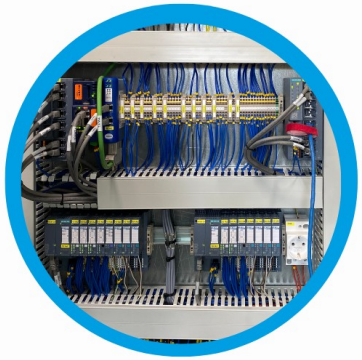
controllab

# HIL Simulators

# HIL SIMULATORS

We make Hardware-in-theLoop (HIL) simulators to help our customers test their control systems in the high-tech systems and marine & offshore markets.

# Hardware-in-the-Loop (HIL) Simulation



PLC

Real Machine

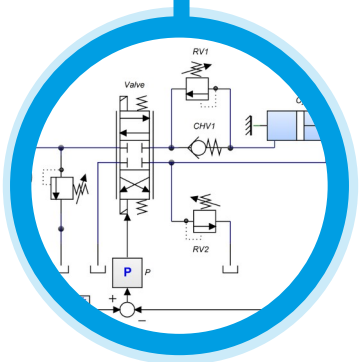
Simulation Model

With HIL simulation, a real machine is exchanged with a simulation model. This allows you to test the control hardware, before the real machine is available.


# BENEFITS

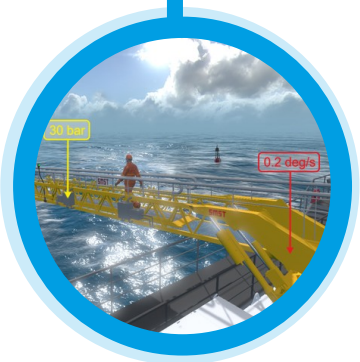
- On HIL simulators you can test operations that are too expensive or too dangerous to do on a real machine.
- Any condition or scenario can be trained instantly. This allows you to test your control software much faster and more thoroughly.
- No real machine is needed for HIL simulation, saving costs on downtime and late delivery.

# OUR TECHNOLOGY




**Software**

**Physics**

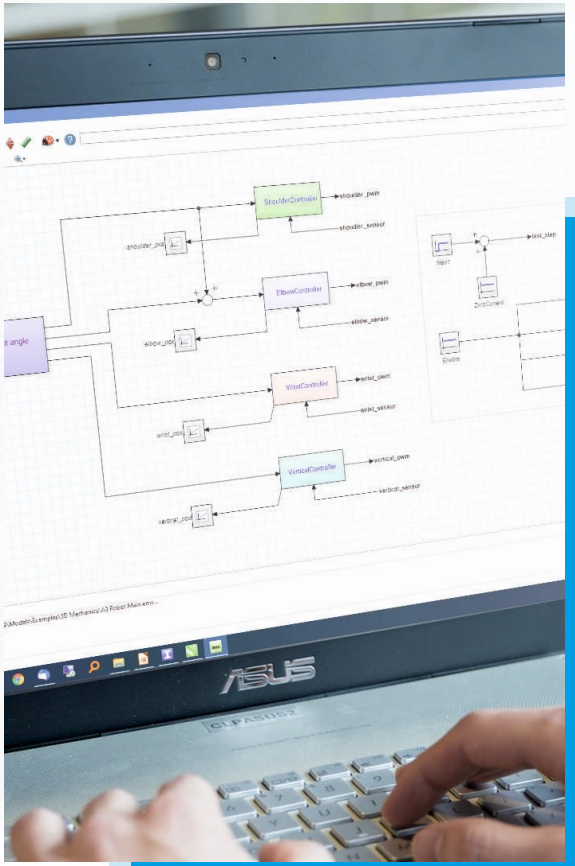



**Interface**

**Cost Effective**

# SOFTWARE

Controllab is the owner and developer of the modeling and simulation software 20-sim. We use this software to create digital twins: simulators that mimic a real machine very accurately. Using CAD import and predefined libraries we can create these twins very efficiently.

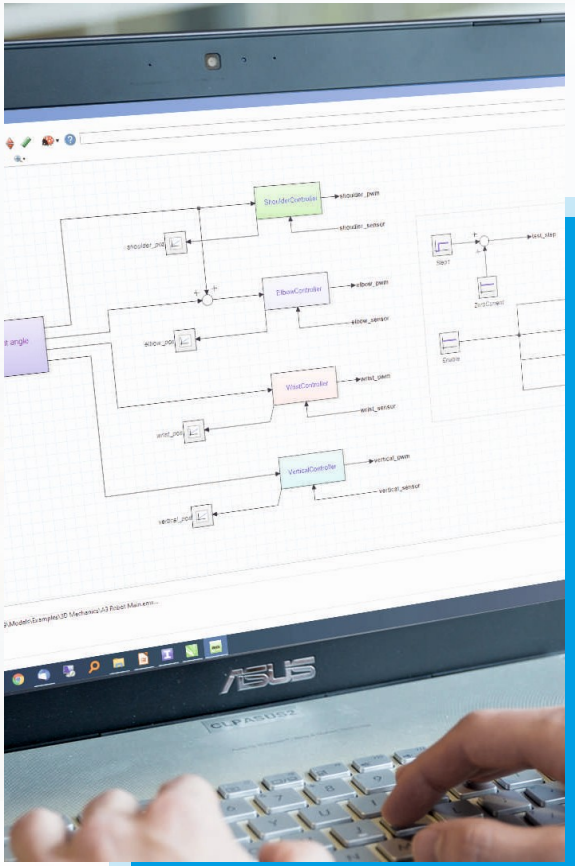


# ACCURATE PHYSICS

All of our simulation blocks run in real-time and have been verified with measurements on real machines. This makes our digital twins ideal for the use in HIL simulators. Our twins are so realistic that they can be used to test every operation that you would run on the real machine.

# INTERFACE

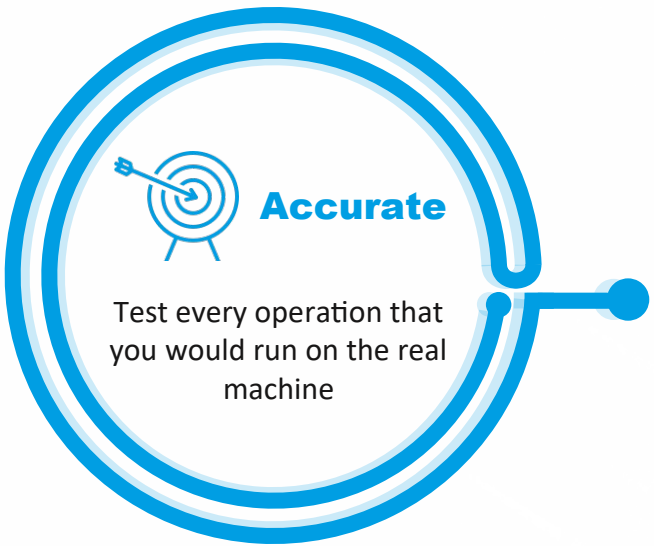
20-sim can be interface with to PLC's and embedded hardware to exchange data while running a simulation. We have created tools that allows us to build an interface efficiently and exchange large sets of data at a high frequency.



# COST-EFFECTIVE

With our technology we can develop HIL simulators very efficiently and make them cost-effective for one-offs and small series.

# WHY CONTROLLAB



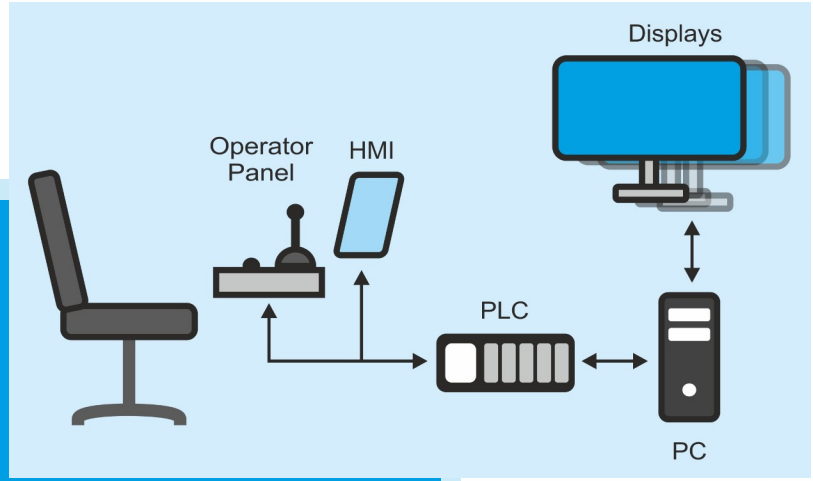
## Accurate

Test every operation that you would run on the real machine

## Cost-effective

Affordable for one-offs and small series

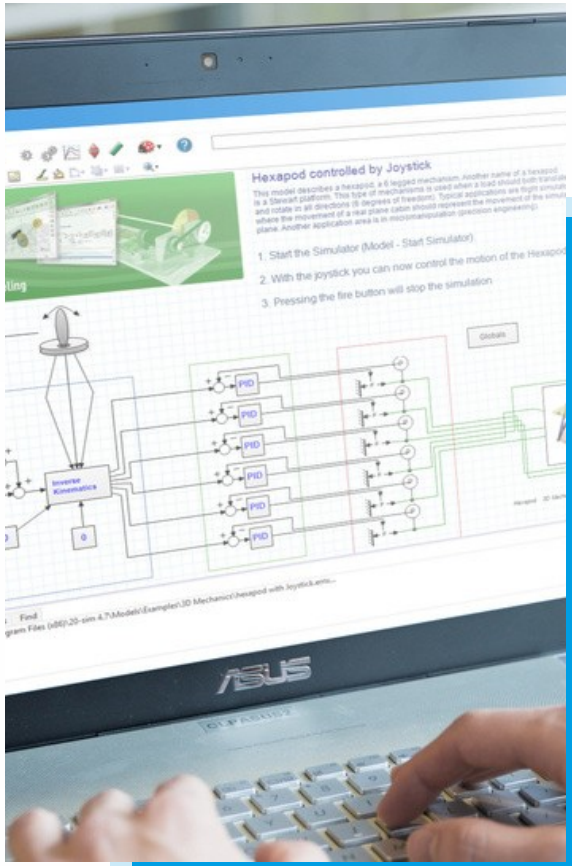
# SIMULATOR SETUP




PC: core simulator software
PLC: control software
Operator Panel: joysticks and buttons
HMI: touch screens with interface to the control software
Displays: Monitors or TV screens

# PC

The PC contains the simulator. All software is provided and licensed by Controllab. The PLC of the customer is coupled to this connected to this PC using TCP/IP. The original operator panel (joysticks, control buttons) and HMI can connected to the PLC to operate the (simulated) machine.



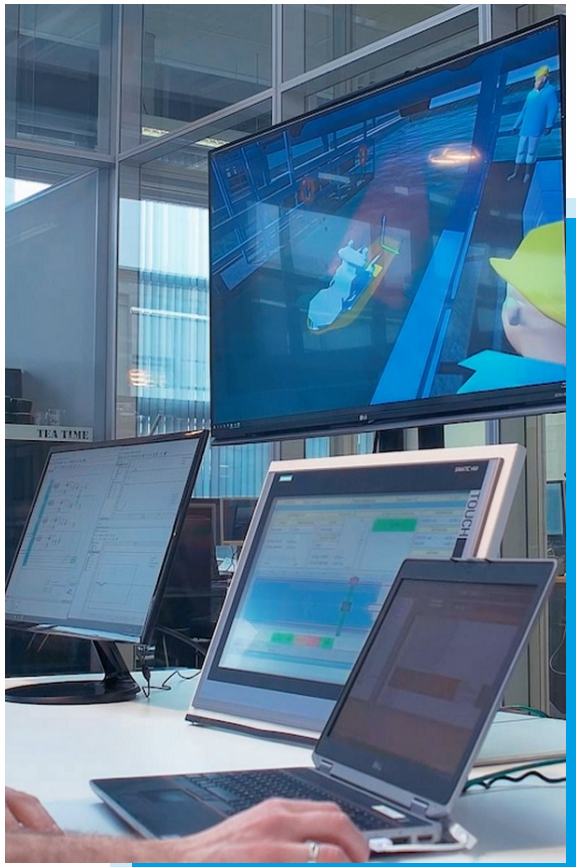
# PLC

The PLC runs the control software.  It is coupled at the bus level with the PC. The interface defines how the output variables of the PLC are coupled to the input variables of the PC and vice versa. Various brands of PLCs are supported. Connections to other PLCs  or computers can be tailor made.

# Displays

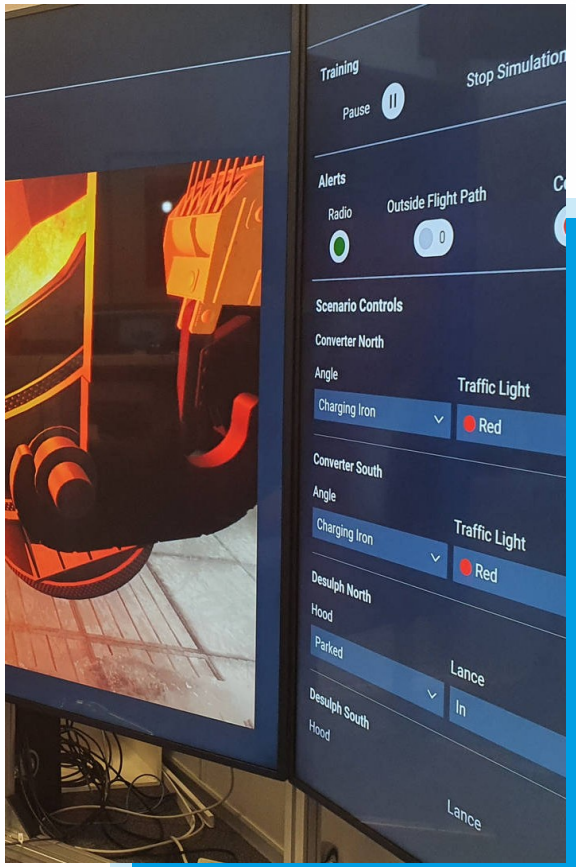
Displays are used to show the simulation results during a HIL simulation.

- Menu for operating the HIL simulation
- Graphs showing control variables and sensor values
- 3D Animation showing the machine in operation



# SCENARIOS

A basic scenario is run to test the standard operation of the machine. Variations on this scenario will change the environmental conditions and introduce emergencies. When the control software masters all of this, failures and non-standard operations are run.



# APPROACH


## Assessment

What should be tested.
Setup, planning & costs

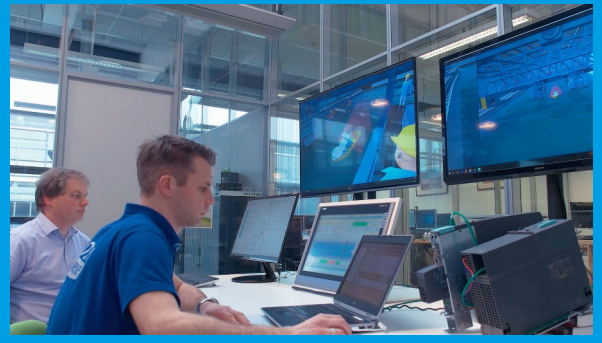
## Standard operation

Implement the first scenario,
learn and adapt


## Other Scenarios

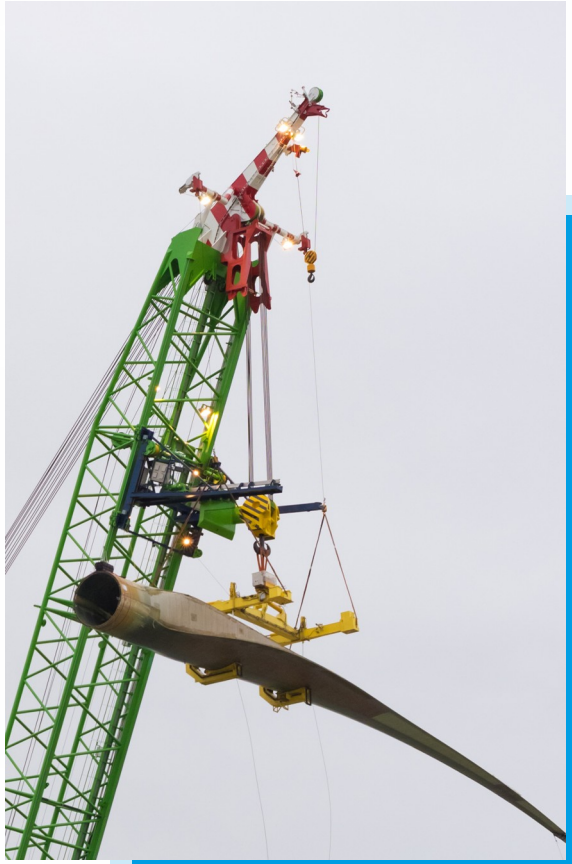
Add all other scenarios

# EXAMPLES



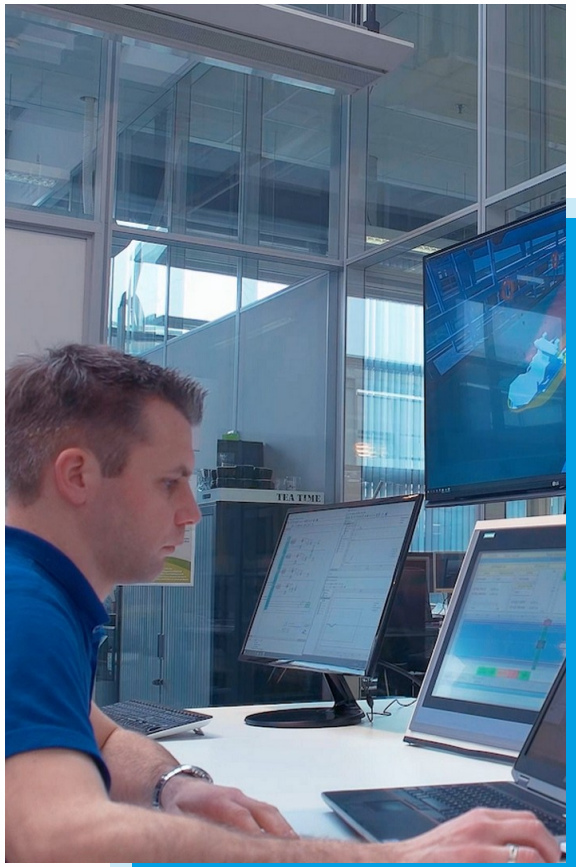
# BOOM LOCK

For DEME we have developed a HIL simulator model for the Boom Lock. This is a crane handling system for the safe and easy handling of wind blades. The complete operation cycle was tested using the HIL simulator.



# TOWING TANK

VSE was responsible for the retrofit of the electric drives and controls of the towing tanks of the Maritime Research Institute Netherlands. 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.

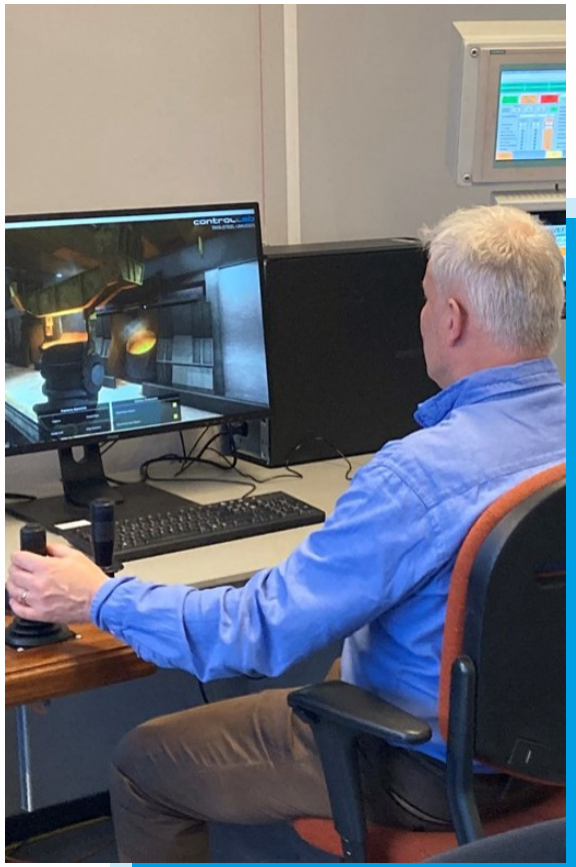


# MOTION COMPENSATED CRANE

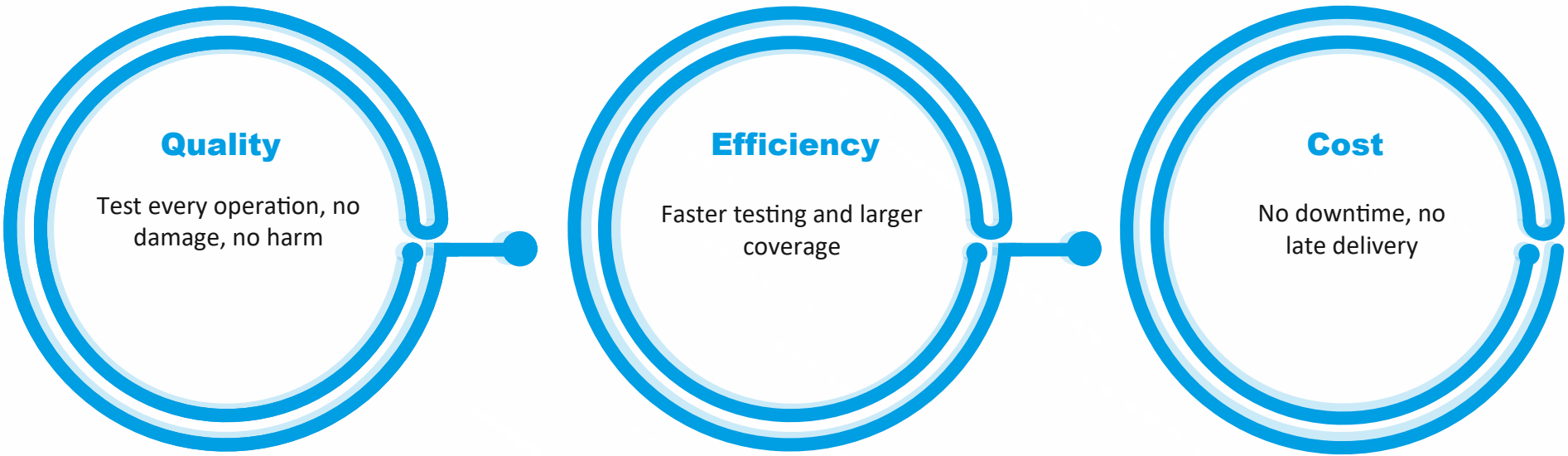
The MacGregor Colibri™ is a double arm unit that can be placed on top of a knuckle boom crane to provide motion compensated cargo lifts. Controllab provided a HIL simulation model to develop and test the control system of the Colibri.

# STEEL CRANE

For Tata Steel we have created a HIL simulator to test the operation of their steel cranes. The HIL simulator is an important tool for testing and adjusting new software. It is used not only for the medium loading crane, but also for the initial testing of new software for other cranes in this area.



# BENEFITS


Quality
Test every operation, no damage, no harm
Efficiency
Faster testing and larger coverage
Cost
No downtime, no late delivery

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START THE VOYAGE