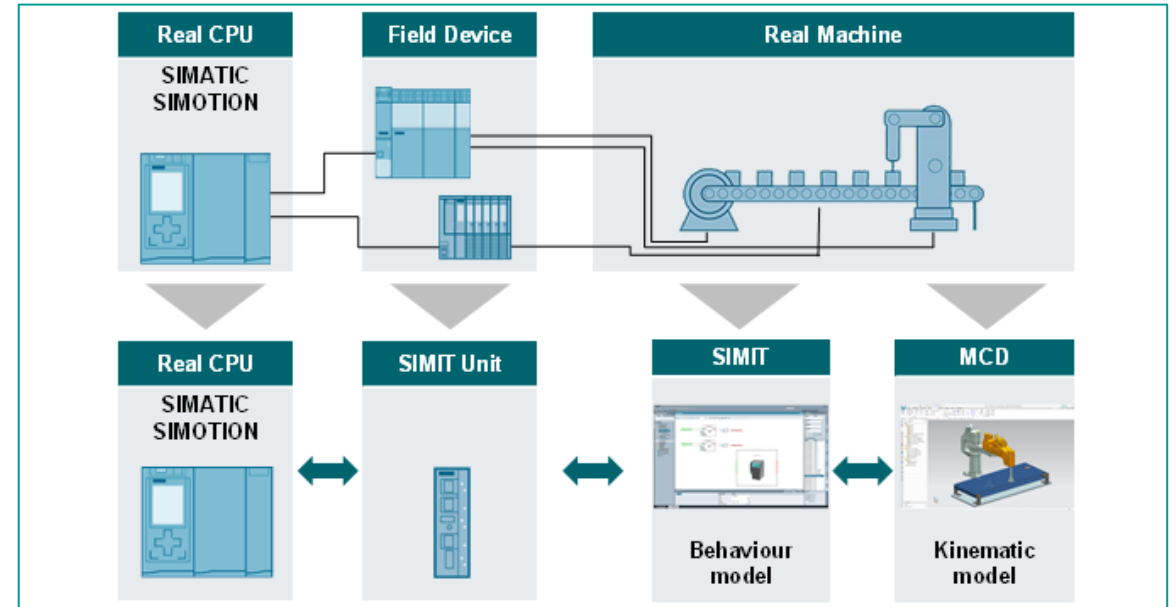
Getting started with SIMATIC Machine Simulator

Use Cases

- Learn how to do build up simulation models for HIL and SIL to perform virtual commissioning
- Simulate your machine in NX MCD
- Create NX MCD, SHM, SIMIT UNIT and SIMATIC S7-PLCSIM Advanced coupling in SIMIT
- Simulation model for PROFIdrive devices

Technical description

- Introduction to Virtual Commissioning
- Software in the Loop (SIL) Simulation with NX MCD, SIMIT and SIMATIC S7-PLCSIM Advanced
- Hardware in the Loop (HIL) Simulation with NX MCD, SIMIT UNIT and SIMOTION / SIMATIC
- Illustration of coupling and interaction of different programs



Information & Download in SIOS

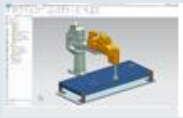
[SIMATIC Machine Simulator – Virtual commissioning of machines Getting Started](#)

[SIMATIC/SIMOTION Virtual Commissioning with Hardware in the Loop](#)

Virtual commissioning of machines

Available resources for getting started

Getting started

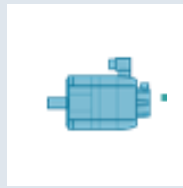


SIMATIC Machine Simulator

Step-by-step explanation with application example for getting started with virtual commissioning

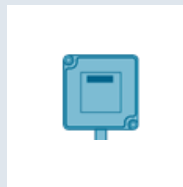


Libraries for SIMIT



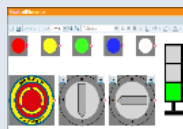
Drives Behavior Library

Simulation of automation technology



RFID Behavior Library

Simulation of sensor and actuator behavior

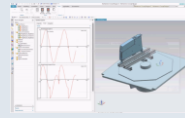


Control Elements Library

SIMIT Library control and indicator elements



Motor Sizing with NX MCD



Motor Sizing with NX MCD

select a motor with the help of NX Mechatronics Concept Designer and SIZER



For more information



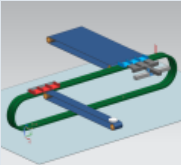
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Virtual commissioning of machines

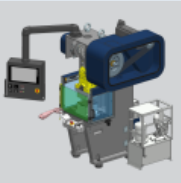
Machine models for industry specific applications

Machine Modules for NX MCD & SIMIT



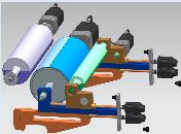
Intelligent Belt

With the multi-train control, products arriving one after the other can be picked up and made available together at one unloading position



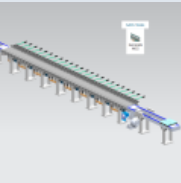
C Frame Press

Software package for automation of a conventional flywheel press with SIMATIC S7-1500 including press safety library



Cylinder Positioning

Application for positioning the printing cylinders of a flexo printing machine



Multi-Carrier-System

Simple creation of models for MCS lines



Models for SIMIT



Continuous web simulation

Mechanical & process elements like winders, driven axes, guide rolls, dancers, and web behavior



For more information



For download in SIOS



Virtual commissioning of machines

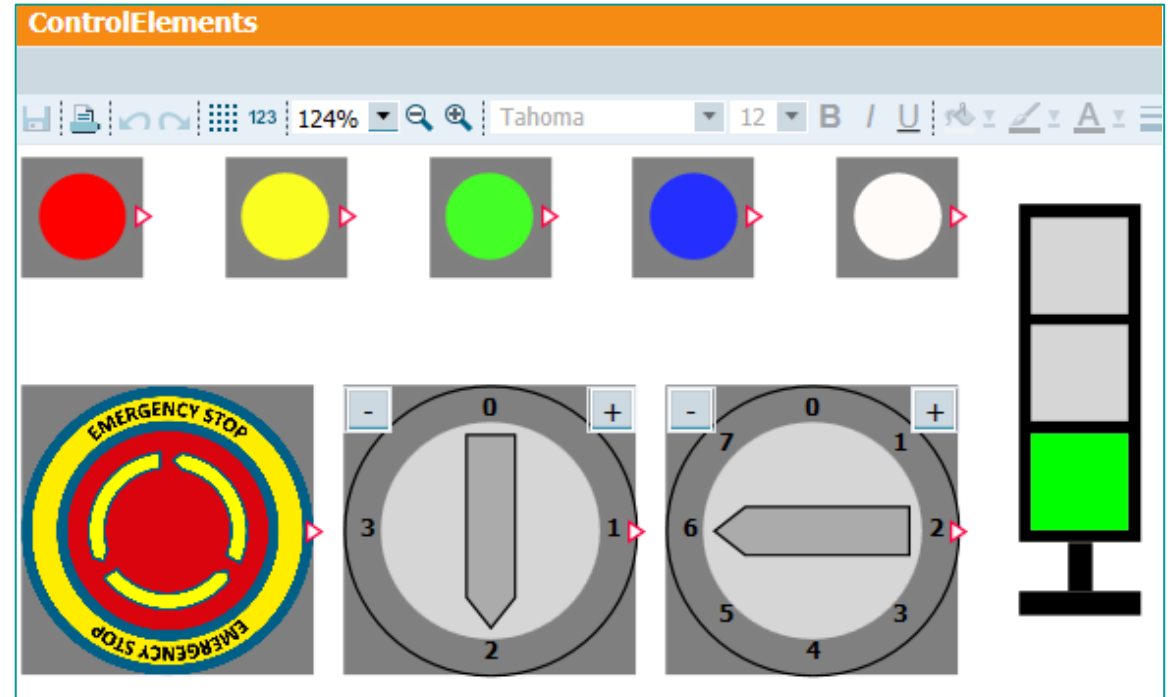
Control element library in SIMIT

Use Cases

- Rebuild the control panel of your machine
- Operator Training with a digital twin
- Open library, can be adopted to own requirements

Technical description

- SIMIT Control elements developed with Component Type Editor (CTE)
- Lightbutton, parameterizable (NO – NC, color, default value)
- Emergency Stop button
- Rotary switch, parameterizable (no. of states, color, default value)
- Indicator and indicator tower
- Key switch



Information & Download in SIOS

[SIMIT library and example project available](#)

Virtual commissioning of machines

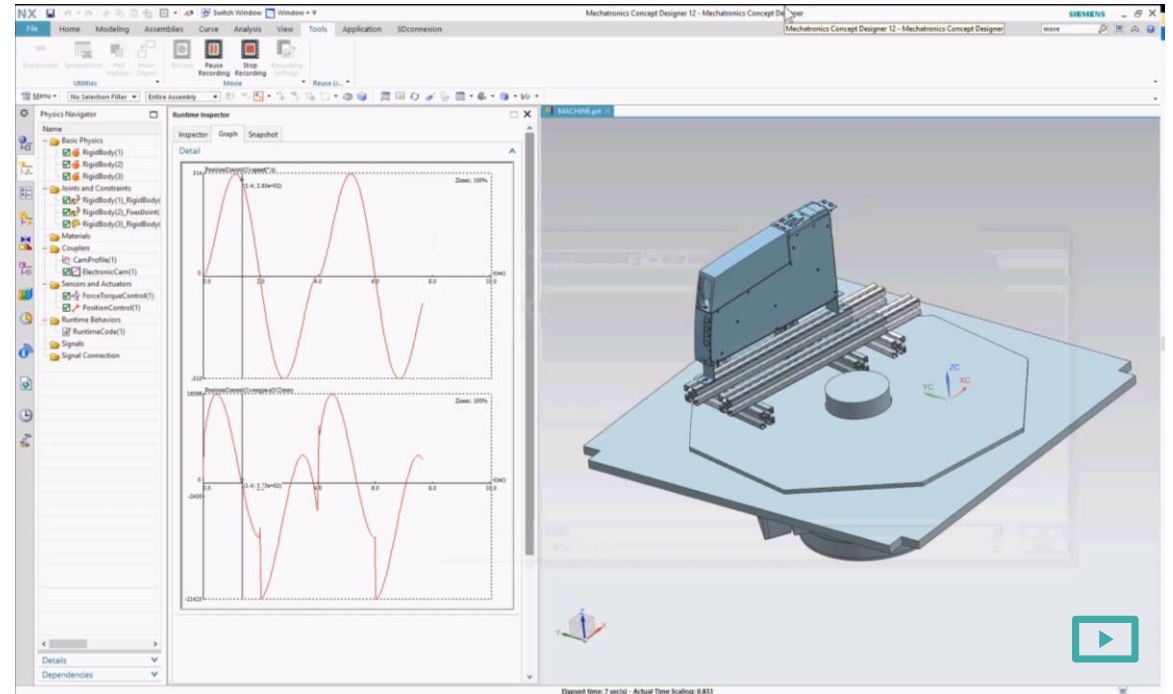
Motor Sizing with NX MCD

Use Cases

- Learn how to do use NX MCD for sizing drives together with SIZER
- Use example project for getting started

Technical description

- Exchange CAM profiles between SIMOTION SCOUT and NX MCD
- Configure Cam profiles in NX MCD
- User defined friction model in NX MCD
- Export load curves from NX MCD to SIZER



Information & Download in SIOS

[NX MCD model, TIA Portal Project and SIZER projects available](#)

Virtual commissioning of machines

Industry specific applications: Intelligent Belt

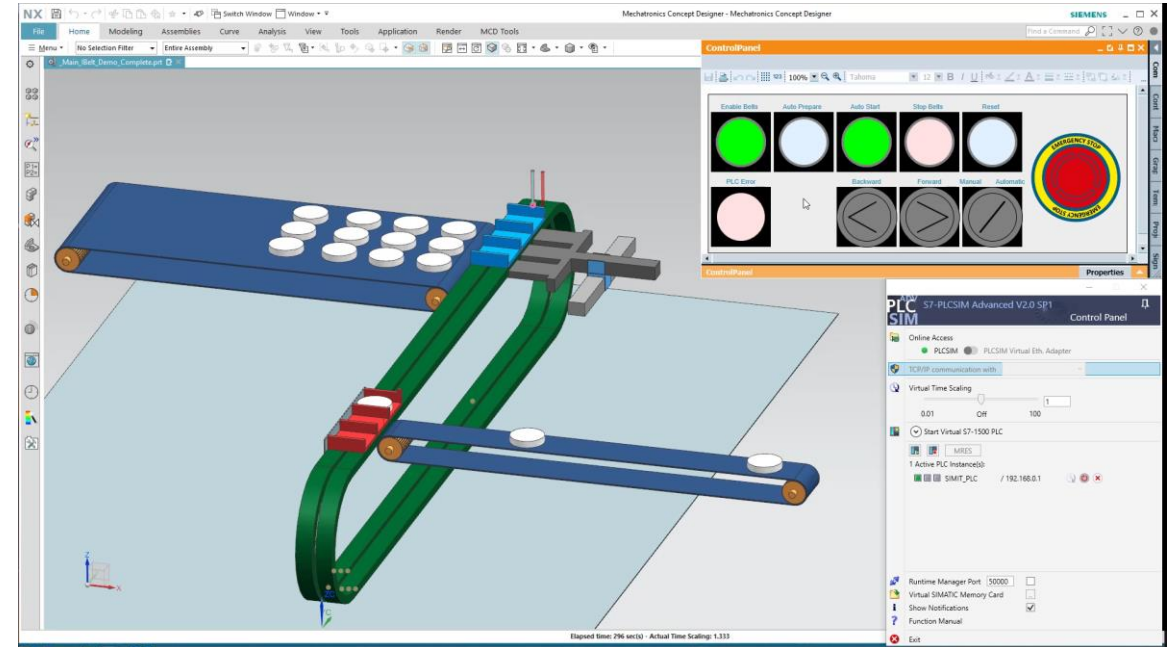
Use Cases

- Evaluate the mechatronic concept (e.g. collision check of the trains, conveyors and products)
- Test step sequences and operation modes of the intelligent belt application
- Test intelligent belt application flexible on variable infeed and outfeed velocities
- Simulate different packaging modes, e.g. sequential or pattern station
- Validate homing process

Technical description



- Digital twin of a multi belt system for packaging machines with NX MCD, SIMIT and PLCSIM Advanced
- PROFIdrive simulation for the belt axes in SIMIT
- Simulation of control panel in SIMIT
- Product handling and collision simulation in NX MCD
- Supply and outfeed conveyors - simulated and controlled by SIMIT



Information & Download in SIOS

[NX MCD, SIMIT model and TIA example project available](#)

Virtual commissioning of machines

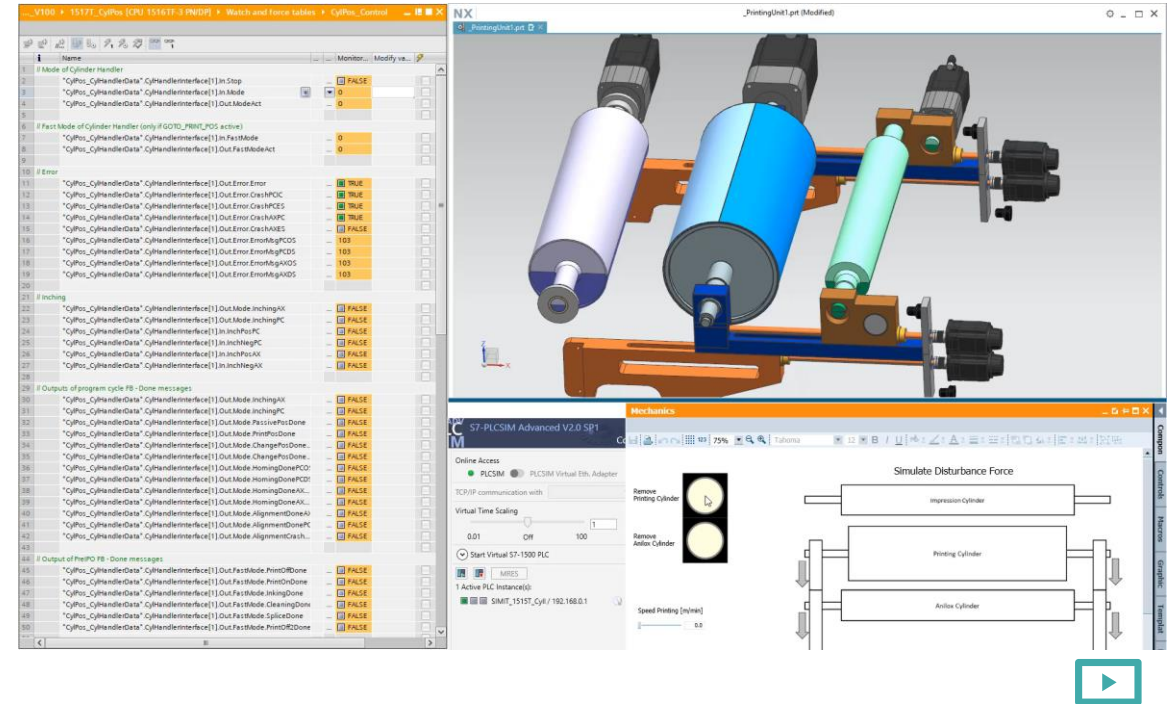
Industry specific applications: Cylinder Positioning

Use Cases

- Evaluate the mechatronic concept (e.g. collision check of the motors)
- Test step sequences and operation modes of the cylinder positioning application
- Validate the geometry calculation
- Simulate homing on fixed endstop
- Test alignment and crash observation

Technical description

- Digital twin of a flexographic printing unit with NX MCD, SIMIT and PLCSIM Advanced
- PROFIdrive simulation for the cylinder positioning axes in SIMIT
- Simplified simulation of contact pressure in SIMIT
- Remove and install printing and anilox cylinders during simulation (e.g. for homing) in NX MCD
- Flexible mechanic: adjustable geometry of printing unit



Information & Download in SIOS

[NX MCD, SIMIT model and TIA example project available](#)

Virtual commissioning of machines

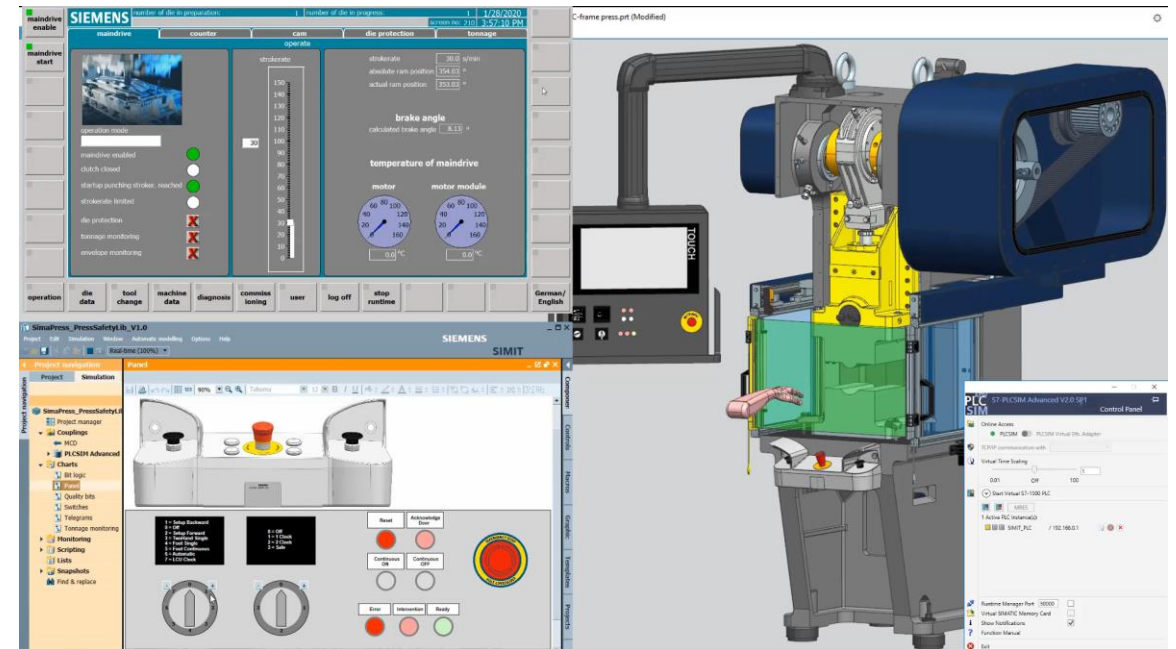
Industry specific applications: Simapress & Press Safety Blocks

Use Cases

- Test step sequences and operation modes of the Simapress and press safety application
- Test safety functions of the machine
- Operator training and training on the simulation
- Validate die protection, tonnage and envelope monitoring

Technical description

- Digital twin of a mechanical flywheel press with NX MCD, SIMIT and PLCSIM Advanced
- PROFIdrive simulation for the driven axis in SIMIT
- Simplified simulation of press tonnage in SIMIT
- Fully implemented operator panel in SIMIT
- Implemented failure scenarios like multiple sheets in the press
- Safety signals simulated in SIMIT and MCD



Information & Download in SIOS

[Information regarding the software package to automate a conventional flywheel press](#)

Virtual commissioning of machines

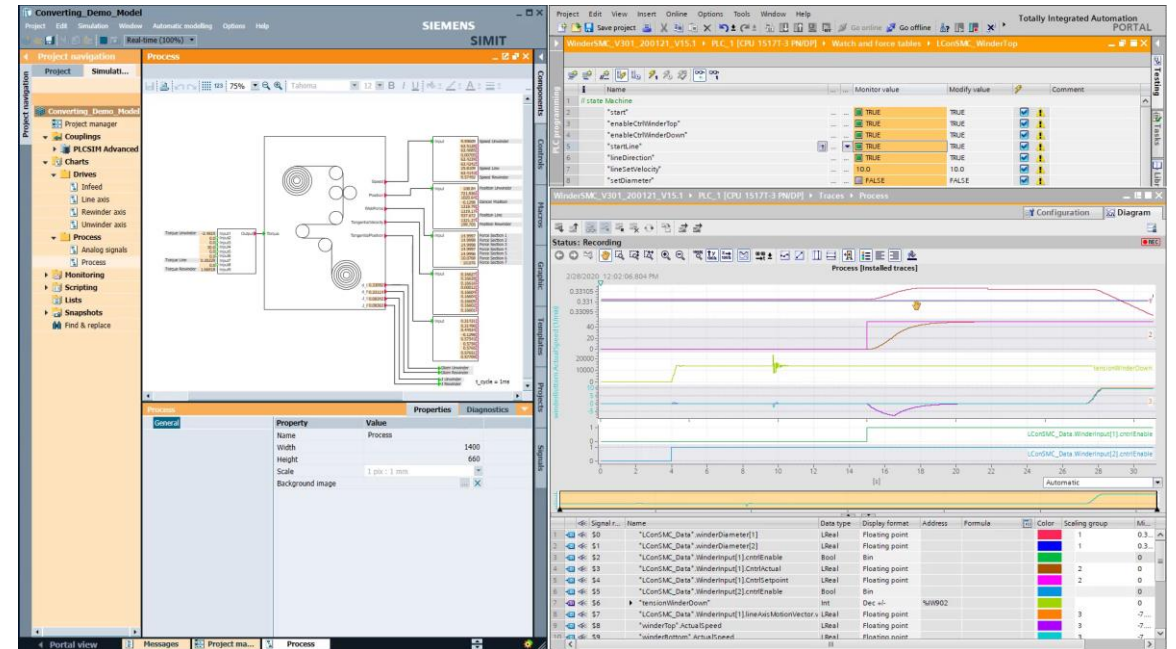
Industry specific applications: Continuous web simulation

Use Cases

- Virtually commission your converting application including line tension control, winders and dancers
- Test and analyze the winder diameter calculation
- Validate the behavior of the chosen line tension control mode in combination with the defined web process and mechanics
- Simulate a web break and validate how your PLC program reacts
- Optimize your technology controllers

Technical description

- Digital twin of a converting machine including winders, dancers, infeed, outfeed and passive axes
- SIMIT component for the simulation of a continuous web process with physical web equations as 1D-model
- Simulation of web position, web tension and loadcells
- Rotatory and linear dancers
- Combine different web sections to one web material



Information & Download in SIOS

[SIMIT library and application example available](#)

Virtual commissioning of machines

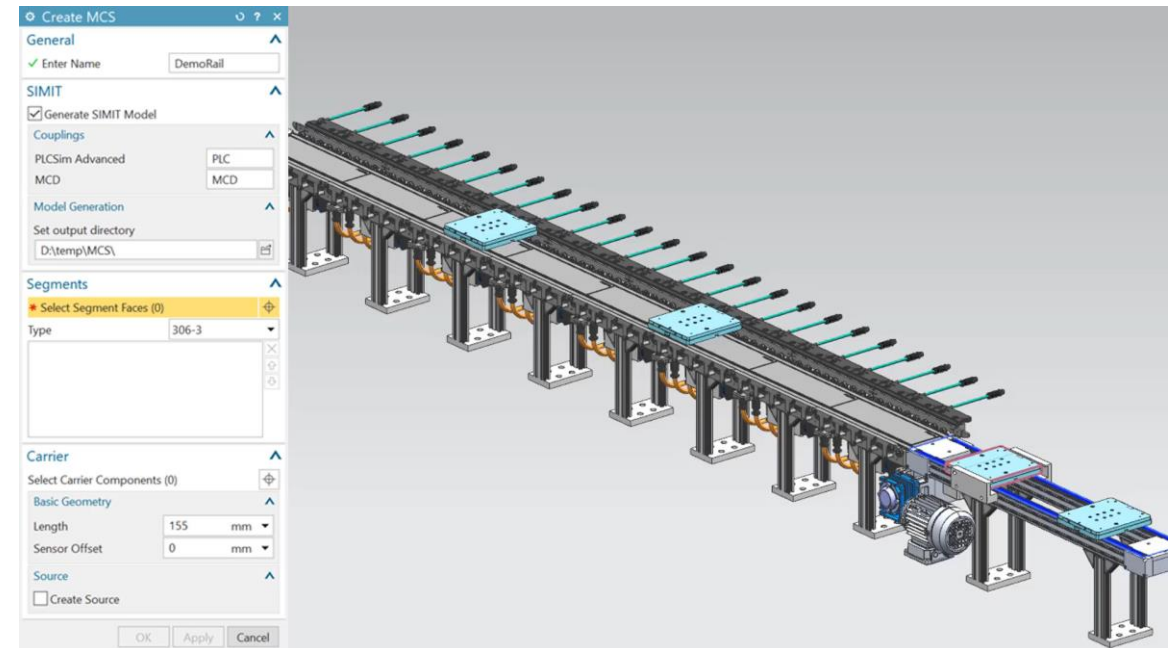
Industry specific applications: Multi-Carrier-Systems

Use Cases

- Quick and easy generation of fully functional NX MCD and SIMIT models for integrated Multi-Carrier-Systems based on supplied CAD Data
- Time efficient virtual commissioning of Multi-Carrier-Systems with just basic knowledge required
- Showcase for automated model creation
- Virtually commission your packaging application including MCS systems

Technical description

- Extension for NX MCD
- Automatic generation of kinematics for NX MCD
- Automatic generation of SIMIT charts for all MCS segments, including the connection of signals
- Simulation of the SINAMICS OA Application *TECRailCtrl* by a dynamic Runtime Behavior (NX MCD)
- Implementation of LRailCtrl telegrams in SIMIT



Information & Download in SIOS

[MCS Toolkit and application example available](#)

I Díky za pozornost

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