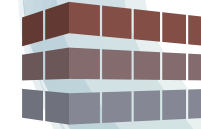


DIGITAL TWIN FOR EDUCATION

software requirements and examples of digital twins

Module 1



CARL-BENZ-SCHULE
GAGGENAU



Mercantec



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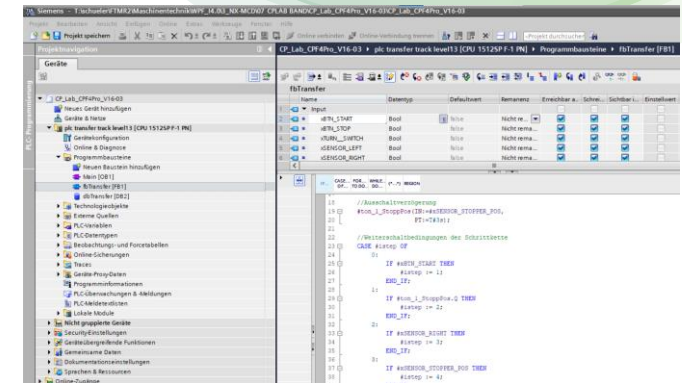
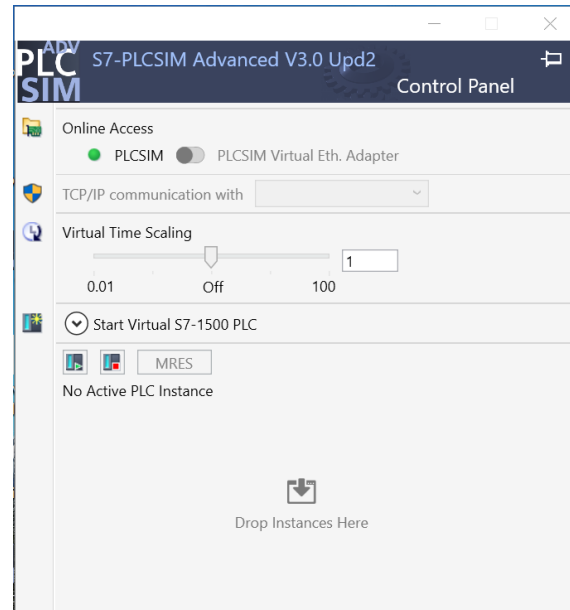
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Software requirements

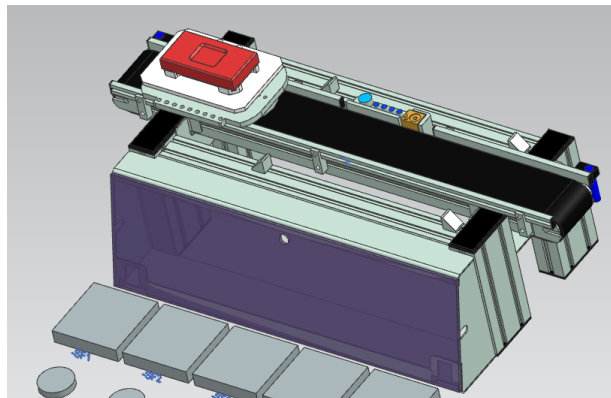


Simulation Tool PLC SIM Adv.



PLC Programming Software Siemens TIA-Portal

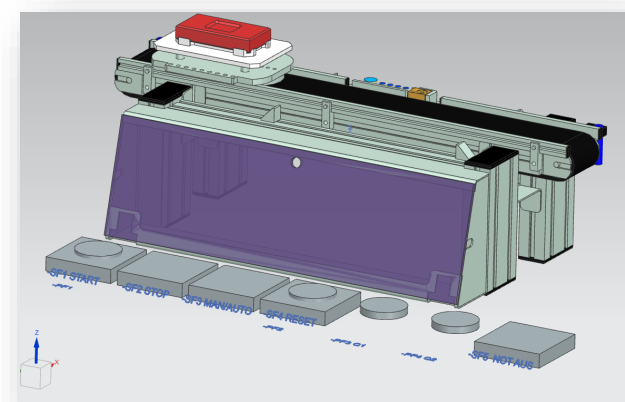
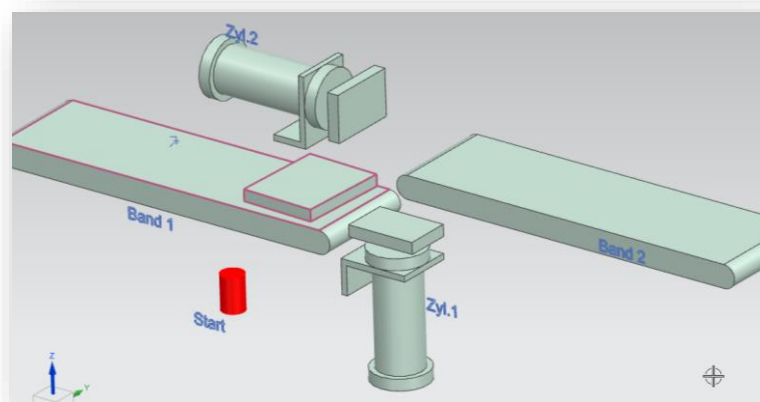
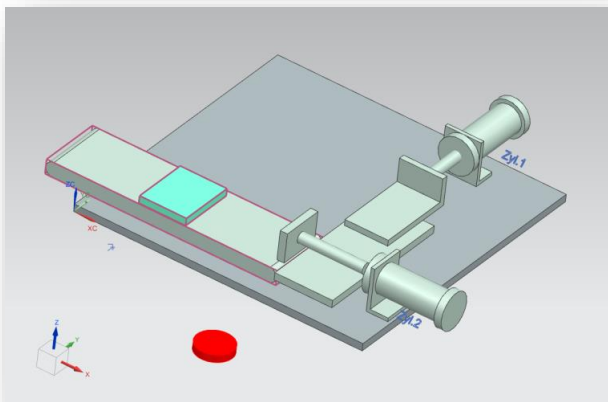
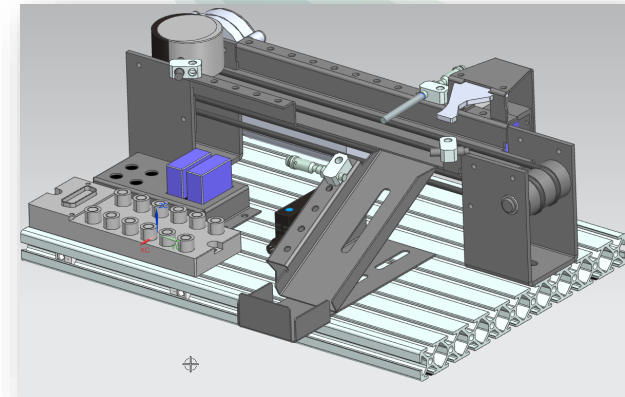
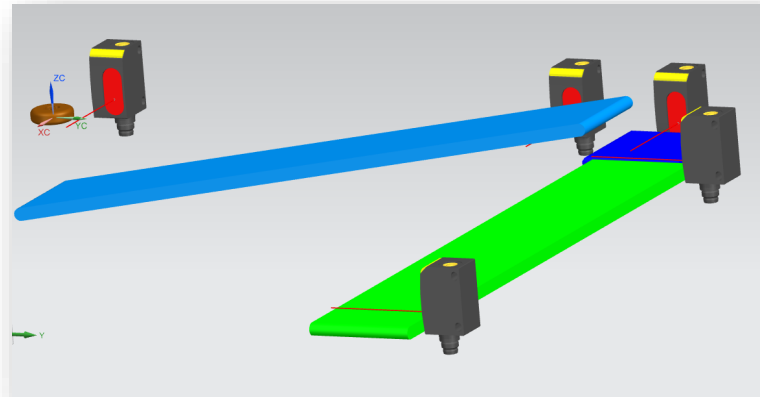
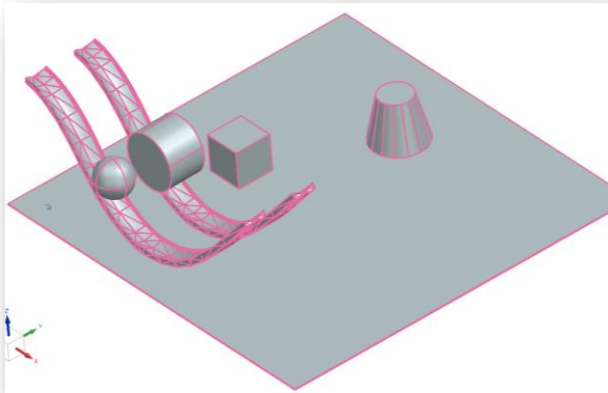
Simulation Software Siemens NX MCD



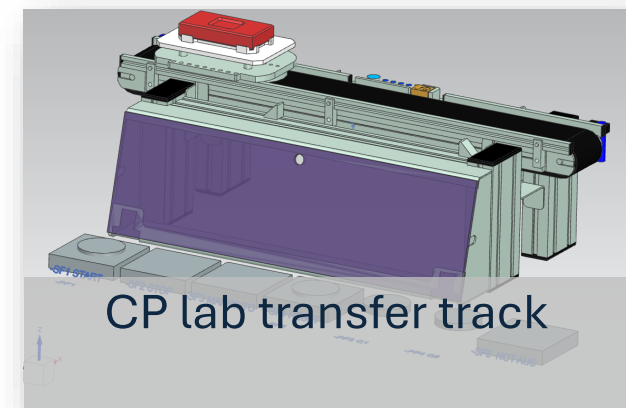
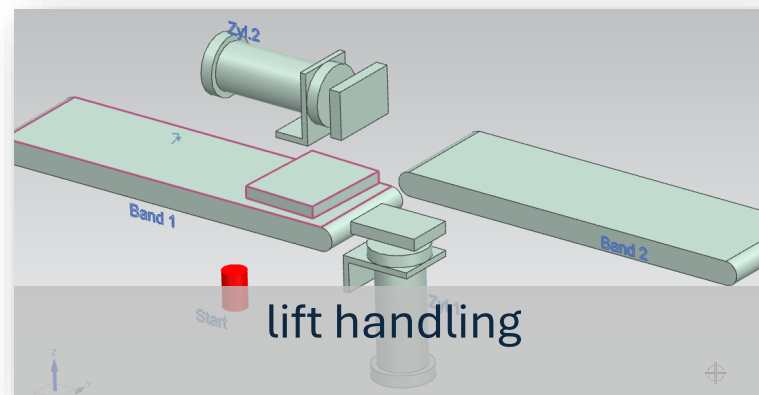
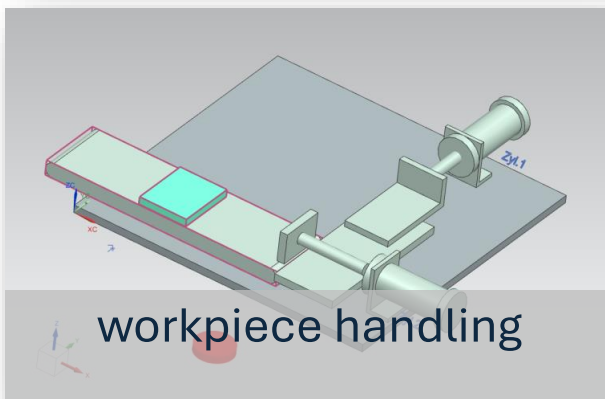
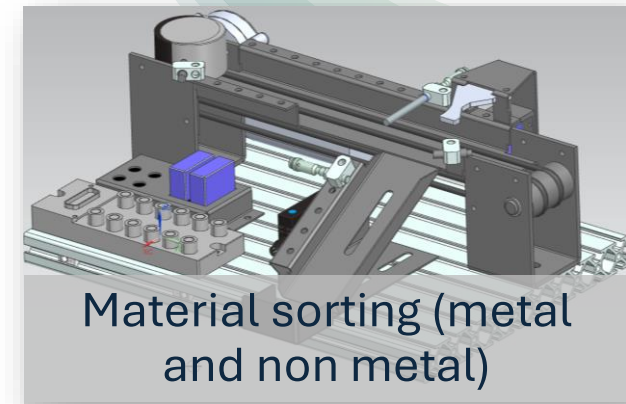
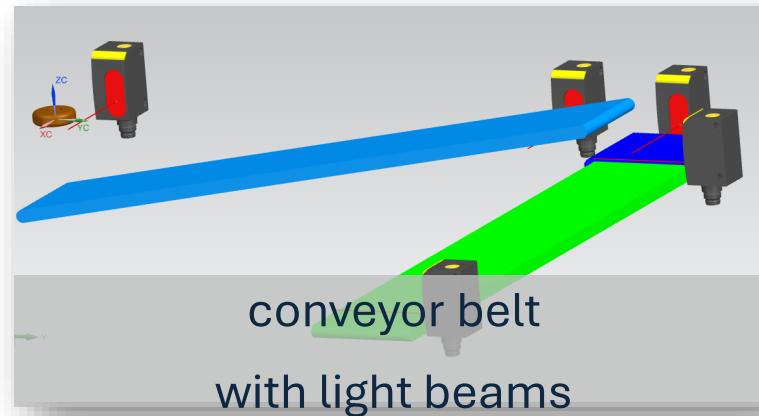
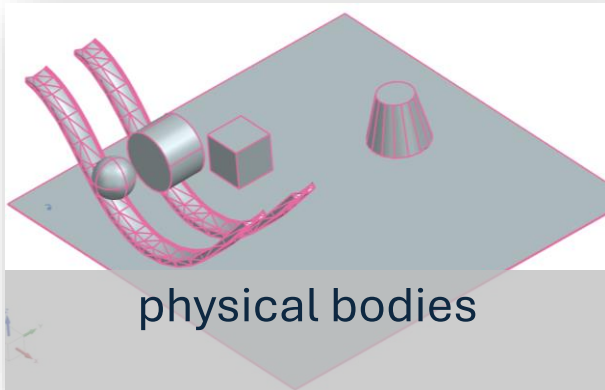
Creating a Soft-PLC as a
connector between
MCD and TIA Portal



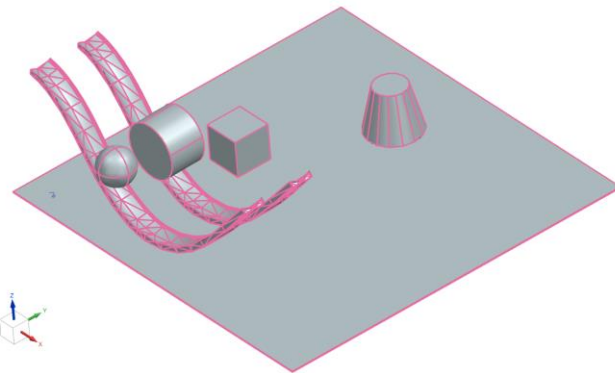
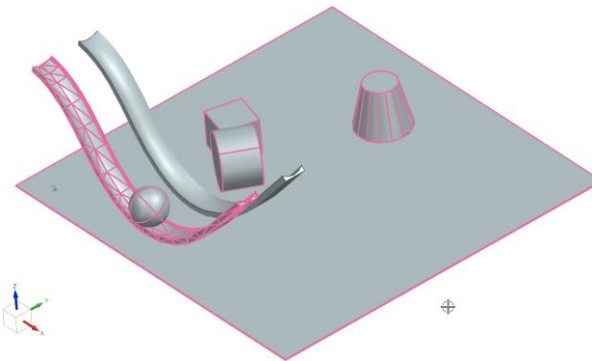
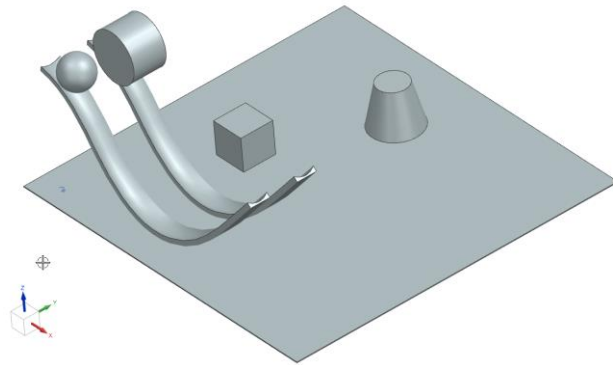
Examples of digital twins



Examples of digital twins

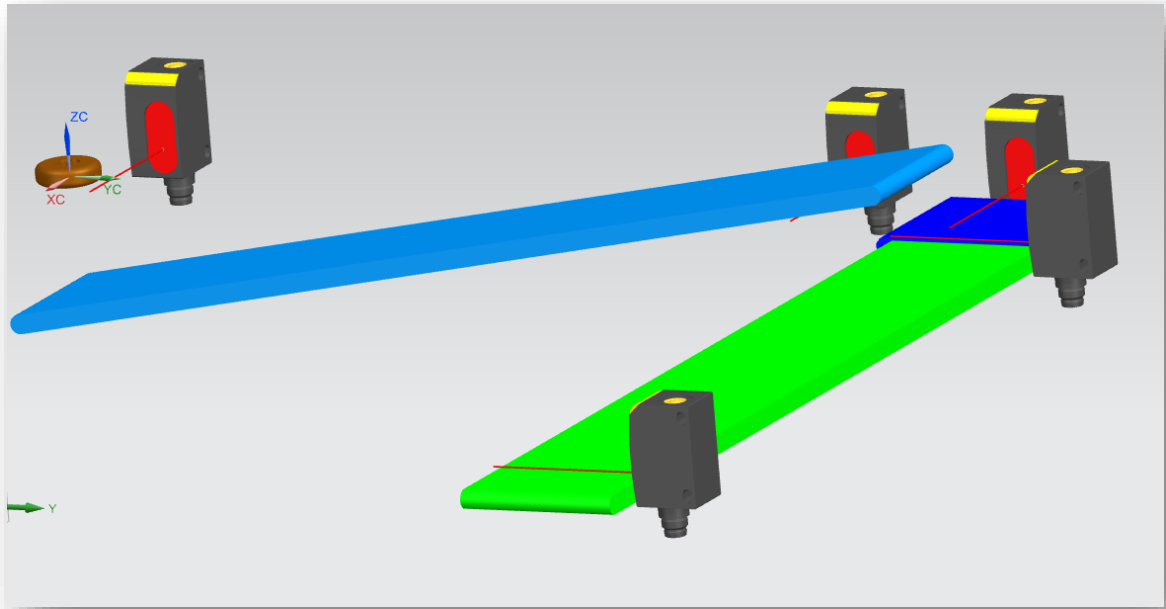


Physical bodies



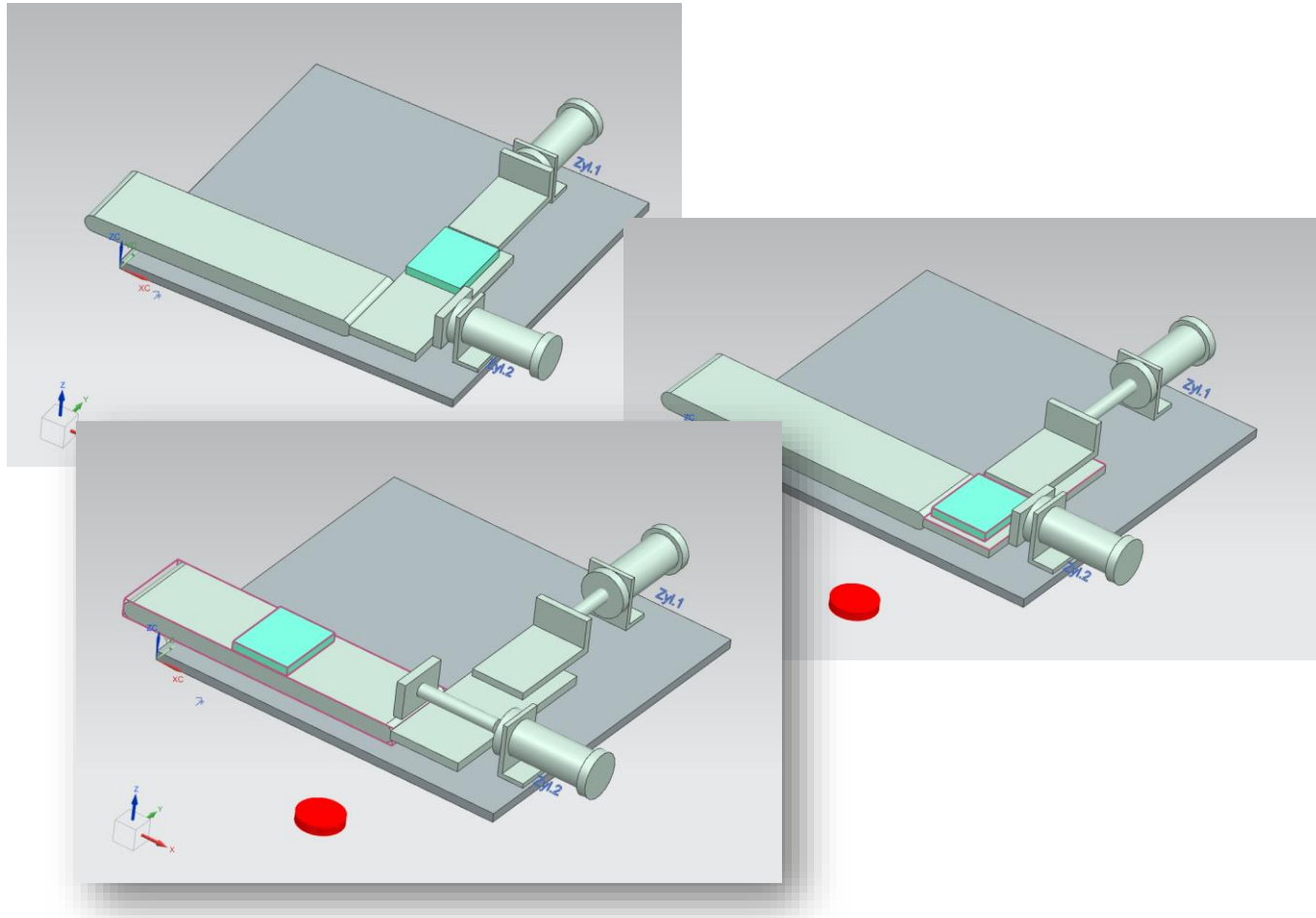
The digital models can be given physical properties (e.g. density, friction, ...). Thus, the model behavior corresponds to the real behavior. The bodies roll down the ramp at different speeds. Also bodies can leave the ramp.

Conveyor belt with light beams



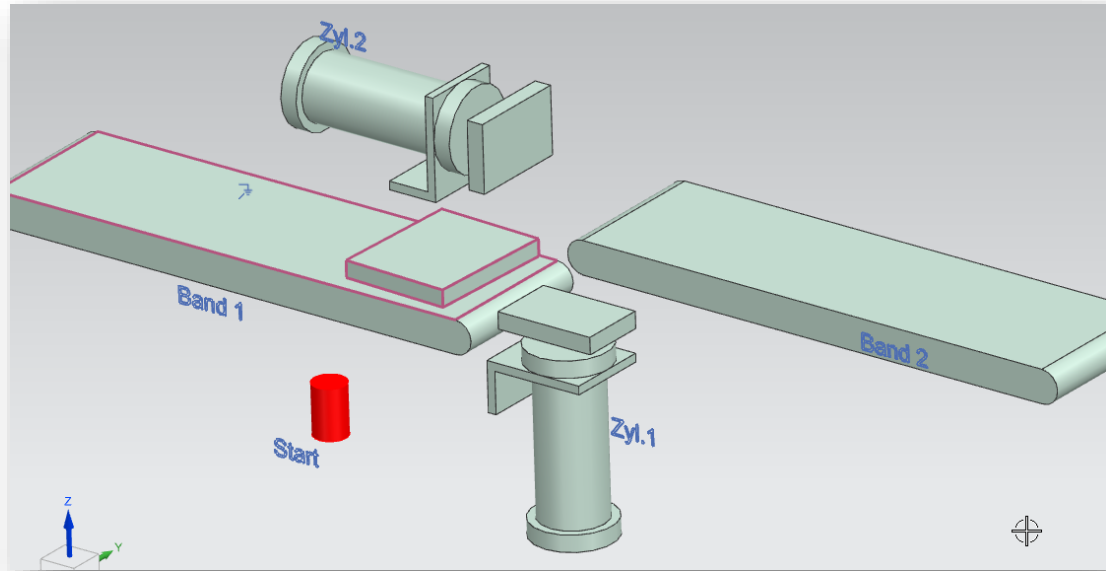
Different bodies can be transported on the belt. Modelled light barriers give signals (e.g. to a controller) that can be further processed.

Workpiece handling



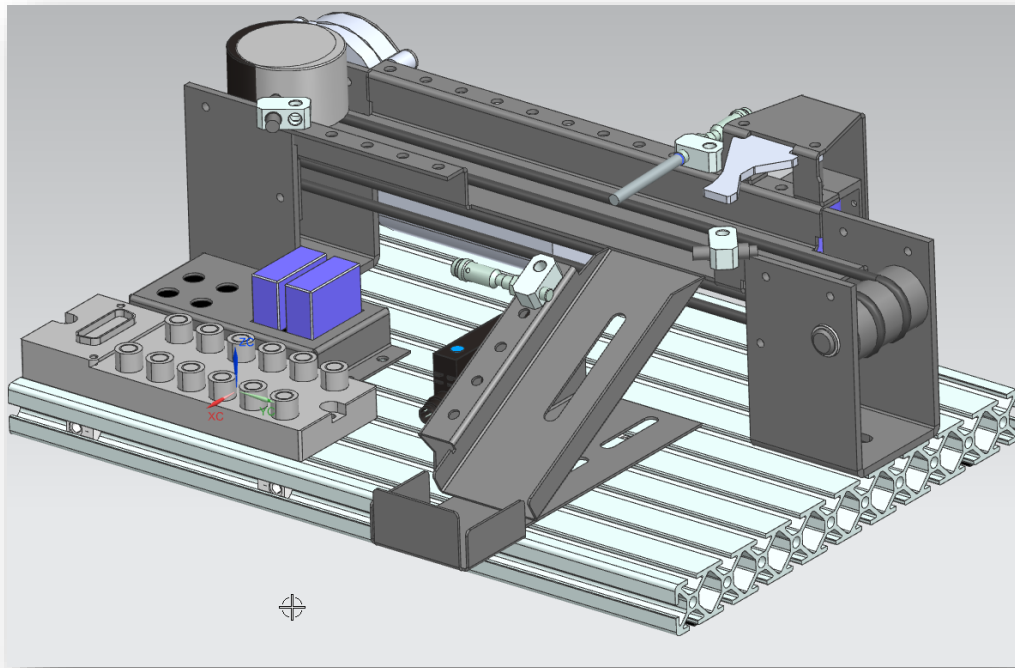
Digital pneumatic cylinders extend and transmit a force to the workpieces so that they reach the next conveyor belt. The cylinders can be integrated into PLC programming and controlled.

Lift handling



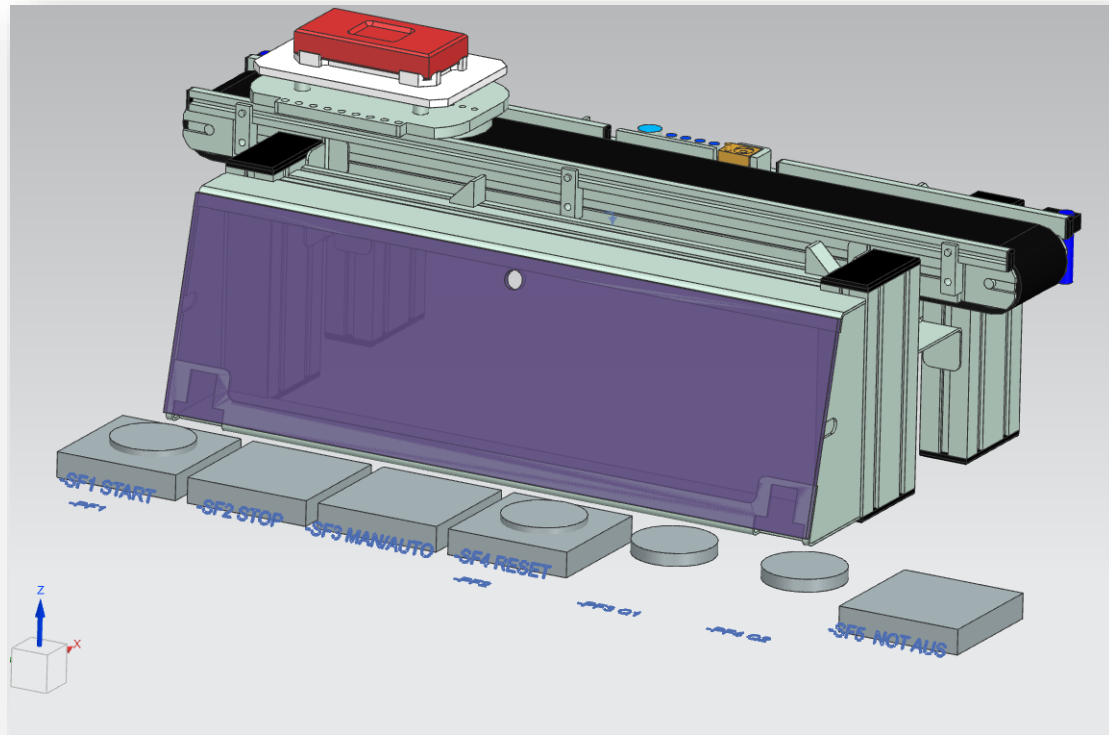
Similarly, a vertical production line can also be simulated using the physical properties. In this example, one cylinder is used as a lifting cylinder and the other as an extension cylinder. Both are controlled by a PLC.

Sorting station



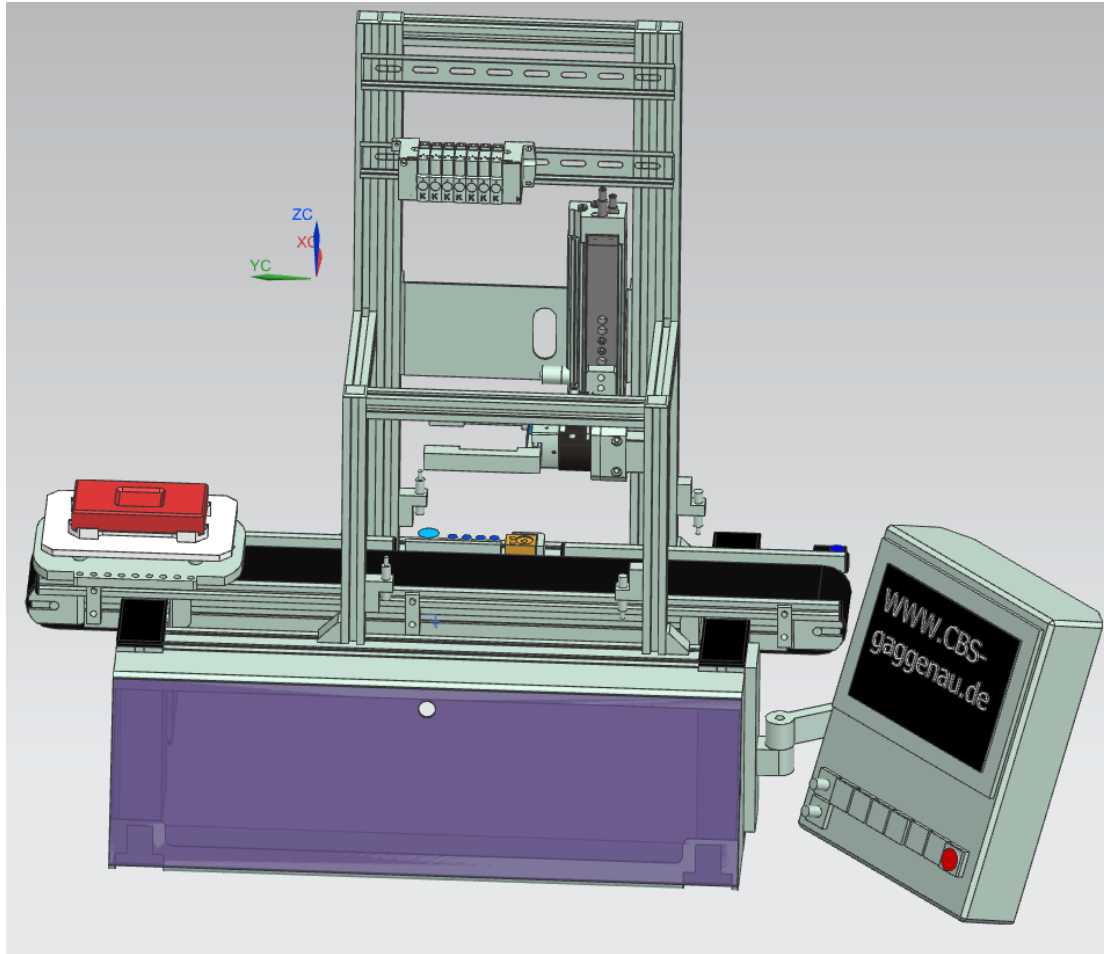
In the material sorting system, a distinction is made between metallic and non-metallic workpieces. The material properties are given to the workpieces as part of the creation of a digital twin. The system can sort out metallic or non-metallic workpieces on the basis of PLC programming.

CP Lab transfer track



Here you can see the digital twin of the transfer track of a production plant. A workpiece (red) is transported through the production line on the belt with the help of a workpiece carrier. The transfer belt is controlled by a PLC. It has several sensors at the respective ends and in the middle. There is also a stopper in the middle. This allows the movements that are crucial for production to be realized.

CP Lab transfer with turning application



Here you can see the digital twin of the transfer track with the turning application on top.

This is the master piece of our digital twin. With this simulation tool a hole class can create plc programs in the same time and test their solutions directly.