Moses in Ö-vik

Demonstration

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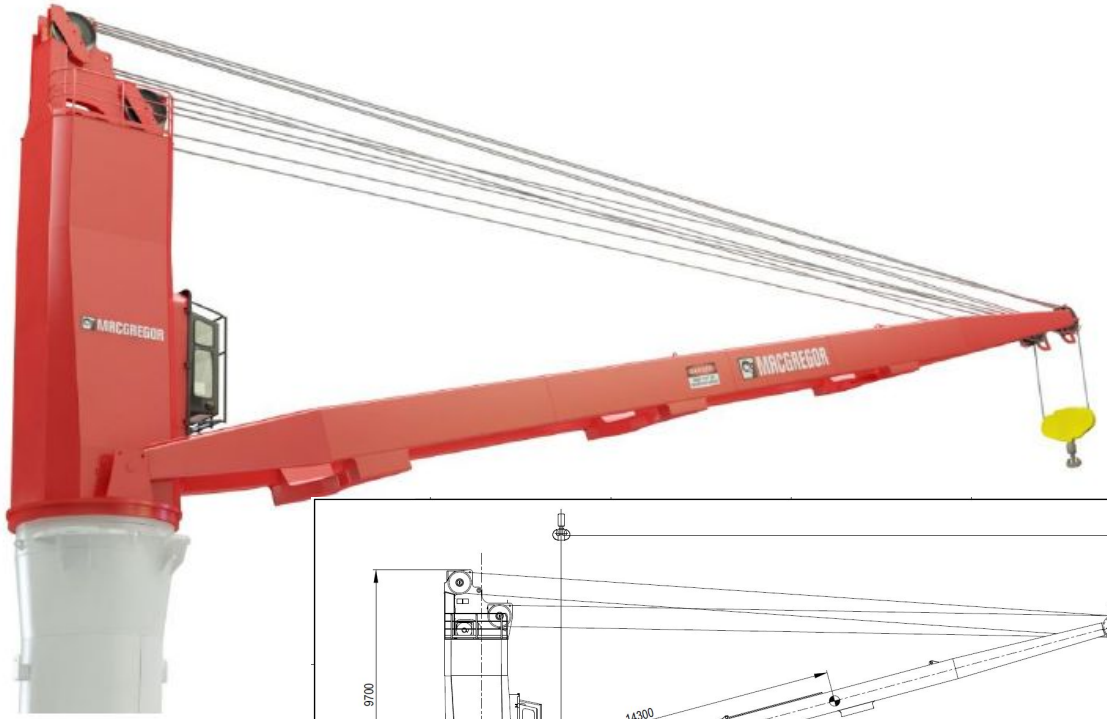
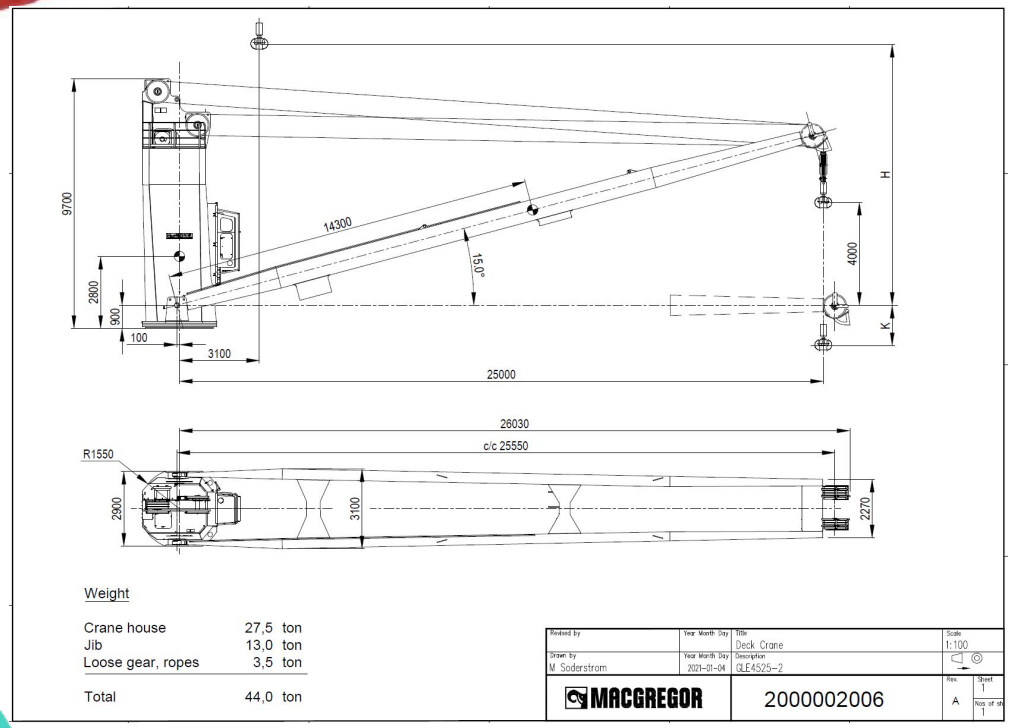
Agenda

- Robotic crane
  - Overview
  - Sub systems and sensors
- Containers
- History
- C-how
- WP7.1 tests
- Demonstration
- The video

GLE crane (Electric)

Robotic container handling system



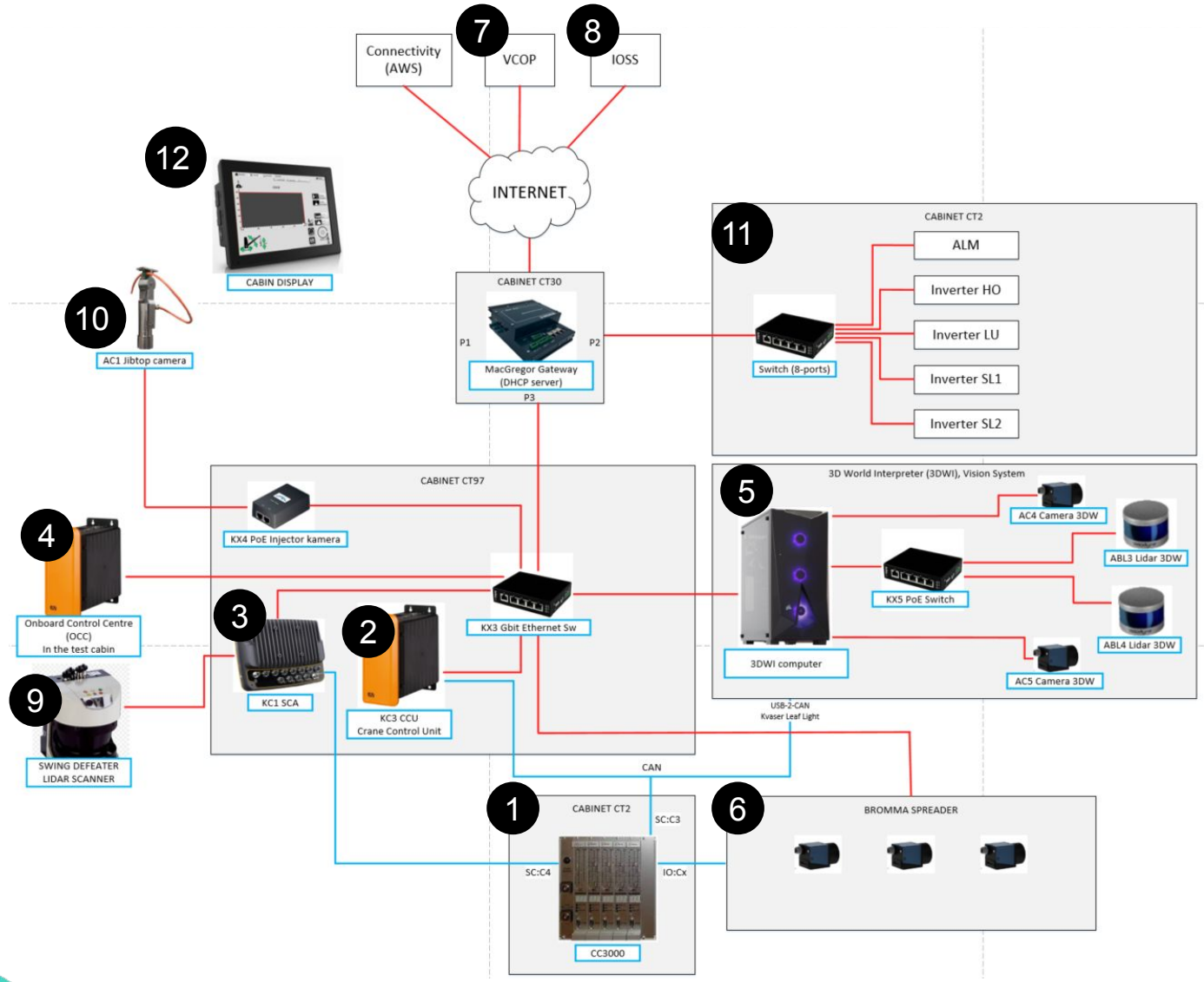


Electric Crane Type GLE4525-2

Hoisting capacity, SWL - hook operation	45	ton
Hoisting capacity, SWL - grab operation	33	ton
Hoisting speed, load depending [1]	20 – 45	m/min
Luffing time, load depending [2]	48 – 58	sec
Slewing speed, load depending	0,6 – 1,0	r/min
Jib radius, min	3,1	m
Jib radius, max	25	m
Lifting height, H+K	35	m
Rated motor power:		
- Hoisting	139	kW
- Luffing	79	kW
- Slewing	2 x 21,3	kW
Main power supply AC	440	V
	60	Hz
M_{max} [3]	13700	kNm
Q_{max} [4]	880	kN
Weight, total	44	ton
Dimension drawing (crane)	2000002006 rev -	No
Dimension drawing (foundation, C-type)	1000007199	No
Installed power drawing (preliminary)	1000008234	No

Crane designed for max 5° list / 2° trim.

System overview



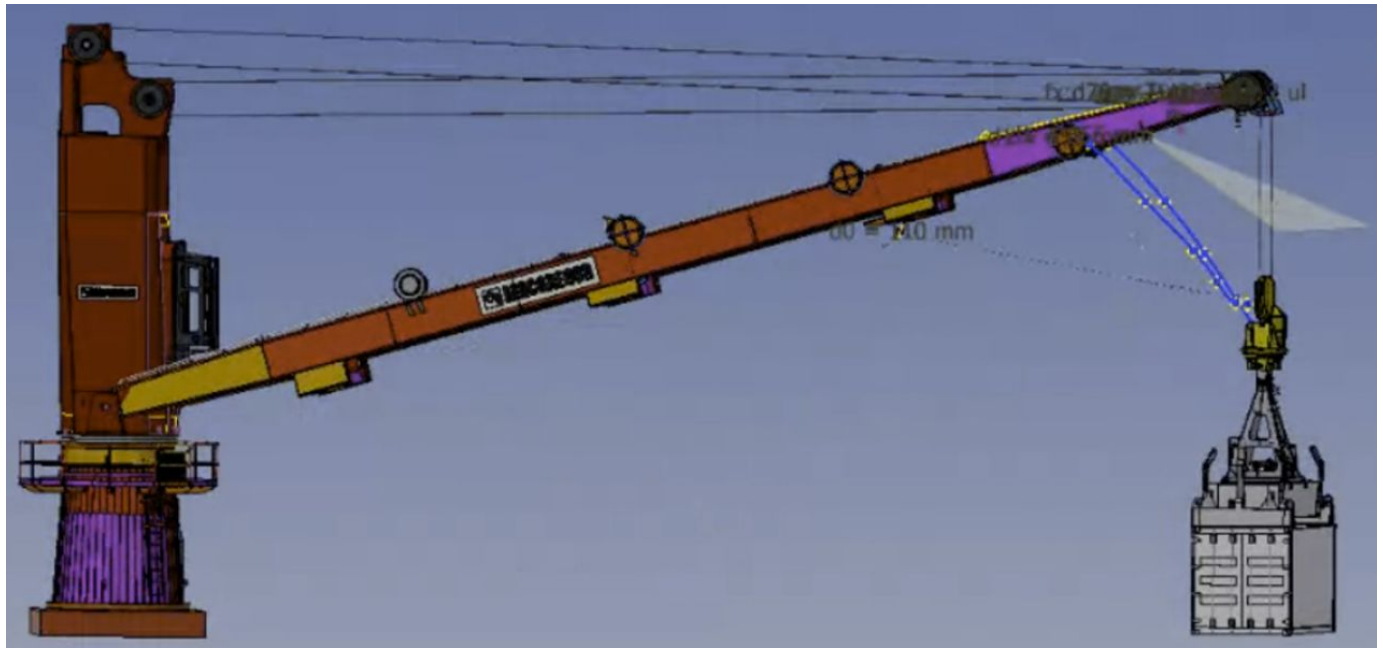
1. CC3000 Crane Control
2. **CCU** **Crane Control Unit**
3. SCU Sensor Computer Unit
4. **OCC** **Onboard Control Centre**
5. **3DWI** **3D World Interpreter**
6. **Bromma Spreader**
7. **VCOP** **Voyage/Container optimization platform**
8. **IOSS** **Intelligent Operator Support System**

9. Swing defeater (Lidar)
10. **Jib top camera**
11. GLE - transmission
12. Cabin display
13. ARC Active Rotation Control

Ethernet
CAN

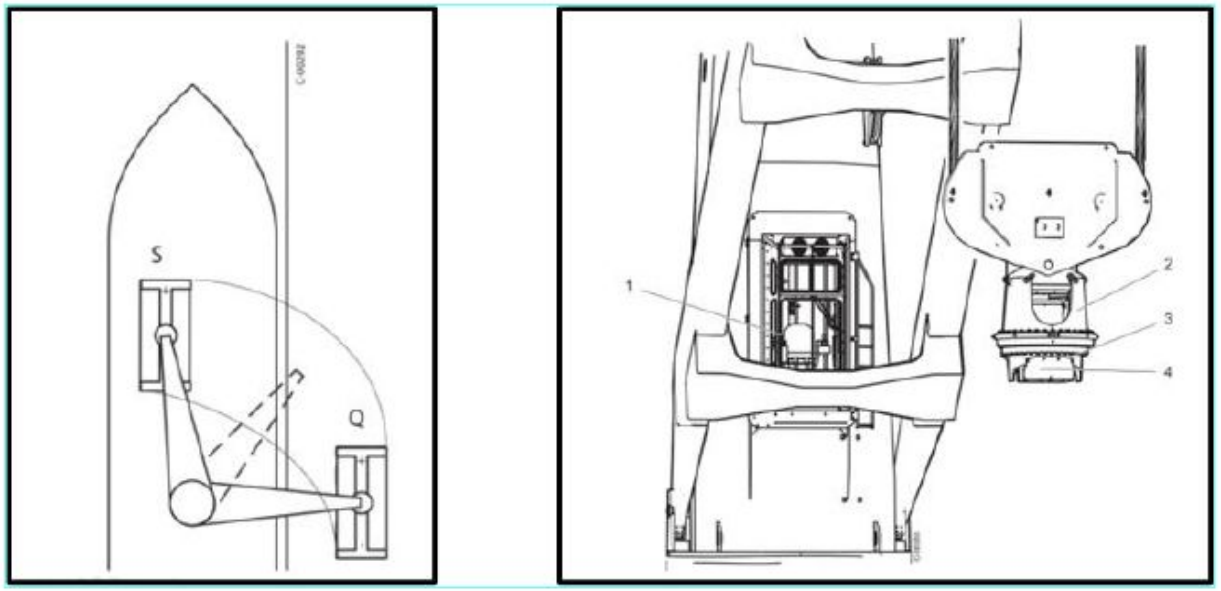
Swing defeater

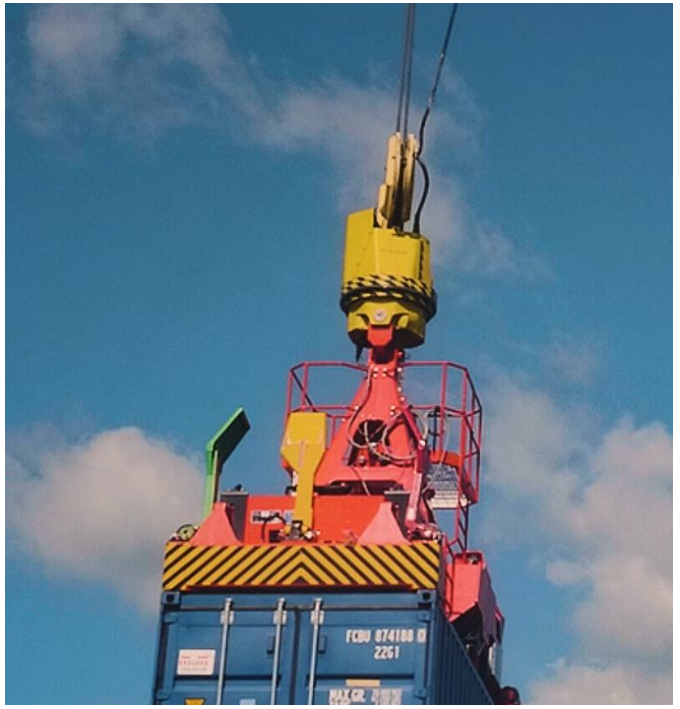
Swing defeater - Dampening of cargo pendulation. A laser scanner unit fitted in the jib top, measures and detects movement of the cargo.



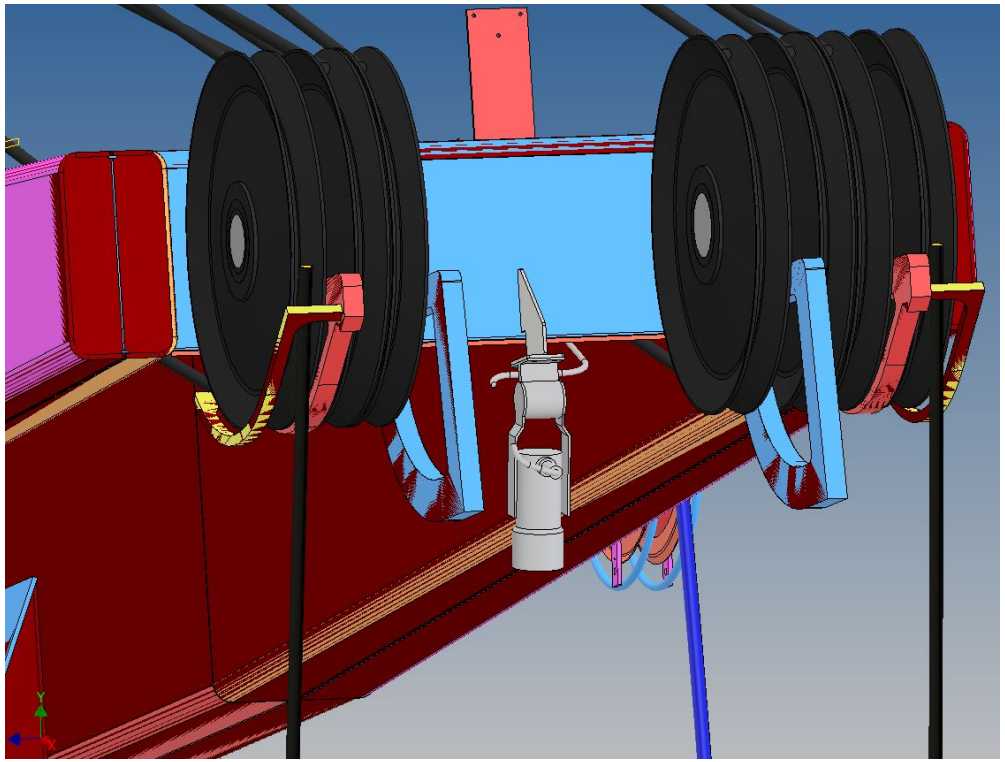
ARC - Active Rotation Control

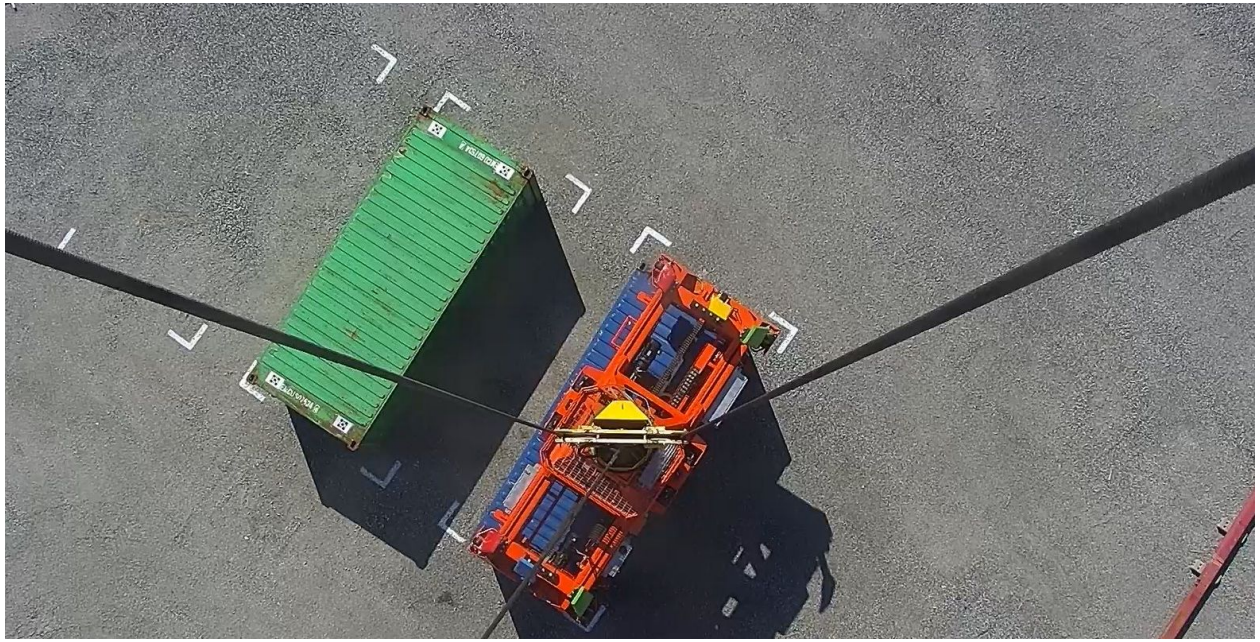
The algorithm for ARC is position-based which means that the power swivel at all points tries to keep the cargo at the same desired angular position in the ship coordinate system.



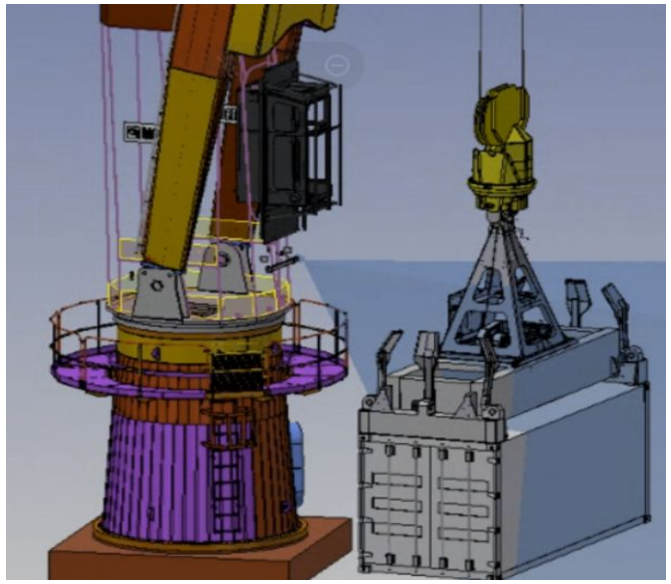


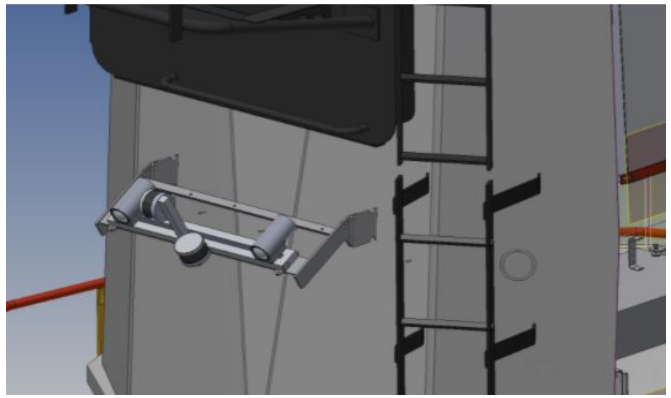
Jib top camera



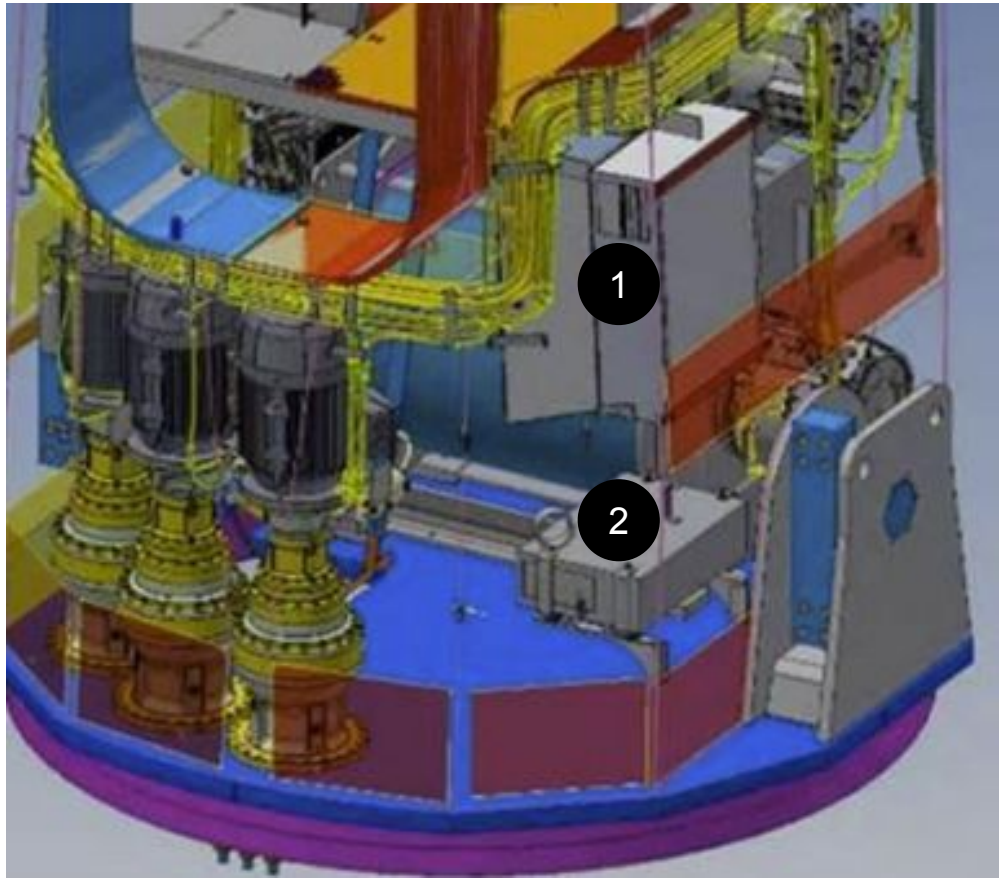


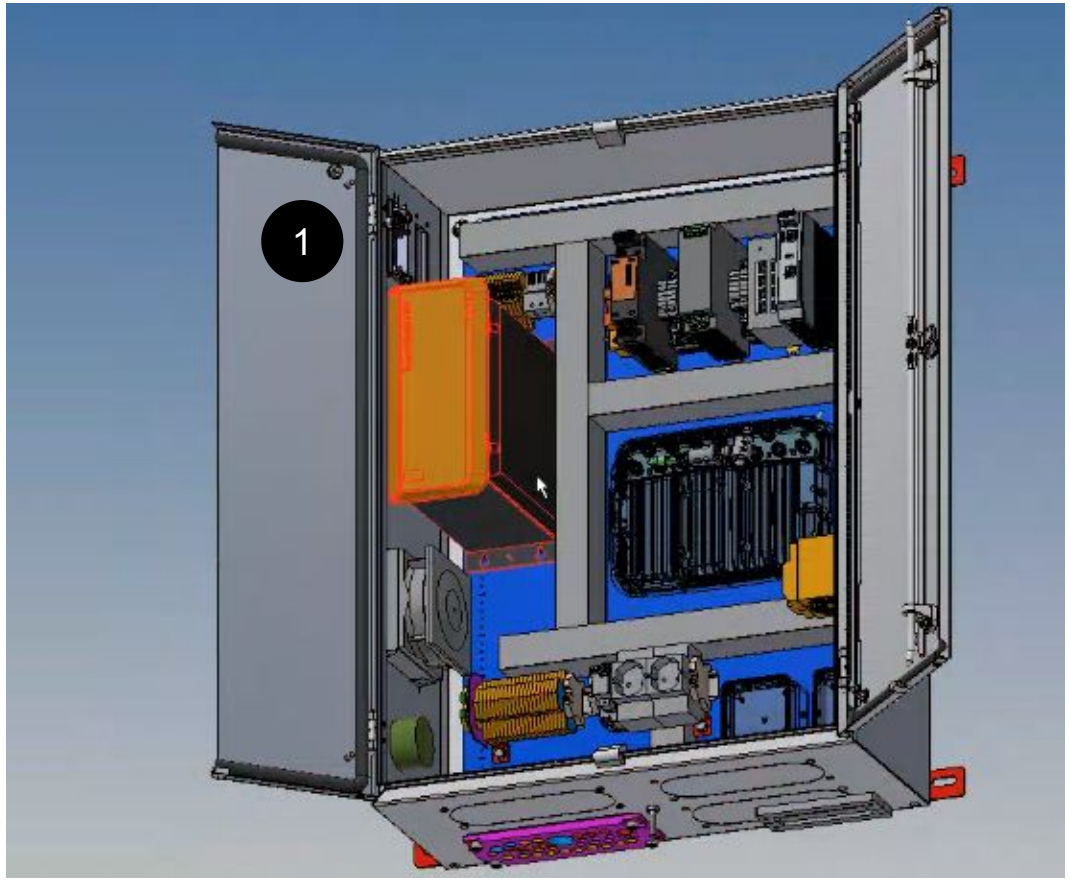
Sensor suite





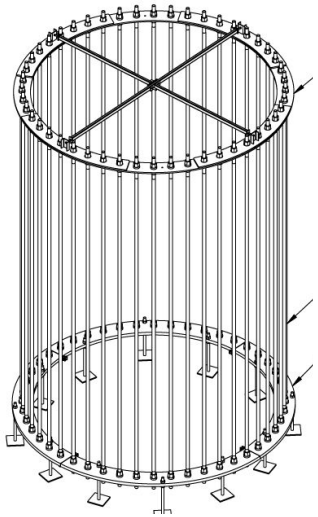
1. Crane Computer Unit (CCU)
2. 3D World Interpreter (3DWI)

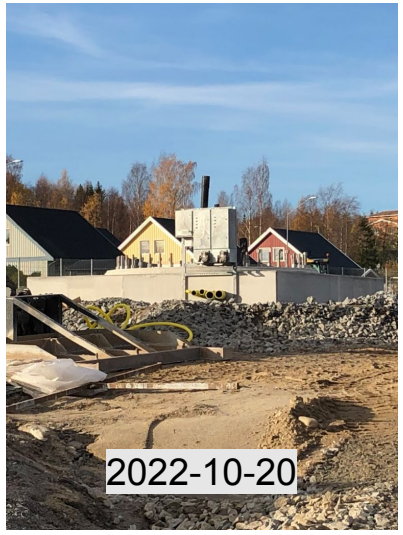


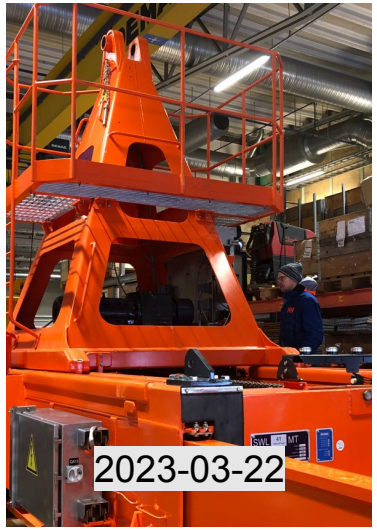


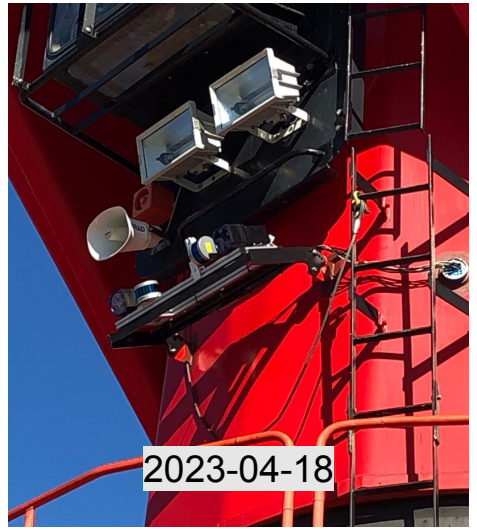
Containers

GLE - Installation (history)





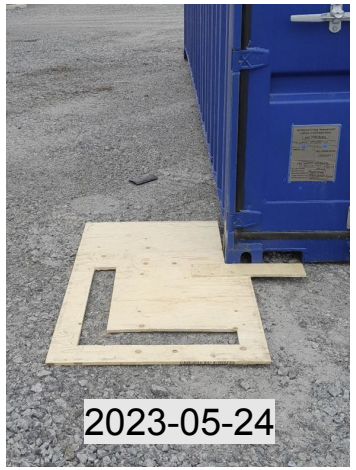




GLE - Installation (history)


2023-04-27

2023-05-16


2023-05-24

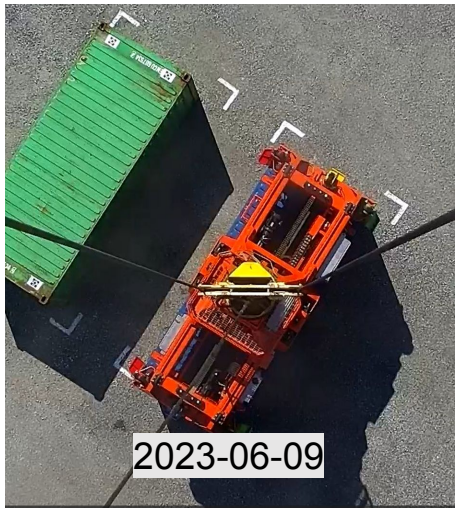

2023-05-24


2023-06-01


2023-06-01


2023-06-09(video)


2023-06-09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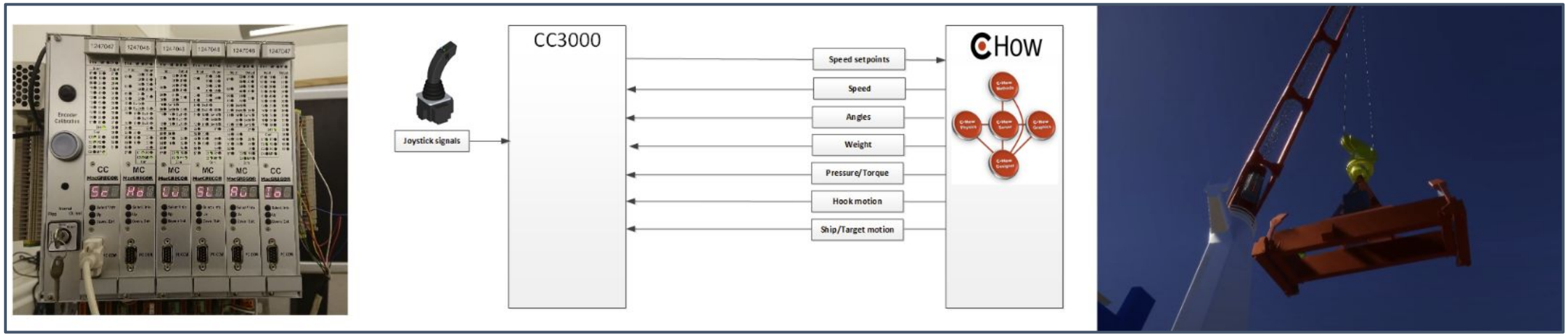
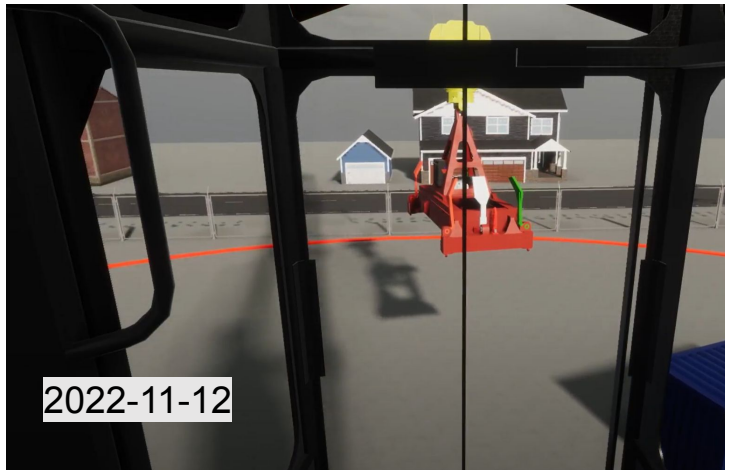
C-how


CC3000
Joystick signals
Speed setpoints
Speed
Angles
Weight
Pressure/Torque
Hook motion
Ship/Target motion
CHow


2021-08-21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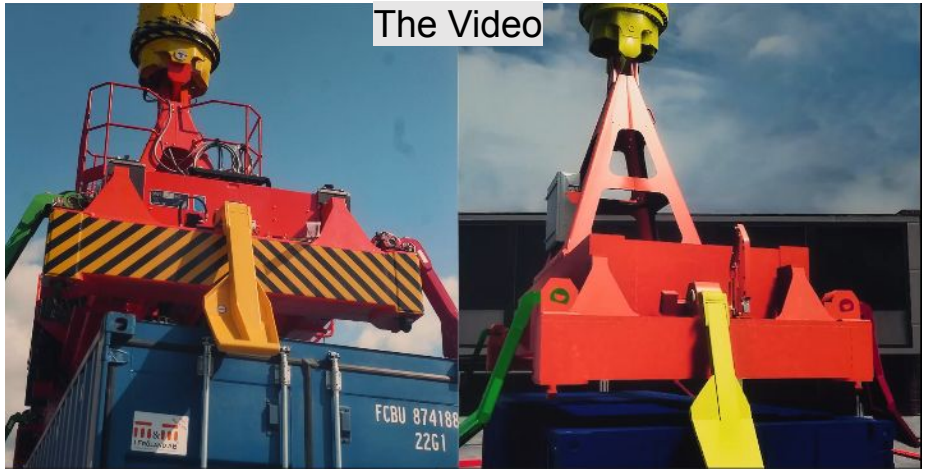
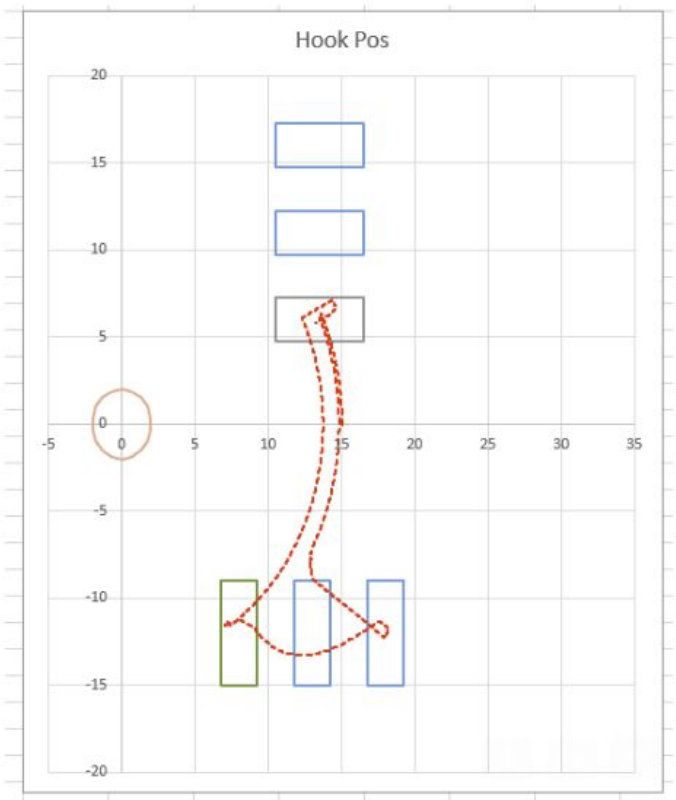

The Video

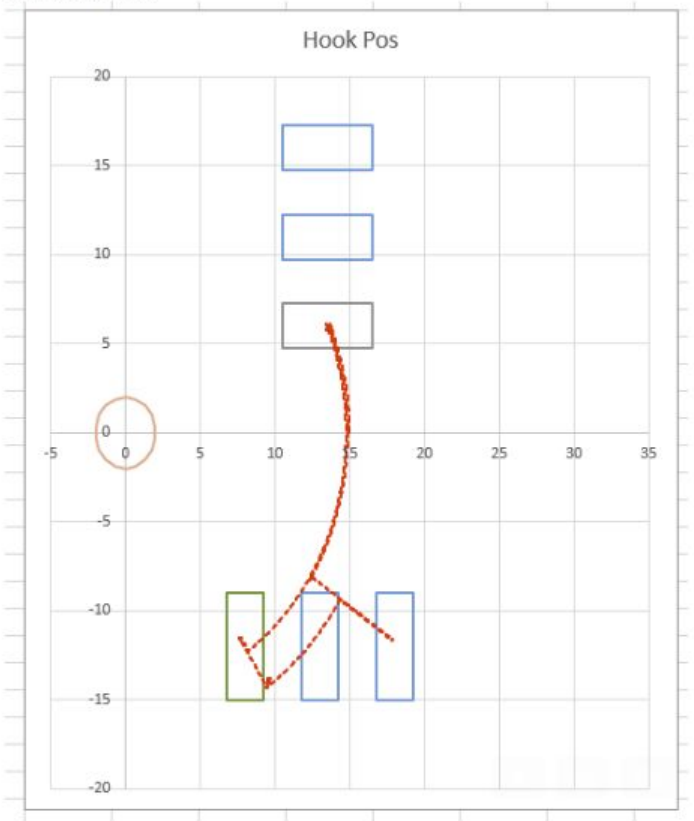
WP7.1 tests

- TC-RCHS-1.01 - Moving two containers from quay to vessel
- **TC-RCHS-1.02 - Discharging one container and loading one container (link to video 1:55)**
- TC-RCHS-1.03 - Discharging between two containers on quayside (wind)
- TC-RCHS-1.04 - Detecting misaligned containers and loading to vessel

Manual #1



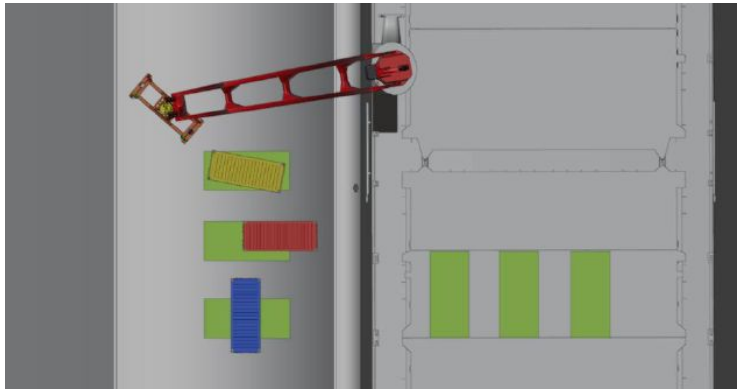
Autonomous #1

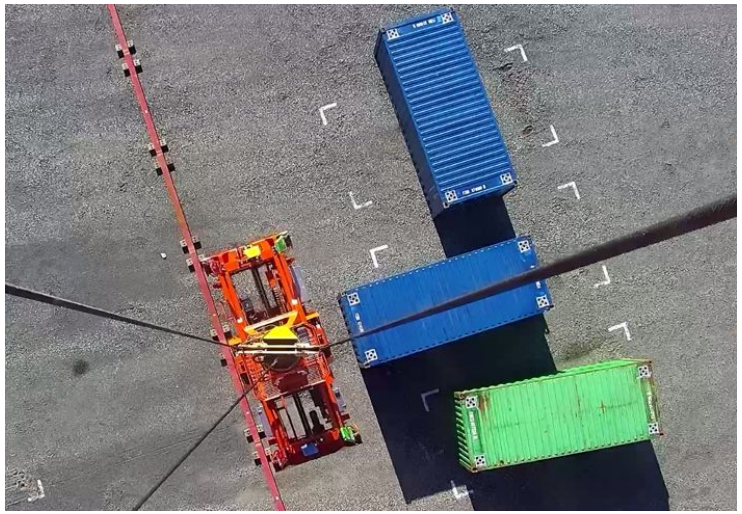


WP7.1 tests

- TC-RCHS-1.01 - Moving two containers from quay to vessel
- TC-RCHS-1.02 - Discharging one container and loading one container
- TC-RCHS-1.03 - Discharging between two containers on quayside (wind)
- **TC-RCHS-1.04 - Detecting misaligned containers and loading to vessel**

Pickup	X	Y	Angle deg	Result
Q1 in Area	0	0	12	Pass
Q2 outside area #1	-1.73	-0.53	1.4	Fail
Q2 outside area #2	-1.14	-0.59	-0.65	Fail
Q2 outside area #3	**-0.79**	-0.61	-0.44	Pass
Q3 90 degrees	0	0	90	Fail
Q3 45 degrees	-0.08	0.12	**-45**	Pass

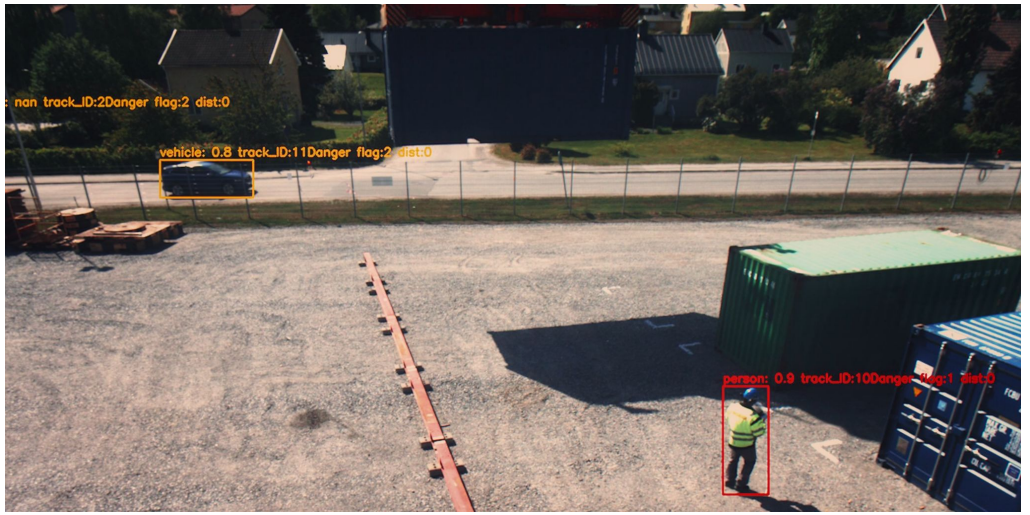




Demonstration

- "Happy Flow" - Moving two containers autonomously
- "Red Alert" - Detecting and classifying objects in the loading area

Moses video



[Link to video]

www. moses-h2020.eu

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MOSES Project

Thank you for your attention!

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