ifm Solutions for Ports

2023

Table of Contents

Why ifm?

ifm.
At a glance

The ifm group of companies is a global industry leader for innovative sensors, controllers and systems for industrial automation and digitalisation.

We combine the flexibility and individuality of a family-owned company with the quality and professionalism of a corporate group.

8,100
employees

1,252
million euros
in sales*

1,140
patents

1969
founded
in Essen

97 %
product availability
on the customer's
requested date

161,000
customers
worldwide

*Total turnover according to HGB (German Commercial Code)

ifm.
Our Management

Since the founding years, ifm has grown considerably – we have retained our virtues, our quality standards and our sincere and respectful cooperation. Our customers are still the focus of our work.

» **Chairmen of the Board and co-CEOs**
Martin Buck
Michael Marhofer

» **Members of the Board**
Christoph von Rosenberg – CFO
Dr. Thomas May – CPO
Benno Kathan – CTO

ifm. “close to you” worldwide

With 8,100 employees, we reach 180 countries.
That is our understanding of “close to you”.

	North / South America	Europe	Africa / Asia / Australia
Employees 2021	545	6,840	665
Total turnover 2021	287 million euros	705 million euros	260 million euros
Turnover distribution	23 %	56 %	21 %

*Total turnover according to HGB (German Commercial Code)

ifm. **Product portfolio**

More than 15,300 tried and tested automation products for all application areas


Position sensors


Sensors for Motion Control


Industrial image processing


Safety technology


Process sensors


Industrial communication


IO-Link


Identification systems


Condition monitoring systems


Systems for mobile machines


Connection technology


Power supplies


Accessories


IIoT Gateways and Appliances


IIoT software

ifm.
Warranty

5-year warranty on all products in the catalogue.

Next day delivery for 97% of all articles.

Global support online and offline by our specialists.

Order 24/7 via our personal webshop on www.ifm.com

5 YEARS
Warranty
on ifm products

ifm.

Industry 4.0

Digitalisation is unique and individual.
We support our customers, concretely and step by step. Scalable. Simple.

ifm offers companies of all sizes and industries **products, services** and **software** for the way from sensor parameter setting to the smart factory.

We make production processes transparent:

» **Increase in plant efficiency**

» **Avoidance of standstills**

» **Optimisation of processes**

ifm.

Digitalisation

Virtualization of all devices and objects (e.g. machines) inside a network and connection to humans and services in an ”internet of things“

Convergence of organizational and physical processes in a cyber-physical value chain (“SMART“)

» Identification and avoidance of waste and inefficiencies

» Higher flexibility

» Faster reaction times

» Saving resources

» Educated/ informed decision making

Result

Resulting data/information products lead to a renovation and rebuild of business models and processes

Context- location-based user-centred information

ifm. **Active in port industry**

» ifm has been a member of the Port Equipment Manufacturers Association since 2010 and is focused in workshops of port equipment automation

PEMA
PORT EQUIPMENT MANUFACTURERS ASSOCIATION

» Exhibiting at TOC Europe and TOC Asia every year with port focused products

TOC
EUROPE

ifm. **Expertise in IIOT**

Hybrid open platform as a strategy, with flexible modular solution packages. Cloud-only approach not feasible in industrial digital applications due to massive data volumes

OEE as key driver for IIOT applications

Smart data vs big data: process-relevant data needs to be aggregated and analyzed near the source to avoid unnecessary clogging of data network. Big data is necessary for machine learning (learning the behavior of machines in their life cycle and ageing process)

Domain know-how is essential

IOT means collaboration between OT and IT with management focus

ifm focus in ports

ifm. **Specialisation in ports**

Quayside

- STS cranes
- Sprinter carriers

Container Yard

- RTG cranes
- RMG cranes
- Straddle carriers

Intermodal

- RMG cranes
- RTG cranes
- Reach stackers
- For rail transport, inland shipping, road transport and pipelines

Ground Transport

- AGVs
- Automated terminal tractors
- Straddle carriers

5G cellular wireless
Cloud connectors
IoT interfaces

Spreader Applications

Applications

Spreader

Ensuring down position of the flipper:

- The flipper is used to make sure the spreader is in proper position to latch and lock on to the container.
- This is achieved with signals from analogue position sensors and motors to ensure the flipper is in down position
- **ifm solution:** inductive sensor IIS260, IM504X

IIS260

IM514X

Applications

Spreader

Twist-lock control on spreaders:

- The twist-lock ensures that the container is secured and can be lifted off safely.
- Inductive sensors (IIS260) or magnetic sensors (MGS204) are used in every corner, middle position of the spreader and if the spreader is flat on container.
- Signals from the sensors help to automate and monitor these processes and ensure bolts are locked in the correct end open/close positions
- **ifm solution:** 3 pcs. inductive sensors M30 (e.g. IIS260 and II0340) or 3 pcs. magnetic sensors MGS204/OIDXXX per twist-lock

IIS260

IIS340

OIDXXX

MGS204

Applications and Upcoming Products

Spreader

Gap detection:

- When lifting two 20’ containers under a spreader in the twin-twenty lifting function, there is a potential risk and danger that the lifting is not safe.
- Photoelectric sensors (O5DXXX) with 2m sensing range are used to detect the gap between the containers.
- **ifm solution:** O5DXXX (measuring range unaffected by color or state of container)

O5DXXX

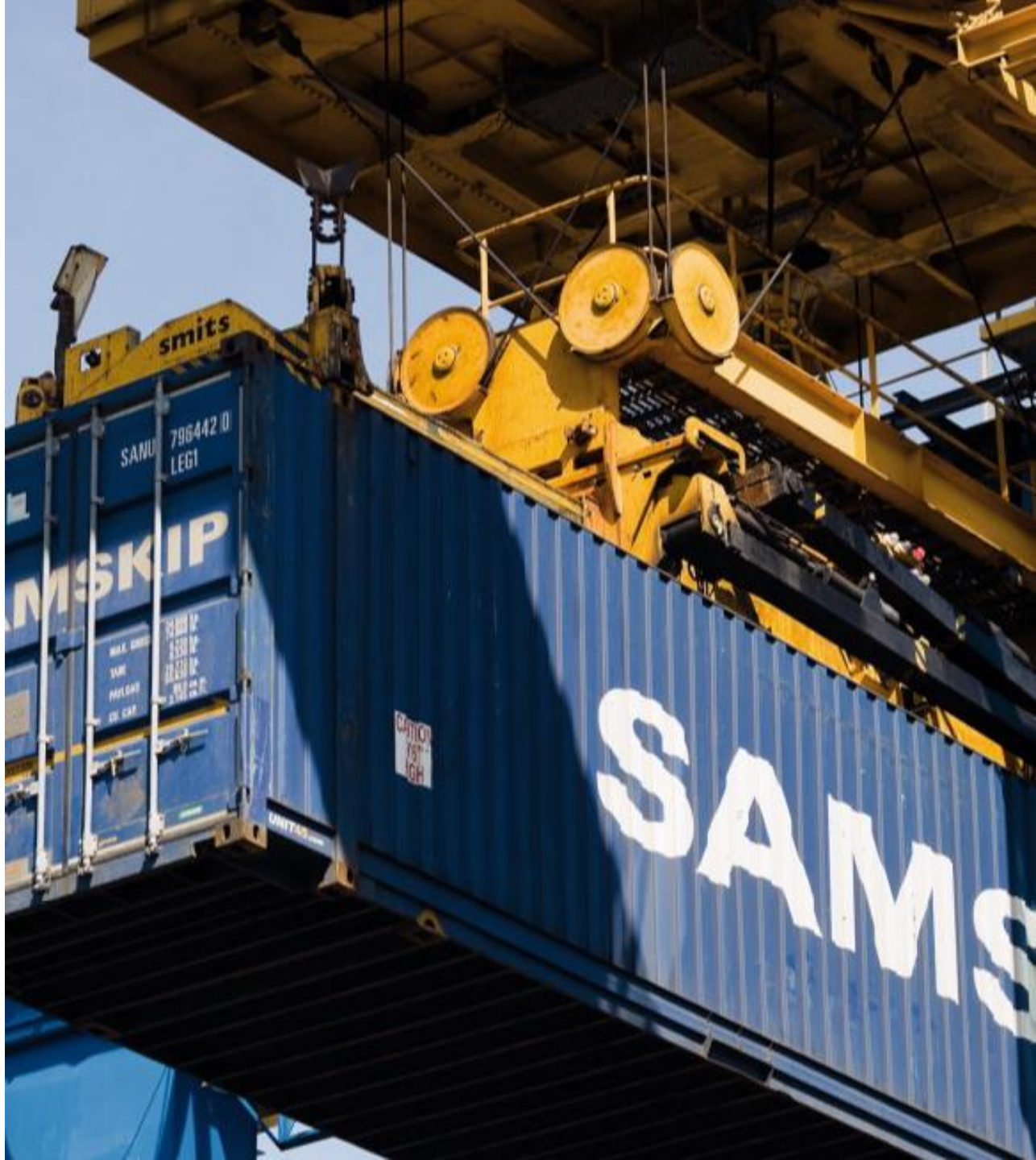
Applications and Upcoming Products

Spreader

Hydraulic spreaders:

- The hydraulic powerpacks are critical for the twist lock function
- Pressure sensors are used to measure the high and low point accurately for correct hydraulic function
- **ifm solution:** PT55XX for hydraulic spreaders or cranes (typ. 100-160 bar operating pressure)

PT5500



Applications and Upcoming Products

Spreader

Hydraulic telescopic spreaders:

- The telescopic system is driven by means of a hydraulic motor and a reduction gearbox connected to an endless chain fitted with a shock absorber at both ends. The telescopic positions are controlled by an absolute encoder or proximity sensors.
- **ifm solution:** RM9000 (multiturn solid shaft encoder) with CAN interface for mobile applications up to 120g (6ms) /30g continuous shock to control the telescopic position of the spreader; another solution is the draw-wire encoder RMS005

RM9000

RMS005

Applications and Upcoming Products

Spreader

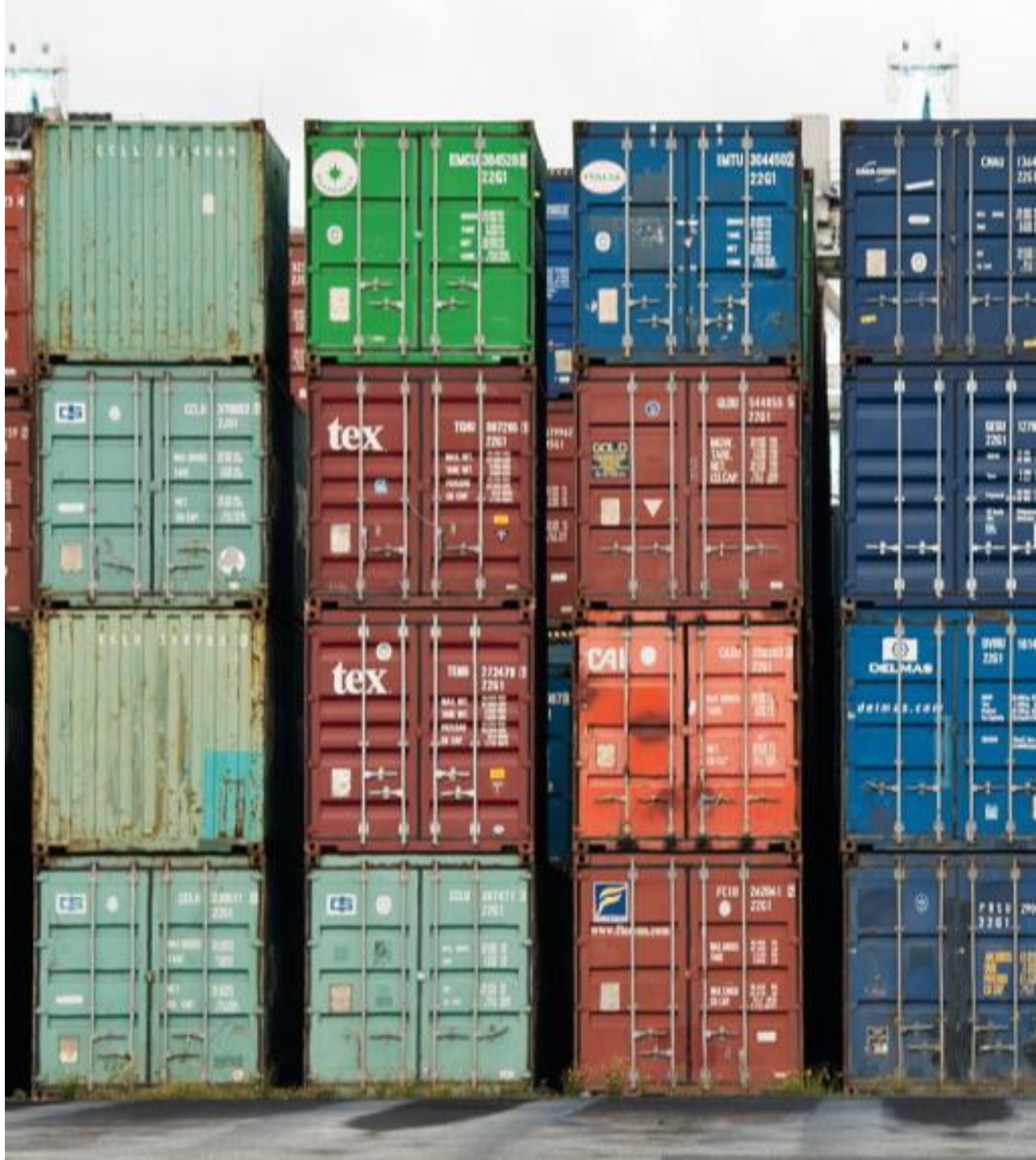
Detecting the deviation:

- When spreaders stack containers, accuracy is important as any deviations can lead to downtime and/or accidents.
- ifm photoelectric sensor O1D can fulfil this need with its precise laser time-of-flight measurement based on PMD technology (PMD = Photonic Mixer Device) and is resistant to extraneous light up to 100,000 klx. In addition, the vibration and shock resistant camera O2MXXX can be used to observe the positioning visually.
- **ifm solution:** Auto-positioning system with 6 pcs. O1D105 per spreader. O1D105 with 10 meter sensing range for outdoor applications up to 100 klx. Another option is O2M (protection rating IP69k, temperature range -30°C…+75°C, heated front lens) or O3D201.

O1D105

O2MXXX

O3D201



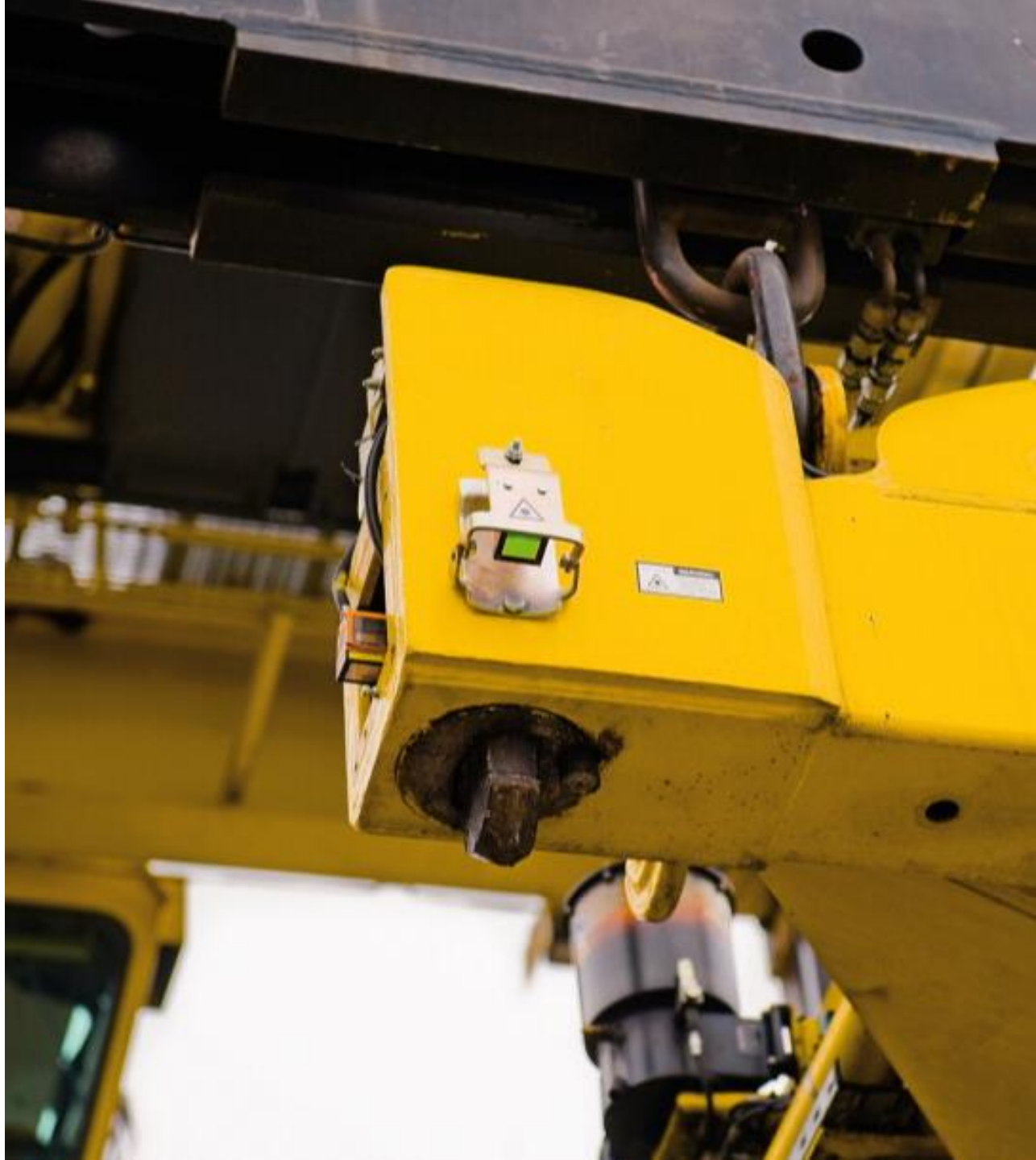
Applications and Upcoming Products

Spreader

Spreader control:

- Spreaders can create damage and noise when approaching a container due to mass and size
- The O1DXXX helps minimize the damage and noise by regulating the spreader speed
- **ifm solution:** O1D105 with special mounting bracket and rubber damping.

O1D105



Applications and Upcoming Products

Spreader

Container weighing system:

- Containers are weighed to manage stress on twist-locks on single/twin-lift spreaders
- This is done by sending signals from sensors measuring this to main PLC and the TOS
- The system also provides various signals to improve operational safety and it allows to monitor twist-lock and spreader life cycles.
- **ifm solution:** A couple of CAN Booster between the spreader and the top of the crane. The CR1081 or CR0401 are used to record, display and make the gateway to the crane PLC.

HMIs

BasicController

Spreader

Using AS-i on spreaders with higher EMC requirements:

- Spreader with preferred AS-i modules (e.g. AC2477, AC2479, AC2434, AC2435) can be easily and quickly connected to the AS-i flat cable. By using the gateway function of AC14XX, sensor/actuator information can be transferred to the higher PLC level. The benefit of using an AS-i system is e.g. the replacement of a parallel wiring by the two-wire AS-i flat cable. This reduces the amount of electro-technical components used on the spreader and cranes. The maintenance personnel can immediately see the occurred errors with the help of AC14XX due to its integrated diagnostic functions. Therefore, commissioning, maintenance and downtime on the crane's spreader can be minimised. The connection to the IO-Link master with AS-i (AC6000) brings further benefits: In case of deviations, it can be immediately detected (wire check due to shocks), so that wiring problems of the spreaders can be eliminated.

- **ifm solution:** AS-i CompactLine modules AC2477, AC2479, AC2434, AC2435 and the IO-Link master with AS-Interface AC6000

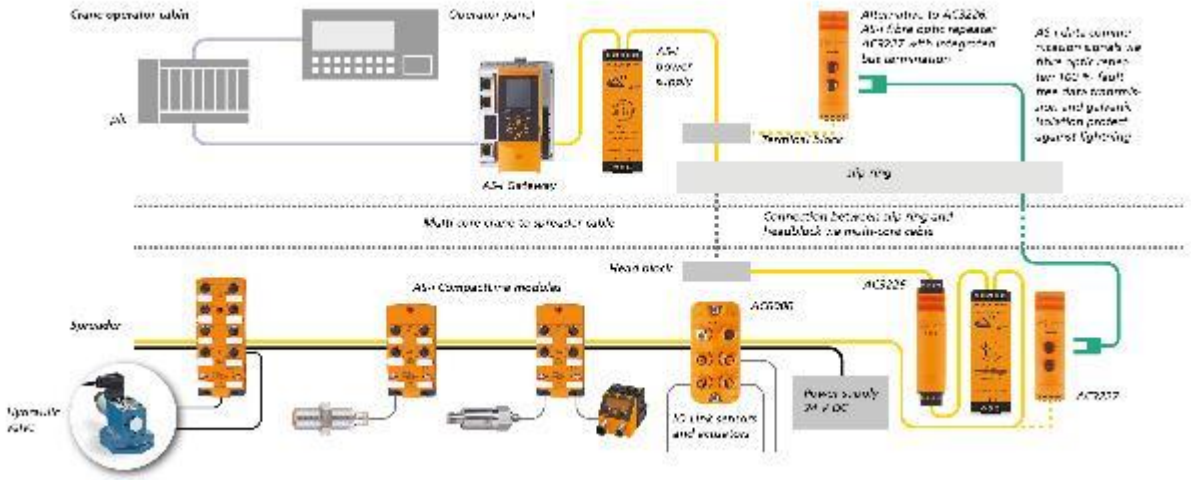

AC14XX


AC2479


AC2477


AC6000

Possible AS-i Layout on Spreaders



Applications and Upcoming Products

Spreader

100% lightning protection:

- The connection between spreader and operator cabin can be interrupted, especially if a crane is struck by lightning due to its height. In this case a fibre optic repeater with AS-i bus termination can be used to guarantee the 100% protection to reduce downtime. The usage of fibre optic cables is very important to maintain the function of fieldbus systems.
- **ifm solution:** The fibre optic repeater AC3227 with AS-i bus termination can be used in connection with multicore fibre optic cables. Another option will be AC3226 with integrated AS-i bus termination with EMC approval for use on spreaders without fibre optic cables; USP of ifm: Transmission of AS-i signals via fibre optic cable is patented

AC3227

Applications and Upcoming Products

Spreader

Port application with ecomatmobile:

- There is also the possibility to equip spreaders with ifm's ecomatmobile system (CAN bus on spreaders). This solution is very reliable in order to give alert to the driver and maintenance personnel in case of errors.
- **ifm solution:** These shown parts are used on a twin-lift spreader system:
- 1 x ifm power supply 20A
- 1 x CAN/Profibus gateway EC2087
- 1 x ecomatController CR711S with connector EC0711
- 11 x CompactModule CR2033 (new version in 2021: CR2042)
- 2 x CompactModule CR2031 (new version in 2021: CR2041)
- 40 - 50 pcs inductive sensors, i.e. IIS260, IGS232
- Cables and jumpers with M12 plug and sockets

CR711S

EC0711

IIS260

IGS232

CR2033

CR2031

Applications

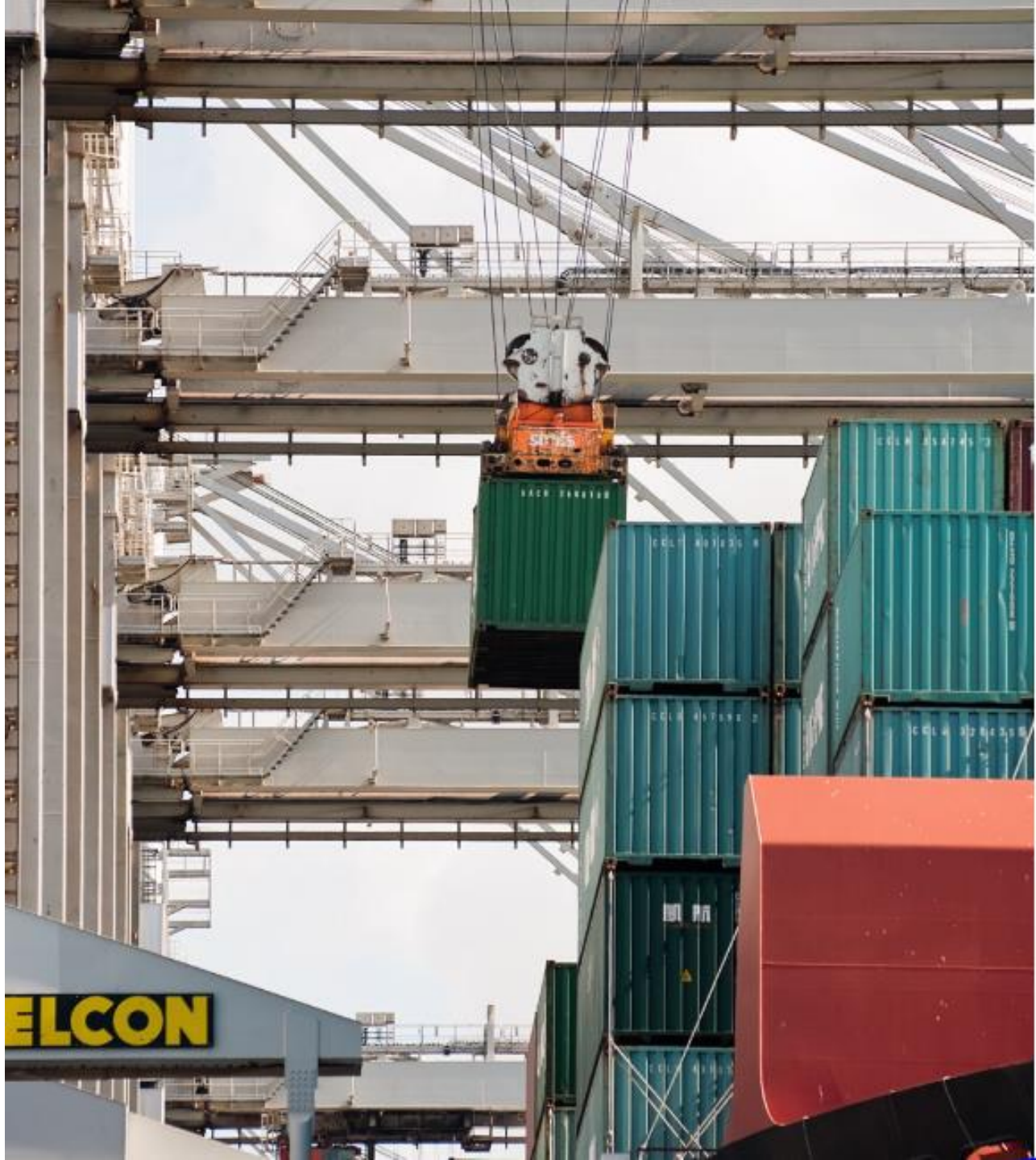
Spreader

Spreaders with tilting function or sway control:

- If bulk materials need to be released from the container, a spreader with tilting function is useful. Another difficulty resulting from container transfer is the swaying phenomenon which makes a quick and exact positioning of containers difficult.
- **ifm solution:** 2 pcs JNXXXX (JN2200) or JDXXXX each for all three axes of the spreader are implemented.

JNXXXX

JDXXXX



STS Crane Applications

Applications

STS Crane

Collision avoidance between two STS cranes:

- There is always a potential risk that cranes will collide, especially if several of them are operated in a row, which cannot be controlled easily by the crane operator. Repairing the damage means decrease of productivity and causing high losses. This issue can be solved with the photoelectric distance sensor O1DXXX on the STS crane and a reflector on the other STS crane. Once the cranes are too close, a signal is given and the operation will be stopped.
- **ifm solution:** type O1D106 (range up to 75 m) and reflector can be installed as anti-collision device between two STS cranes.

O1D106

Applications

STS Crane

Condition monitoring of STS cranes:

- Machine faults at cranes which are not known can create lots of losses in terms of efficiency. A way to foresee such faults will help to avoid such incidents. Some machine faults are bearing unbalance, looseness or overall condition.
- **ifm solution:** VSA001 (4 pcs.) on each VSE100 with integrated history trend is an appropriate solution. Each sensor will monitor a number of specific machine faults in specific programmed frequencies which are related to the machine condition. The sensors are placed in different machines such as STS crane machine room (gearbox, drum and motors), trolley wheels etc. In case a big discrepancy of the set vibration values is observed, alarm signals are given. Measurement criteria can be velocity, acceleration and displacement.

VSA001

VSE100

Applications

STS Crane

Collision avoidance between crane and upper part of the vessel:

- It often happens that the boom of a quay crane collides with the vessel's bridge, mast or antennae. The damage caused by this collision can be very expensive. The photoelectric sensor O1DXXX with 100 m sensing range and 600 m background suppression and reflector is suitable for 100 klx ambient light to solve this issue. The distance between the crane boom and the sensor needs to be adjusted properly and when the vessel's part reaches the sensing range, the sensor gives a signal to stop. Another solution will be the O3M camera based on the PMD Time-of-Flight technology by providing collision prediction to the crane driver, signalling that obstacles are in the path. The O3M camera also offers the possibility to see the obstacle visually.

- **ifm solution:** O1D209 + reflector ZB0422 (1m x 1m) with 100 m sensing range and 600 m background suppression, suitable for 100 klx ambient light as anti-collision device between crane and upper part of the vessel – usual working range 50 - 60 m; O3M camera can be another option

O1D209

O3MXXX

Applications

STS Crane

Door lock switch for trolley gate control:

- Persons accessing the hazardous area of an STS crane (e.g. trolley platform) must be detected. In the normal case, the door to the hazardous area is closed. The door is only unlocked by pressing the button.
- **ifm solution:** door lock switch and pushbutton (AC238X connected to the AS-i bus system via the stainless steel splitter E70354) module both run on AS-i

AC238X

E70354

Applications

STS Crane

Container detection:

- Container detection at transit platform of double trolley quay side cranes
- While containers are handled by trolley cranes at the quayside, it needs to be detected whether containers are on the trolley platform or not. The photoelectric sensors such as the OG wetline series can be used in this application. They are optimised for harsh and wet areas with IP 69K.
- **ifm solution:** The OG wetline series helps to detect the containers at the transit platform

OGXXXX

Applications

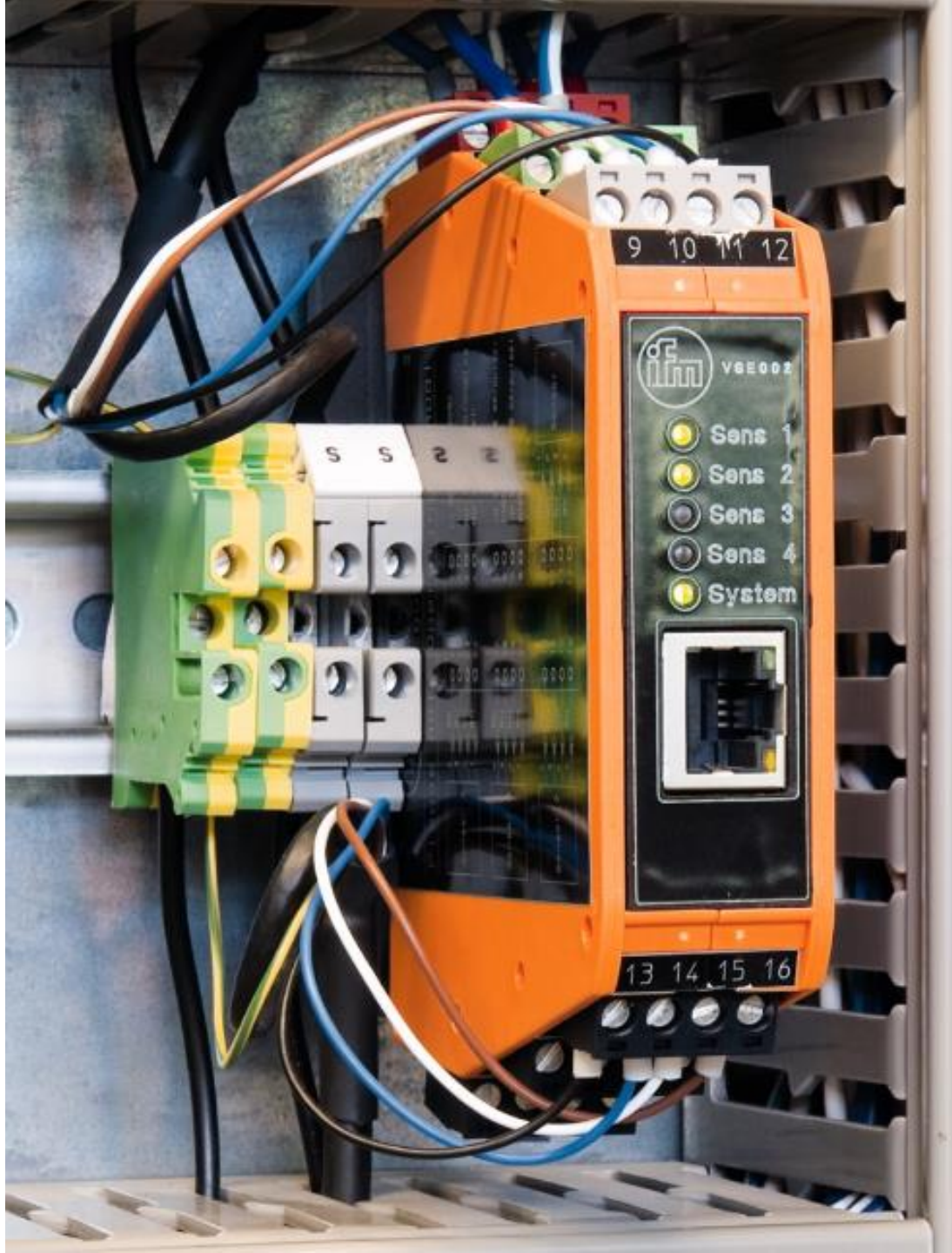
STS Crane

Vibration monitoring at hoist gearbox:

- The crane gearbox is a critical equipment and downtime can be very expensive
- This is a variable speed and load application: crane speed changes from top speed to zero reverses and cycle time is less than a minute
- The load also varies as per direction of movement; also, same crane can carry 20 feet/40 feet container. In this case there are 8 bearings in total to be monitored
- **ifm solution:** The vibration sensors (VSA001) are mounted on a gearbox of a crane for monitoring bearing damage. Each sensor is assigned two bearings to monitor. It is a variable speed application with speed input given through an encoder on IN1 input of VSE002. The integrated battery-backed real-time clock enables time tracking of events. Damage progress is indicated using binary switching outputs (e.g. early warning and alarm). History trends are monitored by the supervisor on the PC on the crane and also by the shift engineer in his office via company LAN

VSA001

VSE002



Applications

STS Crane

AS-i for crane and spreader applications:

- Actuator-Sensor Interface (AS-i) is a reliable wiring system
- Easy installation, cost-effective, quick replacement
- Time saving from 20% to 50%
- Guaranteed transmission time <10 ms with 248 inputs and outputs
- Plug-and-play, no special software required
- Flexible typology
- Cost reduction from 15% to 30%

AS-Interface

RMG and RTG Crane Applications

Applications

RTG/RMG Crane

Anti-collision:

- The application is looking down in between the stack to confirm that there is no people within the vicinity of the crane operation. The ground personnel must wear reflectors on their hard hat and vest which the camera picks up. There was some challenges here with the range as the height is right on the limit. Note this is not a safety application it is just additional information for the driver.
- **ifm solution:** 4xO3M cameras + E2M250 splitter analogue video + display CR1201 + accessories for automation of one crane to do a test for some months

CR1201

O3MXXX

E2M250

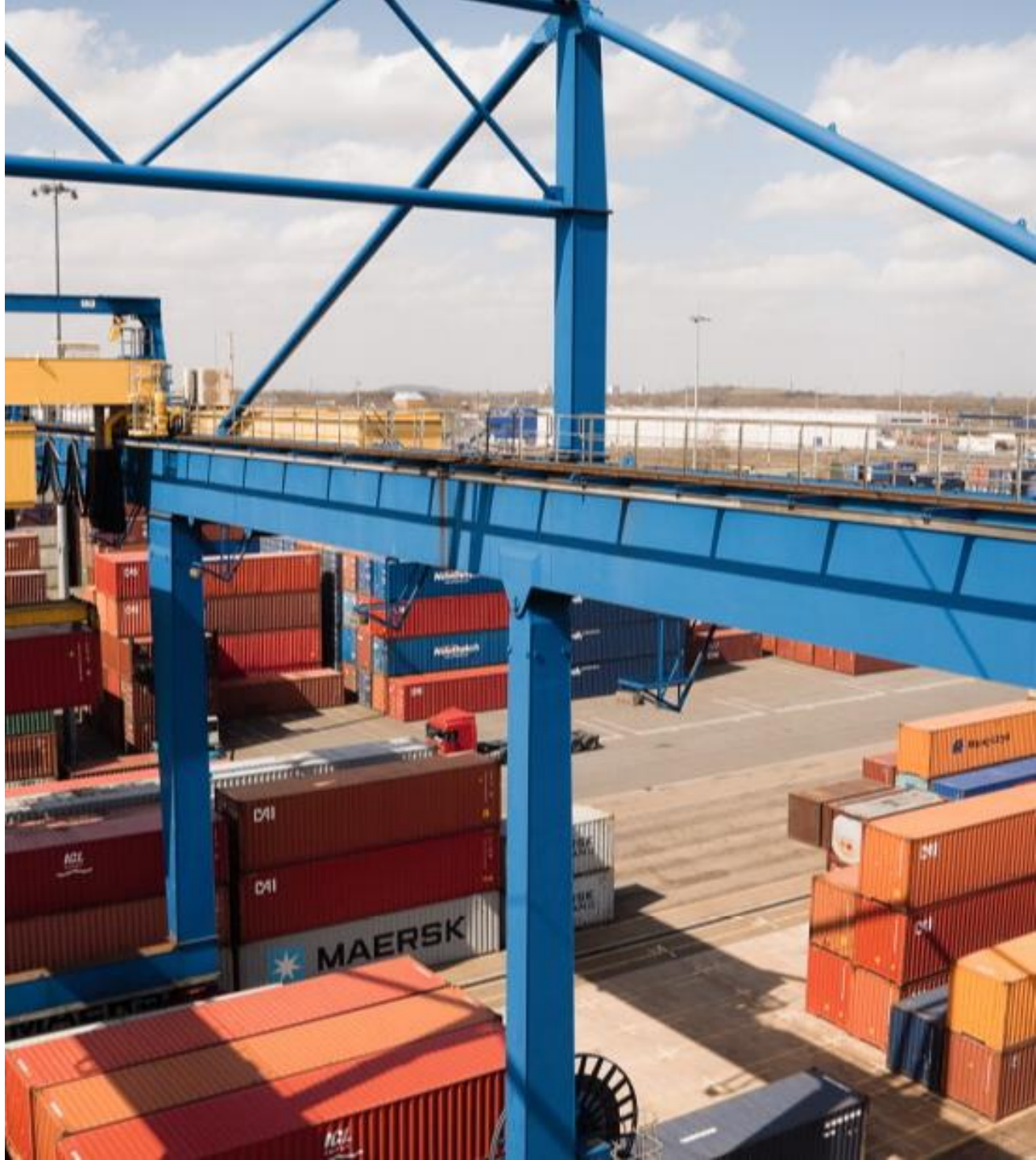
Applications

RTG/RMG Crane

AC bus bar detection:

- AC bus bar detection for electrified RTGs. The O1D is used to detect the distance between the RTG and the AC bus bar. The crane’s PLC receives the measured values (in analogue and binary form) from O1D and stops the gantry travelling if the crane is too close to the bus bar. Some users also apply these values into the auto-steering system of the crane.
- **ifm solution:** 2-4 pcs of O1D105 with 10 meter sensing range for outdoor applications up to 100 klx are used to detect the distance between the RTG and the power supply line (AC or DC bus bar).

O1D105



Applications

RTG/RMG Crane

Diesel level monitoring:

- For monitoring the level of the fuel on RTGs the level sensor of the series LKXXXX, LRXXXX or LTXXXX can help to transmit both analogue and binary signals to the PLC of the crane. The series LKXXXX and LRXXXX are proved for fuel monitoring, especially for diesel. LTXXXX can even monitor level and temperature in one unit. Thus the priority of refuelling can be determined without physical checks of the fuel level.
- **ifm solution:** For monitoring the level of the fuel on RTGs the level sensor of the series LKXXXX, LRXXXX or LTXXXX can help to transmit both analogue and binary signals to the PLC of the crane. The series LKXXXX and LRXXXX are proved for fuel monitoring, especially for diesel. LTXXXX can even monitor level and temperature in one unit. Thus the priority of refuelling can be determined without physical checks of the fuel level.

LKXXXX

LRXXXX

LTXXXX

Applications

RTG/RMG Crane

Condition monitoring of gearbox:

- Condition monitoring of gearboxes on RTGs: two units on trolley, four units on gantry, and one unit on hoist. The bearing is monitored with the contact tip of the temperature sensor and also the temperature of the lubrication oil.
- **ifm solution:** TA3115 temperature sensor for condition monitoring of the gearbox. However, for monitoring the bearing, TA22 or TD22 is a better option.

TA22XX

TA3115

TD22XX

Applications

RTG/RMG Crane

Monitoring and maintenance of engine/generator of RTG:

- The mobile controller is used to communicate with the engine through CAN bus SAE J1939. The operating status of the engine/generator is shown on the display. CAN is used for communication between the controller and HMI (display). At the request of end user, some applications include speed control of the engine.
- **ifm solution:** BasicDisplay CR0451 + CabinetController CR0303

CR0451

CR0303

Applications

RTG/RMG Crane

Measurement of the traverse path:

- Automatic Position Indication (API): The length of the traverse path of the rope should be measured in order to find out the position of trolley, hoist and gantry.
- **ifm solution:** multiturn solid shaft encoder RM9000 with CAN interface for mobile applications with shock resistance up to 200 g (11 ms) and vibration resistance up to 30 g for various crane applications

RM9000

Gate Control Applications

Applications

Gate Control Automation

Truck detection:

- Normally, a vehicle detection loop is laid in the ground. The installation is costly and maintenance is complex and time-consuming. An alternative solution for the detection loop is the usage of the O3MXXX camera or O1D. With the help of the camera, you can see visually in real-time if a truck is at the gate or not. In addition to this, it can help to provide data which can increase the gate processing speed.
- **ifm solution:** Depending on the customer's needs, either the O3M camera (visualisation in real-time) or O1D can be used for this application.

O1D100

O3MXXX

Applications

Gate Control Automation

Car traffic monitoring using RFID technology:

- The fully automated truck management system from RFID to SAP manages 800 trucks per day. The application, which is based on RFID technology (reader-antenna tags), helps to keep track of access control and information management when trucks are being loaded/unloaded and to closely monitor the truck traffic. The operator has an overview of all trucks at the unloading bays and is kept informed about the quantity of goods arriving at the bays and storage cells. An external display shows information about the goods received at the respective bay. Data from SCADA can be imported for real-time updates and information about the individual storage cells.

- **ifm solution:** ifm RFID UHF evaluation units and antennas (see application and project list)

UHF system 865 to 928 MHz

Straddle Carrier Applications

Applications

Straddle Carrier

Distance measurement:

- Straddle carrier drivers often face the issue that they cannot estimate the distance from the spreader to the container. So containers are gripped by the spreader in a hard way, which can damage spreader and container. The usage of the laser sensor O1DXXX can avoid this problem. The distance between spreader and container can be measured and signal is given to the driver so that the spreader’s speed can be adjusted. The container is approached more gently, thus protecting spreader and container.
- **ifm solution:** The usage of O1DXXX can serve this purpose.

O1DXXX

Applications

Straddle Carrier

Prevention of downtime and high operational losses:

- Sometimes drivers are moving the straddle carrier with the second leg on the brake pedal causing considerable wear of the break disk and blocks during operation. Unnecessary downtime of the carrier and high operational losses (up to €10k) occur.
- **ifm solution:** PN7092 (100 bar max. braking pressure due to heavy loads and forces) with switch point set at 1 bar, giving a signal to the operators' cabin to avoid “second leg on the brake pedal”.

PN7092

Applications

Straddle Carrier

Collision avoidance of straddle carriers:

- During operation in a container terminal, collisions occur repeatedly, and also when using straddle carriers. The O3M sensor system are used for collision warning. An algorithm from the automotive industry does not only detect the surface areas but also calculates the probability of collision. Different parameters such as own speed, presumed path, as well as speed and direction values of up to 20 approaching vehicles or objects are taken into account. A highly precise probability of collision is calculated from all this in a split second.
- **ifm solution:** O3M can be a solution for this application.

O3MXXX

ifm's Industrial Imaging – Intelligent Collision Avoidance

AGV Applications

Applications

AGV

Monitoring the rotation angle and weight:

- The rotation angle and the speed from the AGV‘s steering should be monitored and also the weight of the containers on AGVs.
- **ifm solution:** 6x multiturn encoders (RM9000/RM9010) in total per AGV, i.e. one encoder on each tyre for monitoring the rotation angle; 2 additional RM9000 for each rocker to weigh the containers; 2x RB3510 (RB3500) on each axis per AGV (in total 4) to monitor the speed

RM9000

RB3510

Applications

AGV

Communication for AGVs:

- Communication system between engine, generator, steering, master PLC and navigation system for the AGV
- **ifm solution:** Two mobile controllers (ecomatmobile R360 SafetyControllers) are at the heart of these vehicles. They are specifically designed for severe operating conditions. Their high protection rating as well as the wide temperature and operating voltage range provide maximum safety. They communicate with the I/O modules with high protection rating and DEUTSCH connectors (CR205X) to which the sensors are connected via CANbus. A PDM display (dialogue module) is installed in the control cabinet on the side of the vehicle. It provides clear status and diagnostic information.

Dialogue modules

SafetyControllers

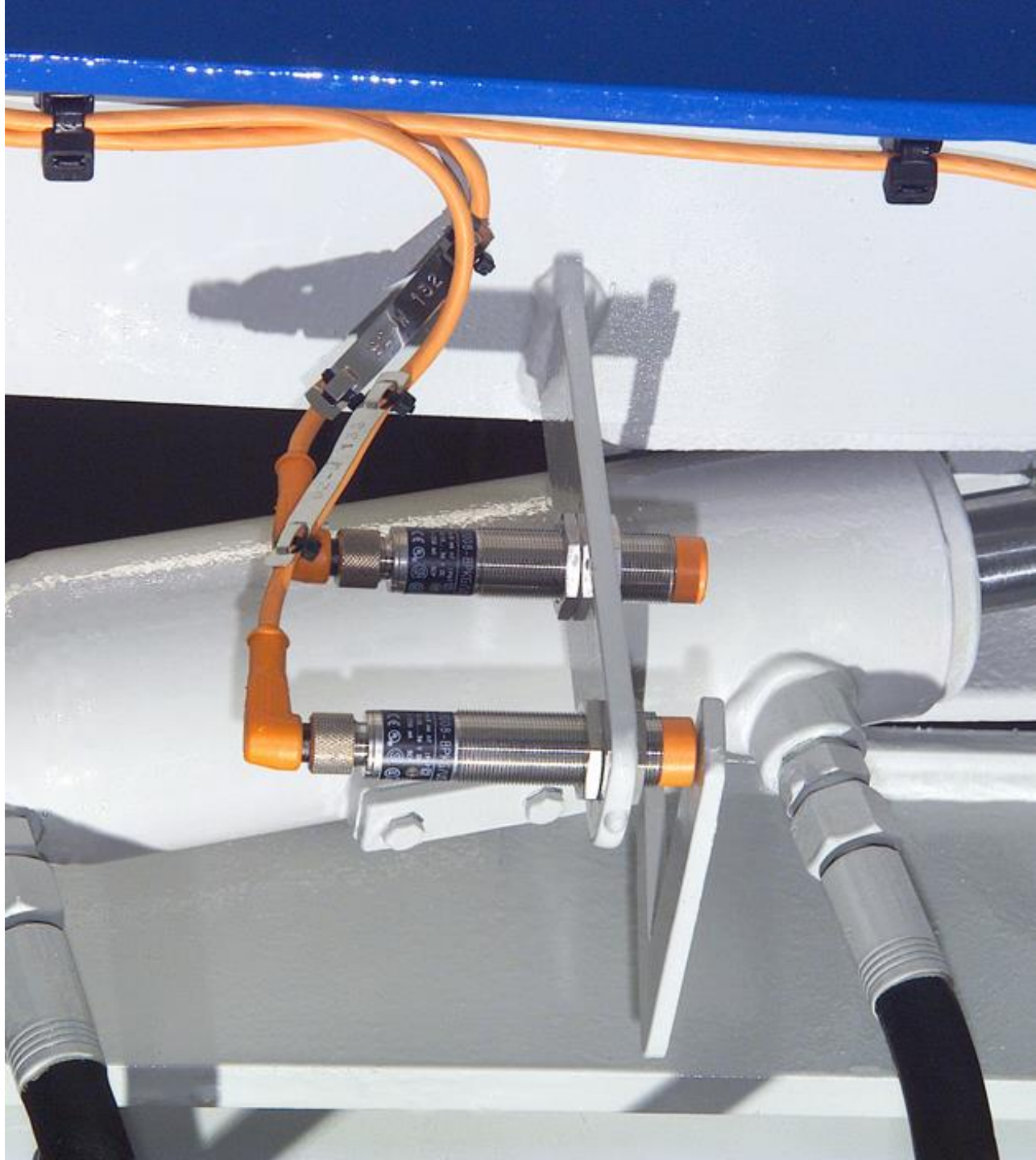
Applications

AGV

Adjustment of latches on AGVs:

- Due to different container sizes, the loading platform of the AGV needs to be adjusted. Inductive sensors of type IIS in M12 design have the high protection ratings IP 65 to IP 69K with a high temperature range of -40…85°C which can help to control the hydraulic cylinders of the AGV. The latches of the AGV platform will be adjusted to the required container size.
- **ifm solution:** 8 x IIS260 for control of the hydraulic cylinders.

IIS260



Applications

AGV

Various applications on AGVs:

- ifm pressure sensors can help to monitor the hydraulics of AGVs to avoid overpressure or dry-running. Temperature sensors can be used to monitor the hydraulics in the control cabinet.
- **ifm solution:** The PN series or PT55XX will be used to monitor the hydraulics. TN2435 is applied to monitor the hydraulics in the control cabinet in this case. Depending on the required installation length TN2511, TRXXXX+TTXXXX or TRXXXX+TMXXXX can be also used.

TN2435

PNXXXX

Other Port Equipment Applications

Applications

Others

Automatic lashing platform (ALP):

- The ALP automates the manual coning/deconing of twistlocks used to secure stacks of containers during sea transport. Normally, this job is done by stevedores exposed to hazardous work areas
- **ifm solution:** 98 pcs of IG6565 and EVMXXX are used for this application

IG6565

EVMXXX

Applications

Others

Weight detection at reach stackers:

- When a reach stacker lifts up a container, the weight of the container is a crucial point that can make the vehicle unbalanced. The crane boom of the reach stacker has to be adjusted in this case to keep the balance between the load and the vehicle. At the same time the driver needs to know how fast he is allowed to drive with the load. In order to enable this, the ecomatController, the I/O module CR201X and the inclination sensor series JN/JD help to show the occurrence on the PMD NG display.
- **ifm solution:** CR0020 classic controller + CR2014 I/O module + dialogue module

CR2012

PDM360 Display

SafetyControllers

JNXXXX

JDXXXX

Applications

Others

Control of a reach stacker:

- Control of engine and angle and length of boom
- **ifm solution:** mobile controller + CR2012 I/O module + PDM360 display + JNXXXX/JDXXXX inclination sensor

CR2012

JNXXXX

JDXXXX

PDM360 Display

Mobile Controller

Applications

Others

Anti-collision system for reachstackers:

- The driver can have poor visibility of some areas around the reachstacker which can lead to dangerous situations. Further accident risks result from time pressure or fatigue of the machine operator. The ifm driver assistance system, which supports the daily work of the driver, provides the remedy.
- **ifm solution:** Ready-to-start application package (complete set) ZZ1103. The active obstacle detection developed by ifm monitors six danger zones around the vehicle and warns the driver of imminent collisions in good time. For this purpose, a tried-and-tested 3D time-of-flight system from ifm is used which reduces false alarms to a minimum thanks to a sophisticated algorithm. Warnings are provided visually, acoustically and in the form of icons via the supplied 7" monitor. *Link to Video*

ZZ1103

Applications

Others

Automated mooring system:

- Vacuum and hydraulic based system which dispenses with the use of ropes and quay-side personnel
- **ifm solution:** opportunities for O1D105 (measuring distance between quay wall and vessel), PN2099 and inductive sensors in order to measure the height of the vessel

O1D105

PN2099

Applications

Others

Time and cost reduction of mooring systems:

- Mooring systems have been used for many years in offshore industry, especially at quays, wharfs etc. to secure vessels from movements. There are automatic and semi-automatic system in the market to enable easy mooring without manual work with ropes.
- **ifm solution:** The BasicController CR0403 and the ecomatDisplay CR1074 act here as a "master" which manage all logics in a mooring system. The "master" together with the I/O-Controllers CR2052, pressure sensors PT5501 and other sensors can steer the hydraulic aggregates of mooring lines in the hydraulic cabinet, so that the mooring system can operate in a safe and accurate way.


CR0403


CR1074


CR2052


PT5501


TA3105


CR2050


G1501S


DV2120


PK6524


PA3528

Applications

Others

Empty container detection:

- A twinlift side spreader for simultaneous handling of two empty containers for reach stackers
- The visual contact with the stack, container corners and hooks has been optimized to allow rapid positioning of the lifting heads to the container
- The twinlift side spreader is equipped with side shift, telescopic and mechanical pile slope functions that' allows it to easily locate containers. It uses hooks and side clamps to secure the container. The hooks engage the top of the bottom container and the side clamps lock into the corner castings of both containers
- **ifm solution:** Two UGT593 are installed on the twin lift side spreader. UGT593 senses the upper container on an empty container side lift.

UGT593

Why are 5G dedicated networks essential for Smart Ports?

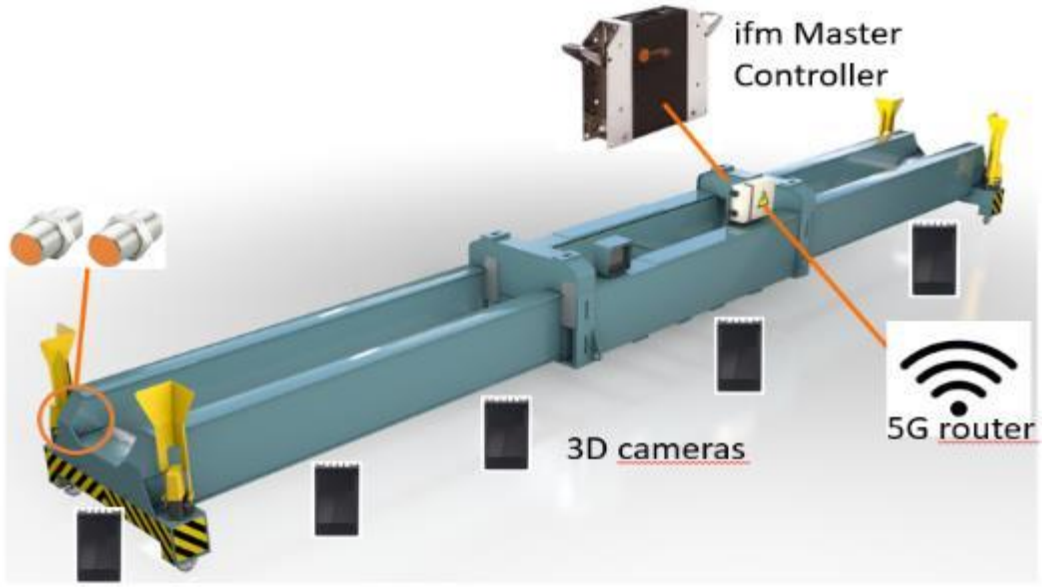
A smart port's cellular network infrastructure must be able to handle the large amounts of data generated by cranes, vehicles, equipment, and workers. Cellular will enable massive real-time data collection and analytics, allowing humans, sensors, forklifts, trucks, cranes, and cameras to work seamlessly together as one. Our main support partner with 5G private networks is Ericsson

What are typical use cases for 5G cellular technology?

- Automated rubber-tired gantry (RTG) cranes
- Remote-controlled ship-to-shore (STS) cranes
- Automated guided vehicles (AGVs)
- Condition monitoring (hydraulics, drives, gear boxes)

How secure is a private 5G network?

5G comes with inbuild security by design. 5G campus networks use dedica-ted spectrum and are keeping all user data on premise. 5G networks for industrial use have implemented additional industrial security measures.



AGV Collision Avoidance

IFM's 3D camera O3M is approved by several port operators for it's outstanding perfor-mance on AGVs for **collision avoidance**.

Spreader Health Monitoring

IFM's robust sensors and controls technology help port operators to collect 24/7 health information for better **predictive maintenance**.

Thank You!