Intermodal Africa 2026 Exhibition and Conference
12th February 2026

Know Your Loads, Weights and Forces for a Safe and Secure Operation

Facts & Figures

About BROSA

Headquarters

BROSA GmbH, Tettnang, Germany
- Production and R&D Sensors

Subsidiaries

BROSAtronic AG, Switzerland
- Production and R&D Electronics, SW

BROSA B.V., Oss, Netherlands
- Sales Office

BROSA Pte Ltd, Singapore
- Sales Office

BROSA (Nanjing) Co., Ltd., China
- Sales Office

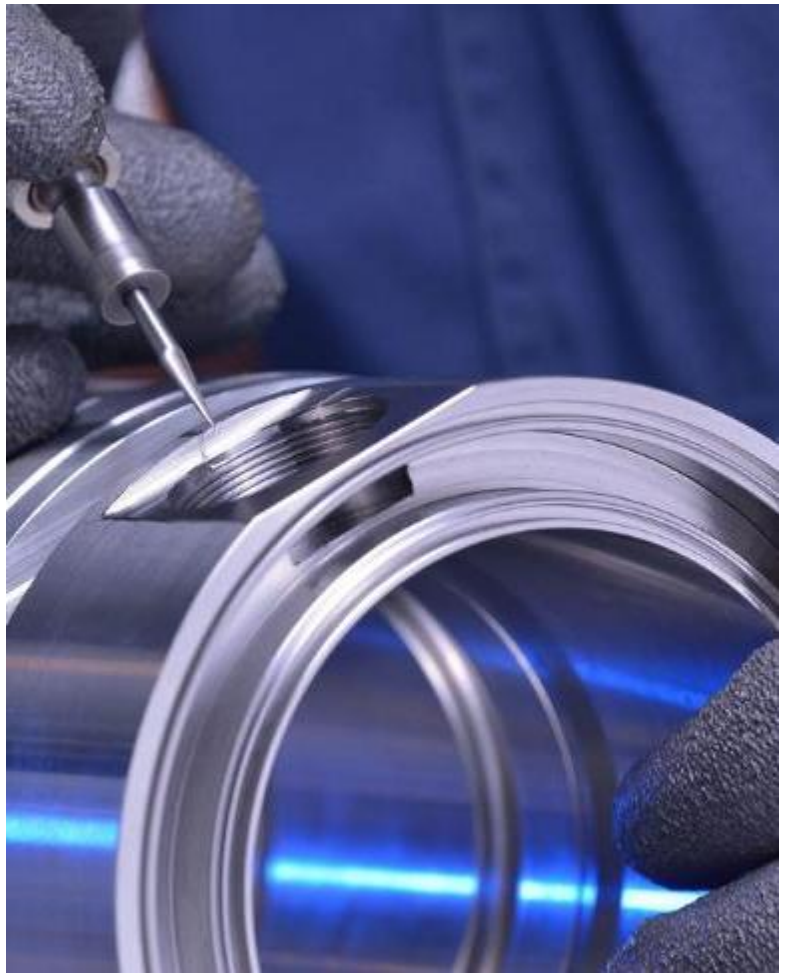
Key Figures

- Founded in 1935
- 100 Employees
- ISO 9001 and ISO 14001 certified

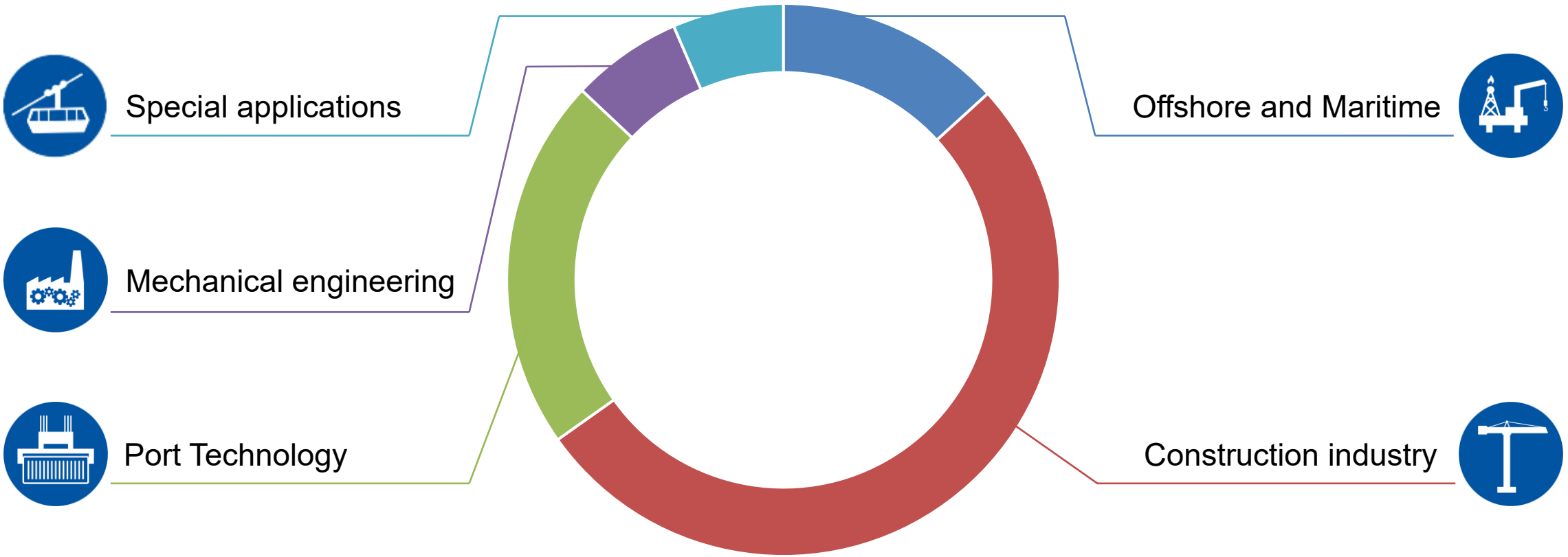
Facts & Figures

About BROSA

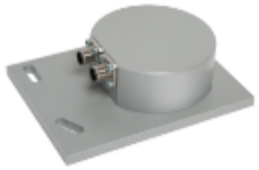
- Products are developed in close collaboration with our customers
- Understanding the Trends & Industries
- Compliance with worldwide safety standards
- “Made in Germany”
- More than 90% in house manufacturing
- Full scope of product engineering and manufacturing
  - Specification
  - Technical proposals
  - Production: mechanical, electrical, assembly
  - Calibration
  - Certification, Type Approvals,
  - Customer Acceptance Tests



Markets


Special applications
Mechanical engineering
Port Technology
Offshore and Maritime
Construction industry

Product Portfolio

					 	
Force measuring pin	Tension load cell	Force sensor washer	Tubular load cell	Compression load cell	Weighing and Overload Systems	
						
Support jack load cell	Angle sensor MEMS	Normal force sensor	Sensor for Ex area	Pressure transducer	Pressure transducers	BROSA electronics

Safety Sensor Concept

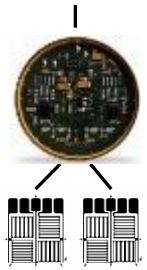
Single output

PL c / SIL 1

1 measuring system
1 amplifier
1 output

4-20 mA
CANopen
PROFINET

PL d / SIL 2

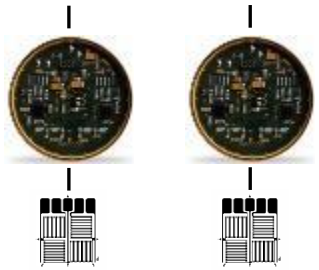


2 measuring systems
1 amplifier
1 output

4-20 mA
CANopen
CANopen safety
PROFINET
PROFINET PROFIsafe

Redundant (double output)

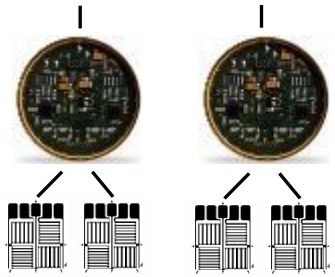
2x PL c / SIL 1 *



2 measuring systems
2 amplifiers
2 outputs

4-20 mA
CANopen
PROFINET

2x PL d / SIL 2 *



4 measuring systems
2 amplifier
2 output

4-20 mA
CANopen
CANopen safety
PROFINET
PROFINET PROFIsafe

* PL e / SIL 3 is possible if used in parent systems DIN EN ISO 13849-1

Functional Safety acc. EN13849

Categories

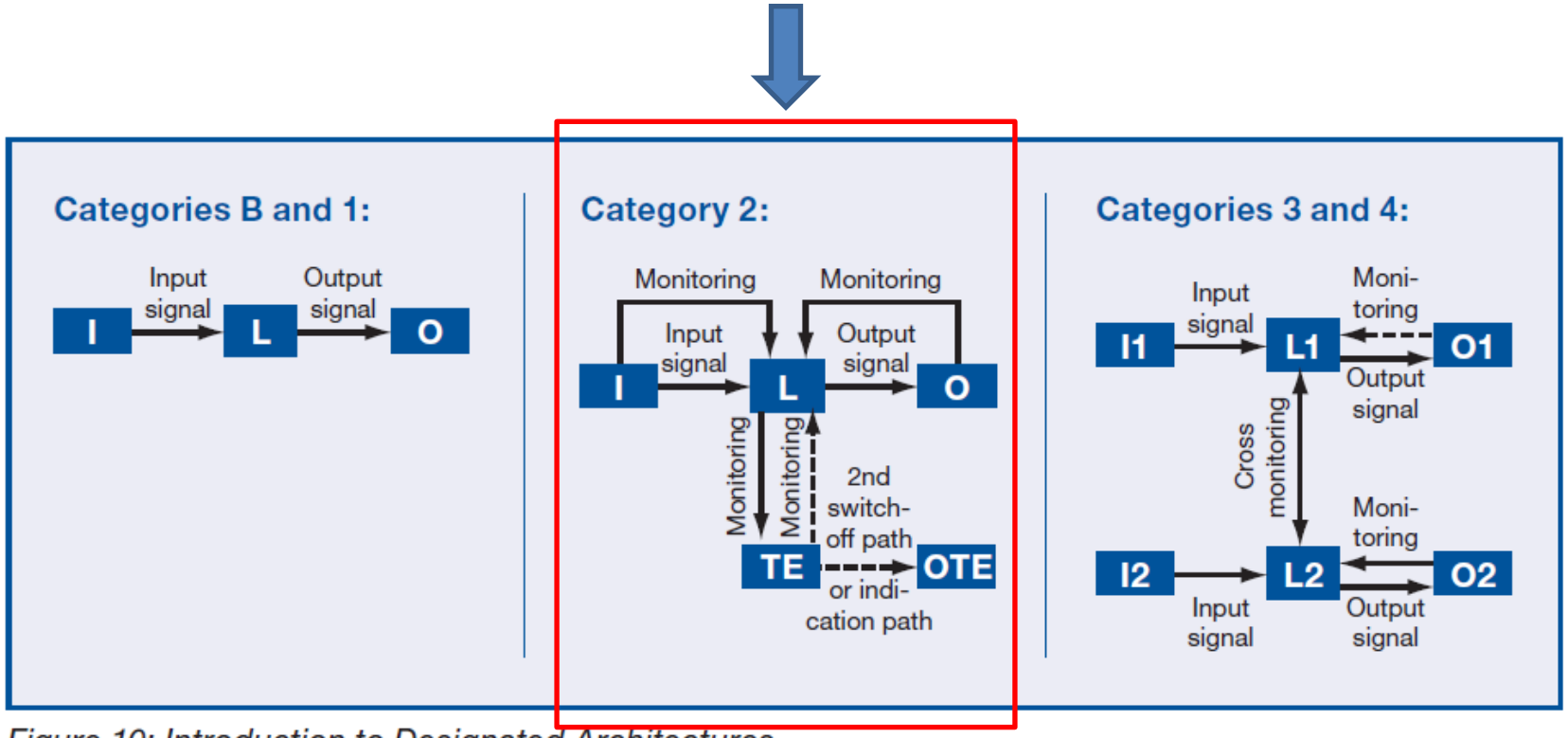
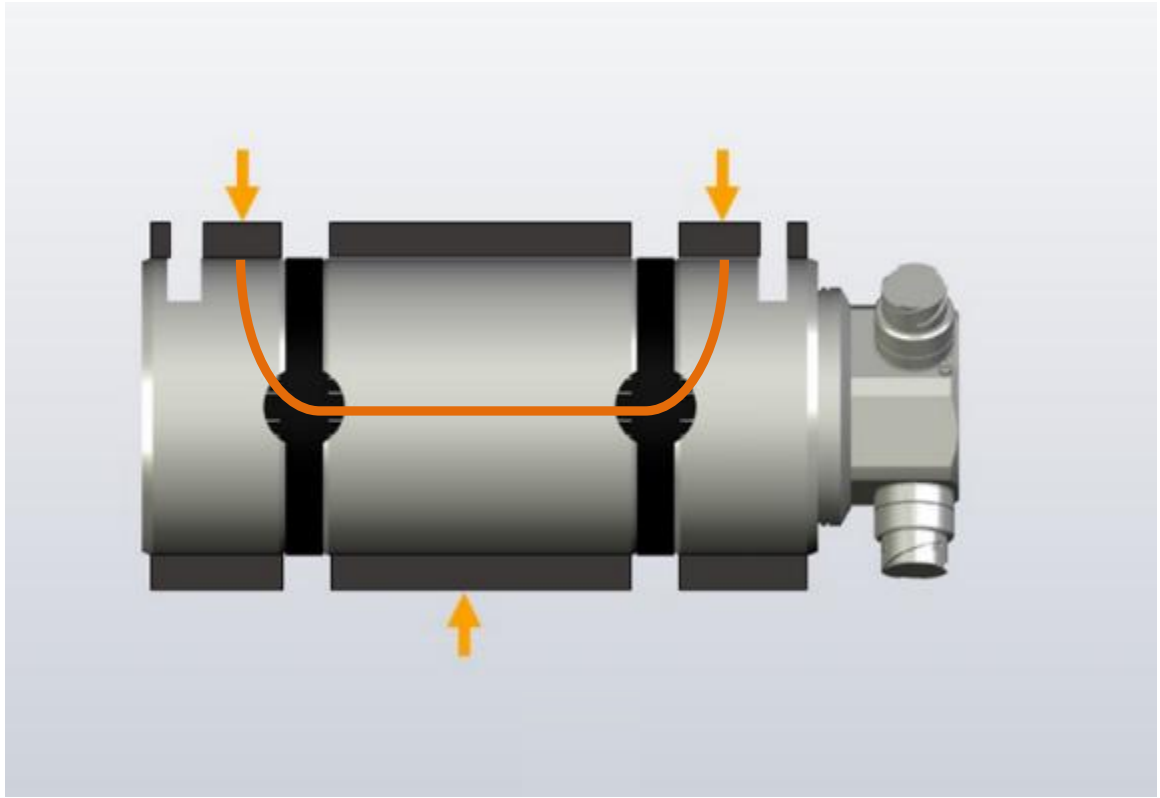


Figure 10: Introduction to Designated Architectures

I = Input, L = Logic, O = Output, TE = Test Equipment, OTE = Output of Test Equipment

BROSA Load pins



Typical installations

Installations

Anchor points on dead end of hoist rope

Sheave at rope system

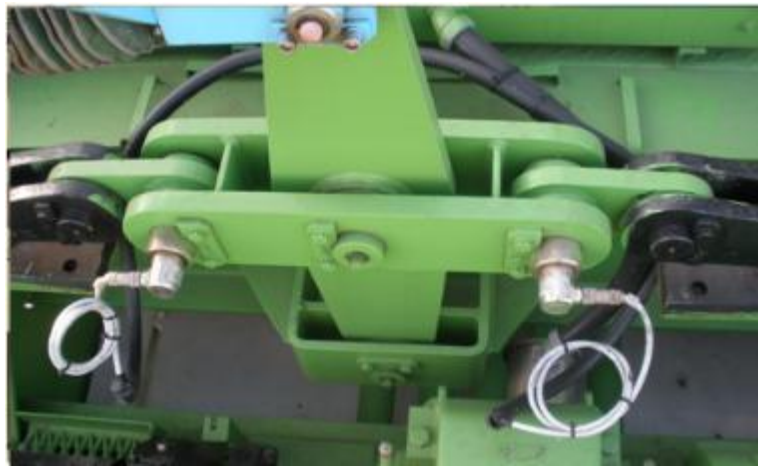
Brakes

Designs

Standard Design, 1 measuring direction

X-Y Measurement, 2 measuring directions with a 90° offset

MOP Design, with Mechanical Overload Protection



BROSA 3P sensor washer

Integration of the sensor in a twistlock

- No effect on twistlock cross-section
- Direct force measurement by integrating the sensor into the twistlock assembly
- Tension of the twistlock is transformed into a compression force
- Detachable mechanical assembly
  - Can be re-used during twistlock inspection
  - Can be re-used after twistlock exchange
- Designed and tested for > 2 Mio. load cycles

Installations

Twistlock on Spreaders

Twistlock on Headblock

Rope anchor point

Product Portfolio Systems

Safety System for SIL2 requirements

- Processor TMS570 Texas Instruments
- 8 digital inputs,
- 8 digital outputs
- 3 CAN lines (sensors, display & communication)
- Safety cut-off, Power MOSFET
- Communication controller for interfacing with the main PLC
  - Profinet (ProfiSafe)
  - CANopen (Safety)
  - Profibus DP
  - RS-485 (compatible to BROSA display)
  - RS-232 (for service purposes)
- Firmware FlexLim Safety
- Suitable for headblock installation, shock & vibration proofed
- Area of Use
  - Safety System
  - Weighing System
  - Gateway

Safety System Concept

Load sensors with CAN in / CAN out

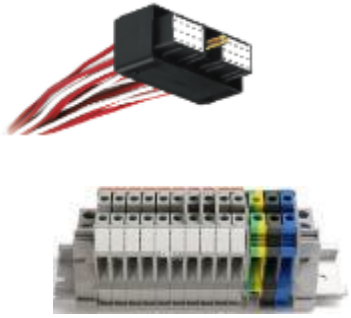
Connection cables 5 pin male / female connectors

Termination resistor

Electronic system 0656
with connectors and accessories

Profinet

RS232, Profibus



Modbus

Operator’s display

Crane PLC

Certificates

Weighing & Safety, FMEA, OIML Certificate

Key Data from RP & FMEA

- Standard: IEC 61508 / EN 13849
- Architecture-Category
- Probability of a dangerous failure (PFH)
- Mean Time to a dangerous Failure ($MTTF_d$)
- Diagnostic Coverage of dangerous failures (DC)
- Mission time
- Resulting in Safety Integrity Level
  - SIL2 = PL_d

Project Nr: LUD013D024	DANGmicro (2 Mess
Issue: 02	Reliability Prediction

OVERVIEW

OIML BASIC CERTIFICATE OF CONFORMITY

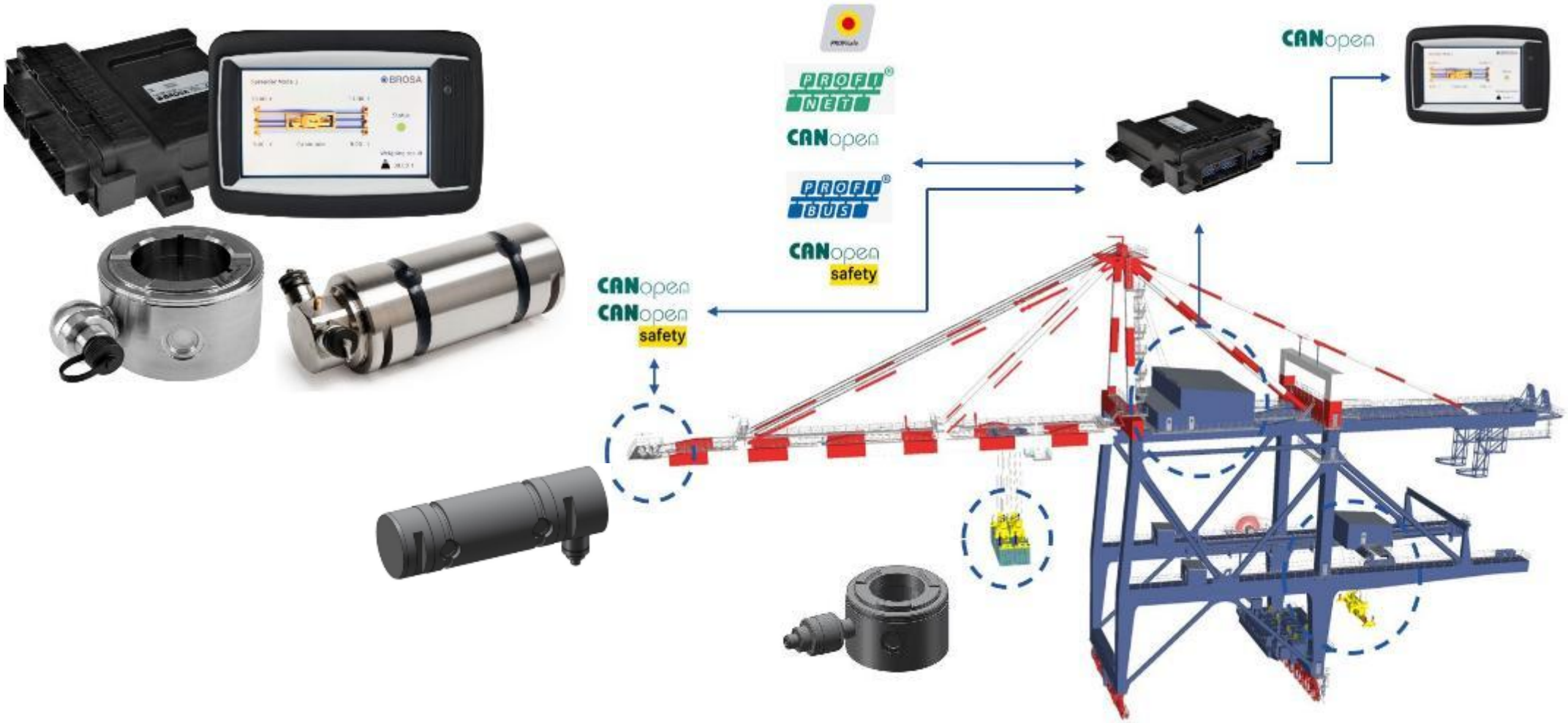
OIML BASIC CERTIFICATE OF CONFORMITY

Safe Lifting of Loads

Why Safety Systems

- Safety systems on lifting equipment are a mandatory requirement when loads are lifted
- Nearly 25% of accidents in container ports are load dependant, but not in all cases containers are overloaded.
- Monitoring of Safe Working Limits and Operational Limits at all times
- Safety Systems must comply with Safety Standards
    - European and International Safety Standards
        - Performance Level d (DIN 13849)
        - Safety Integrity Level 2, SIL2 (IEC 61508)

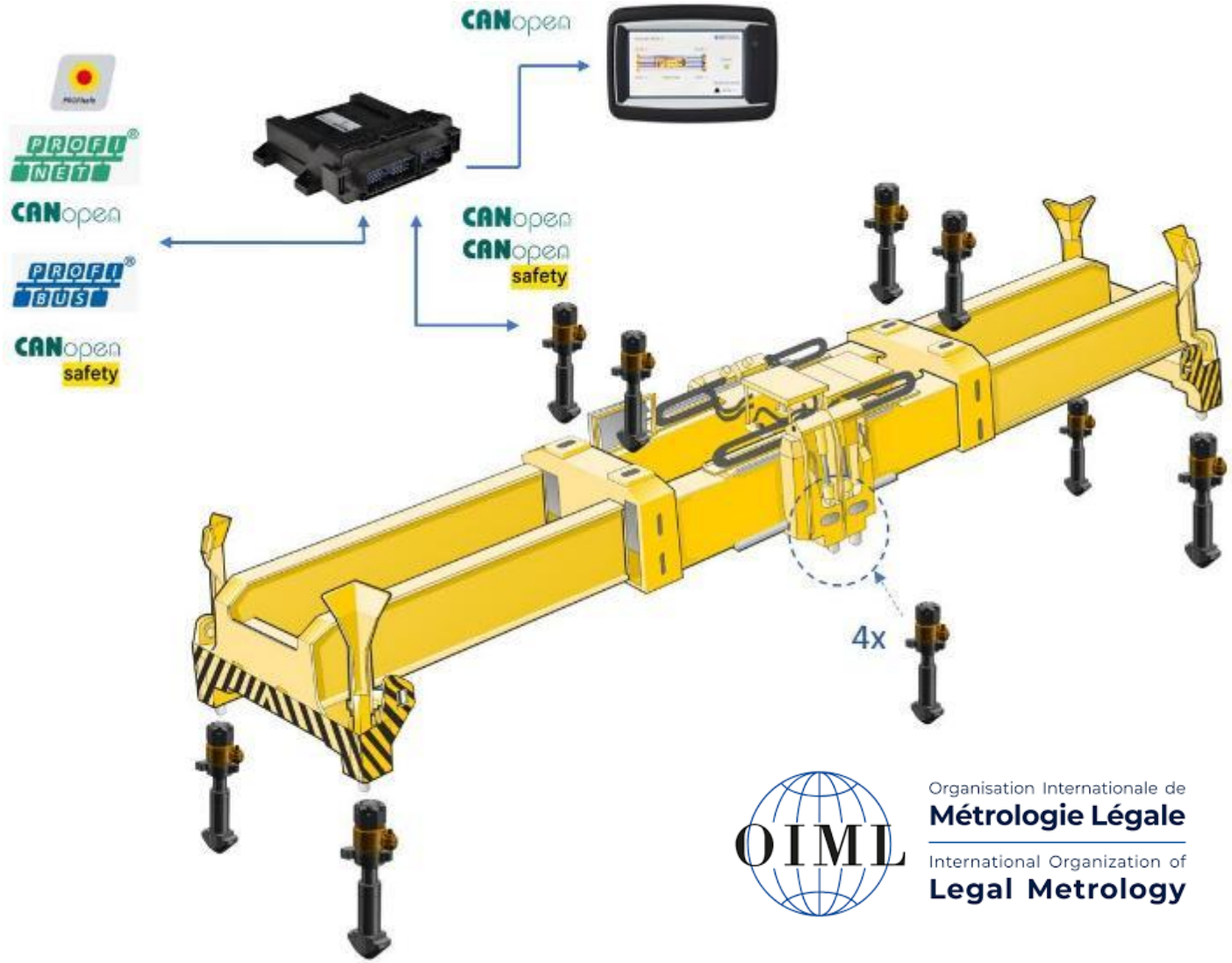
Safety System



SOLAS Container Weighing

- Safety issues for extended functions (e.g. SOLAS)
  - Mandatory to verify the VGM of the container before its lifted to a vessel since 01.07.2016.
  - Different methods to verify the VGM (Method 1 & Method 2)
  - Detection of wrongly declared Container Weights
  - Improvement of Ship Stowage Plans
  - All VGM must be taken by a verified system

SOLAS Weighing System Spreader



Organisation Internationale de Métrologie Légale
International Organization of Legal Metrology

SOLAS Weighing System Headblock

Organisation Internationale de
Métrologie Légale
International Organization of
Legal Metrology

Mobile Port Equipment

- Critical Situations:
  - Driving at high speed
  - Taking turns at high speeds and to sharp
  - Load too high at straddle carrier

  - Load measurement at the twistlocks can reduce the possibility of dangerous situations (known weight)
  - Knowing the centre of gravity and lifting height can also reduce the possibility of dangerous situations (position)

Additional & Special Functions

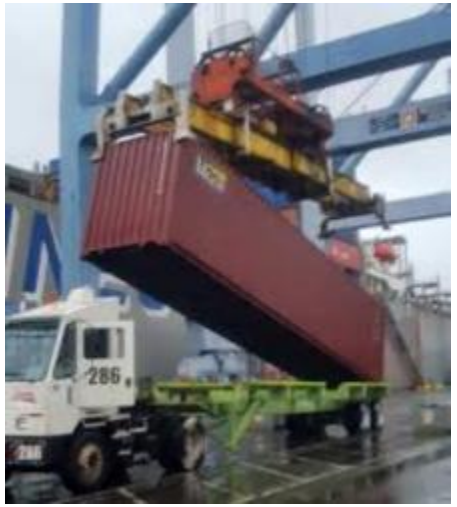
Lock detection for twistlocks

Dangerous situations occurs when

- One of the twistlocks is not correctly locked in corner
- For Twin-Spreaders: the twin detection system does not detect 2 containers, so that inner twistlocks will not lock

Enhancement for better detection and much more safe lifts

- Installation of force sensor washer on each twistlock
- Load measurement and plausible load checks by start lifting

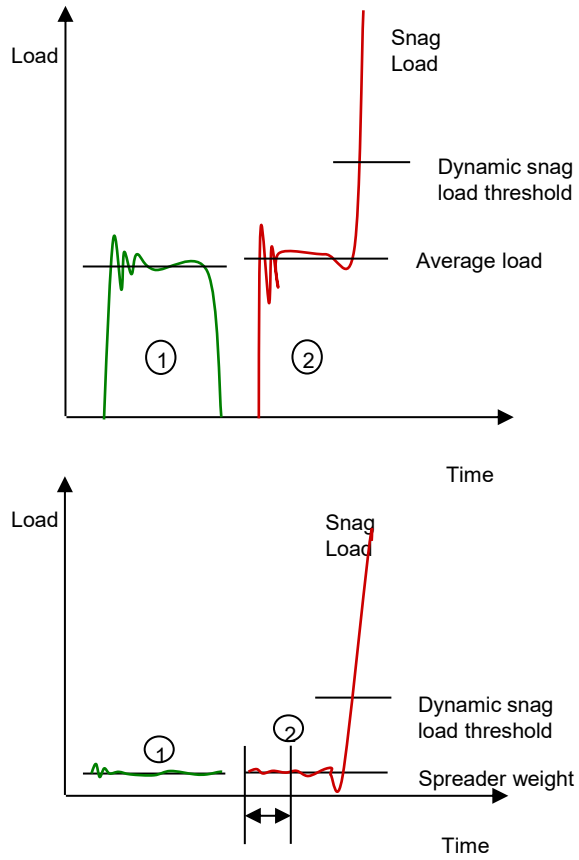


Additional & Special Functions

Snag Load Detection

Dangerous situations occurs when

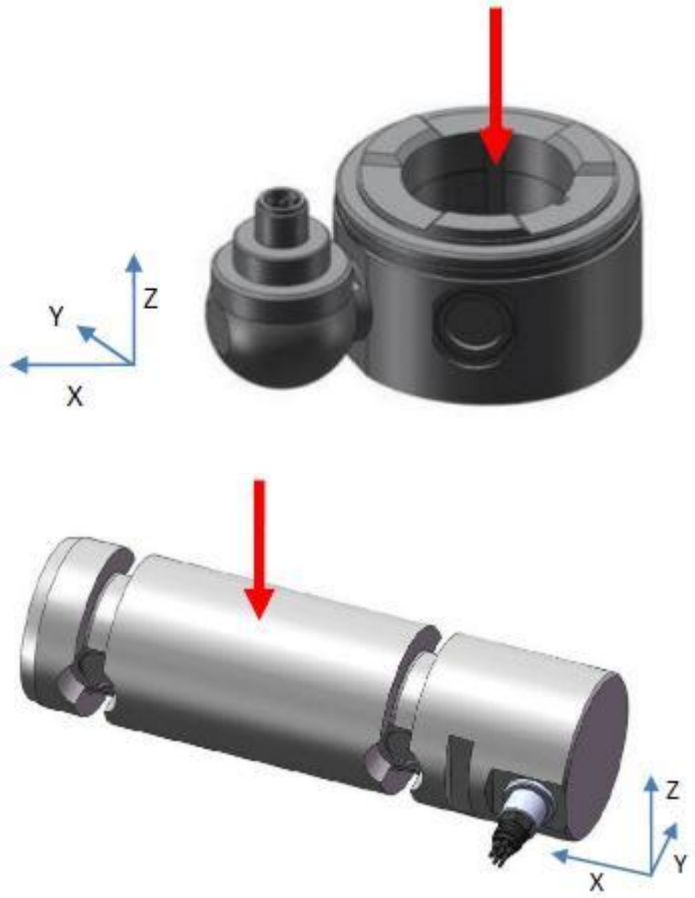
- A container gets stuck in the railings of a vessel during the lift
- Parts of the spreader block the lift
- When the head covers are not completely removed and obstruct the lifting area
- ….
- The load sensors are immediately registering a second increase of the load signal
- Once a second increase is detected on any of the load sensors the snag warning can be triggered
- The threshold for the detection is dynamic, dependant on the weight of the container being lifted.



New Developments

Intelligent Sensors

- For sensor installation in the headblock
- Acceleration = change in velocity
  - Change in speed
  - Change in direction
  - Change in both
- During a lift of a container the hoisting speed accelerates while the trolley movement changes the direction.
- This causes unwanted effects into the measurement of the force created by the container
- The amplifier inside the sensor needs to calculate the dynamic forces
- Result shall be an increase of the overall accuracy of the load measurement by splitting the load signal in a static and a dynamic signal



Why Brosa?

BROSA GmbH

- A competent partner for load sensing and monitoring
- A leading supplier to the container handling industry
- An innovation driven development partner for future oriented products
- Supplier to all major crane and port equipment manufactures
- Products are used in all major ports around the world.

THANK YOU VERY MUCH FOR YOUR ATTENTION