



avans
hogeschool

Offshore: groter, sneller, efficiënter

10 november 2011
's-Hertogenbosch



Motion compensated platform for offshore installation

Providing increased safety and workability



KIVI NIRIA

“Offshore Conference AVANS Hogeschool”
“ 10-November 2011”

Maarten Kuijpers, Bosch Rexroth

Workability of Crane Barges



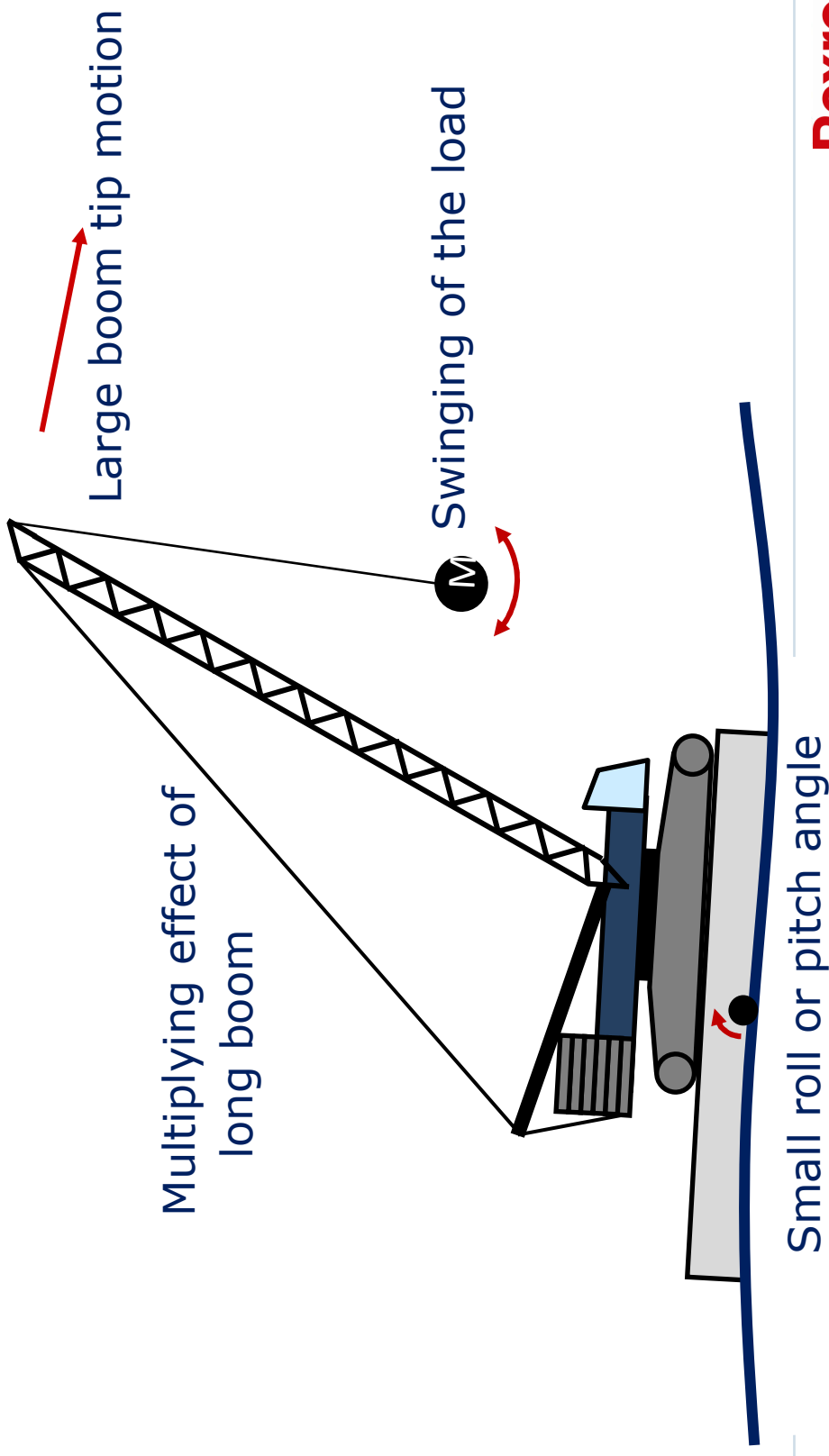
3 Linear Motion and Assembly Technologies | _firstname _lastname | tt.mm.jjjj | Abteilung | © Bosch Rexroth AG 2009. Alle Rechte vorbehalten, auch bzgl. jeder Verfügung, Verwertung, Reproduktion, Bearbeitung, Weitergabe sowie für den Fall von Schutzrechtsanmeldungen.

The Barge Master



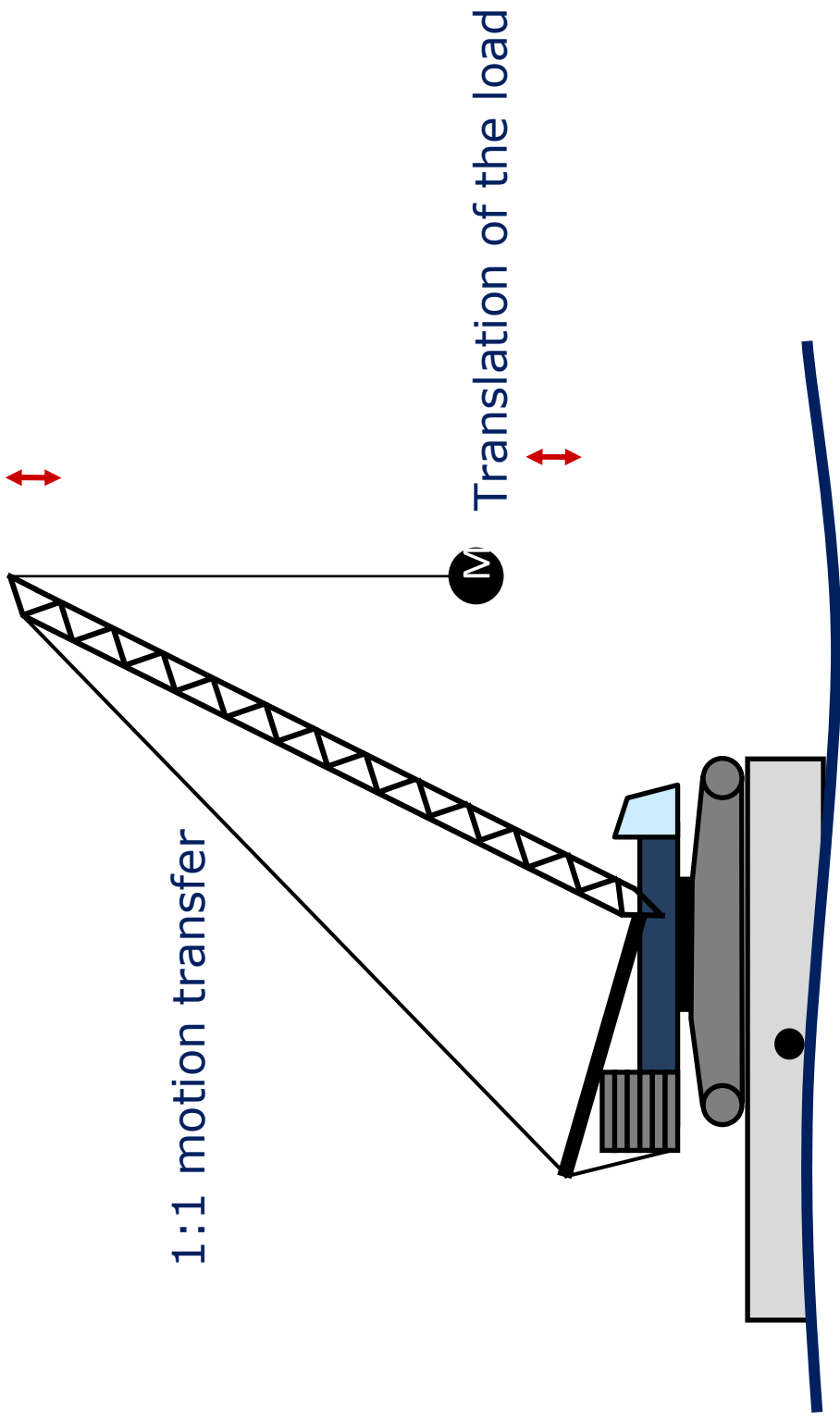
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Workability of Crane Barges



Workability of Crane Barges

1:1 motion transfer



The Barge Master

A New solution...

- Using standard barge
- ~~Using standard barges~~ Linear Motion Compensator



New Solution for cranes

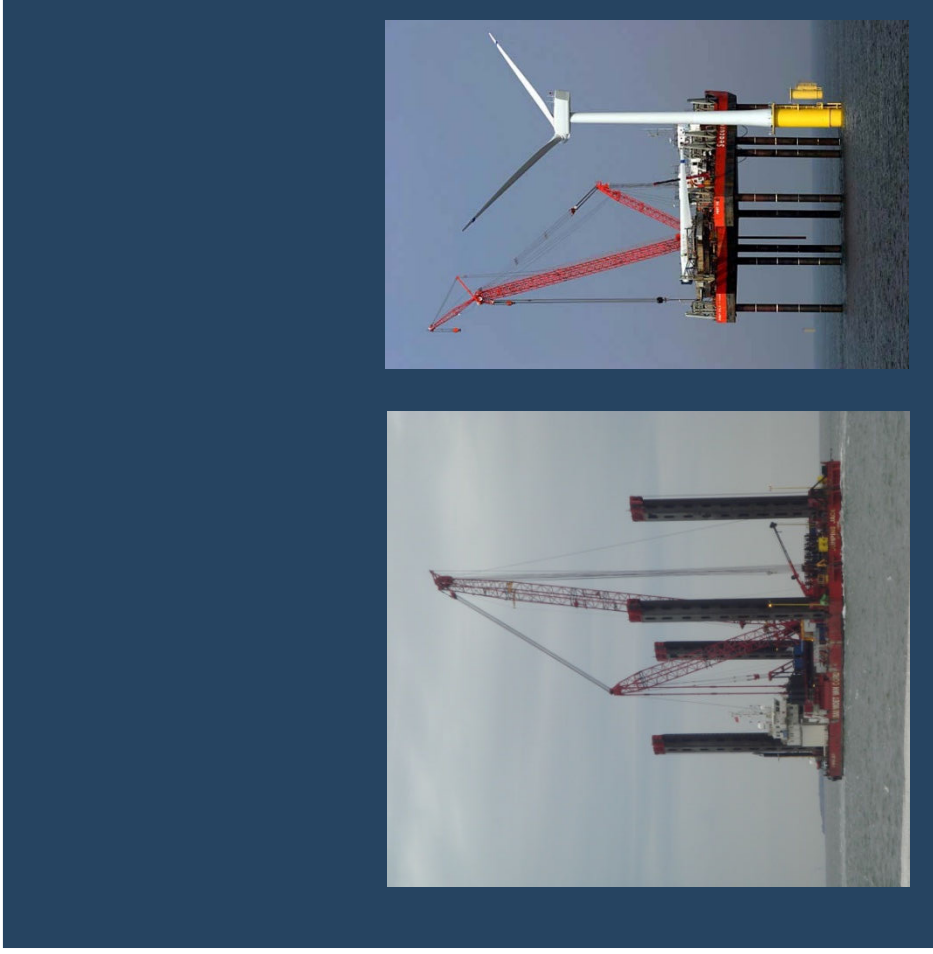


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The Barge Master

Crane barges and weather window

- Safety
- Weather downtime/workability
- Planning & costs
- Traditional solution
 - Reliable
 - Costly
 - Lacks flexibility

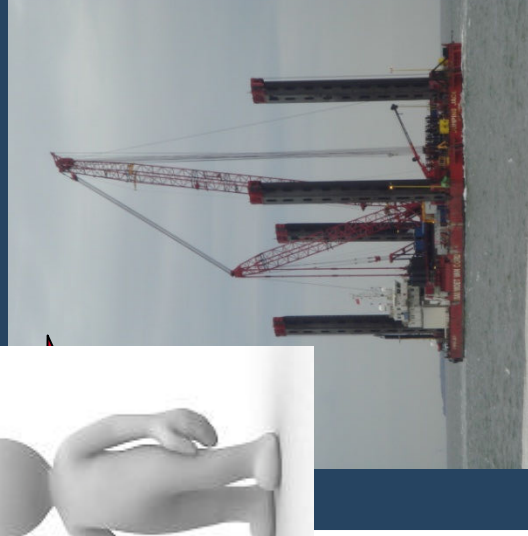


Applications



Cranes

Jack-Ups



Applications

Combination
Bargemaster & Jack-
up's

Extends use of jack-ups

Load-In not required in
sheltered water.

Less mass on board of
jack-up's



Supply

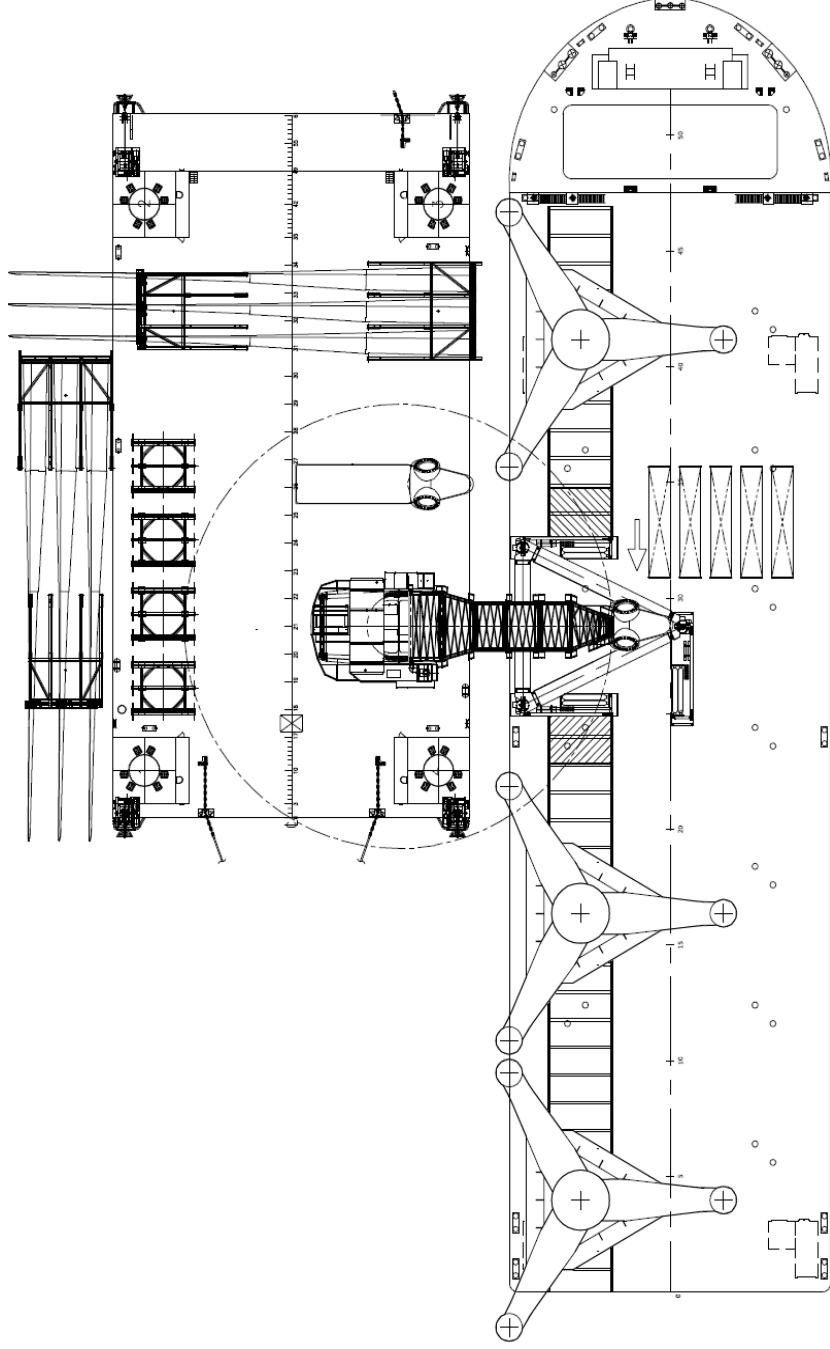
Barge Master as supply platform

Motion compensated supply to Jack-up barges
Screenshots from animation made by Jumbo



Barge Master as supply platform

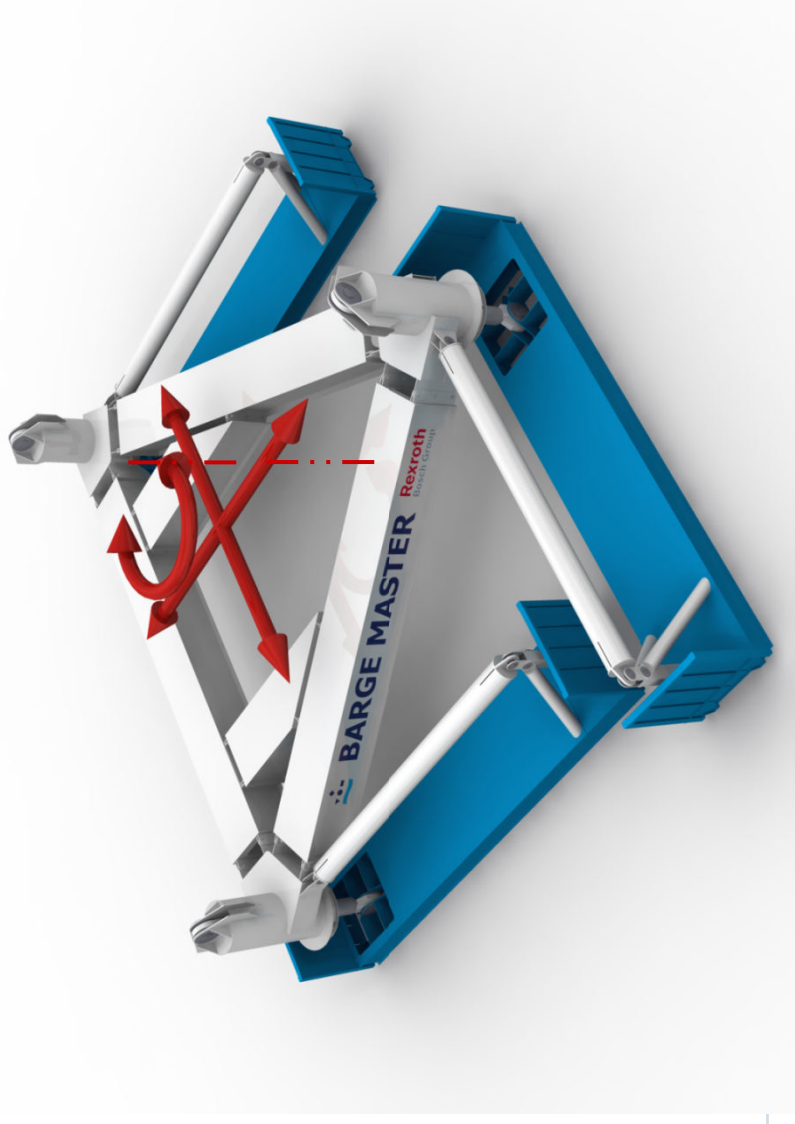
Motion compensated supply of tripods to Jack-up barges



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Technology - Working principle

- 3 DOF fixation of barge and platform
- Surge, sway and yaw



Working principle

- 3 DOF compensation
- Heave, Roll and Pitch



Barge Master System

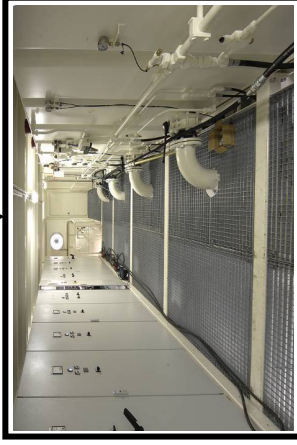
Drive and Control by Bosch Rexroth



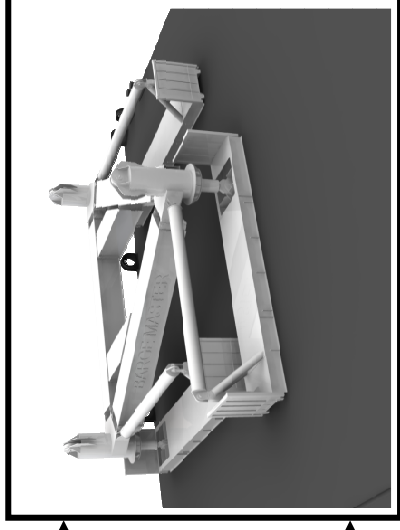
Sensors (MRU)



Controls



Power unit

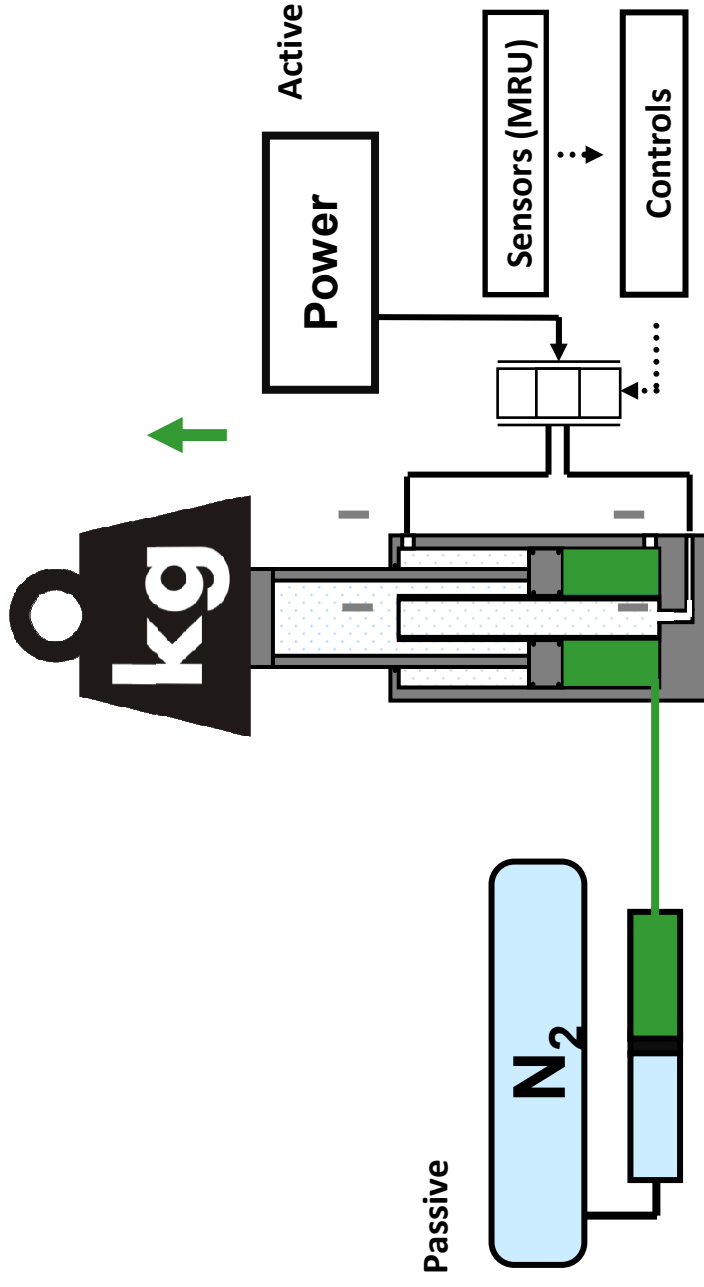


Compensated crane platform



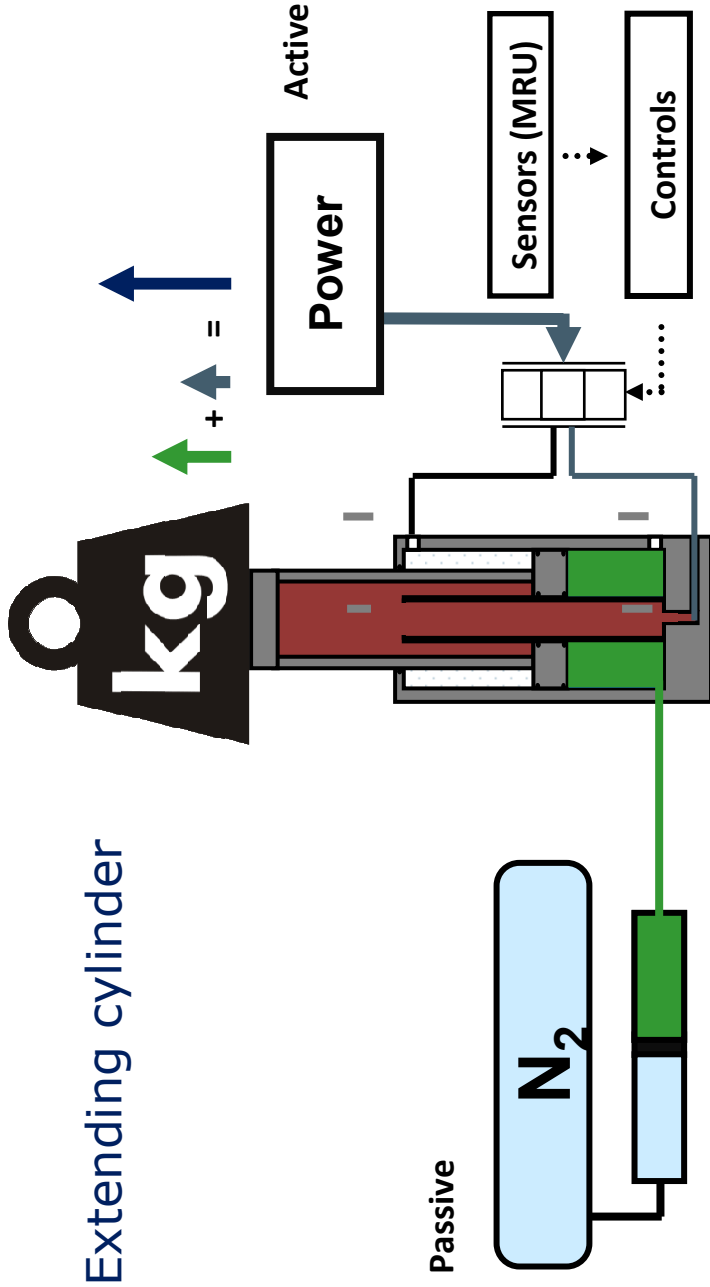
Hydraulics

- Special type of cylinder
- Third chamber for passive compensation
- Passive compensation of static weight



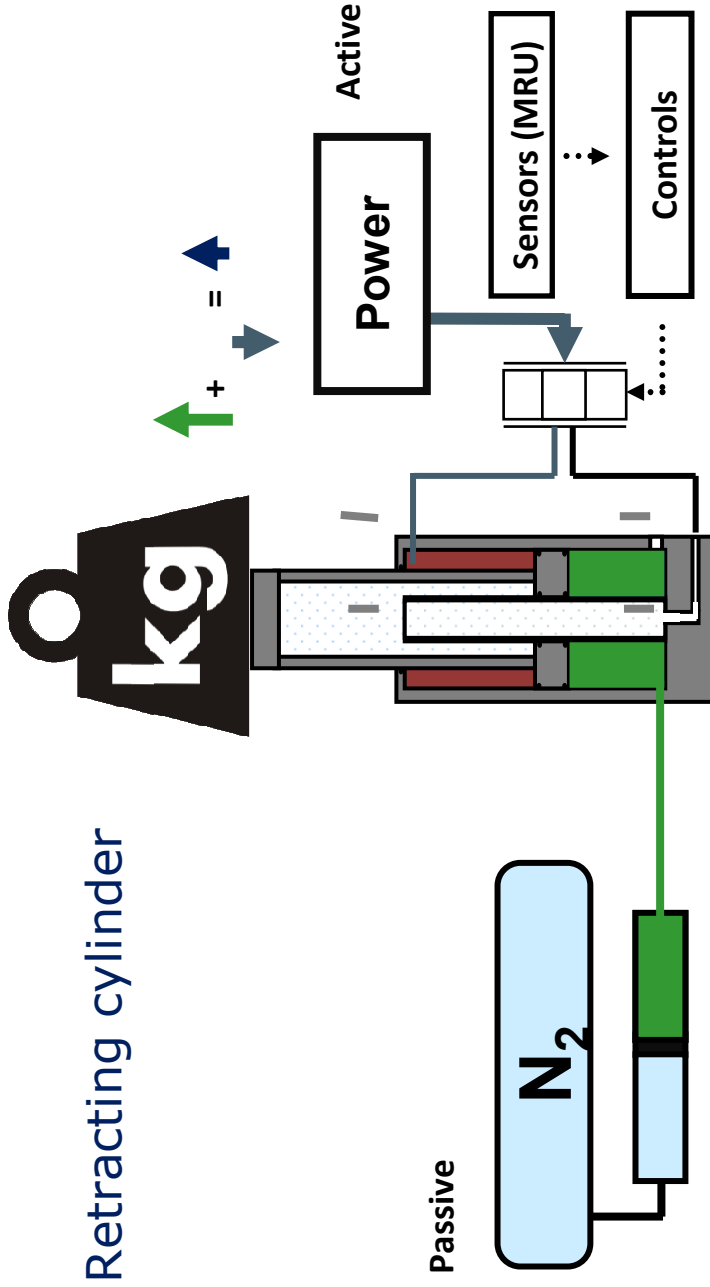
Hydraulics

- Passive compensation of static weight
- Active compensation of dynamic forces
- Extending cylinder



Hydraulics

- Passive compensation of static weight
- Active compensation of dynamic forces
- Retracting cylinder



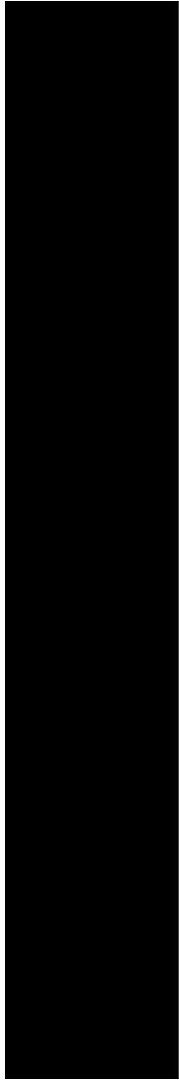
MARIN Scale model testing



MARIN Scale model testing



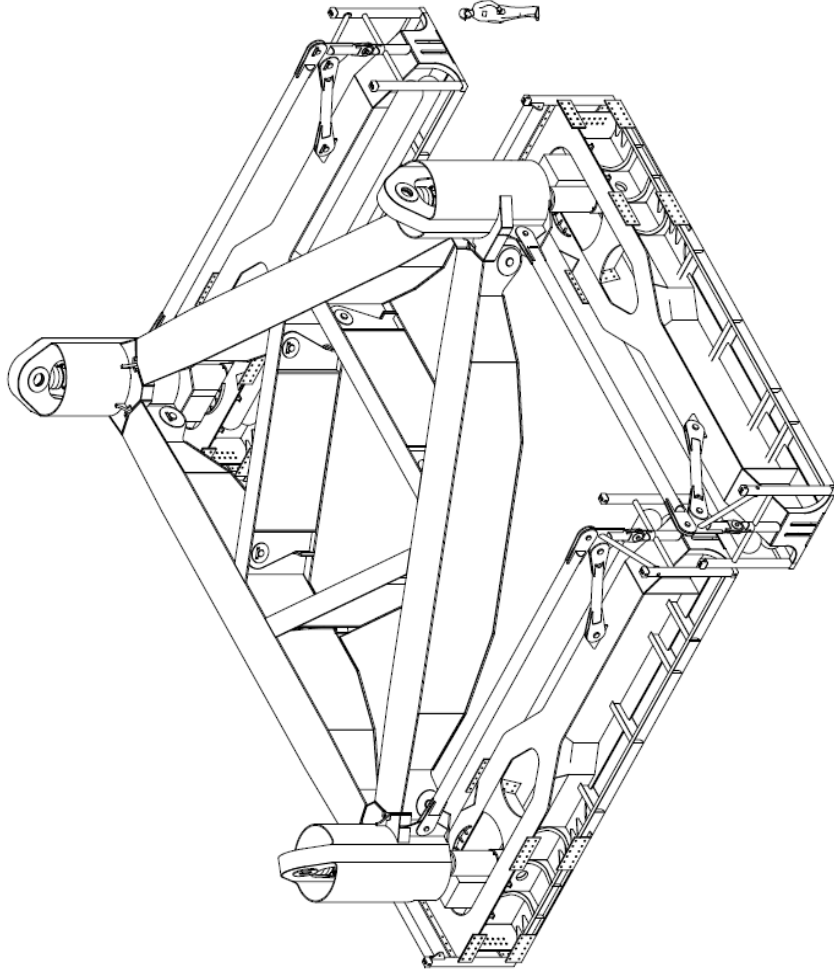
- Roll compensation > 95%
- Pitch compensation > 95%
- Heave compensation > 95%



BARGE MASTER

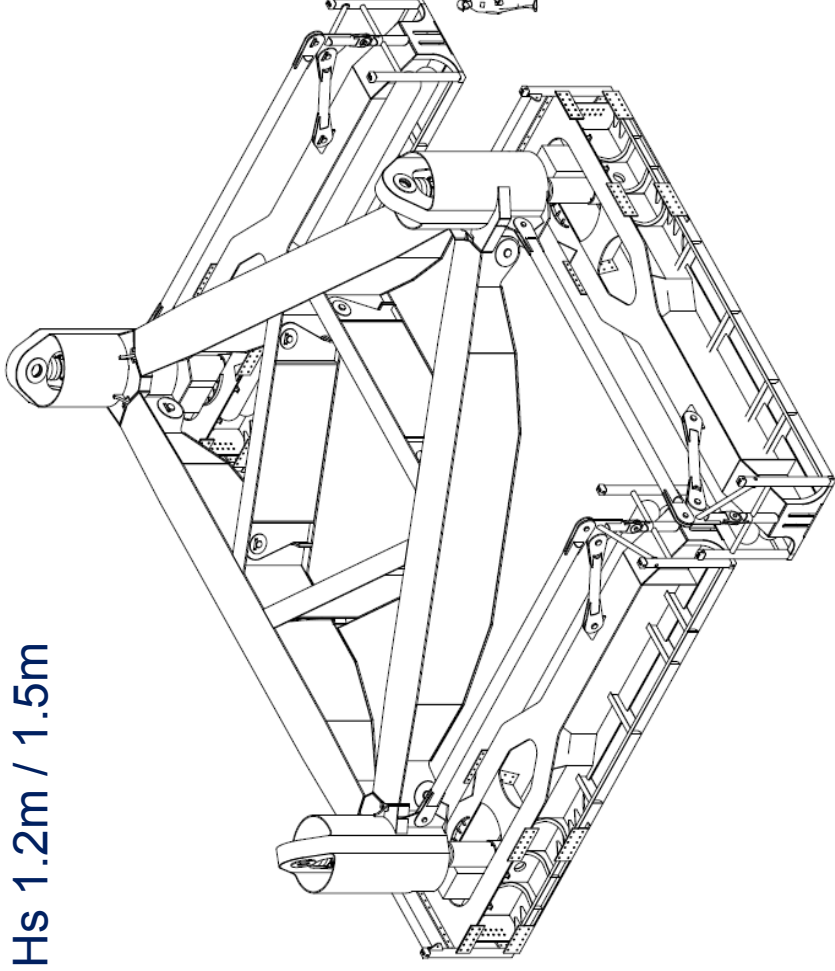


Questions?



C400 / S700 Barge Master under construction

- For 400T crane
- Or 700T supply load
- Compensation up to Hs 1.2m / 1.5m
- Available July 2012
- 2 MW power pack



Barge Master features

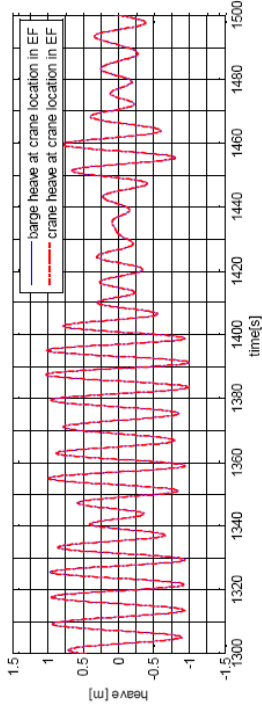
- Flexible in use
- Relatively low cost
- Containerized for transport
- Use standard crane and barge
- Modular design
- Customized for client / application
- 80T – 600T crane capacity
- 200T - 1000T supply capacity



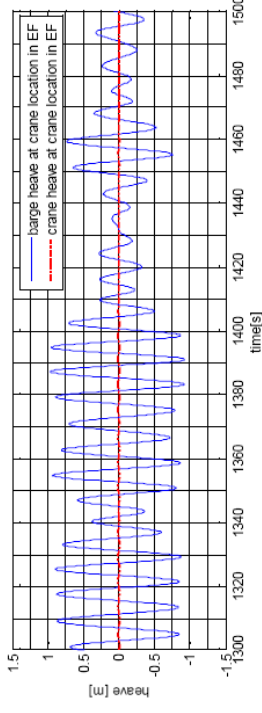
Kapitelitel

MARIN results

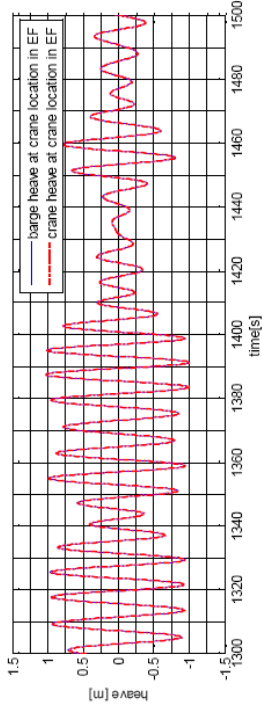
CONTROLLER INACTIVE (Tp:8s, dir:210deg)



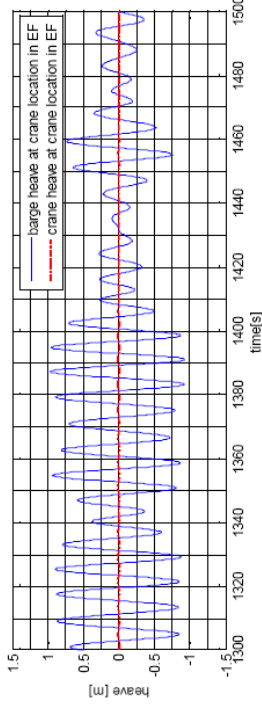
CONTROLLER ACTIVE (Tp:8s, dir:210deg)



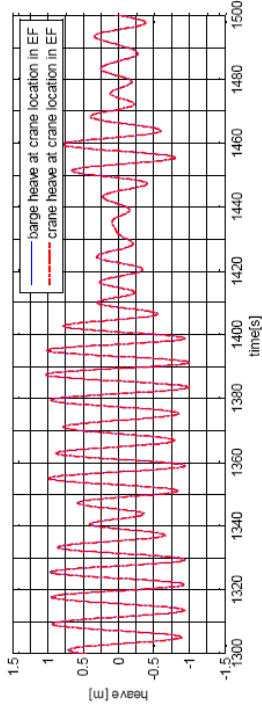
CONTROLLER INACTIVE (Tp:8s, dir:210deg)



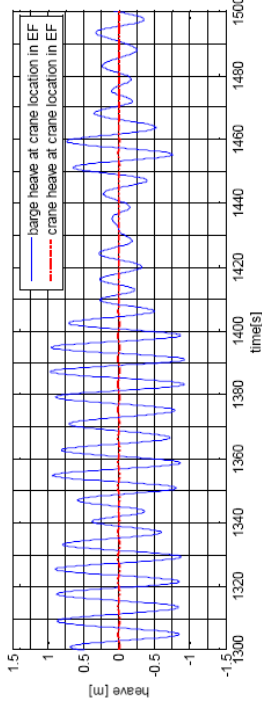
CONTROLLER ACTIVE (Tp:8s, dir:210deg)



CONTROLLER INACTIVE (Tp:8s, dir:210deg)



CONTROLLER ACTIVE (Tp:8s, dir:210deg)



Safety - Certification

Lloyd's Register certification

- Safety and Emergency Philosophy
- Platform and foundations
- Structural design
- Fabrication
- Drive and control
- Part level - FMEA
- System at FAT
- System at SAT



ISO 9001:2015
DATE: 16.08.2019
PRODUCT: ALL SYSTEMS

REXROTH BOSCH GROUP

NO.	DESCRIPTION	SCOPE	STATUS
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Safety - Redundancy

- No single failure in the electronics may lead to a system stop
 - two motion reference units
 - three CIMS sensors for cylinder position
 - two central processors
 - two HNC's per cylinder
 - UPS systems
 - Generators on busbar
- No single failure in the hydraulics may lead to an uncontrolled situation
 - three+ motor pump groups
 - two filter cooler circuits
 - safety valves





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