Digital Twin – revolutionizes development

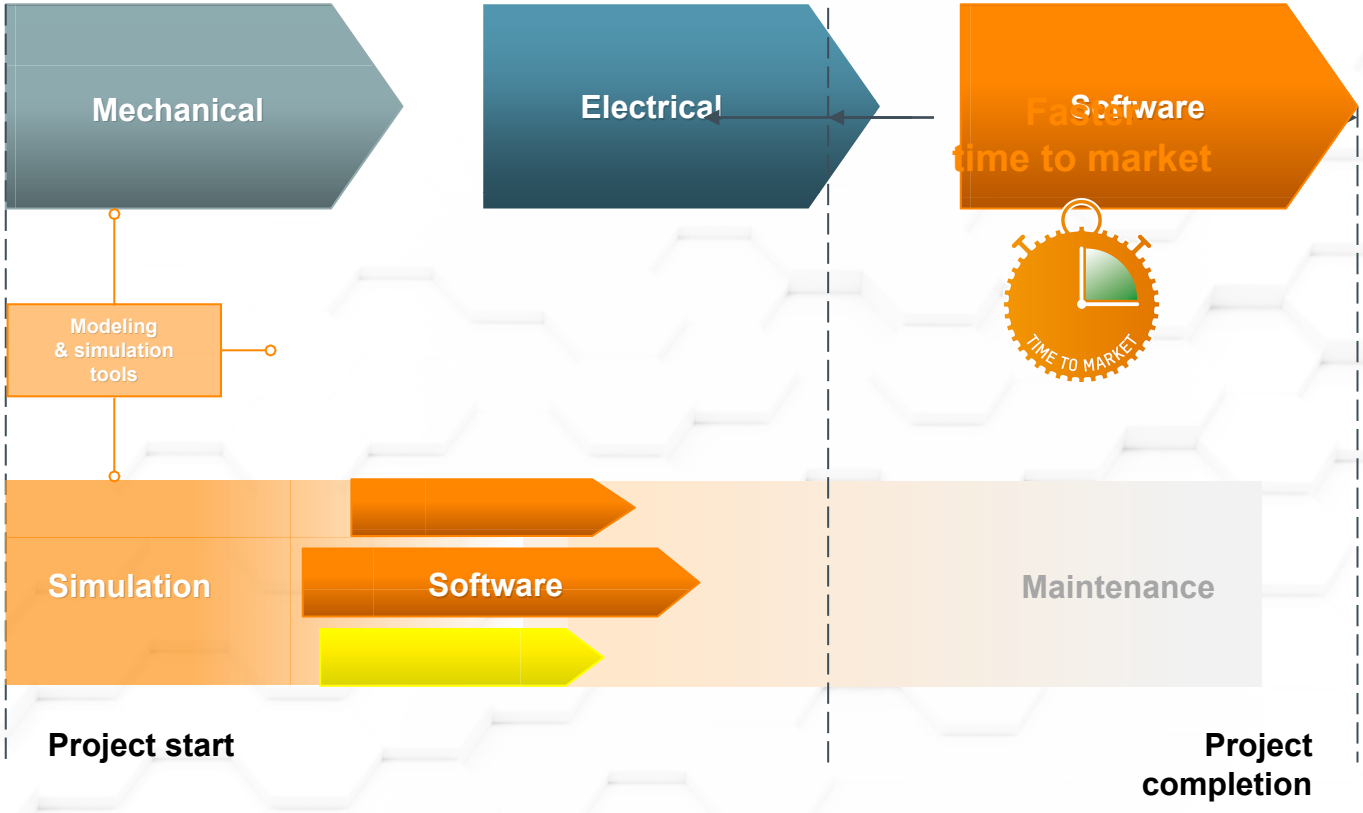
modelling before manufacturing

RAHUL VERMA

BUSINESS DEVELOPMENT

B&R INDUSTRIAL AUTOMATION PVT LTD

Requirements for the development process



Why do we need digital twins?

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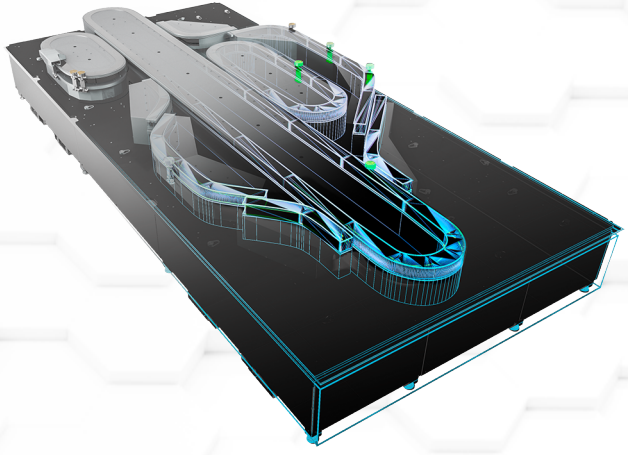
Simulation & Digital Twin



Shorter TTM

- Accelerated development and testing

Better ROI

- Reduced development costs
- Reduced dependency on expensive, time-consuming prototyping

Higher OEE

- Live testing of changes and updates
- Configuration without stopping machine

Easy maintenance

- Easy troubleshooting, repair and maintenance (without training)

Standard areas of application

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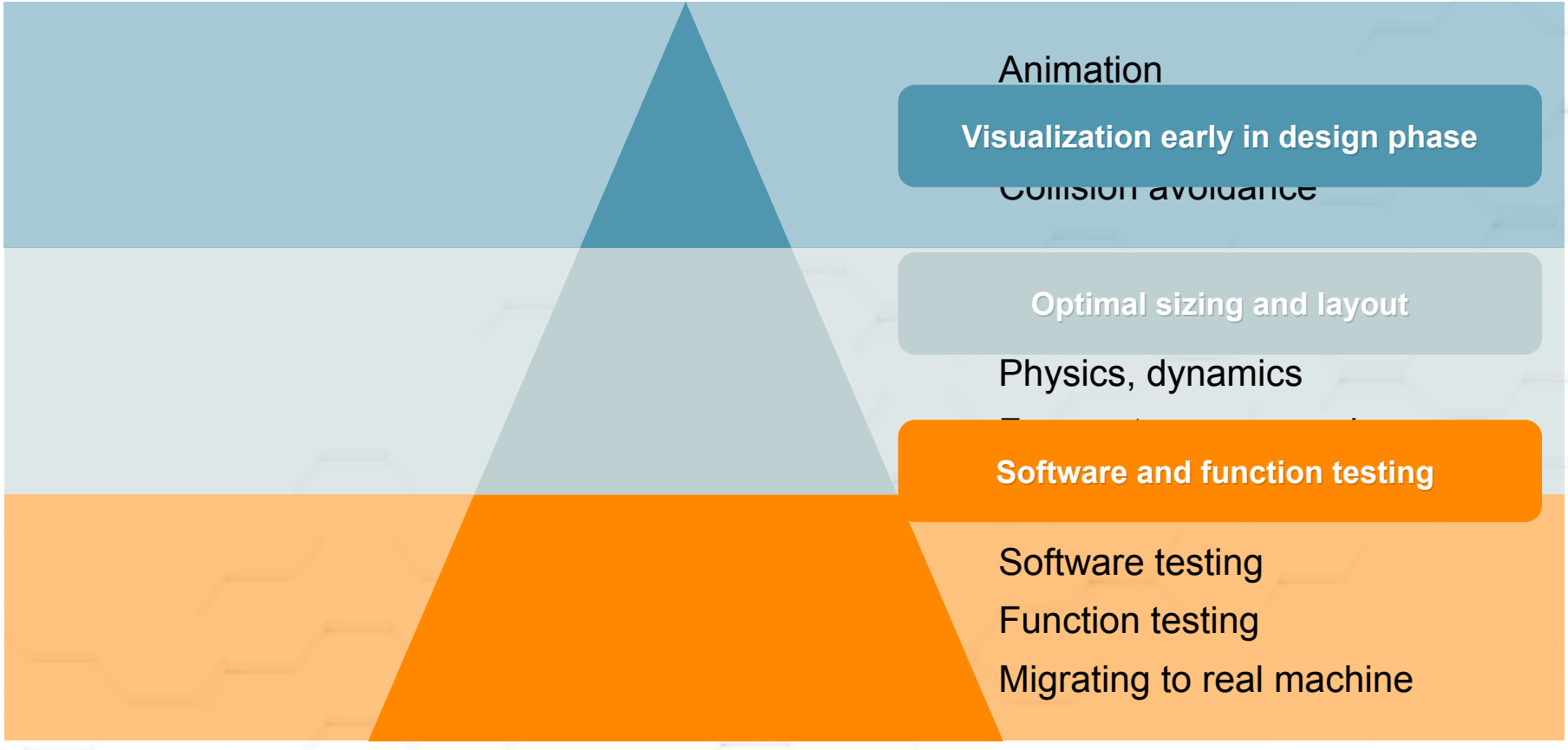
Virtual commissioning
Digital twins
Simulation

Visualization early in design phase

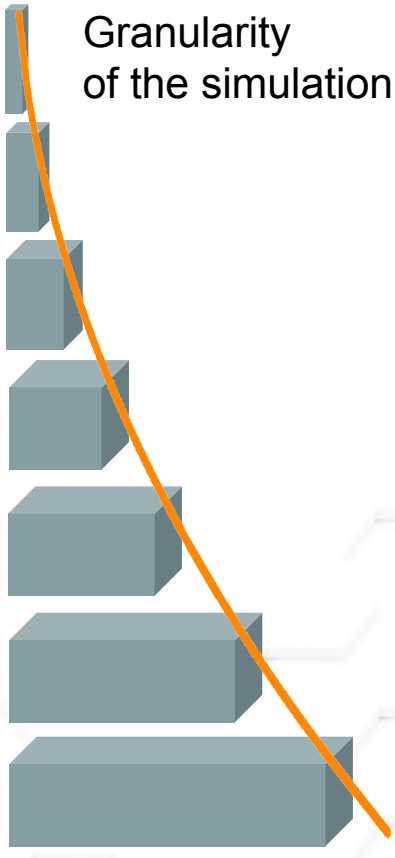
Optimal sizing and layout

Software and function testing

Challenges in software development



Challenges in software development



Process simulation

Animation
Flow of material
Collision avoidance

Machine simulation

Kinematics
Physics, dynamics
Forces, torque, speed

Hardware simulation

Software testing
Function testing
Migrating to real machine

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Line and process simulation

industrialPhysics B&R Edition

industrialPhysics – Digital twins made easy

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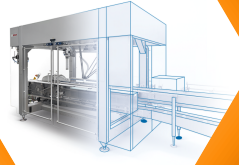
Simulation models
Directly from CAD

Connect controllers

Synchronized
engineering

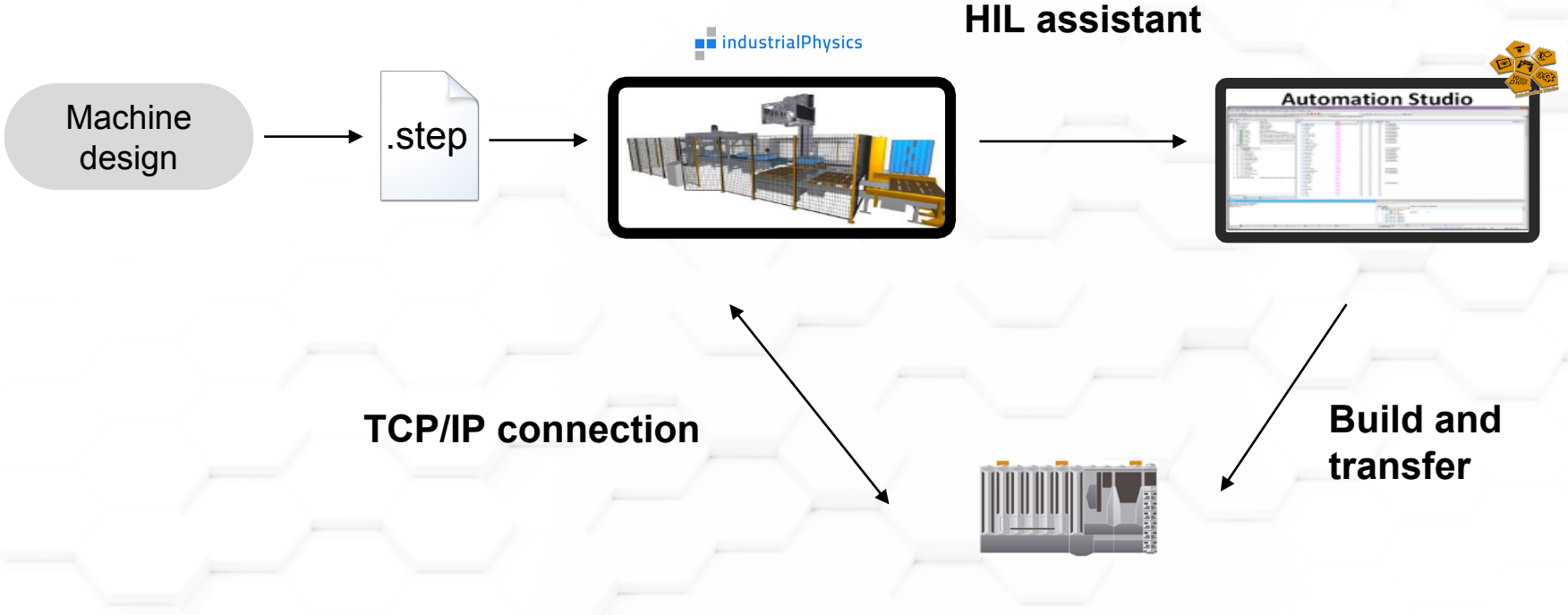


Virtual commissioning of
sequential controls up to
robotics controls

Consistent process
along entire value chain

Transfer models
to VR and AR glasses

Model-based development with industrialPhysics



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Usage example

Pharmaceutical industry

Use case – Pharmaceutical industry

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Goal

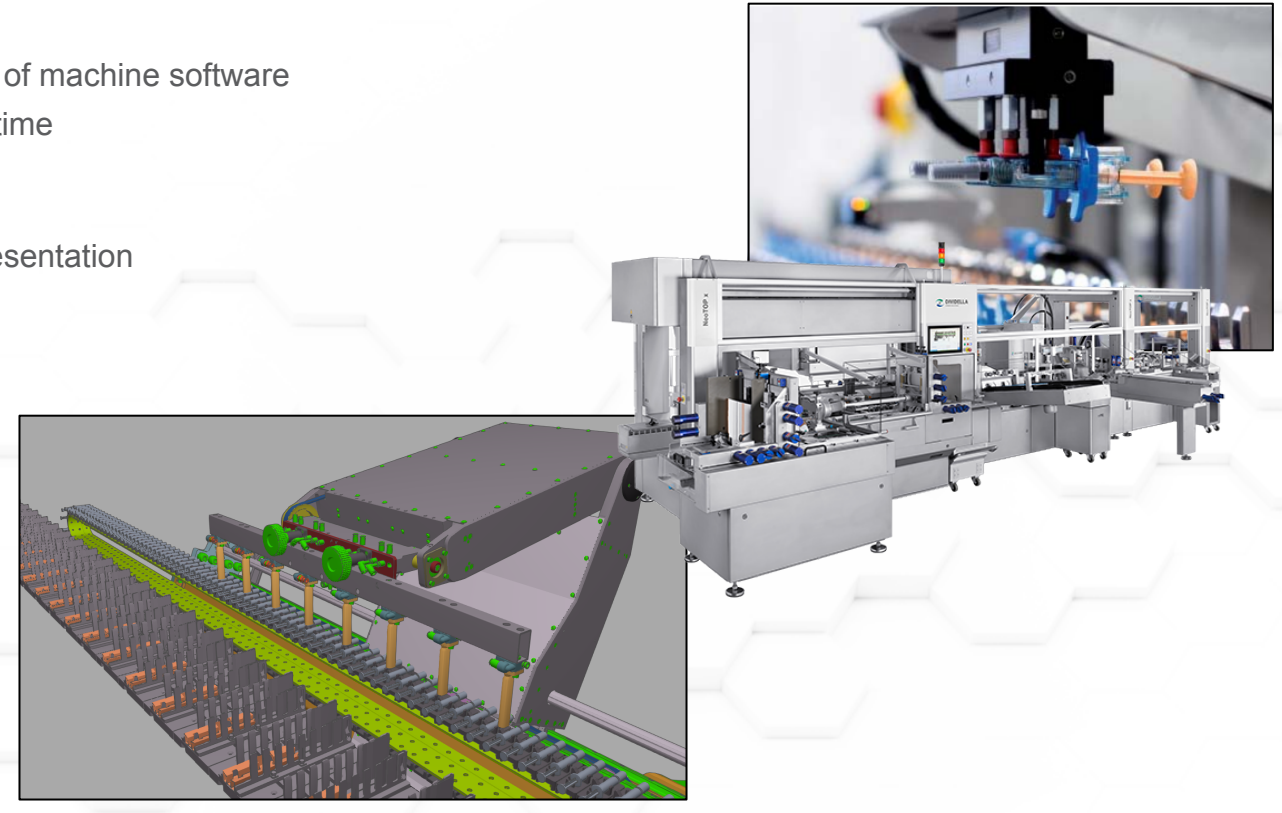
- Accelerate development of machine software
- Shorten commissioning time

Specification

- 5 months to machine presentation

Solution

- Use a digital twin



Use case – Pharmaceutical industry

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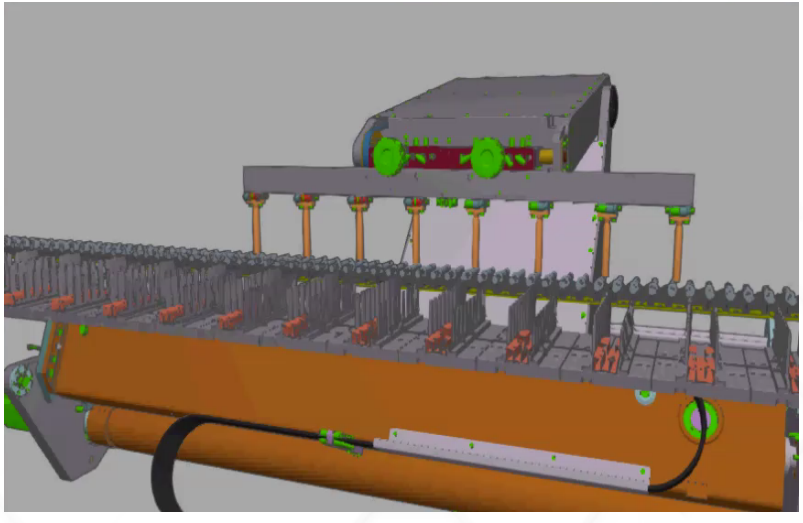
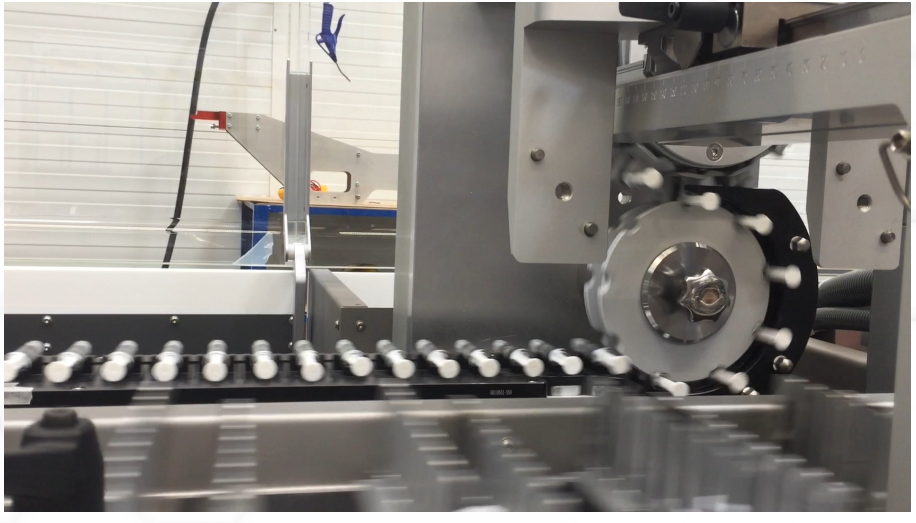
Results

Virtual machine



Real machine



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Virtual reality with industrialPhysics B&R Edition

Potential applications of virtual reality

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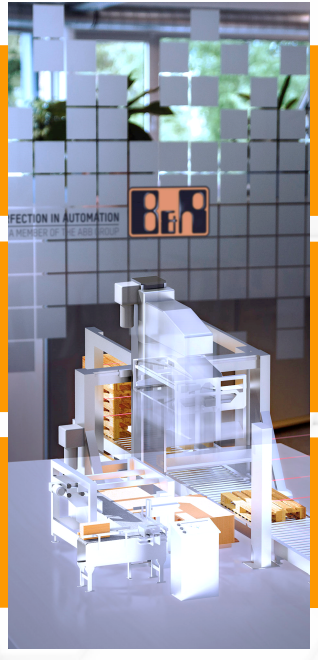
- Development of equipment and products
- Basis for design concepts
- Training and instructions



- Ergonomic evaluations
- Show live data in model
- Factory and layout planning

Example of virtual reality

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Position in virtual reality

Defined starting point in industrialPhysics

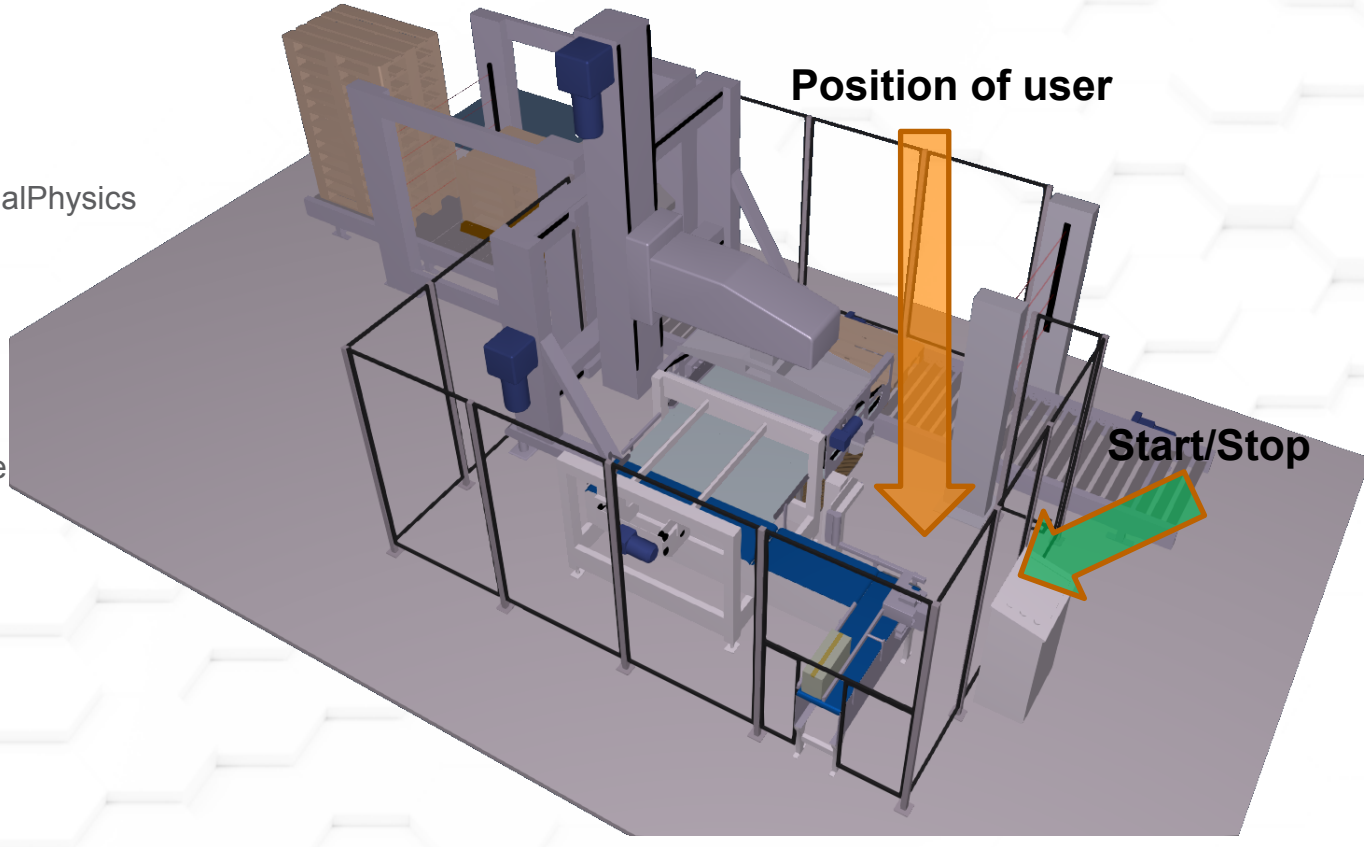
Navigation

Position of VR headset

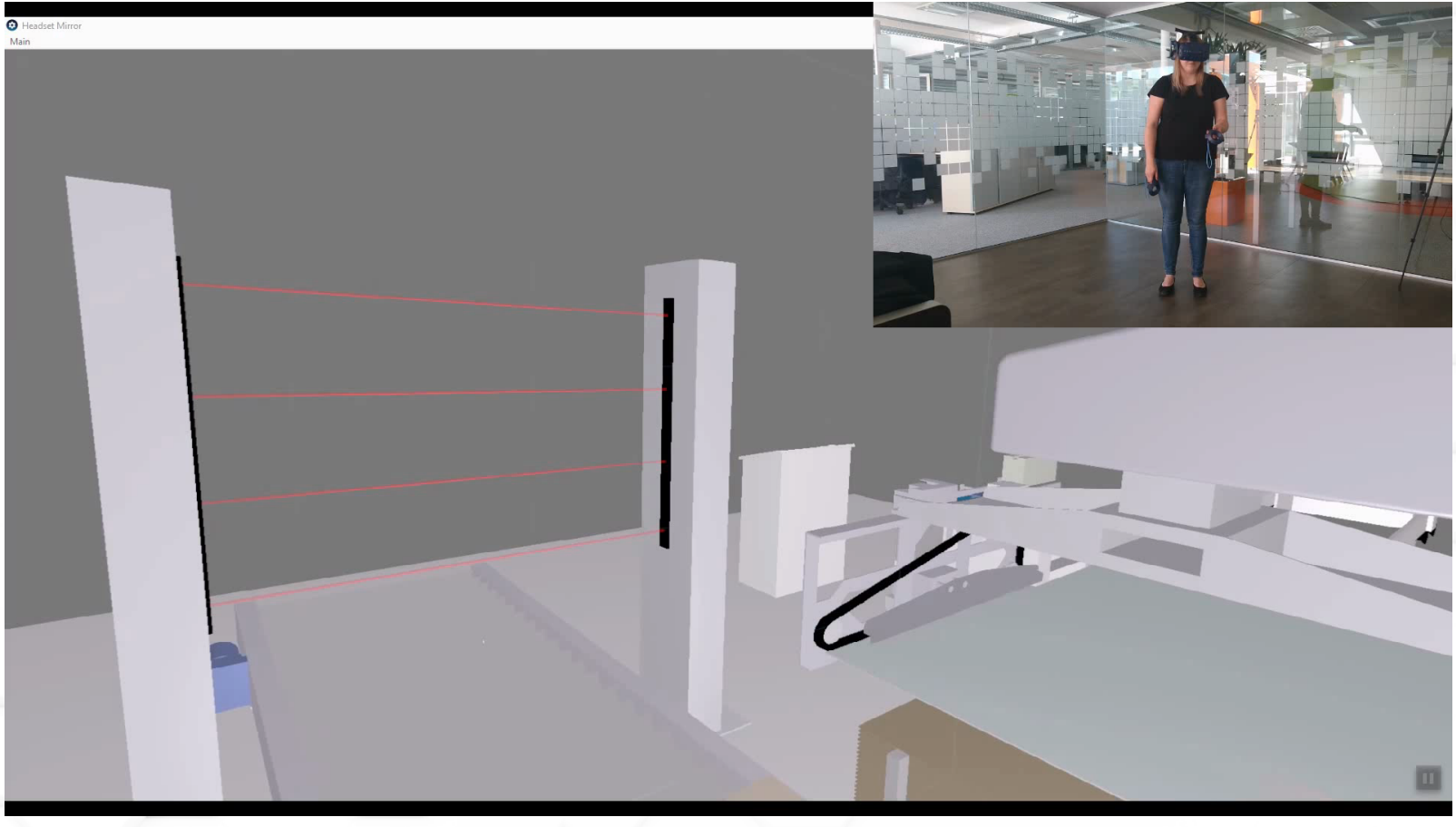
Forward motion using HTC Vive

Interaction

HTC Vive controller

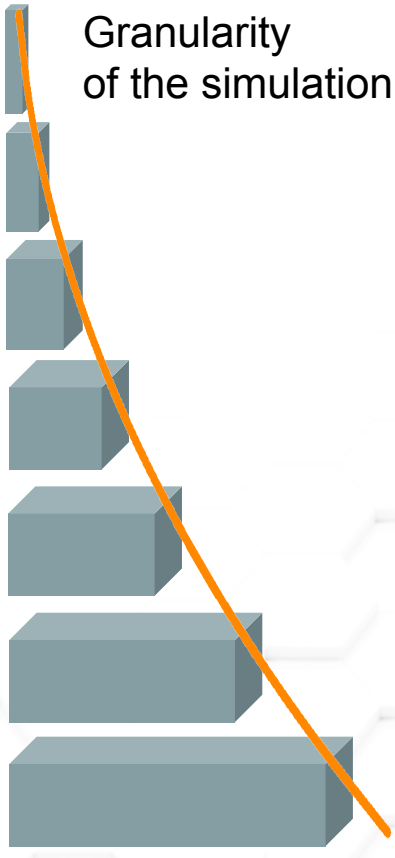


Virtual reality demo



Hardware

Challenges in software development



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Simulating machines and components

B&R MapleSim Connector

MapleSim – Digital twins made easy

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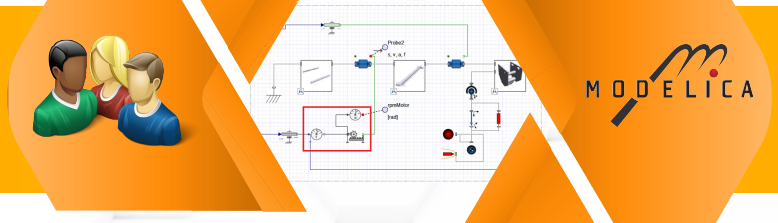
Simulation models from CRM

Generate real time models automatically

Synchronized engineering

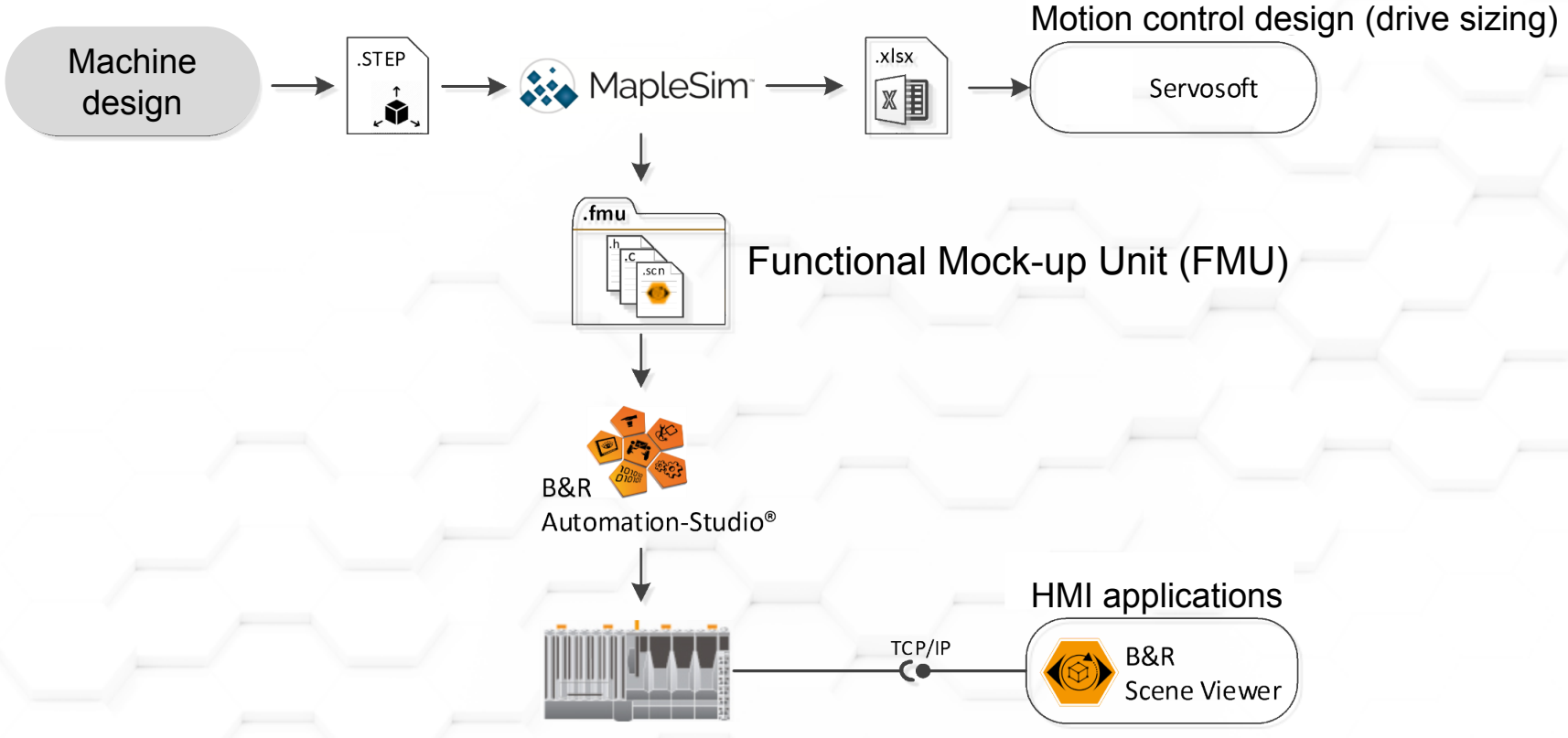


Create models easily with Modelica

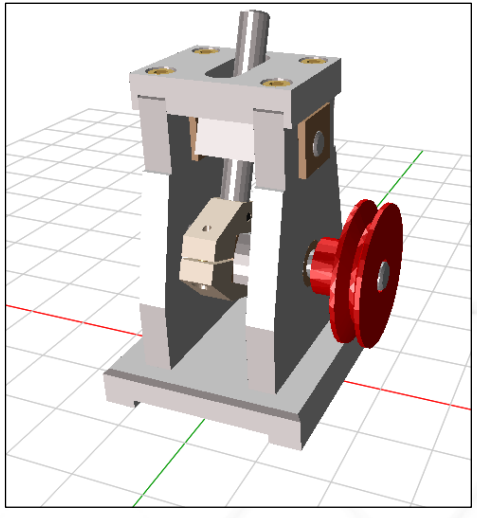
Motor design parameters

Transfer models to Scene Viewer

Develop models faster and error-free



Example of workflow



MapleSim

.fmu

.h .c .scn

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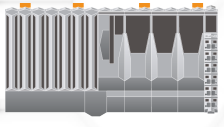

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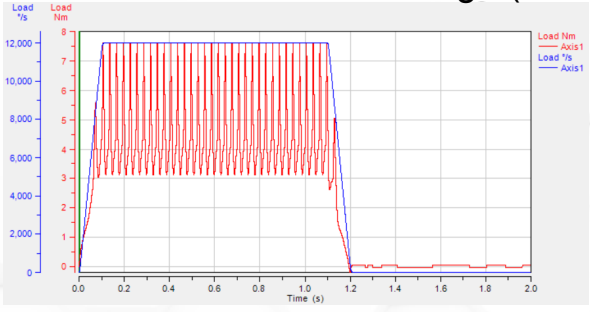
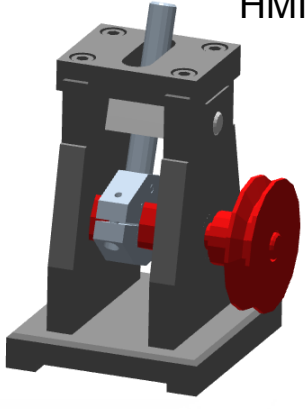
TCP/IP

Motion control design (drive sizing)



HMI applications



Goals of B&R MapleSim Connector

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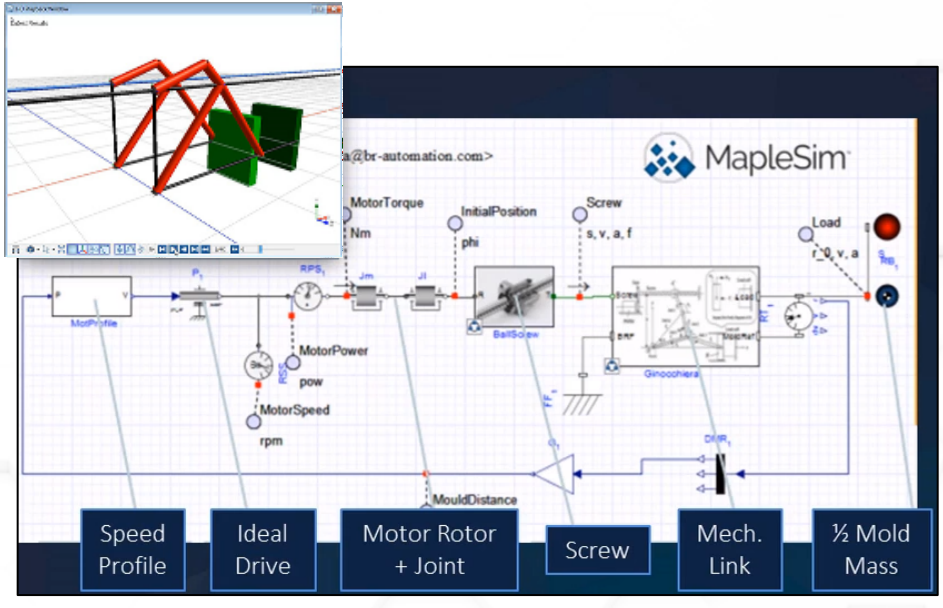
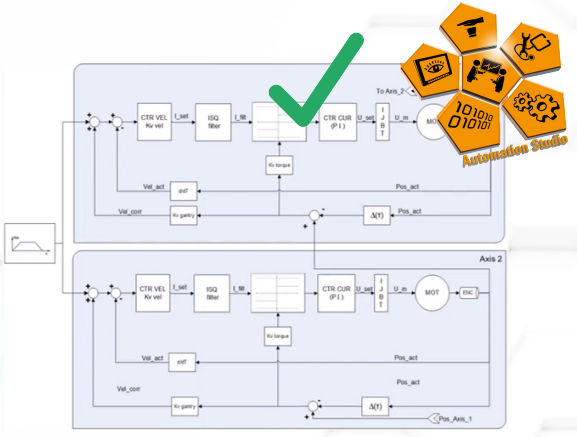
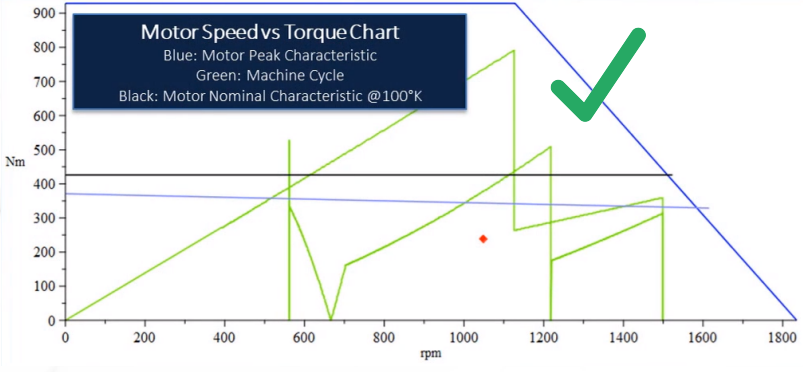
Size machine components precisely

Validate controls strategy







Challenges in software development

Managing increasingly complex systems ✓

Shortening commissioning times ✓

Facilitating innovation ✓

Optimizing internal processes ✓

Reaching physical limits ✓

New ways to influence processes ✓

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