

igus® the-chain ... moving energy made easy
...e-chainsystems®...e-chain®...readychain®...chainflex®-cables



igus® - smart plastics for crane & port applications...

6th MED PORTS

2018



igus® the-chain ... moving energy made easy

More than 2,950 employees worldwide



igus® - Headquarter, Cologne Germany

- 36 igus® subsidiaries worldwide (and more to come)
- More than 52 certified igus® distributors around the world

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**E-Chains®
and Accessories**
E-ChainSystems® -
cable carriers and
energy chains for
modern machines. Pre-
assembled ex stock.



**Chainflex®
Cables**
Special flexible cables
for E-Chains® - tested
millions of cycles. More
than 1040 types
available ex stock.



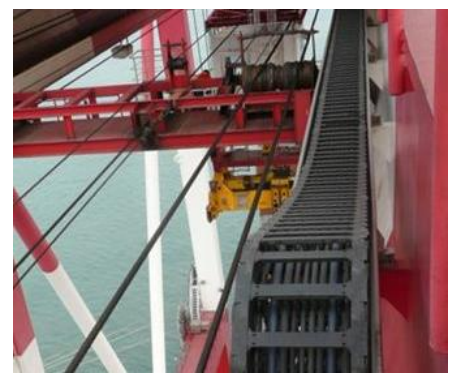
**iglidur®
Plain bearings**
iglidur® polymer plastic
bearings and bushings
lengthen tool life, lower
costs and eliminate
need for lubrication.
7000 types available ex
stock.

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Diagnostic tools to monitor igus® e-chainsystems®



igus® smart plastics

icom – igus® communication module

Receives data from isense sensors & sends the data – according to configuration – to desired terminals.

icom



isense EC.RC



isense EC.W



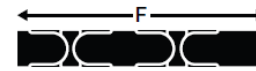
isense EC.P



isense EC.B



isense CF.Q



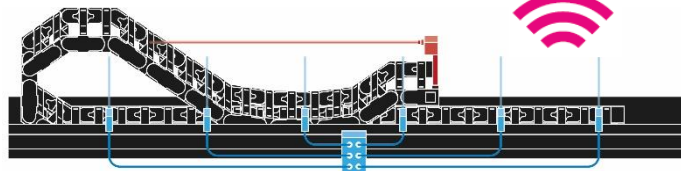
Operation monitoring

Wear detection

Push-/Pull force detection

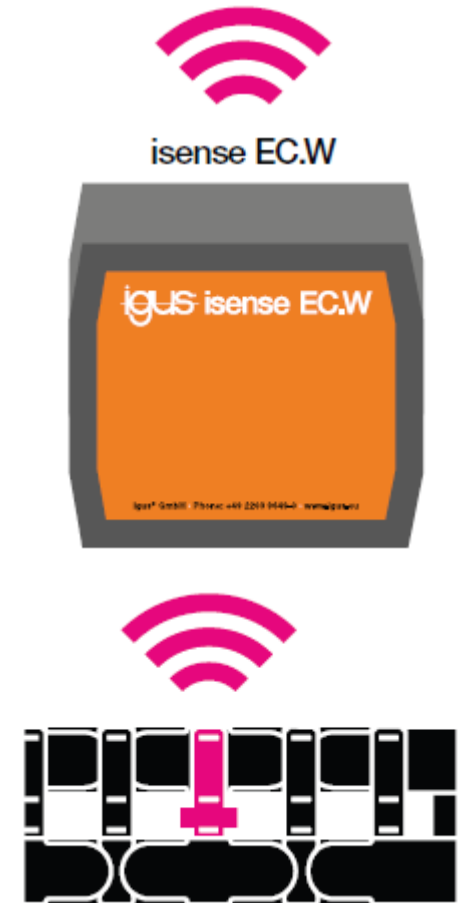
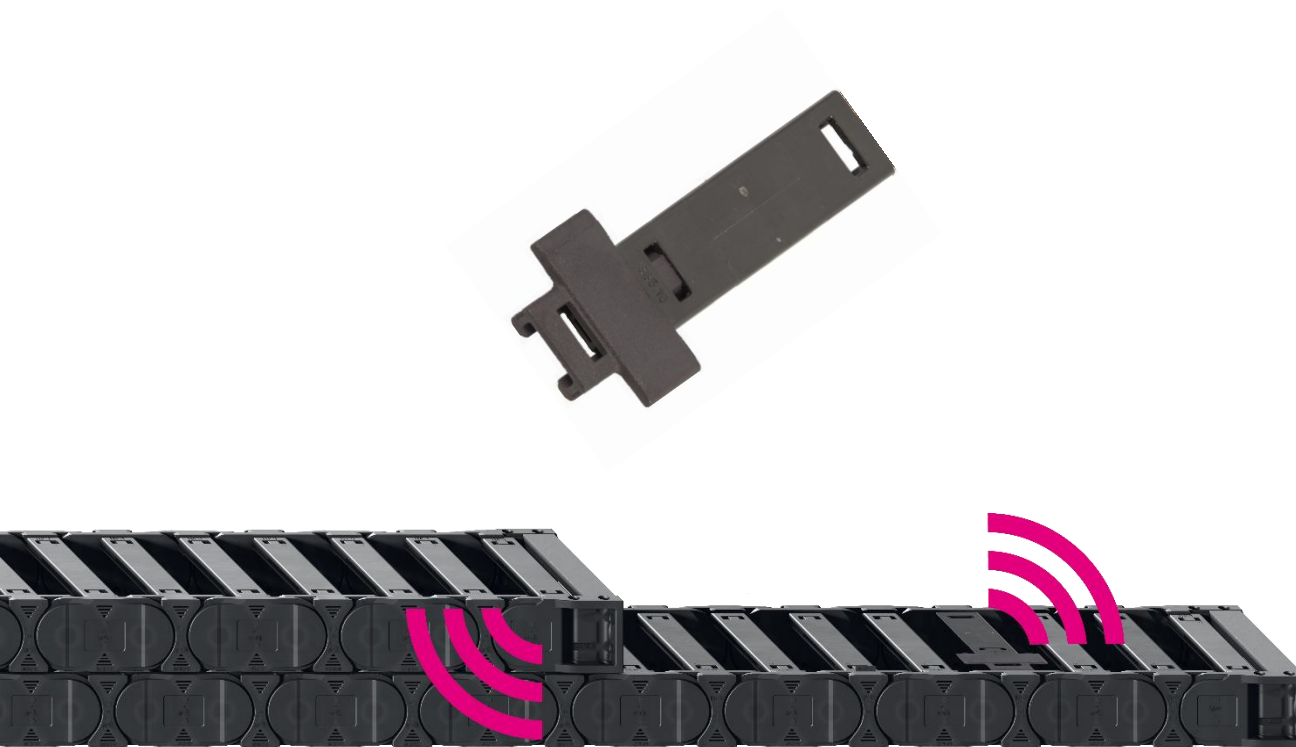
Breakage detection

Downtime detection



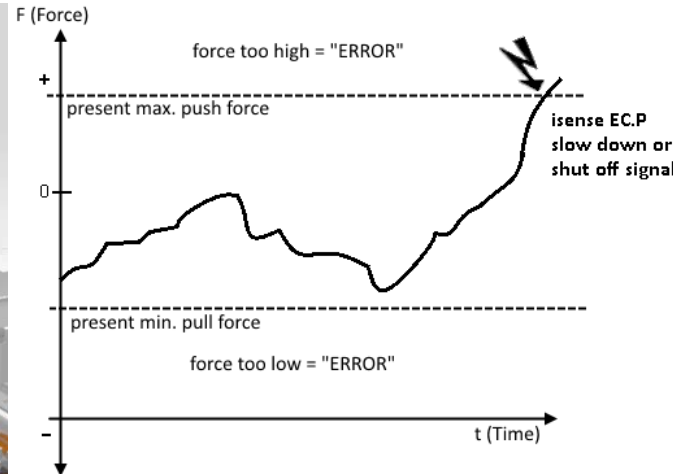
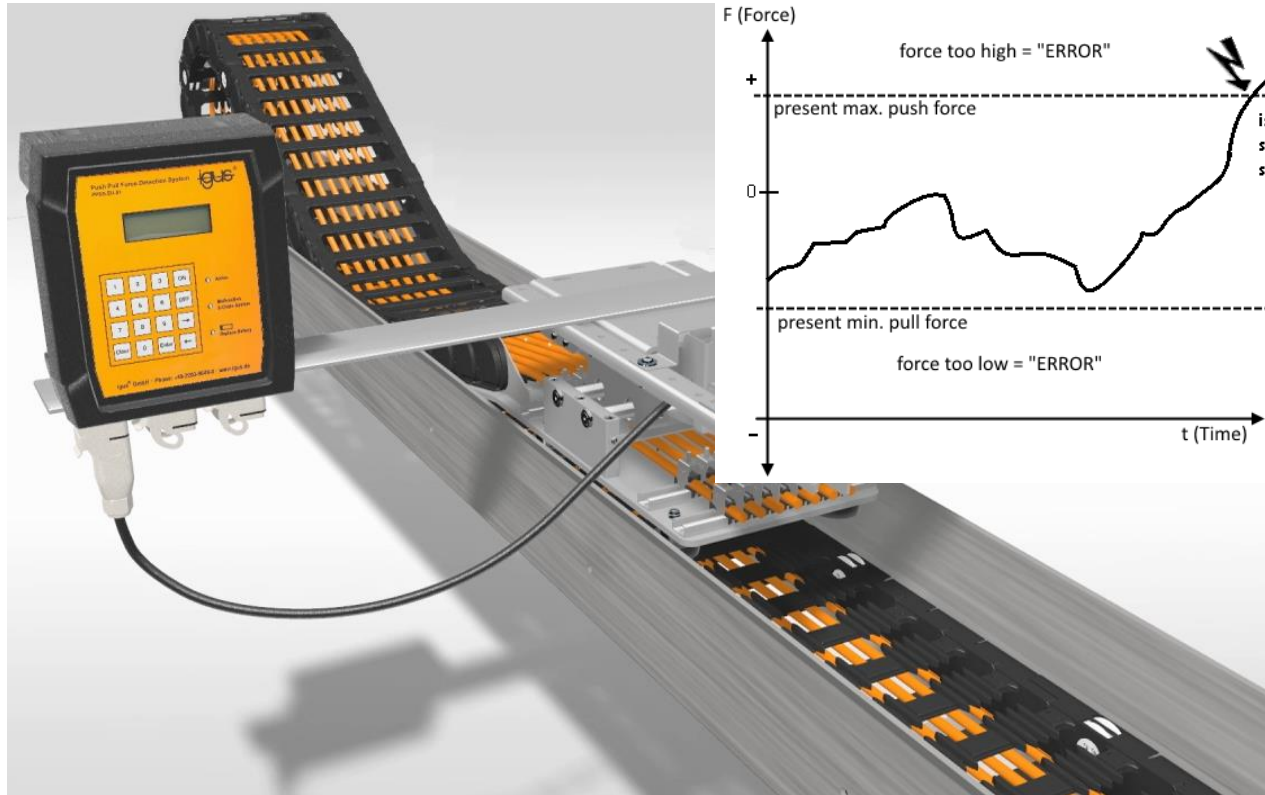
igus® smart plastics – isense EC.W(ear)

- ▶ Diagnostic tool to measure the wear on the e-chain®
- ▶ Receiver unit/antenna of the wear sensor in crossbar
- ▶ Equipment downtime for replacement can be scheduled



igus® smart plastics – isense EC.P(ush/Pull)

- ▶ Diagnostic tool to monitor the push/pull forces of igus® e-chains®
- ▶ Combination of a load cell (force monitoring) & evaluation unit
- ▶ Prevents damage to e-chainsystem®



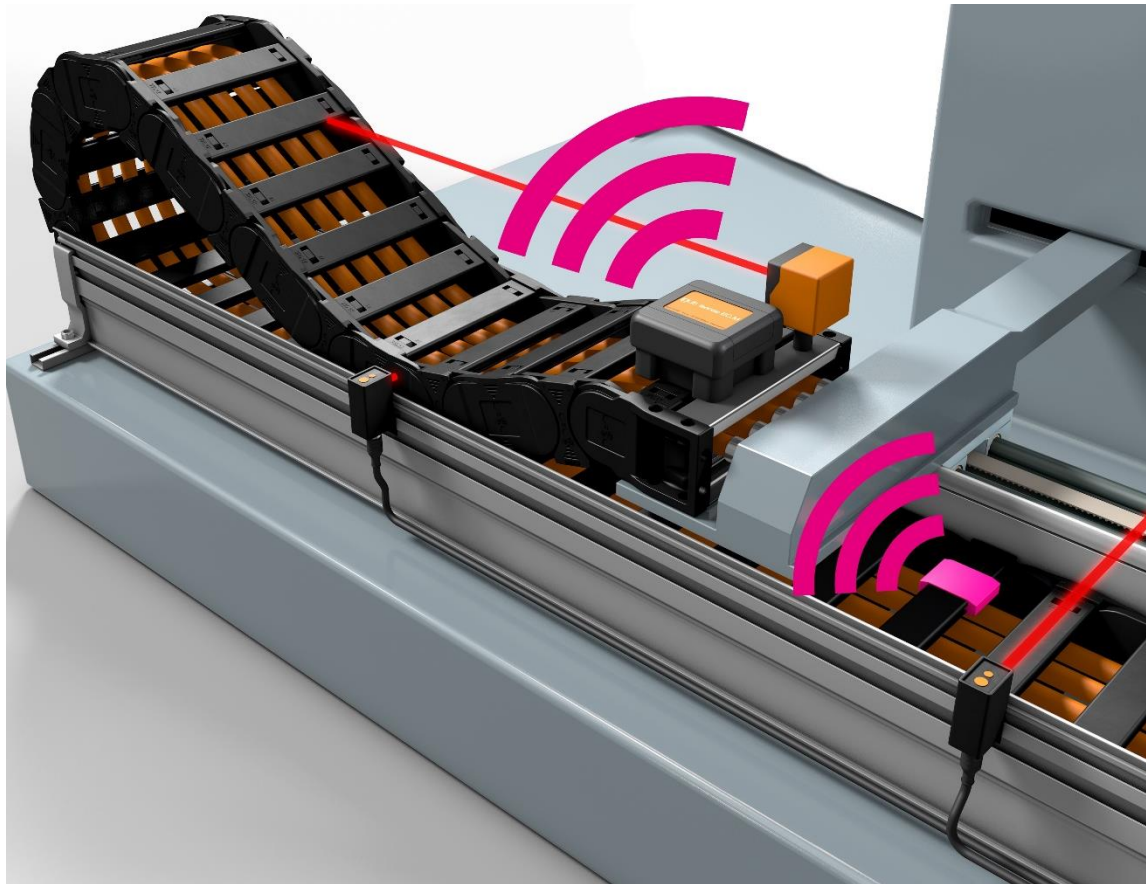
isense EC.P



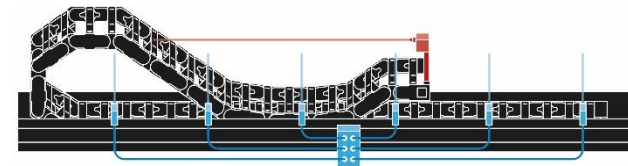
PPDS – continuous real push-/pull-force measurement & limit comparison

igus® smart plastics – isense EC.RC(e-chain® Run Control)

- ▶ Sensors measure & check the position of the e-chain®
- ▶ Prevents unexpected down time



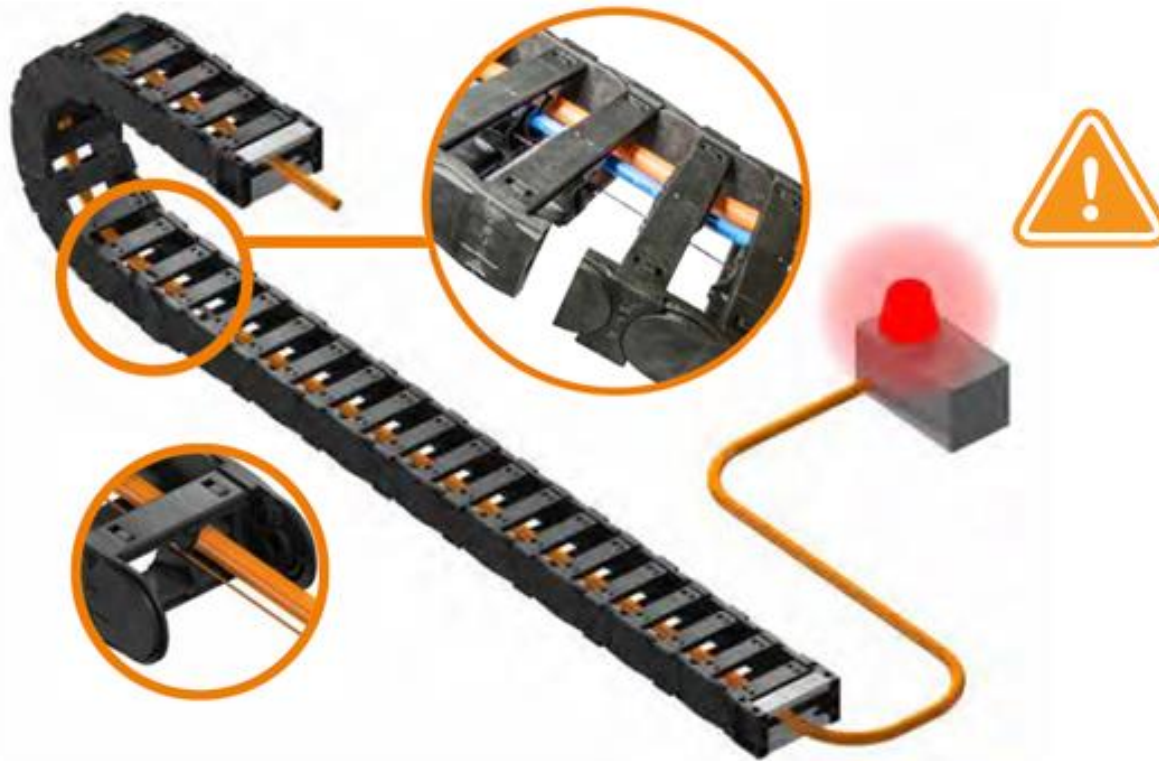
isense EC.RC



Alarm through autonomous detection of a defect of the e-chain®

igus® smart plastics – isense EC.B(reakage)

- ▶ Electronic diagnostic tool for partial e-chain® defect detection
- ▶ Prevents unexpected down time



isense EC.B



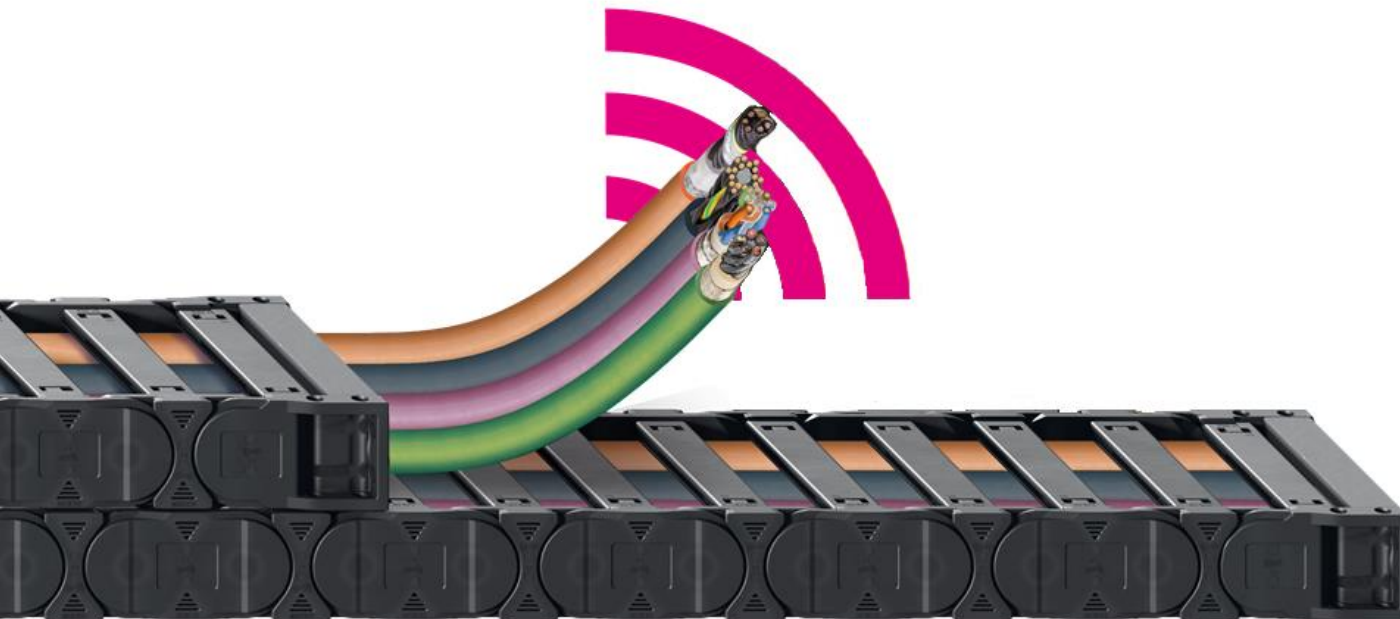
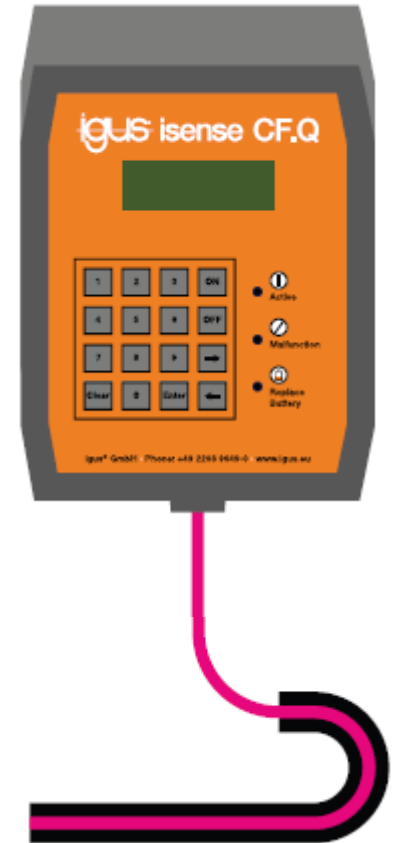
Alarm through autonomous detection of a defect/partial defect of the e-chain®

igus® smart plastics – isense CF.Q (Electronic Conductor Quality)

- ▶ Electronic diagnostic tool measuring various cable parameters
- ▶ Continuous comparison of real time data to preset values
- ▶ Prevents unexpected down time



isense CF.Q

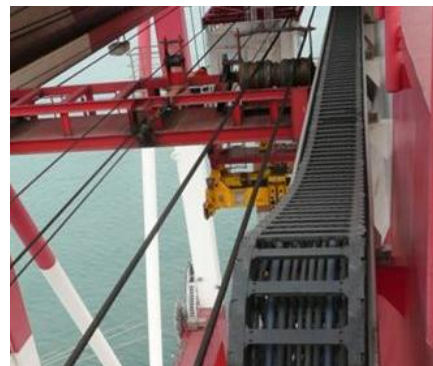


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...e-chainsystems®...e-chains®...readychain®...chainflex® cables



e-chainsystem® benefits for (A)RMG & ASC cranes



(A)RMG & ASC trolley travel

- ▶ Space saving design
- ▶ No cable loop station
- ▶ No additional drives or control systems
- ▶ Synchronous run of trolley and e-chainsystem®
- ▶ Wind and weather resistant system

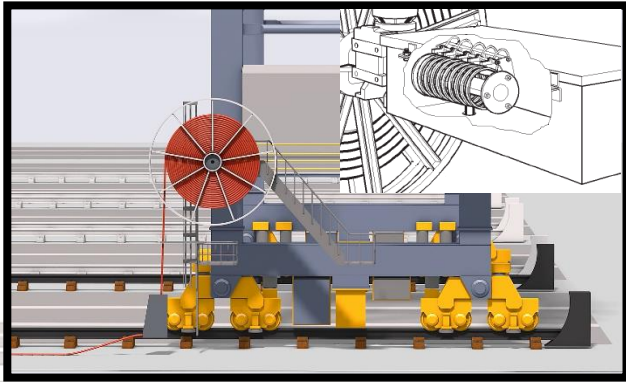


(A)RMG & ASC crane travel

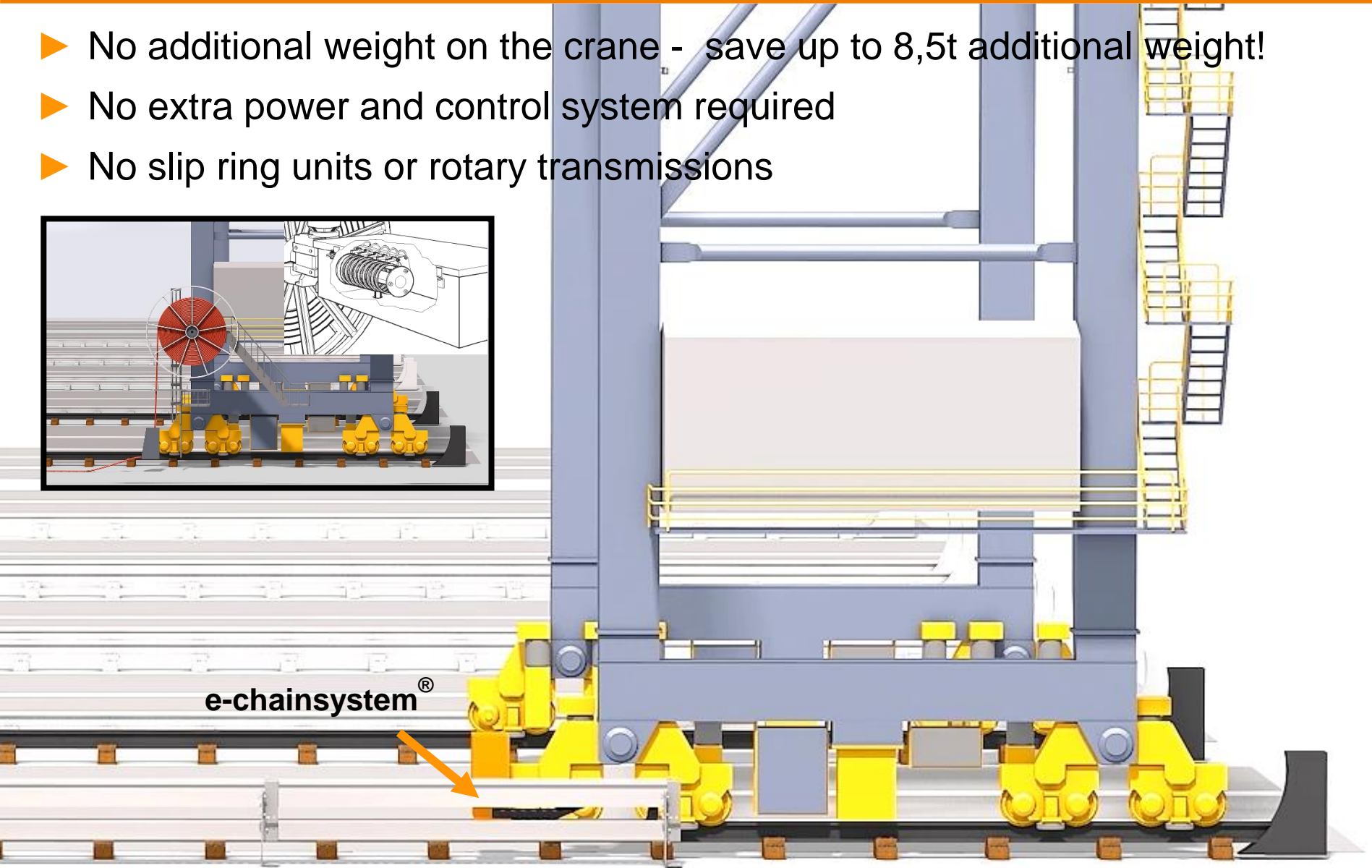


e-chainsystem®

- ▶ No additional weight on the crane - save up to 8,5t additional weight!
- ▶ No extra power and control system required
- ▶ No slip ring units or rotary transmissions



e-chainsystem®

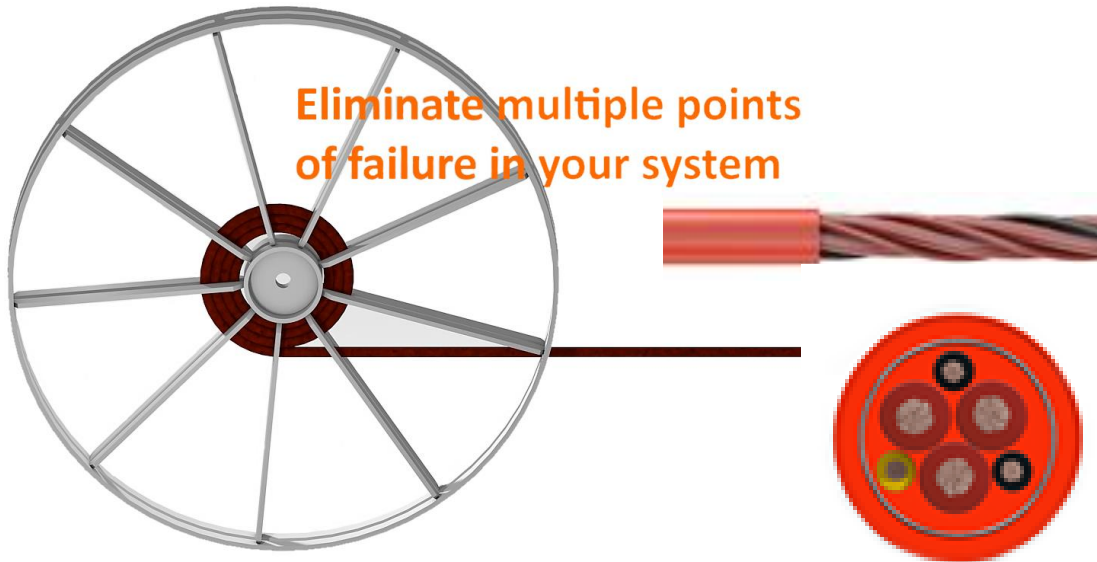


- ▶ Free standard chainflex® cable selection (power, data, FOC, control)
- ▶ For travel speeds of up to 600m/min

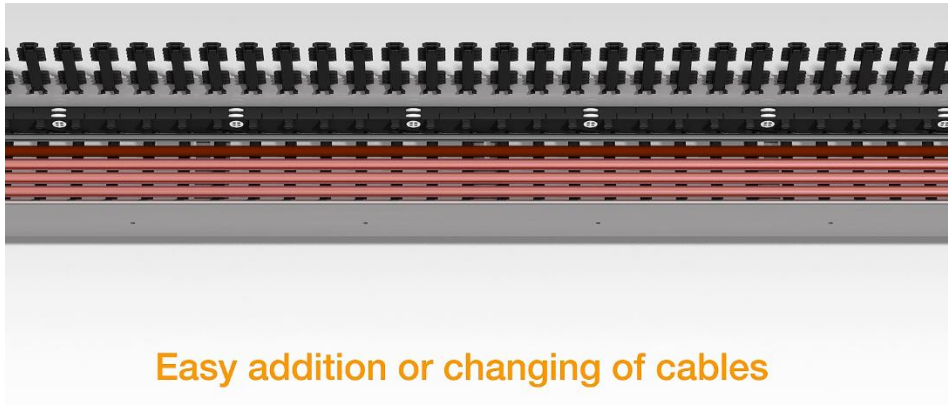


Simplify wiring and use "in stock" cabling

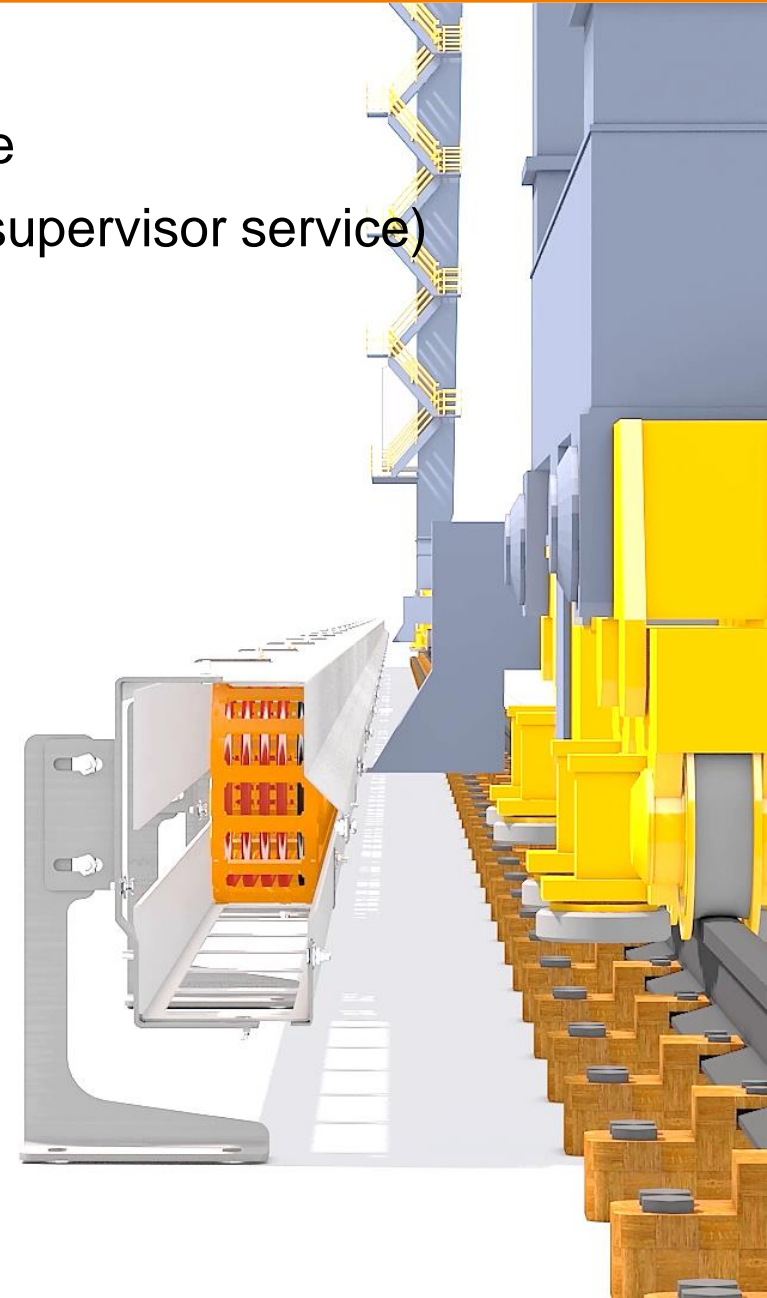
Eliminate multiple points of failure in your system



- ▶ Secure cable guidance
- ▶ Quick and easy installation of additional cables
- ▶ Low maintenance extravagance – less downtime of the crane



- ▶ Wind an weather resistant system
- ▶ Spare part guarantee for 10 years and more
- ▶ igus® field service (inspection, installation, supervisor service)



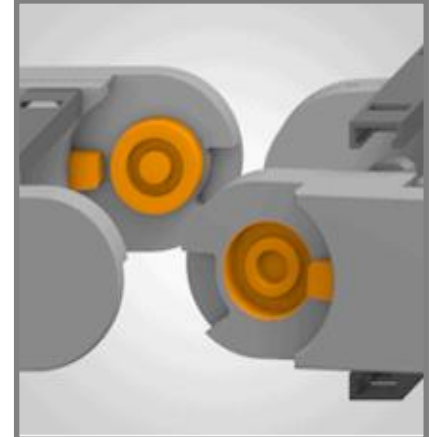
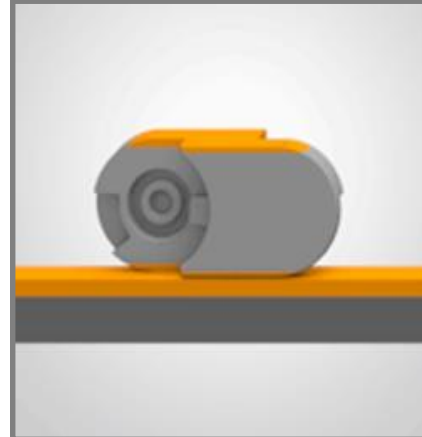
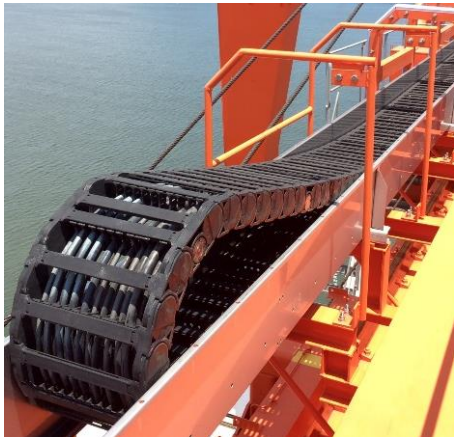
Heavy Duty (rol) e-chain® series



- ▶ Heavy Duty chain® for high cable loads
- ▶ Large pin / bore connection surface
- ▶ Enlarged gliding surface, less wear
- ▶ Robust steel mounting brackets

**18 years experience -
chains with integrated rollers!**

Successfully used in various port applications (RTG, RMG & STS) since 2004!



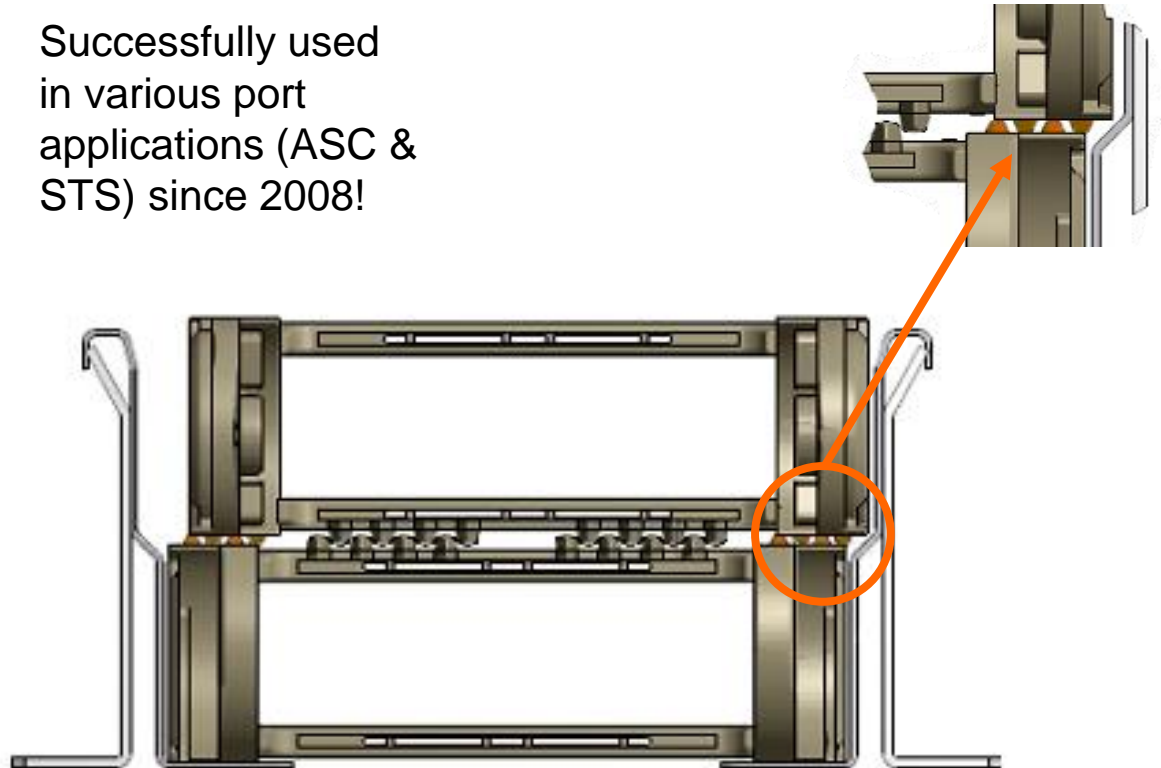
e-chain® series P4



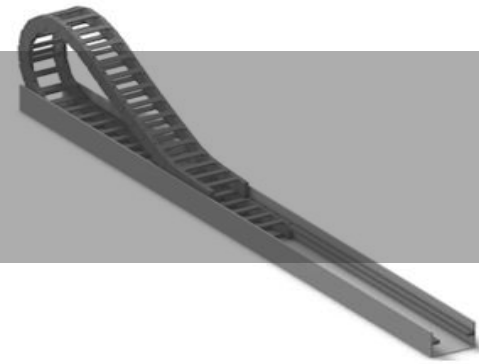
- ▶ Smooth & low noise operation
- ▶ Integrated grooved roller, running on a large, even & plain surface
- ▶ Designed for high fill weights & fast travel speeds



Successfully used
in various port
applications (ASC &
STS) since 2008!



Technical details



▶ **Speed up to 600 m/min**

The fastest crane with igus® e-chain® is running at 300m/min

▶ **Acceleration up to 10 m/s²**

▶ **Travel length up to 900 m**

The longest crane application running with igus® e-chain® is 500 m long
(STS, Port of Singapore, since 2002)

The longest igus® e-chain® application is 615 m*

▶ **No limit to cable load**

▶ **Possible to use hydraulic-, pneumatic- and water hoses**

▶ **Possible to use 6/10kV power-cables**

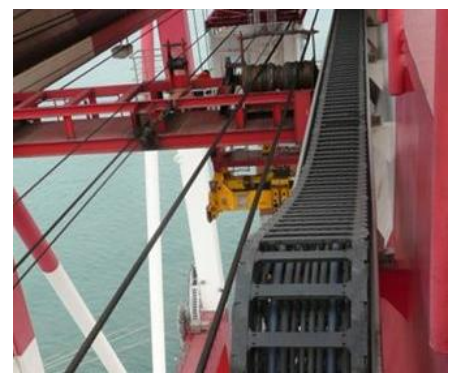
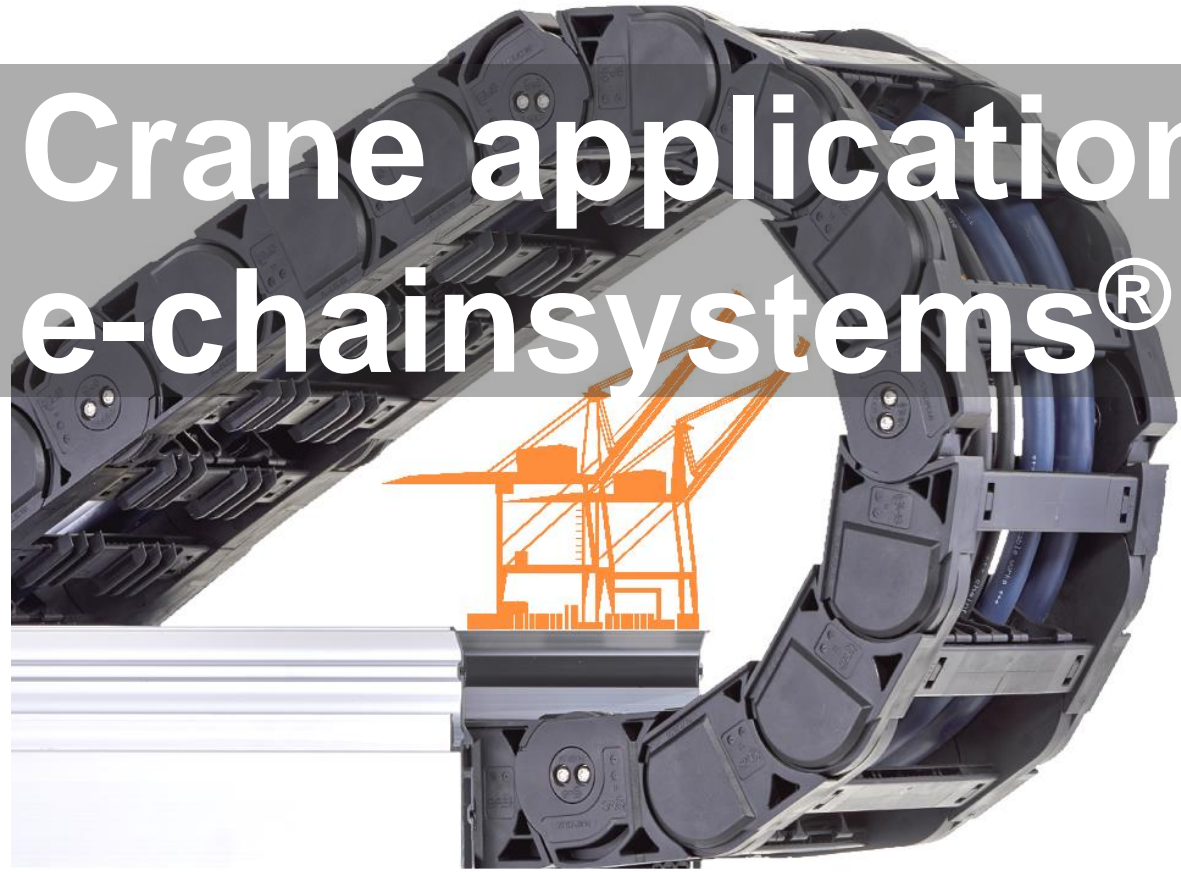
* January 2017

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Crane applications for e-chainsystems®





... STS trolley travel with e-chainsystem® & stainless steel guide trough ...



Travel length: 118,5 m
Speed: 4,0 m/s
Acceleration: 0,8 m/s²

e-chain®: P4.56R.20.250.S40.0.AG
chainflex®: CF330, CF9, CFLG
Guide trough: stainless steel HD trough

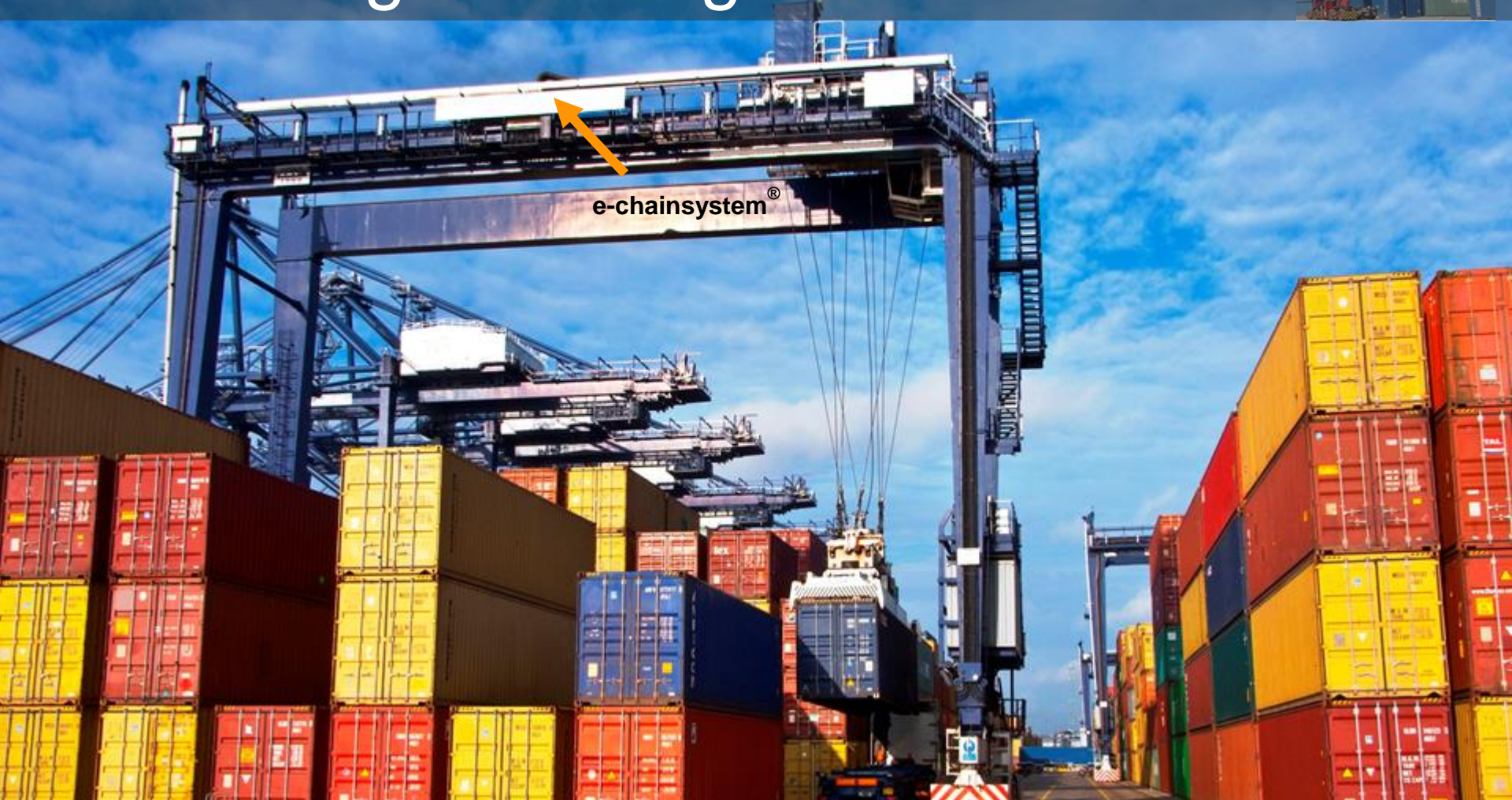
... RMG/ASC trolley travel with e-chain-system® & stainless steel guide trough ...



Travel length: 113 m
Speed: 2,5 m/s
Acceleration: 0,5 m/s²

e-chain®: P4.56R.20.300.S40.0.AG
chainflex®: CF300, CF330, CF34, CF9, CFLG
Guide trough: stainless steel HD trough

... RTG trolley travel with e-chainsystem® & aluminum guide trough ...



... Reachstacker applications ...



e-chain®



...Crane retrofits ... RTG / RMG / STS

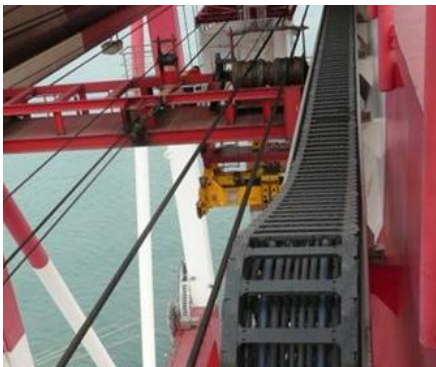
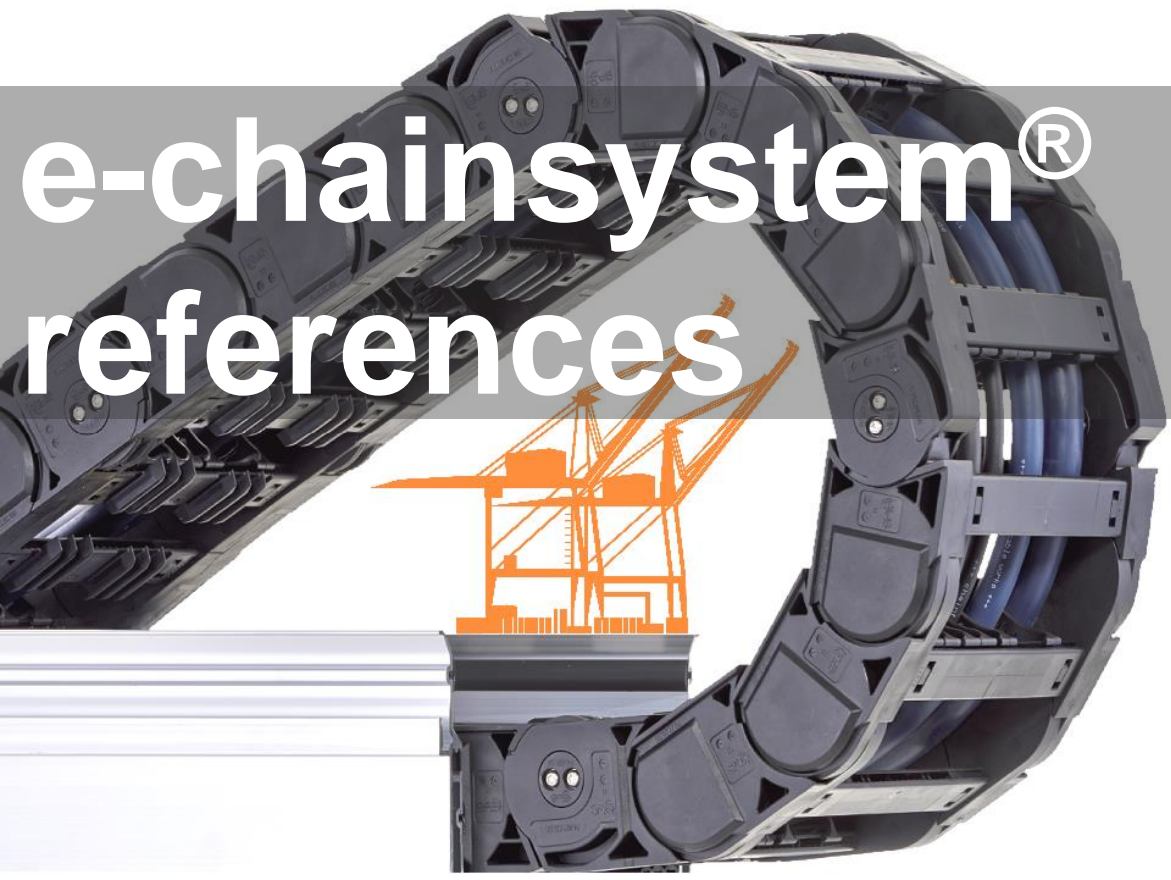


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e-chainsystem® references





Worldwide:

- ▶ More than 5.887* RTG's / RMG's (174 with P4 e-chain®)
- ▶ More than 1018* STS (351 with P4 e-chain®)
- ▶ More than 15.500* Spreader applications
- ▶ More than 30.000* Indoor-, Gantry-, Bulkhandling-, Shipyard- and Special-cranes

* November 2017



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igus® - Crane references



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