

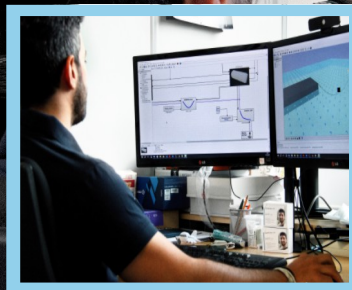
controlLab

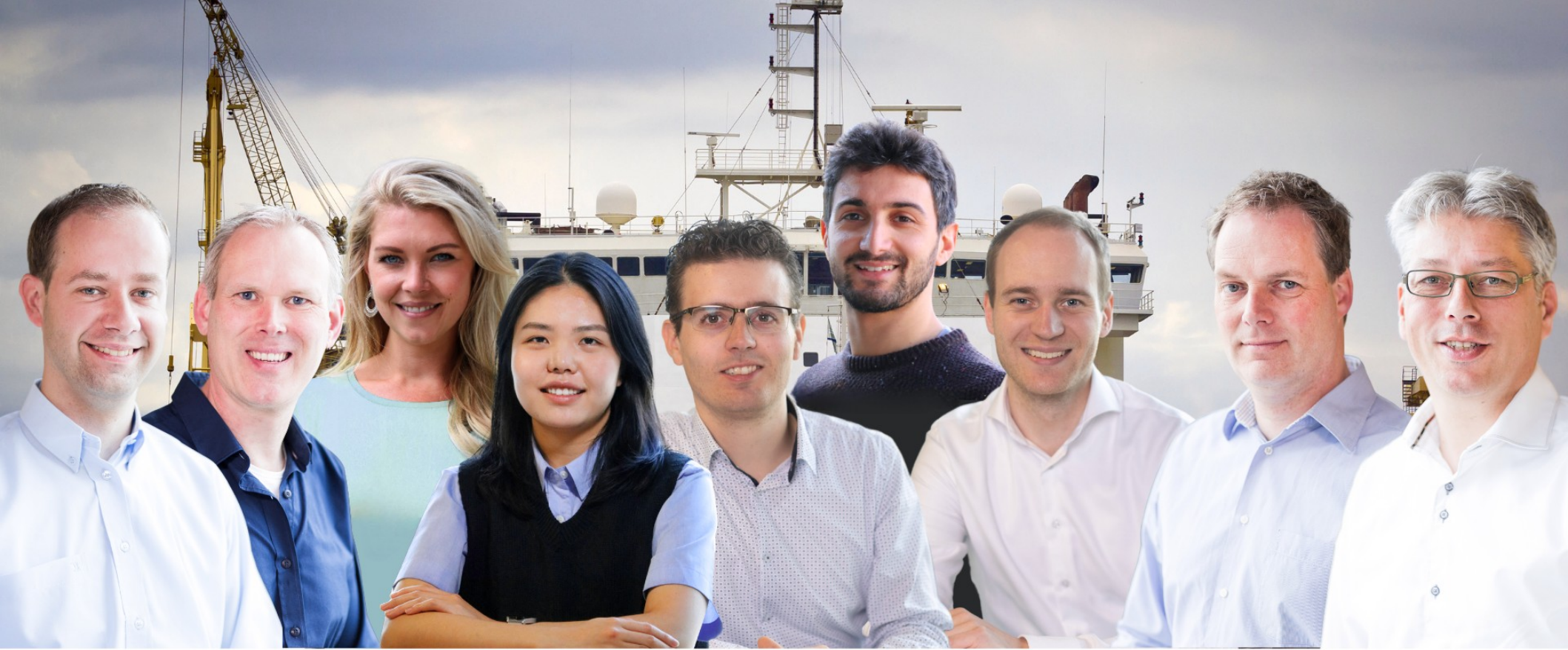
Designing the future with Digital Twins



DIGITAL TWINS

We make digital twins to test control software and build training simulators for the high-tech systems and marine & offshore markets.





TEAM

**Steel
Industry**



**High-Tech
Systems**



MARKETS

Offshore



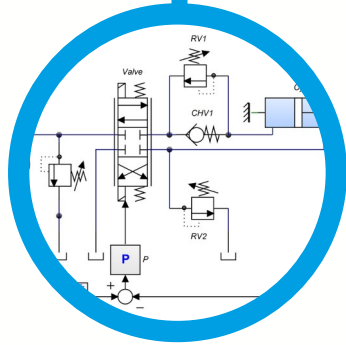
Dredging



CUSTOMERS



TECHNOLOGY



Software



Physics



HIL-Simulation

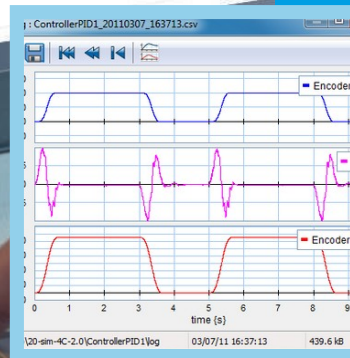
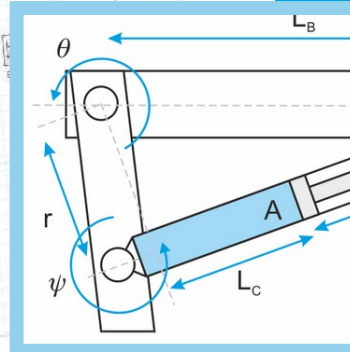
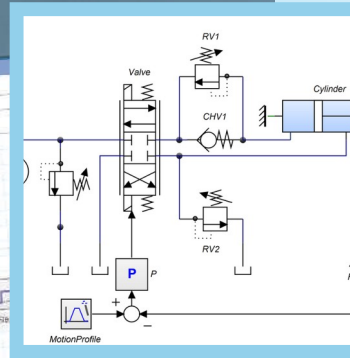


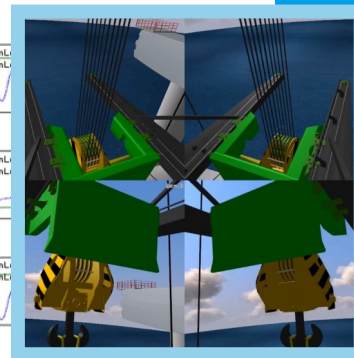
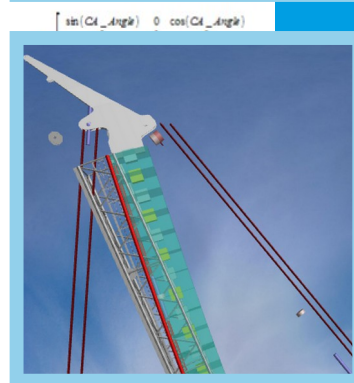
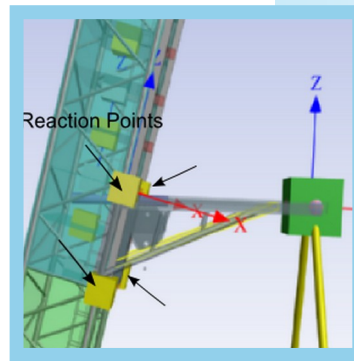
3D Animation

SOFTWARE



Controllab is the owner and developer of the modeling and simulation software 20-sim. With 20-sim you can simulate the behavior of dynamic systems, such as electrical, mechanical and hydraulic machines. We use this software to create our digital twins: simulation models that resemble real machines very accurately.

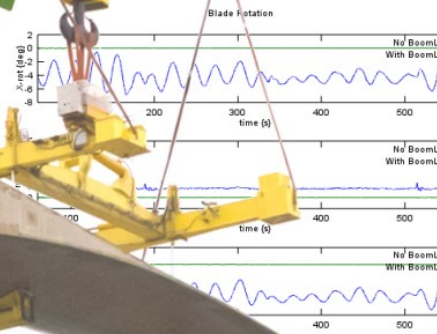




PHYSICS



We build our simulation models using building blocks that we have verified with measurements on real machines. The blocks use ports for exchange. Port allow us to verify that energy is conserved. This results in digital twins that resemble a real machine very well. We have special technology to make these twins run in real-time. This makes our digital twins ideal for interfacing with control software.



HIL SIMULATION

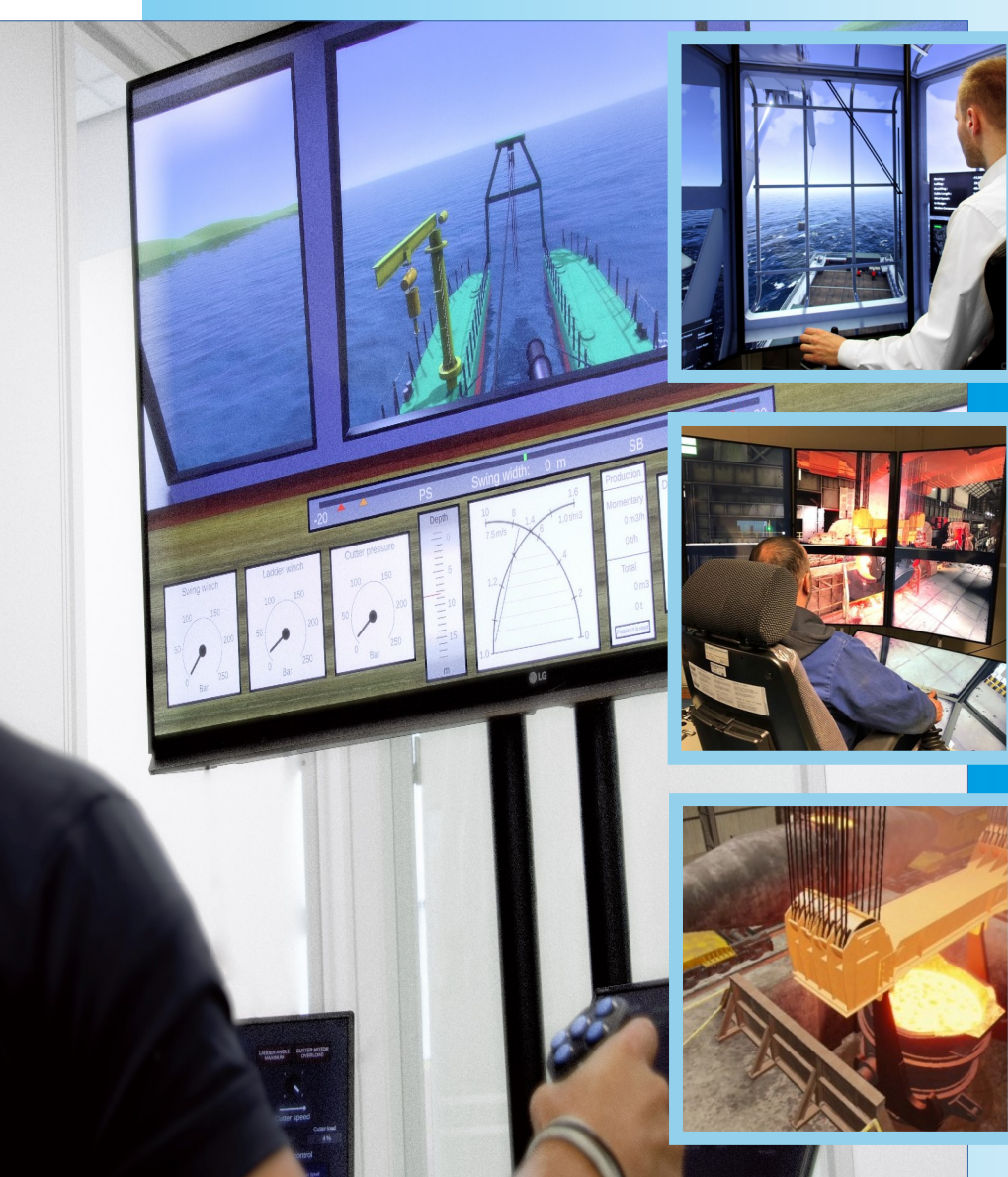


20-sim can couple to PLCs. This allows us to simulate a machine in 20-sim while send and reading data from the control software running on the PLC. This is called Hardware-in-the-Loop (HIL) simulation.

PLC

Real Plant

Simulation Model



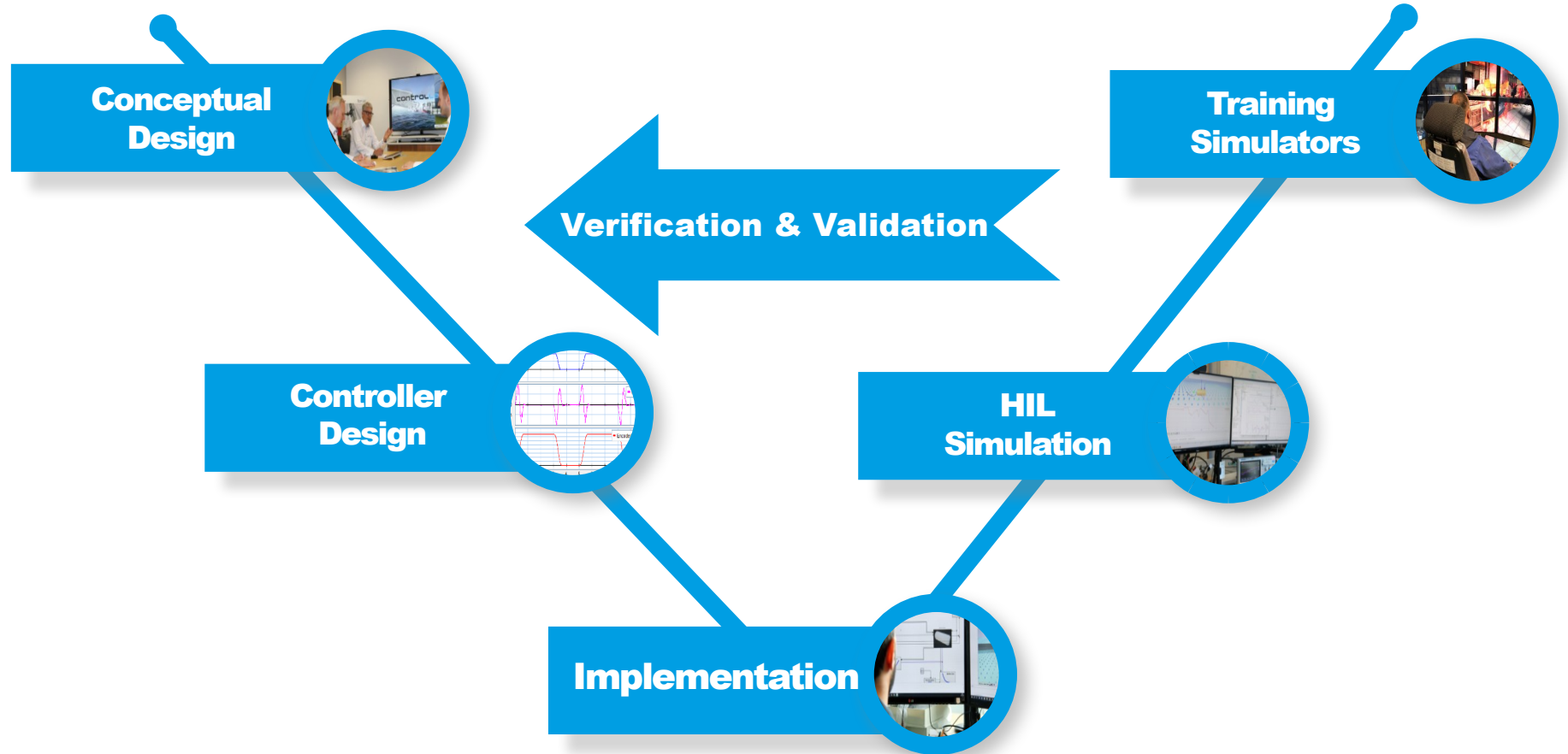


3D ANIMATION



20-sim can couple to Unity 3D. This allows us to simulate a machine in 20-sim and show a 3D animation of the machine in Unity. Unity is a gaming platform that can be used to create realistic 3D animations. We also use Unity to create Human Machine Interfaces with buttons, displays and graphs and joystick inputs. We use this to develop training simulators

APPROACH





CASES

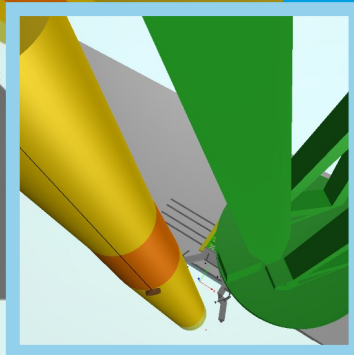
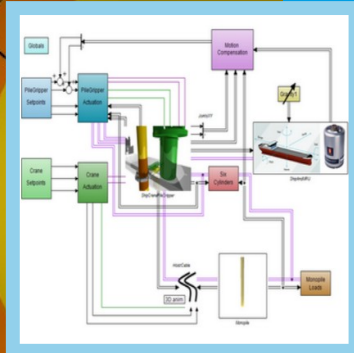
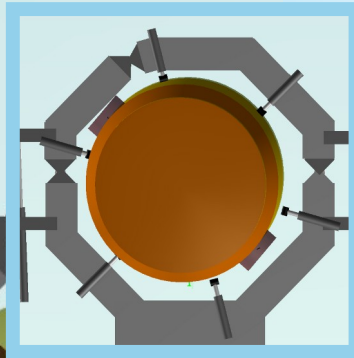
**From Virtual reality
to Real Innovation:
Designing the Future
with Digital Twins.**

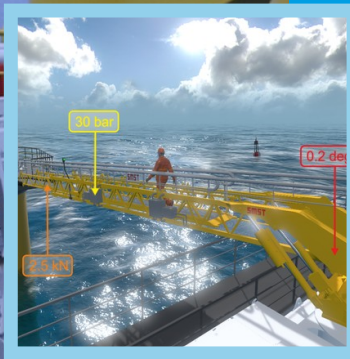
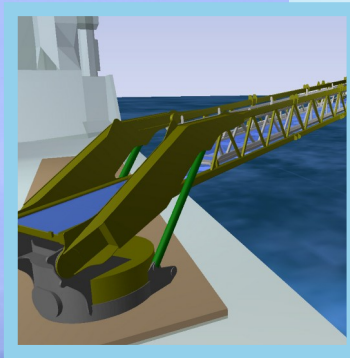


Pile Gripper Feasibility Study



We have carried out a feasibility study for a motion compensated pile gripper. The gripper was modeled to the specific requirements of the customer and coupled with models of the ship, crane and monopile. Using simulations we investigated the performance of the gripper under various sea conditions. The performance was defined using a set of variables such as power, speed and accuracy.





SMST – Controller Design



Controllab designed the motion compensation software for the Tab-M gangway of SMST. The gangway is operated by gravity compensated luffing cylinders and a telescoping motor. Using a digital twin of the gangway coupled to the control PLC, we tested software under all conditions. This allowed us to ensure maximum safety and optimize the performance of the gangway. Over 10 gangways are now in active service.



MacGregor – Motion Compensation Crane

The TTS Colibri™ is a double arm unit that can be placed on top of a knuckle boom crane to provide motion compensated cargo lifts. The tip of the Colibri compensates in the horizontal plane while the winch takes care of the vertical motion. The Colibri is also equipped with an anti-sway controller. This controller uses the horizontal motion of the crane to actively damp cargo swing. Controllab provided the motion compensation control system and anti-sway controller.



VSE – HIL Simulator

VSE was responsible for the retrofit of the electric drives and controls of the towing tanks of the Maritime Research Institute Netherlands. The overhaul was planned during a six weeks standstill of the towing tank. Using a HIL simulation provided by Controllab, VSE tested the control software in advance. The retrofit was successfully carried out requiring 2 days less than planned.

TATA – Training Simulator



In cooperation with Steel Sim VR we developed a training simulator for Tata UK. The simulator was used to learn 20 crane operators to work with a new steel crane. Traditionally training is done on a real crane with an instructor on board. The training simulator saved more than 60 days of training. It is now in use to train new crane operators.



BENEFITS

Quality

On a digital twin you can test operations that are too expensive or too dangerous to do on a real machine.

Efficiency

On our digital twins you can instantly change anything. This means you can work much faster.

Cost

With our digital twins there are no operational costs of the real machine.



controlLab

Start the voyage