

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



light & quick
for heavy-weights...

9th PHILIPPINE
PORTS AND SHIPPING 2017



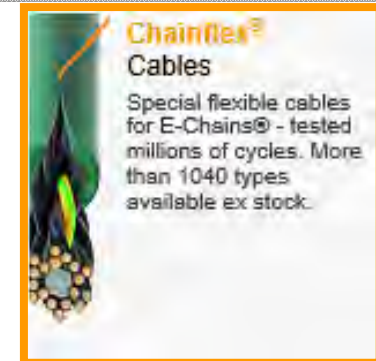
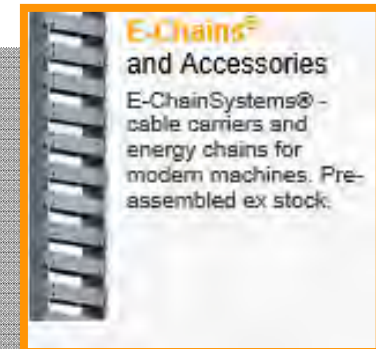
igus® the-chain ... moving energy made easy
More than 2,950 employees worldwide



igus® - Headquarter, Cologne Germany

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

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

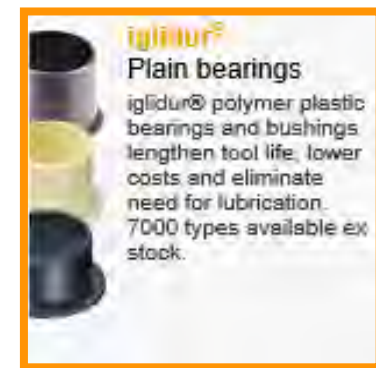


Location: 

Unit 6A, 8414 D. A. Santos Ave.
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Philippines 1700

sales@sieplus.ph

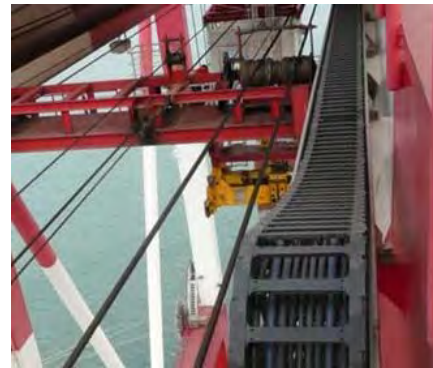
www.sieplus.ph



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



e-chainsystem® benefits



- ▶ Space saving design
- ▶ No cable loop station & no loop station

additional steel structure for

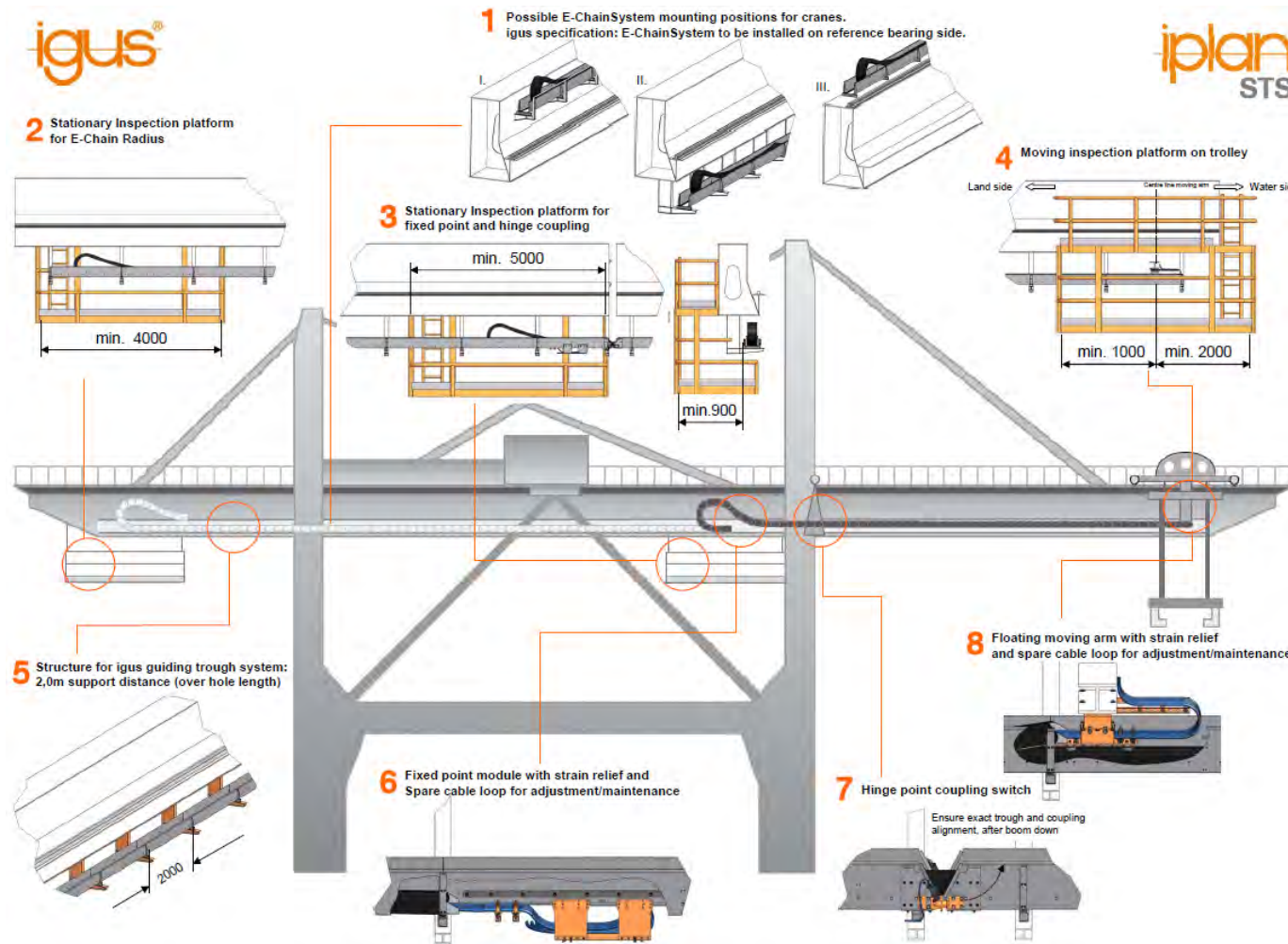
e-chainsystem®



- ▶ No additional drives or control system necessary to move the chain system
- ▶ Synchronous run of trolley and e-chainsystem®
- ▶ All kind of media (power, data, fiber optics, hydraulics, pneumatics, ...) can be conveyed in one system
- ▶ Quick and easy installation of additional cables and hoses
- ▶ igus® field service (inspection, installation, supervisor service)



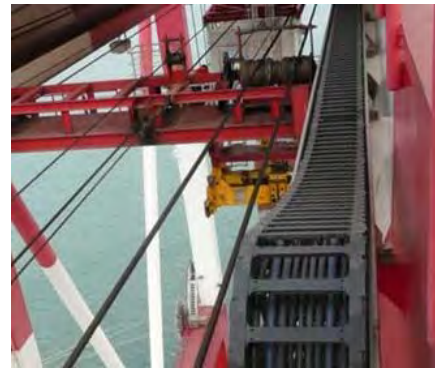
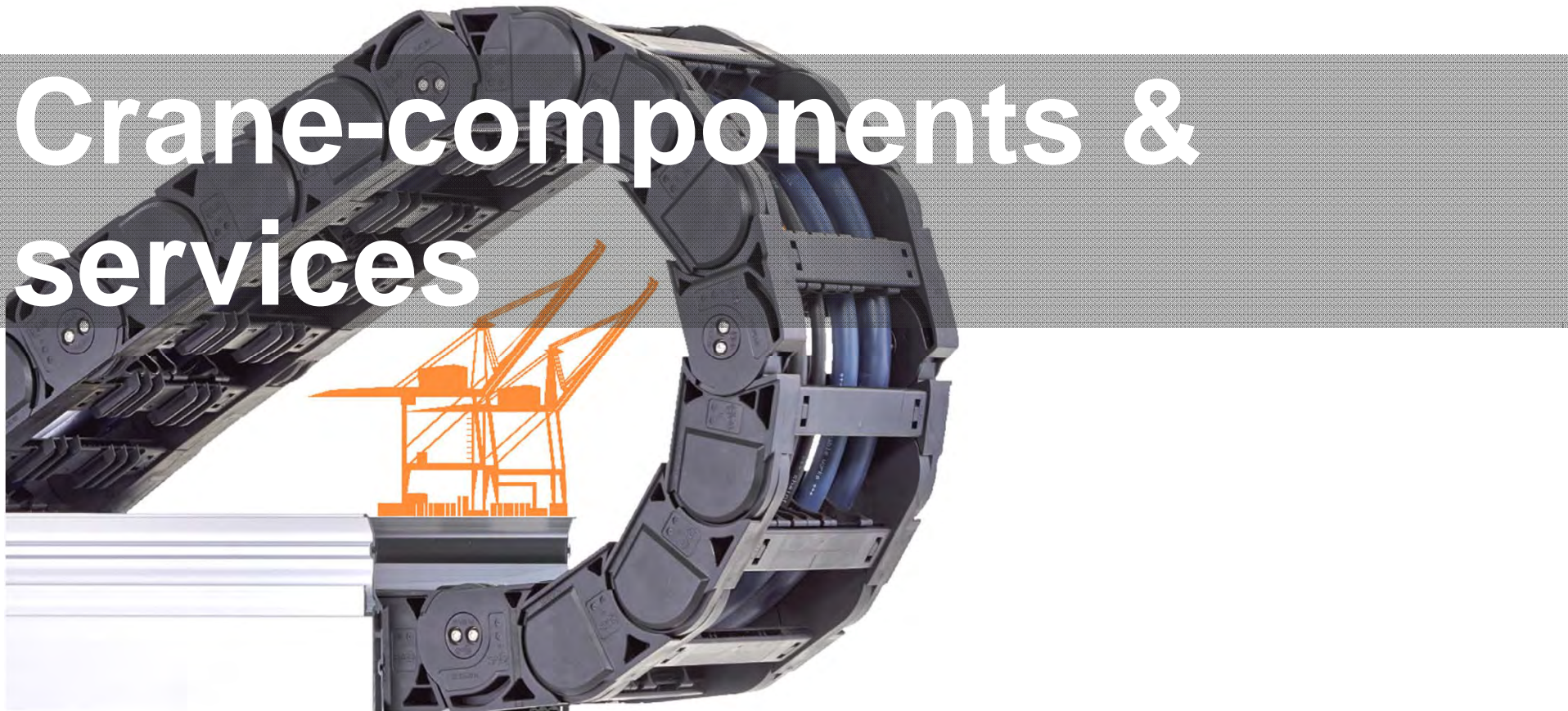
- ▶ Low maintenance extravagance – less downtime of the crane
- ▶ Wind and weather resistant system
- ▶ Spare part guarantee for 10 years and more



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



Crane-components & services



e-chain® series E4.1



- ▶ High lateral stability
- ▶ Suitable for large unsupported lengths
- ▶ Dirt repellent, with smooth, wear-resistant surface
- ▶ Wide, cable friendly plastic crossbars
- ▶ Large interior separation kit



Successfully used on various Reachstacker applications around the world



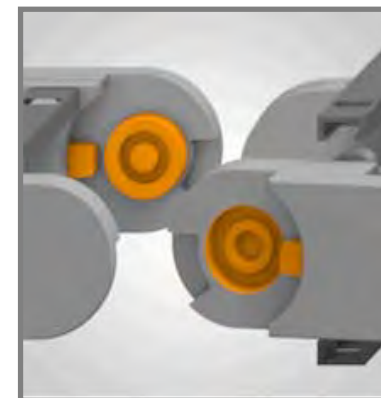
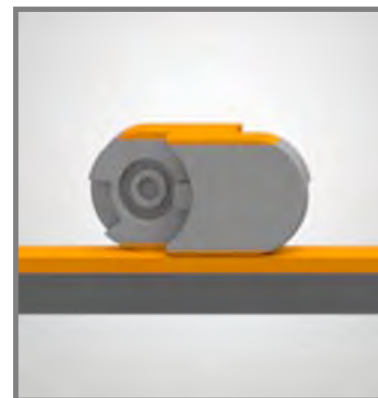
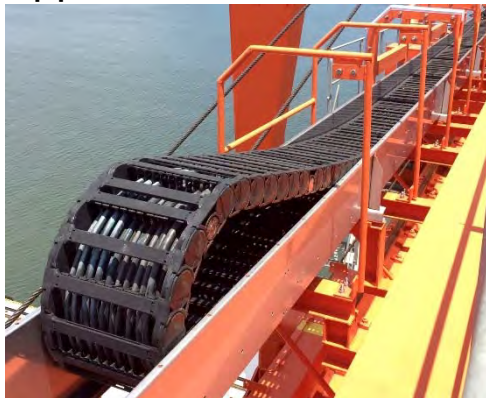
Heavy Duty (rol) e-chain® series



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

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

Successfully used in various port applications since 2004!

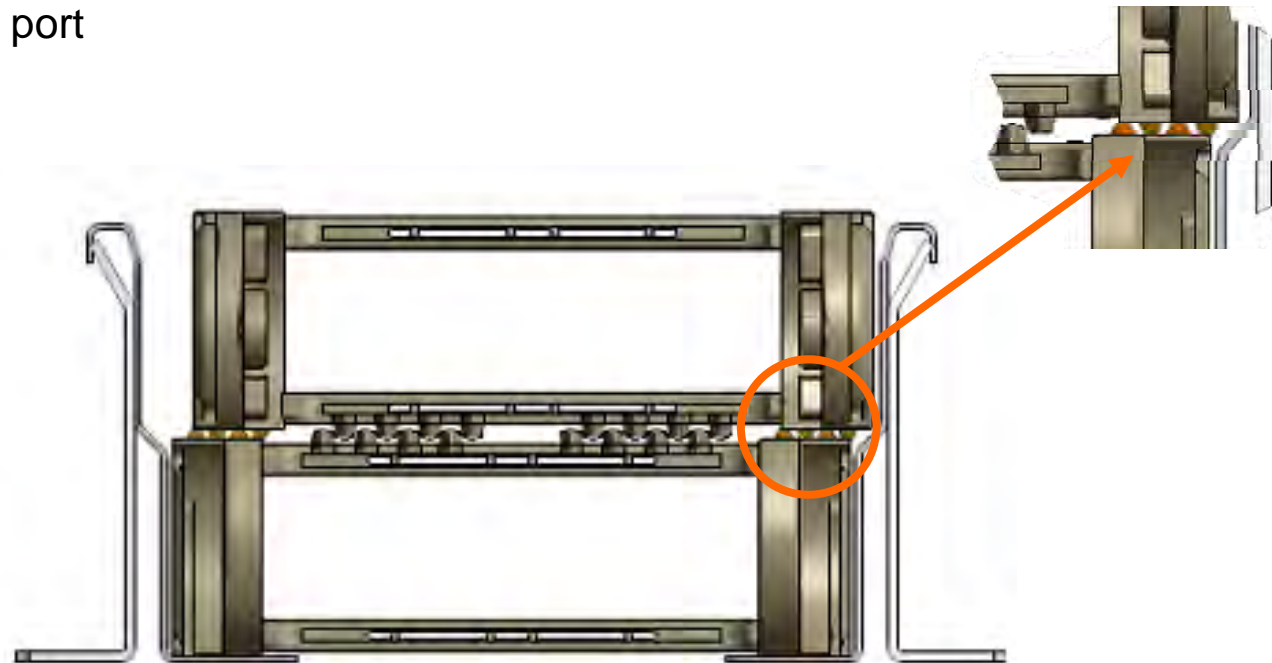


e-chain® series P4



- ▶ 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 since 2008!



Guide trough systems for cranes (Steel or Aluminum)



Heavy Duty installation sets, with reinforced brackets / special installation profiles

chainflex®-cables



More than 25 years experience in the development of cables for e-chains®

Bus Cables



chainflex® bus cables are available for all continuous bus systems within e-chains®

Fiber Optic / Coaxial Cables



Plastic (980/1000) or glass fibers (62.5/125 or 50/125), 1, 2, 6 or 12 fibers
(all tested for several million life cycles inside e-chains®)

Control Cables



PVC, PUR, TPE – A wide selection of materials for all applications – shielded and unshielded control cables with various combinations of cores and cross sections

chainflex®-cables



More than 25 years experience in the development of cables for e-chains®

Motor & Servo Cables

Shielded servo cables for inverter operation 600/1000 V, with one or two shielded signal pairs. Shielded & unshielded motor cables (1,5 to 95mm²)

Single Core Motor Cables

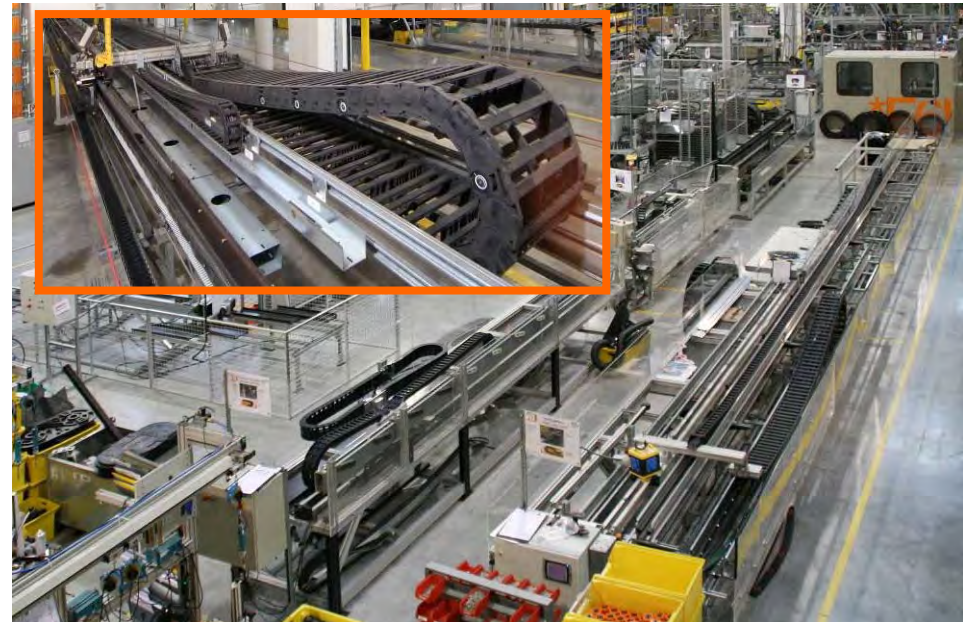
Shielded and unshielded single core motor cables for most demanding requirements as copper or special CCA material conductors

Single Core CF Crane

Shielded, highly flexible single core for up to 6/10kV.
Medium voltage cable for most demanding requirements in crane applications

Test lab

- ▶ 2750 m² test area
- ▶ More than 80 e-chain® & chainflex® tests running at a time
- ▶ Function & life time testing
- ▶ Simulating real conditions (travels up to 300 m and speeds up to 300 m/min)



Climatic tests for all e-chain® & chainflex®-cables.
Material tests from - 40°C up to +199°C.

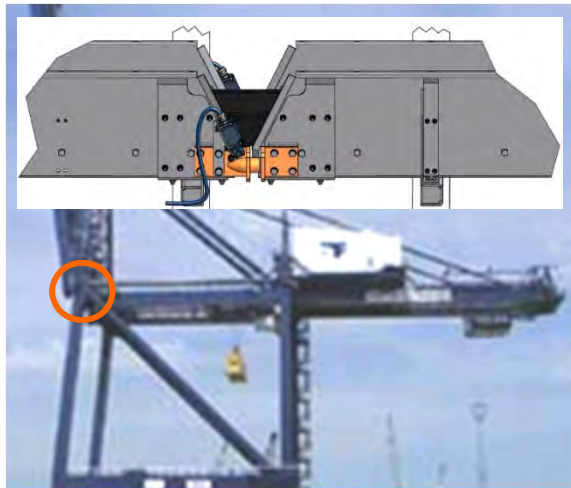


chainflex®-cables in life span test. Millions of cycles
guarantee: chainflex® lasts or money back!



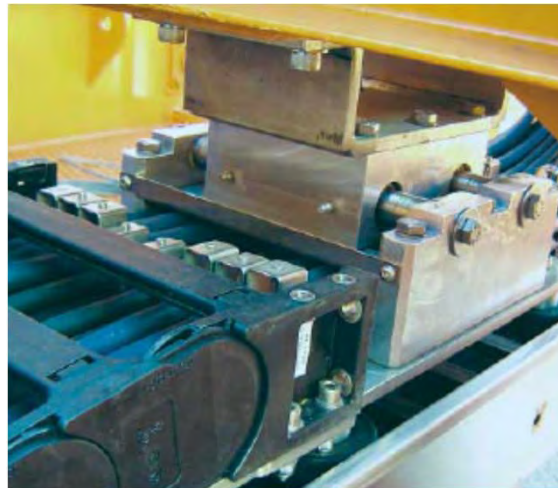
igus® Special parts

Hinge clutch



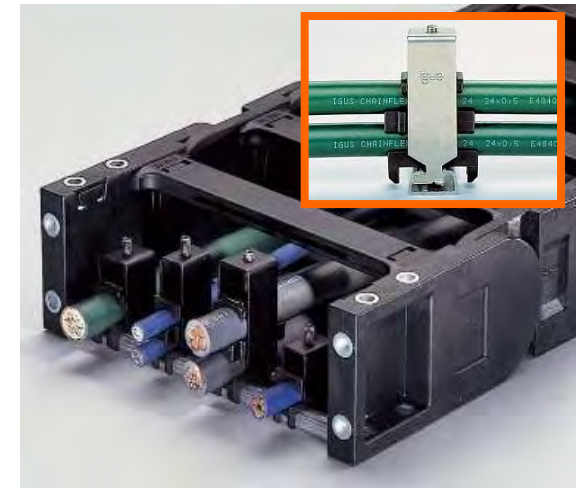
Hinge clutch at the hinge point, with bolts and holes to get a safe adjustment of the trough system after bringing down the boom.

Floating moving arm



igus® floating moving arm for compensation of the lateral mismatch. Floating moving arms are successfully used by igus® on STS / RMG / RTG / ASC cranes and other applications for more than 15 years.

Strain relief

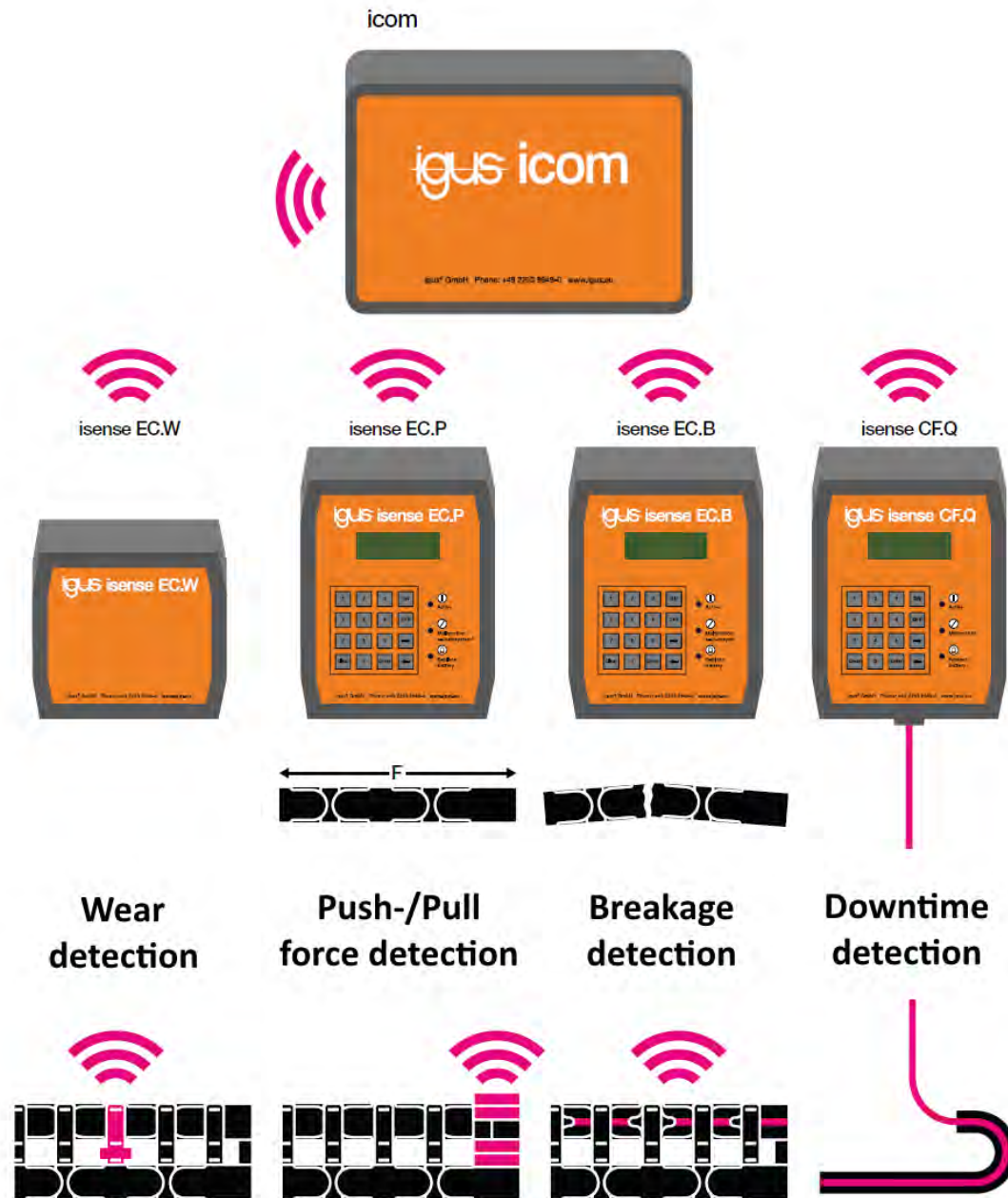


Clamps for safe cable strain relief. All strain relief elements are an igus® own development.

igus® smart plastics

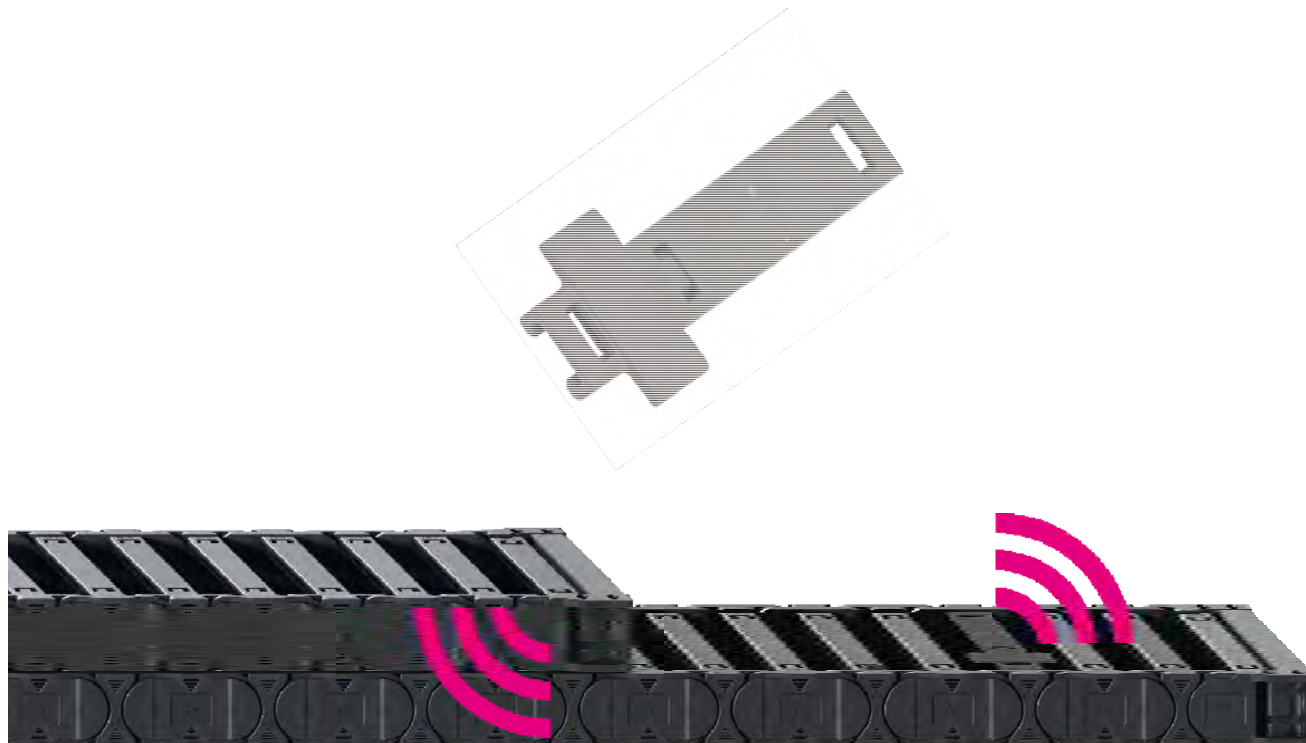
icom – igus® communication module

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



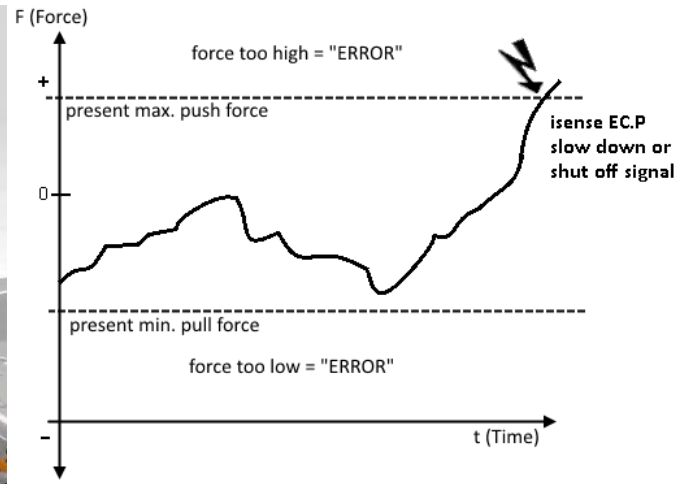
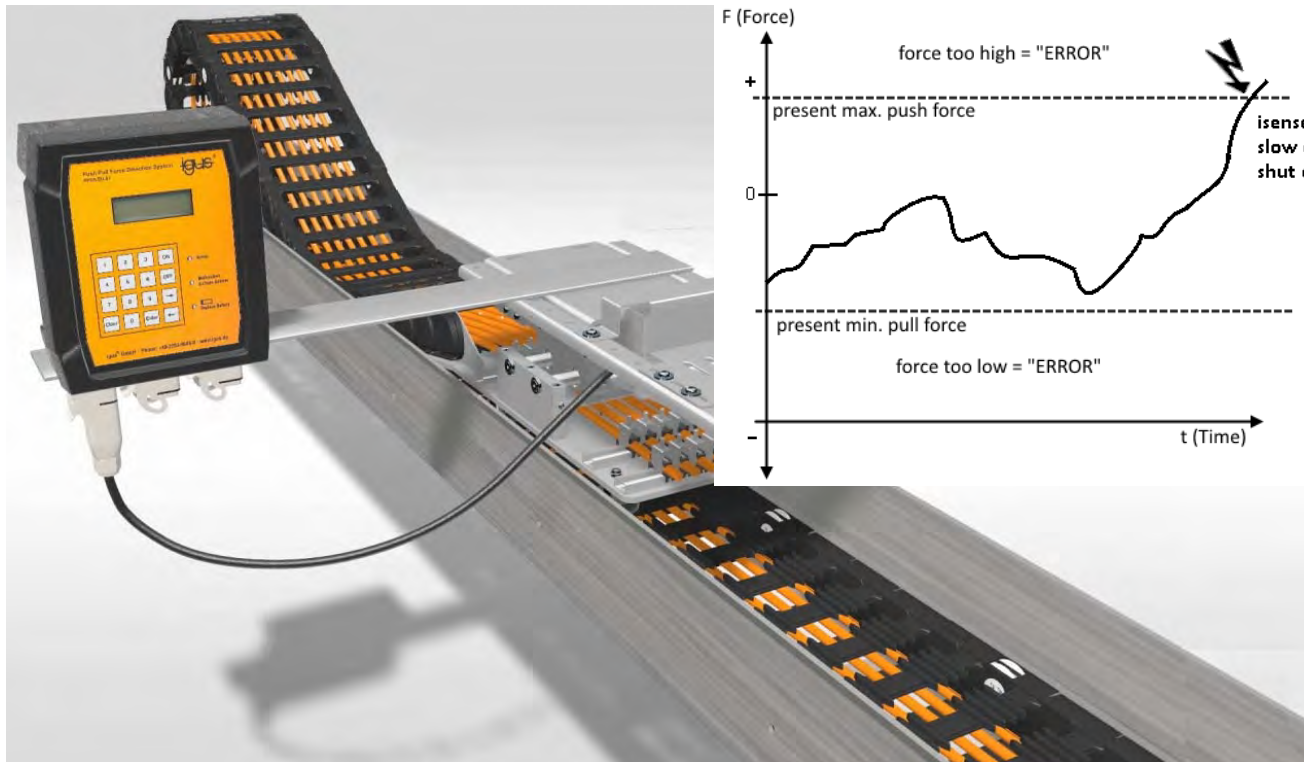
igus® smart plastics – isense EC.W(ear)

- ▶ 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)

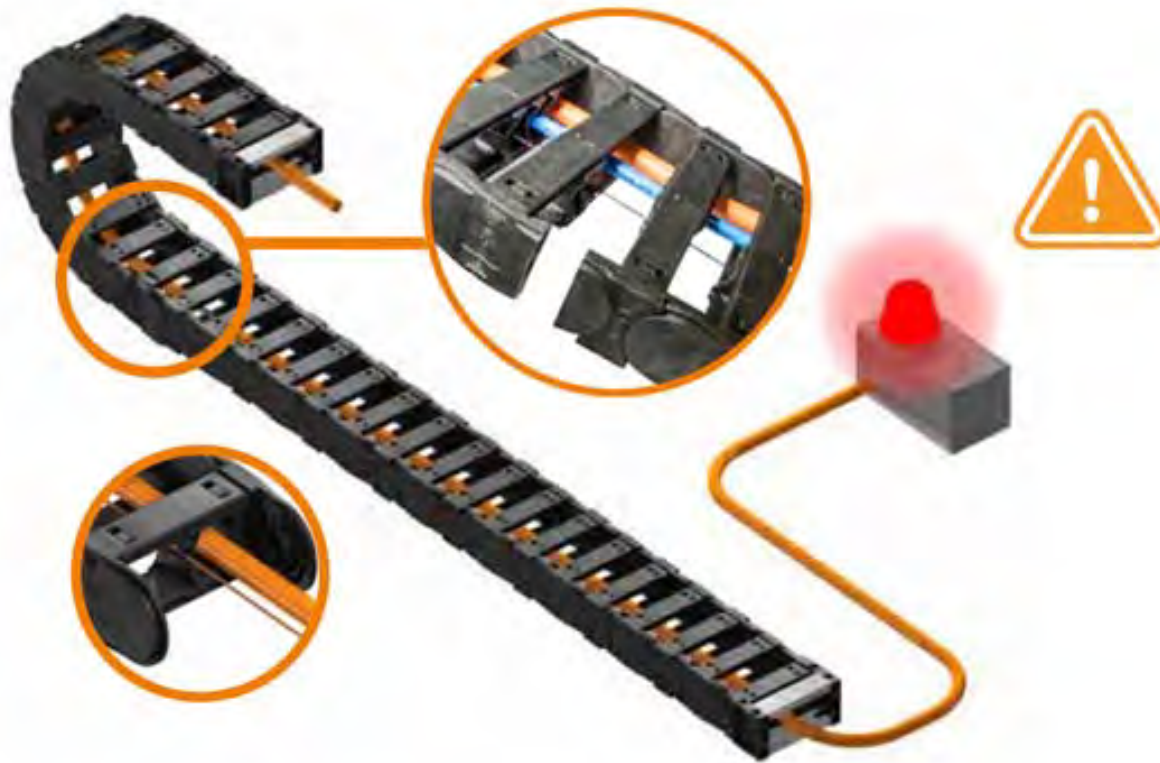
- ▶ Diagnostic tool to monitor the push/pull forces of igus® e-chains®
- ▶ Combination of a load cell (force monitoring) & evaluation unit
- ▶ Prevents damage to e-chainsystem®



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

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

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



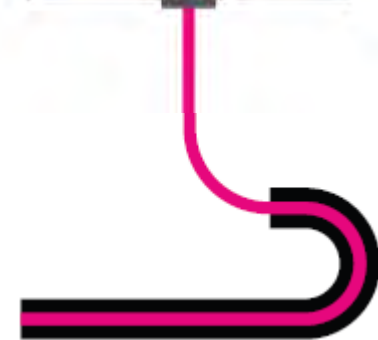
Alarm through autonomous detection of a defect/partial defect of the e-chain®

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



Project engineering

- ▶ Detailed project drawings
- ▶ igus® documentation

Technical Data of the Drum:
 chain fixed on centre of drum with
 distance to the bracket
 middle of the chain

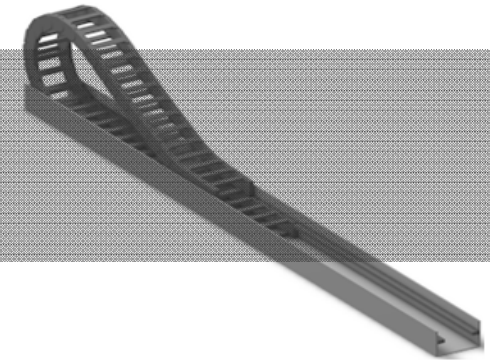
Part no. / Description	MAT no.	No. of cores & conductor cross-section	Qty	Diameter	Weight per cable	total weight	cable over-length at fixed point, incl. 1.2m cable reserve	cable over-length at moving end, incl. 1.2m cable reserve	total length	total weight	min. bending radius factor x d	actual bending radius factor x d
1 CF38 250.04		(4 G 25.0/C)	1	27.0 mm	1.49 kg/m	0.47 kg/m	17.19 m	17.19 m	84.00 m	125.1 kg	7.5 x	11.1 x
2 CF9 25.12		12 G 2.5	1	17.0 mm	0.47 kg/m	0.47 kg/m	17.19 m	17.19 m	84.00 m	39.3 kg	5.0 x	17.6 x
3 CF9 25.18		16 G 2.5	1	21.0 mm	0.60 kg/m	0.60 kg/m	17.19 m	17.19 m	84.00 m	50.4 kg	5.0 x	14.3 x
4 CFL3.63.82.5/125.TC		8x 0.63.5/125m	2	11.5 mm	0.11 kg/m	0.22 kg/m	17.19 m	17.19 m	84.00 m	19.5 kg	15.0 x	26.1 x
5 CF12.10.06.02		(6 x 2 x 1.0/C)	2	20.0 mm	0.54 kg/m	1.08 kg/m	17.19 m	17.19 m	84.00 m	91.1 kg	10.0 x	15.0 x
6 CF38 160.04		(4 G 16.0/C)	4	22.0 mm	0.97 kg/m	3.86 kg/m	17.19 m	17.19 m	84.00 m	324.2 kg	5.0 x	13.6 x
7 CF38 160.04		(4 G 16.0/C)	4	22.0 mm	0.97 kg/m	3.86 kg/m	17.19 m	27.19 m	94.00 m	362.8 kg	5.0 x	13.6 x

Zusatzlast / additional load: 11.58 kg/m
 Gesamtgewicht Lötungen / total weight cables: 1011.4 kg
 Kettengewicht / chain weight: 8.99 kg/m
 Gesamtgewicht Kette / total weight chain: 446.1 kg
 Gesamtgewicht / total weight: 20.57 kg/m
 Gesamtgewicht / total weight: 1457.5 kg

Pos. 4, Belieferung - AB 1766608, ersetzt durch CFL6.126.62.5/125.TC.
 Delivery, AB 1766608, replaced by CFL6.126.62.5/125.TC.

Additional sheets:
 sheet 1/2 - interior shelving
 sheet 2/2 - coil arrangement

View: from fixed point into the chain
 Production name in accordance with DIN 34
 Version: 02.11.2009
 Drawing: 75279.1d
 Project: HI Alex 4 055
 Project-no.: 2005-227
 Scale: 1:1
 Date: 02.11.2009
 Drawn: [Name]
 Checked: [Name]
 Approved: [Name]



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)

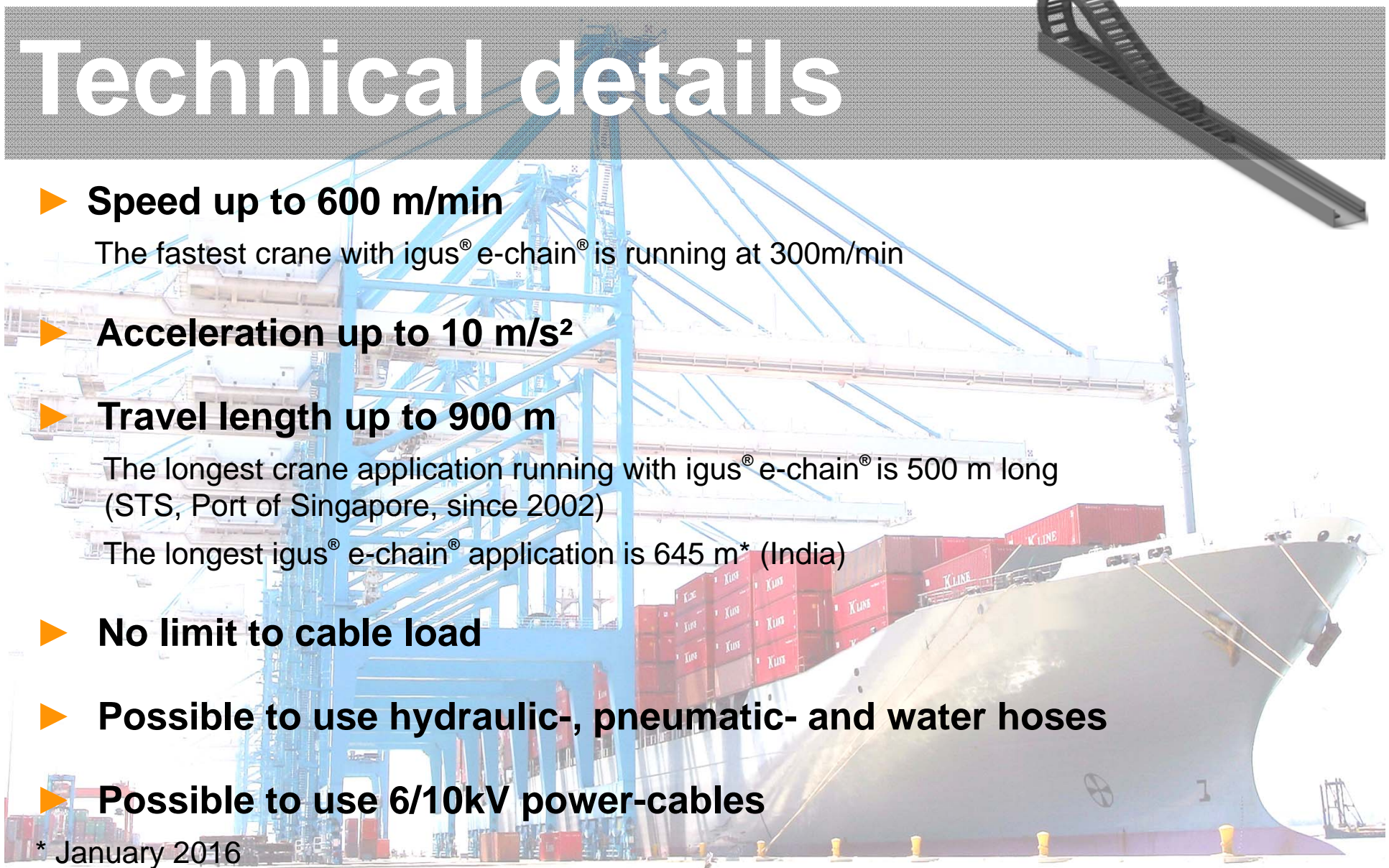
The longest igus® e-chain® application is 645 m* (India)

▶ **No limit to cable load**

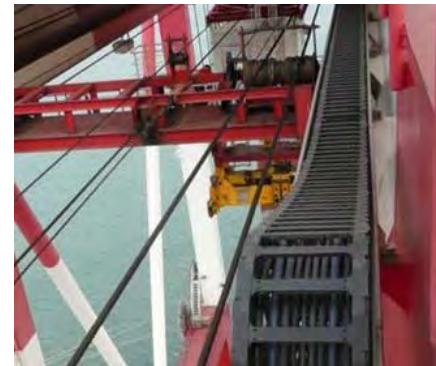
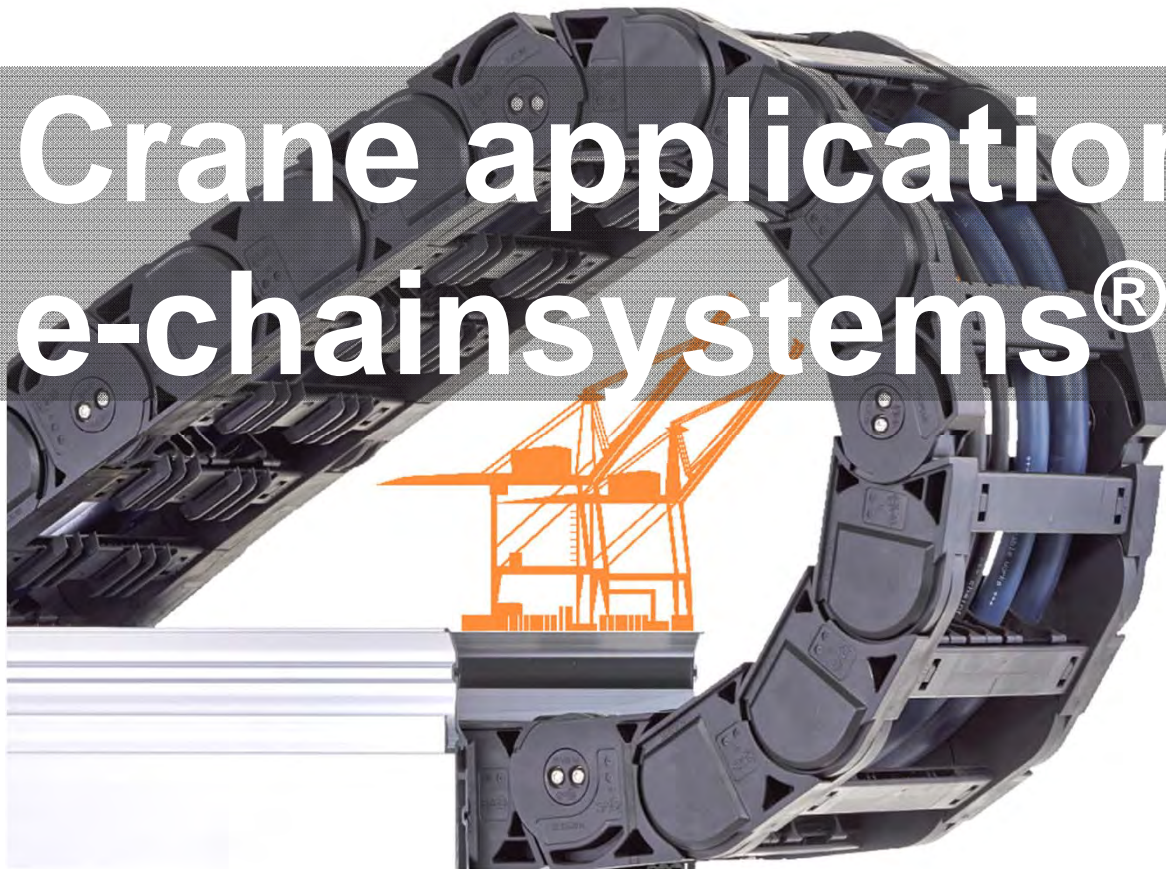
▶ **Possible to use hydraulic-, pneumatic- and water hoses**

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

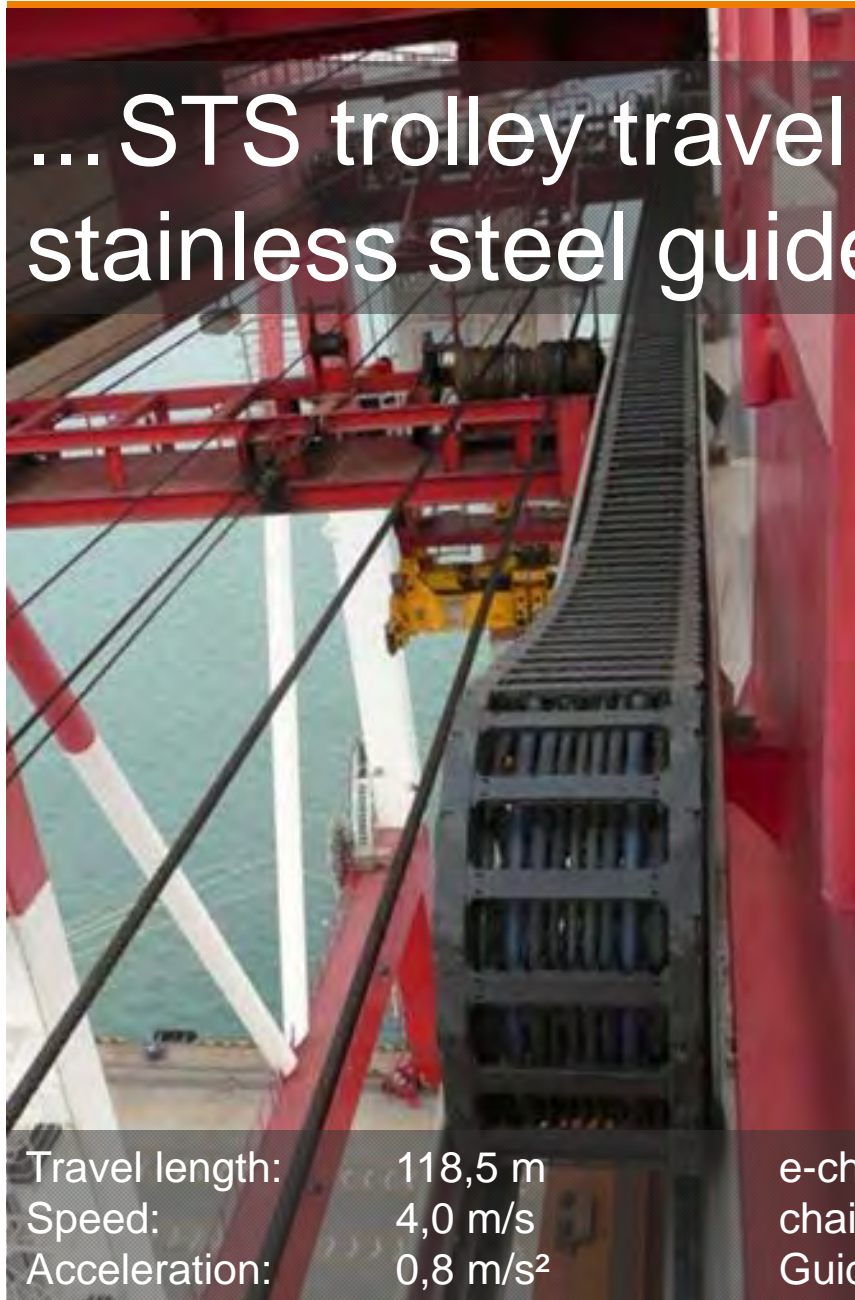
* January 2016



Crane applications for e-chainsystems®



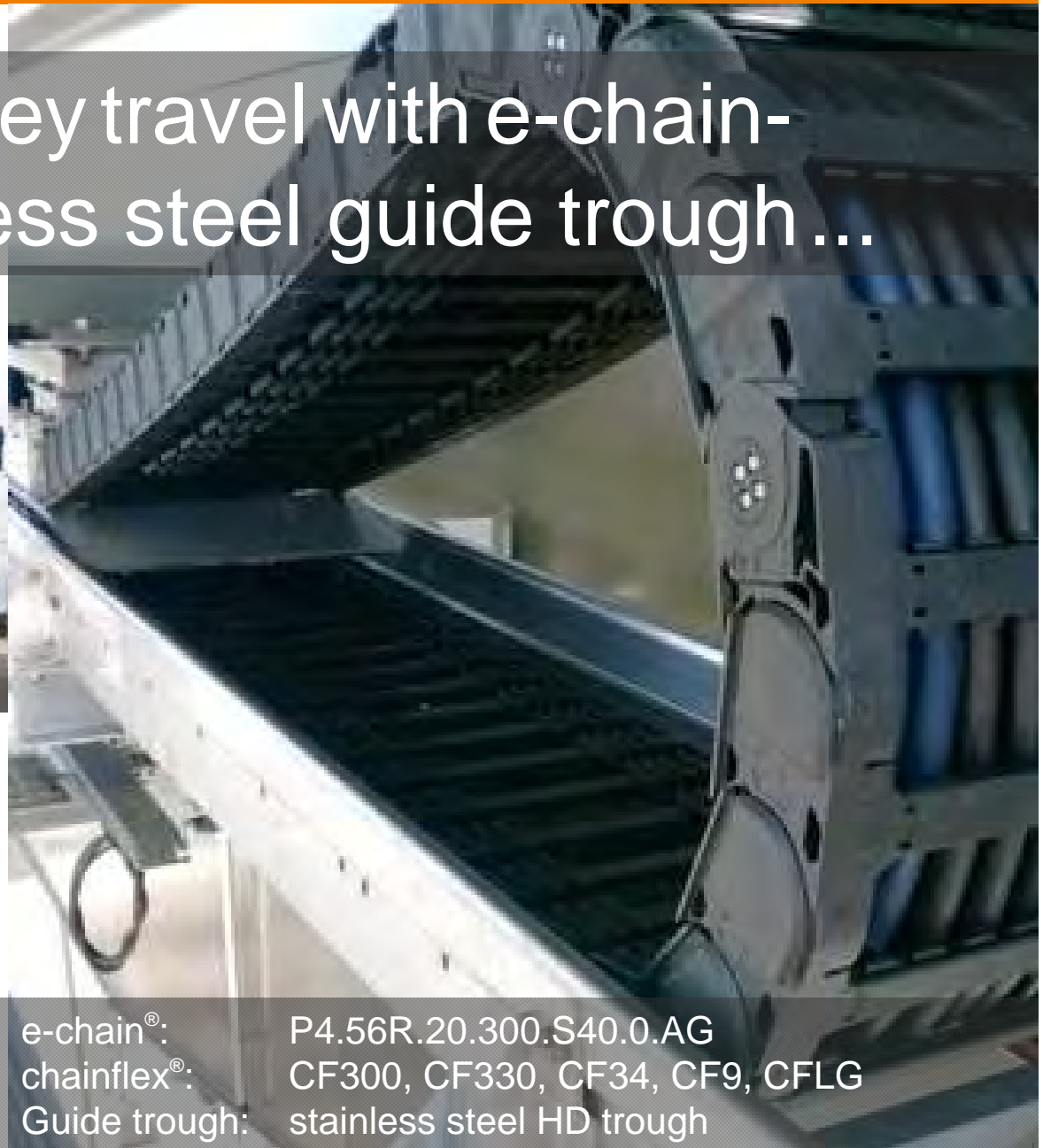
... STS trolley travel with e-chainsystem® & stainless steel guide trough...



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

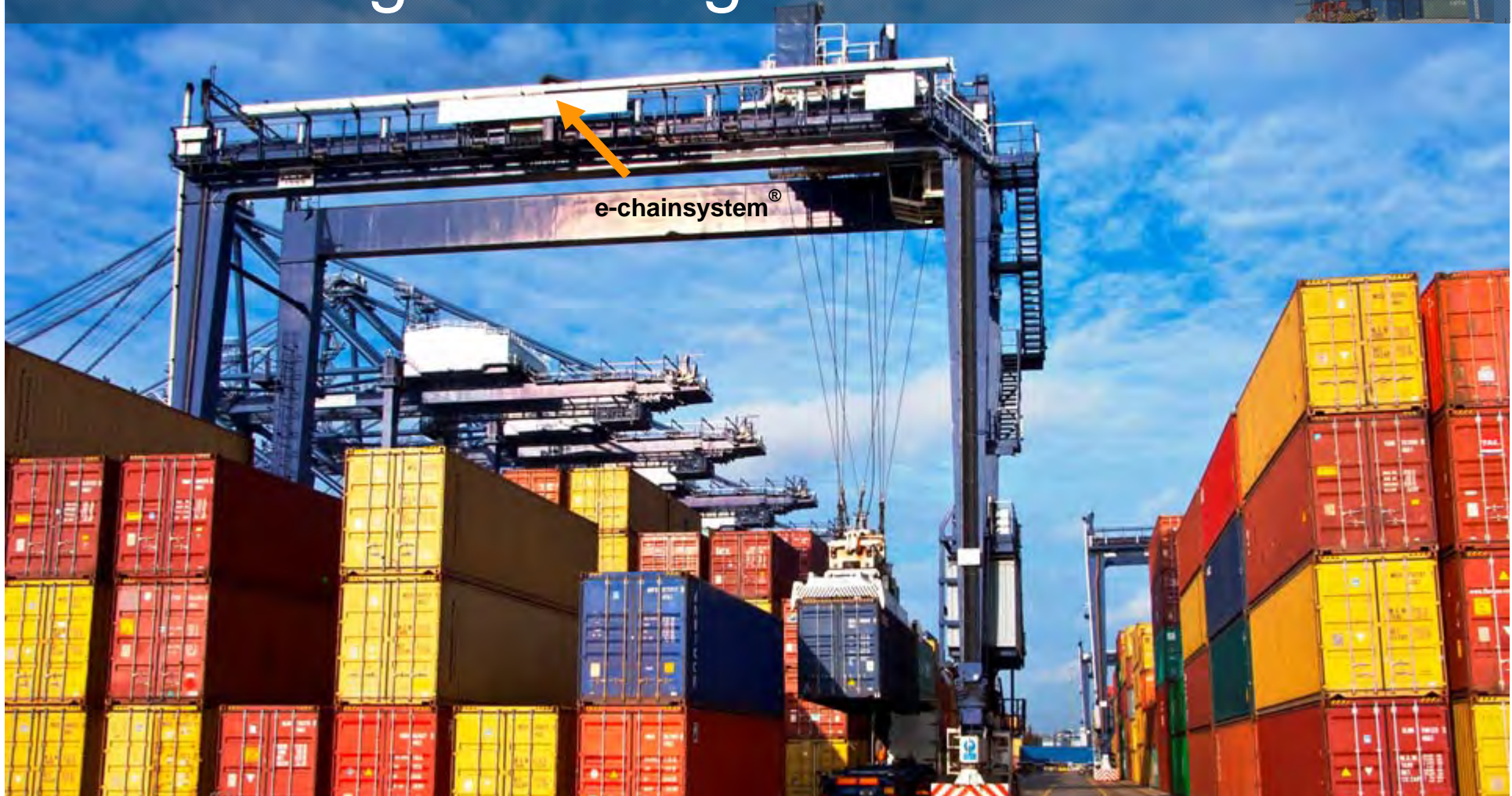
...RMG/ASC trolley travel with e-chain-system® & stainless steel guide trough ...



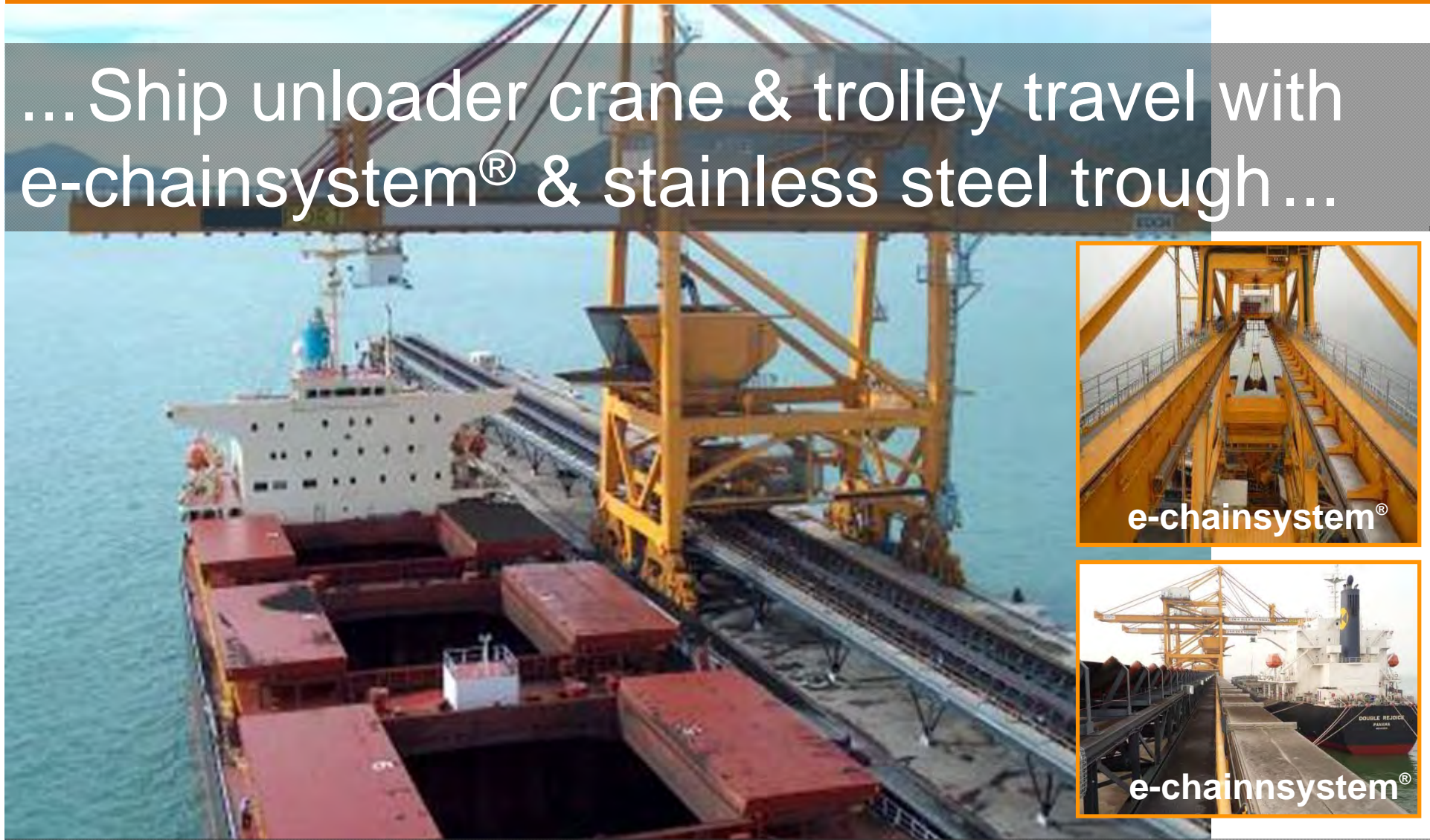
Travel length: 113 m
Speed: 2,5 m/s
Acceleration: 0,5 m/s²

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 ...



... Ship unloader crane & trolley travel with e-chainsystem® & stainless steel trough ...



e-chainsystem®

e-chainnsystem®

Travel length, crane / trolley: 441 / 90 m
Speed, crane / trolley: 0,5 / 3,2 m/s
Acceleration, crane / trolley: 0,1 / 1,0 m/s²

e-chain® crane / trolley: 5050R rol-e-chain®
chainflex®: CFCRANE, CF330, CF31, CF11, CFLG
Guide trough: stainless steel HD

... Reachstacker applications ...



... Retrofit STS crane ...

Before: Festoon System



After: igus® e-chain®



... Retrofit RMG crane ...

Before: Festoon System

After: igus® e-chain®



... Retrofit RTG crane ...

Before: Cable Tender System

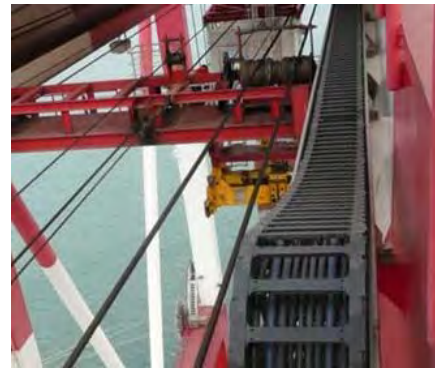
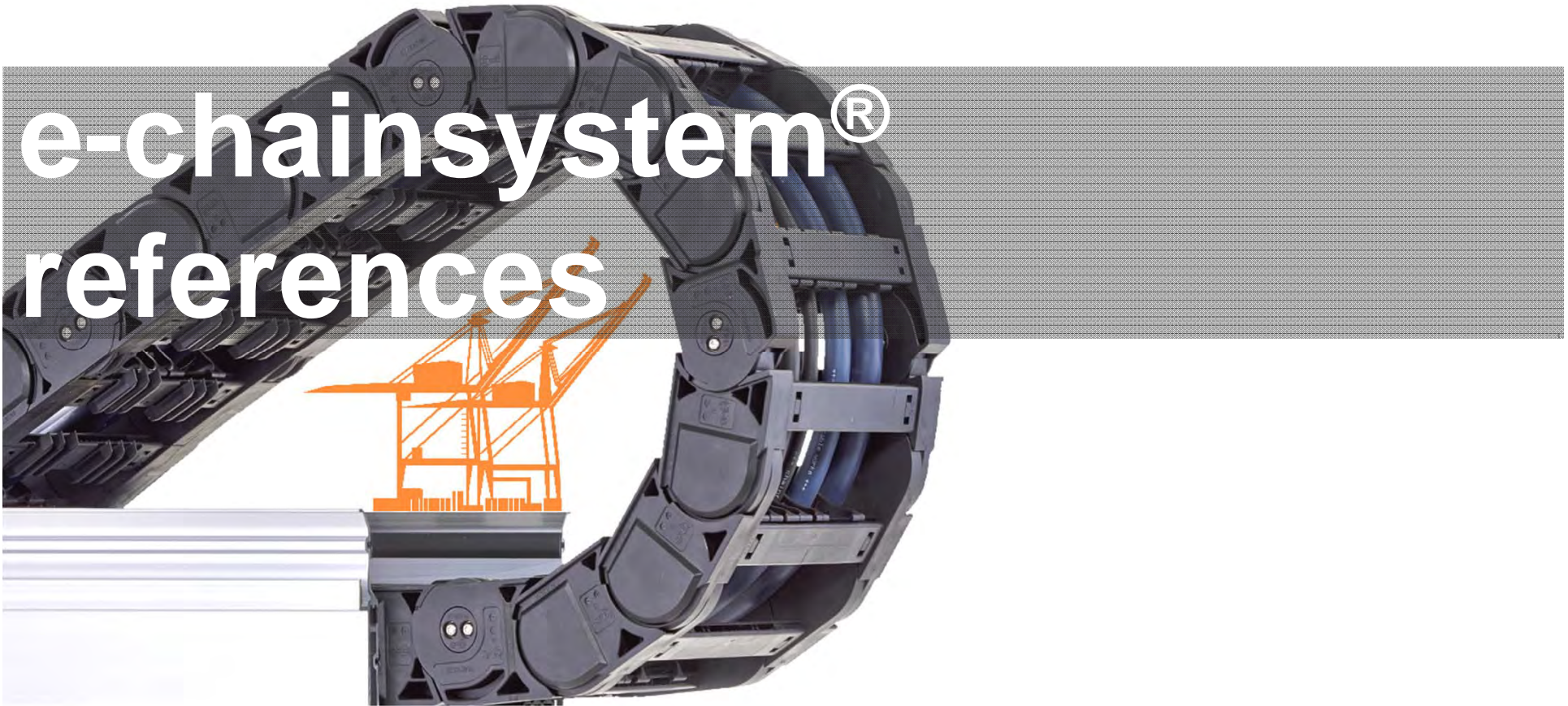
After: igus® e-chain®



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



e-chainsystem® references





Worldwide:

- ▶ More than 5.409* RTG´s / RMG´s (185 with P4 e-chain®)
- ▶ More than 971* STS (329 with P4 e-chain®)
- ▶ More than 15.500* Spreader applications
- ▶ More than 30.000* Indoor-, Gantry-, Bulkhandling-, Shipyard- and Special-cranes

* December 2016



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



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