

igus® the-chain ... moving energy made easy
Modular toolbox for almost every application and industry



light & quick
for heavy-weights...

13th ASEAN
PORTS & SHIPPING
2015



igus® the-chain ... moving energy made easy
More than 2,400 employees worldwide



igus® - Headquarter, Cologne Germany

- **35 igus® subsidiaries world wide (and more to come)**
- **More than 55 certified igus® distributors around the world**

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

Local service and support



P. Hadiwijaya

**Project Manager
Indonesia**


Phone +62 21 5376 184
Fax +62 21 5376 183
Mobile +62 817 9856 709
Email phadiwijaya@igus.co.id



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



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

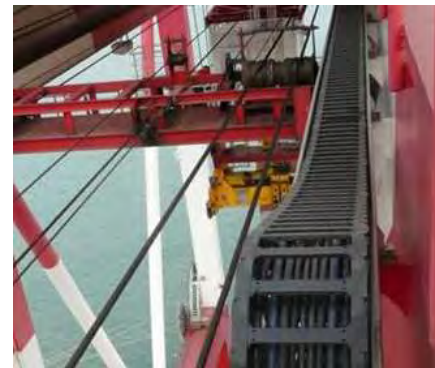
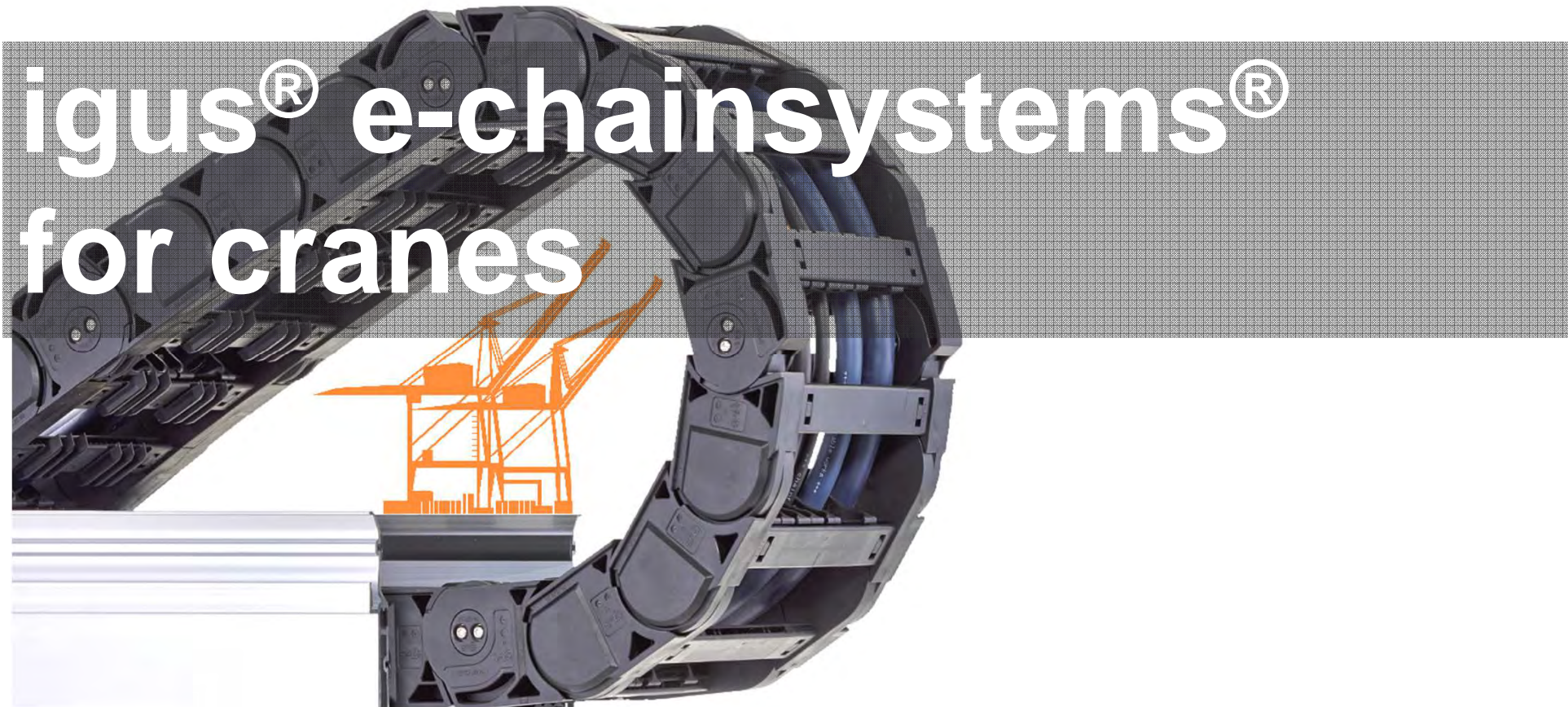


**iglidur®
Plain bearings**
igidur® polymer plastic
bearings and bushings
lengthen tool life, lower
costs and eliminate
need for lubrication.
7000 types available ex
stock.

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



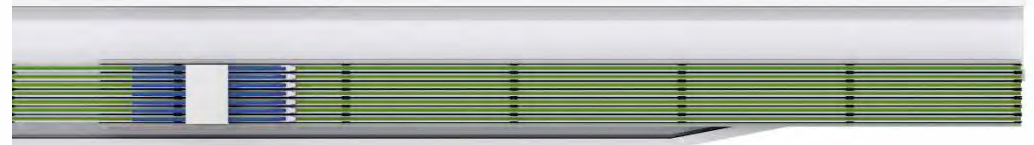
igus® e-chainsystems® for cranes



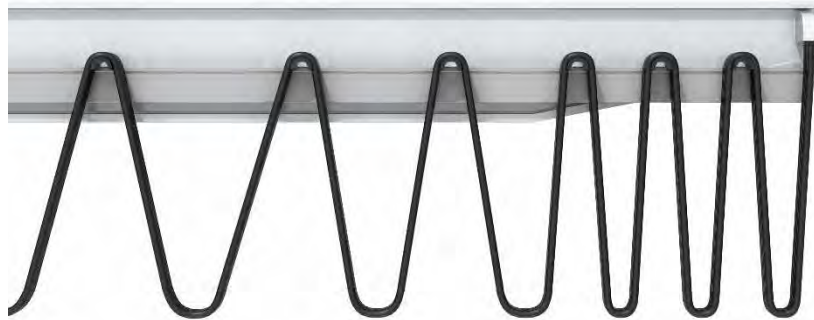


e-chains® - one system for energy, data, media

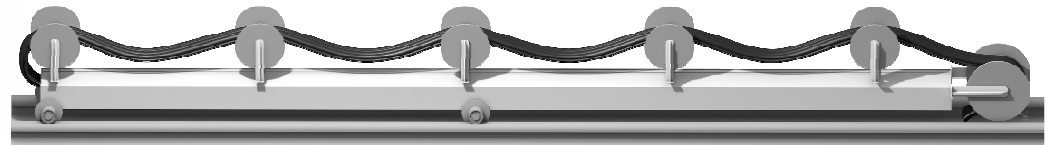
Motorized cable reels



Conductor or BusBar-Systems



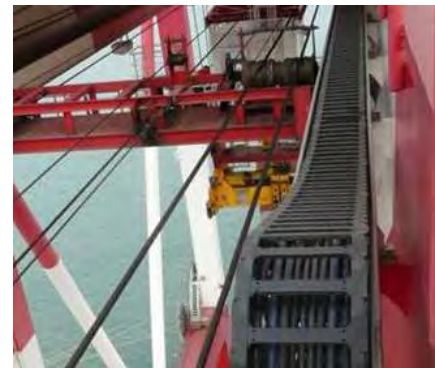
Festoon System



Cable tender

e-chainsystem® benefits

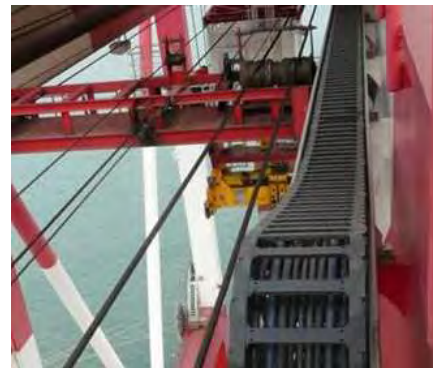
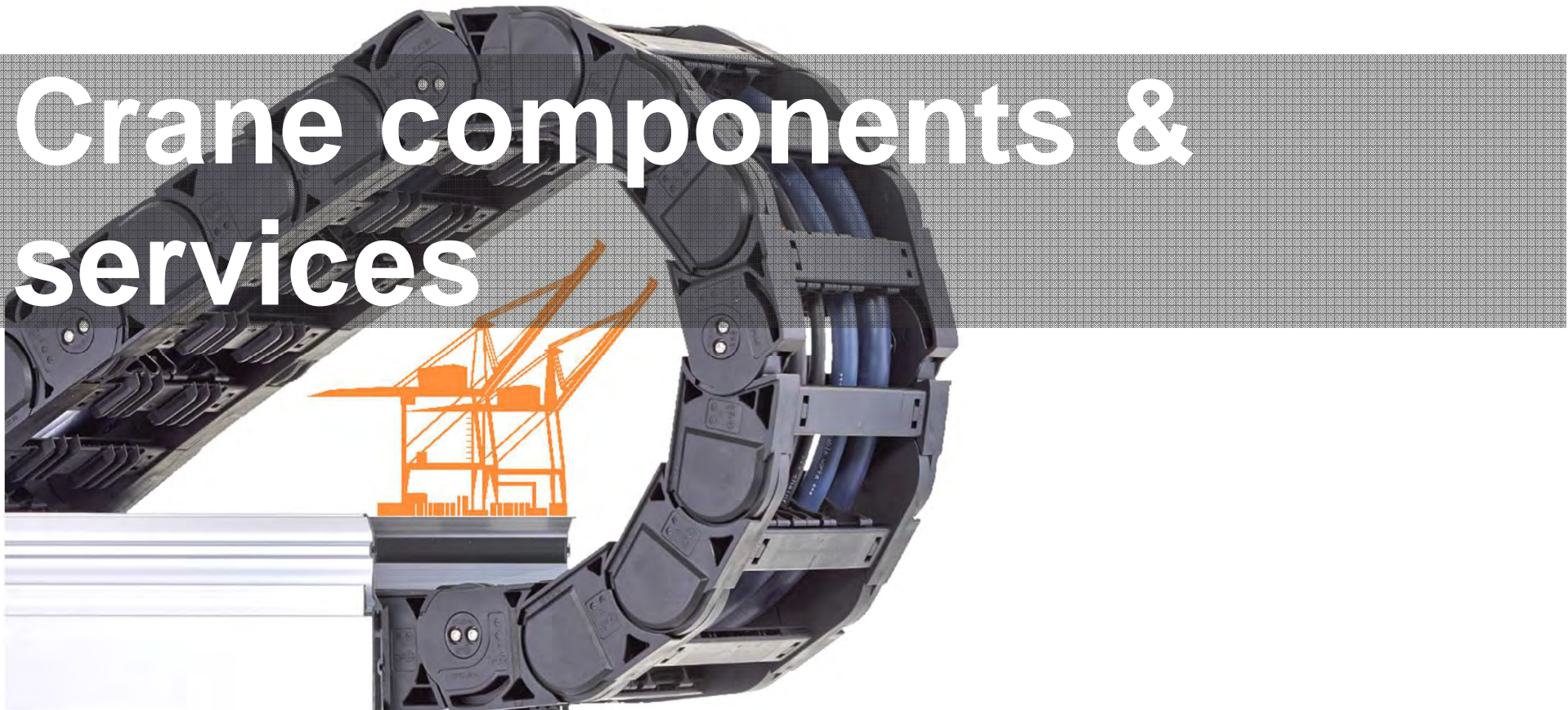
- ▶ Space saving design
- ▶ No cable loop station & no additional steel structure for loop station
- ▶ No additional drives or control system necessary to move the chain system
- ▶ Synchronous run of trolley and e-chainsystem®
- ▶ All kind of media (power, data, hydraulics, pneumatics, ...) conveyed in one system
- ▶ Low maintenance extravagance – less downtime of the crane
- ▶ Wind an weather resistant parts
- ▶ Spare part guarantee for 10 years and more
- ▶ igus® installation, supervisor or maintenance service



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



Crane components & services



e-chain® series E4/4



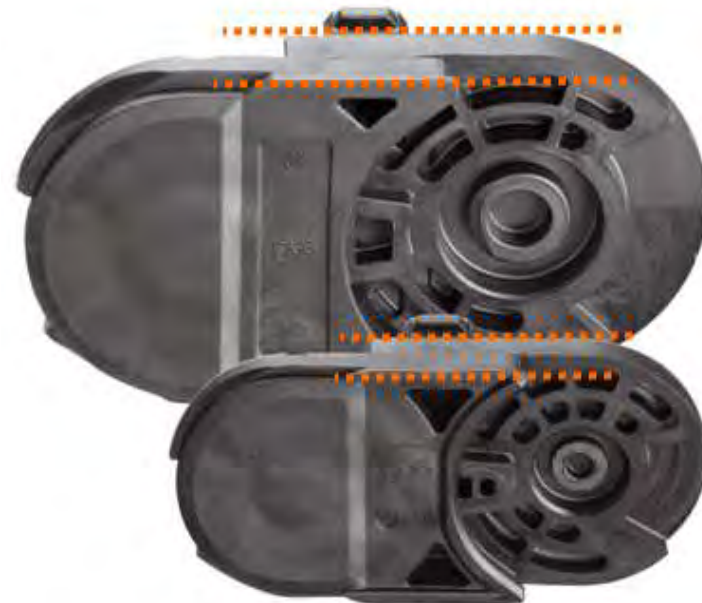
- ▶ Rugged stop dog design
- ▶ Outer link with rear catch for high stability
- ▶ High torsion rigidity
- ▶ Wide, cable friendly plastic crossbars
- ▶ Large interior separation kit

Successfully used in various port applications since 1995!





- ▶ Better force distribution, due to rectangular shaped stop dog design (larger surface pressure).
More than 2 stop dogs can barely be synchronized
- ▶ Interlocking side links – tongue & groove design





- ▶ Complete chain link incl. stop dog & gliding surface made from highly abrasion-resistant polymer plastics, developed by igus
(no glide shoes or other protections needed)
(40 years material design for polymer bearings)



- ▶ No additional parts (like screws or bolts) required to mount the chain
- ▶ Only a screw driver is needed to assemble / disassemble the chain



rol-e-chain® series E4/4



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

Successfully used in various port
applications since 1999!

- ▶ Rolling instead of gliding – major reduction in driving power
- ▶ Rollers with stainless steel roller bearings as standard
- ▶ Consistent rolling resistance for applications in dirty environments
- ▶ Various roller types for optimum application adaption



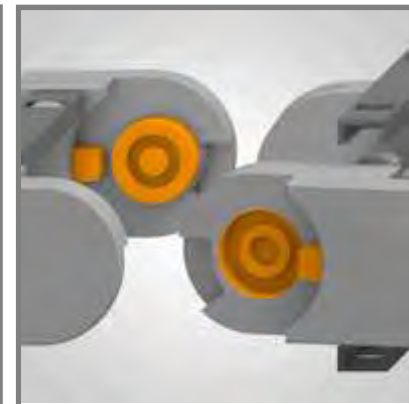
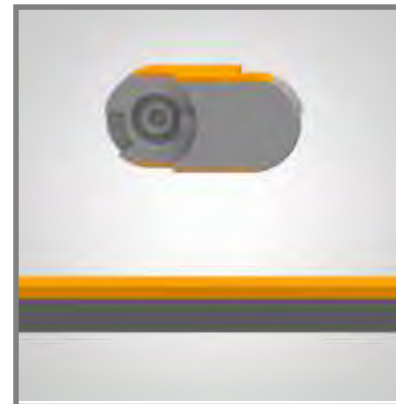
Heavy Duty rol-e-chain® series



- ▶ Larger pin / bore connection surface (Y)
- ▶ Enlarged gliding surface, less wear (X)
- ▶ Widened stop dog surface
- ▶ High tensile stability
- ▶ Robust steel mounting brackets

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

Successfully used in various port
applications since 2004!

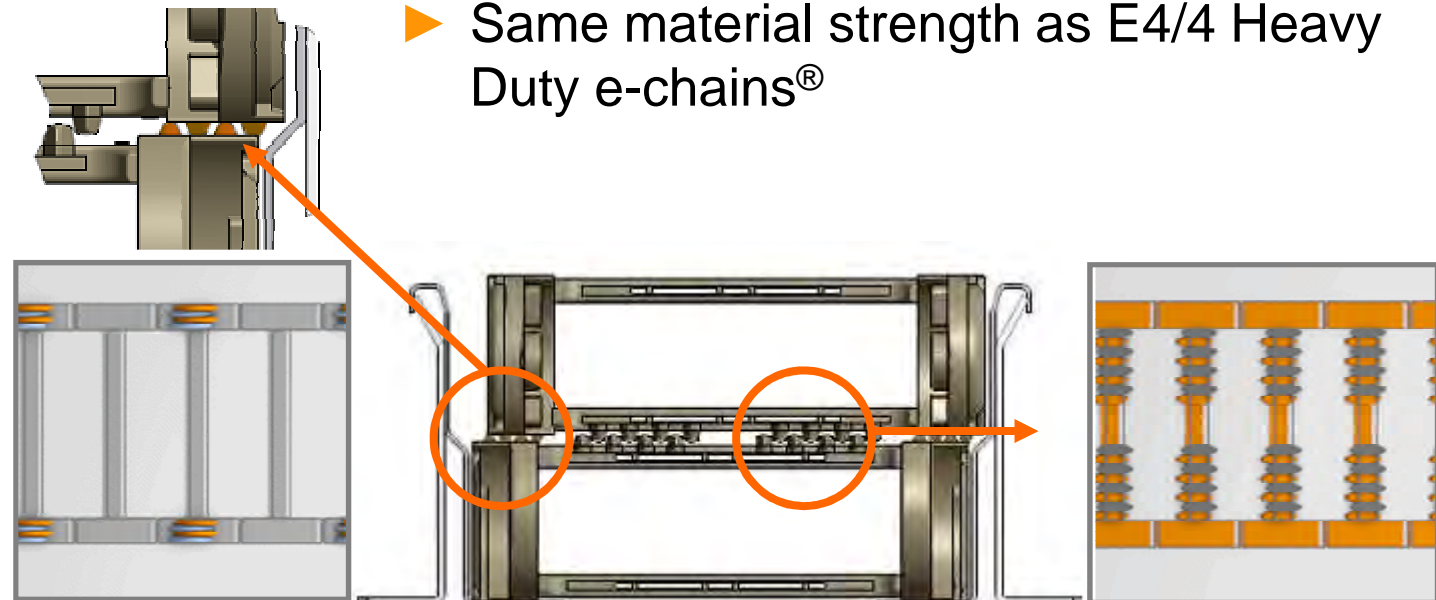


e-chain® series P4



Successfully used in various port applications since 2008!

- ▶ Smooth & low noise operation
- ▶ Integrated grooved roller, running on a large, even & plain surface
- ▶ 2 rectangular shaped stop dogs
- ▶ Interlocking side links - tongue & groove design
- ▶ Designed for high fill weights & fast travel speeds
- ▶ Same material strength as E4/4 Heavy Duty e-chains®



rol-e-chain® series E4.1



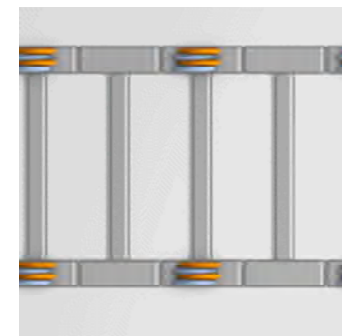
16 years experience -
chains with integrated rollers!



Same pitch of the roller and standard chain links as well as "ramps" - smooth running e-chain®



Profile rollers - roll beside each other not over each other. Considerable reduction in operating noise and an increase of service life.



Guide trough systems for cranes (Steel or Aluminum)



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

chainflex® cables



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



Plastic (980/1000) or fibre glass (62.5/125 or 50/125), 1, 2, 6 or 12 fibres (they are all tested for several million cycles)



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



Motor & Servo Cables

Shielded servo cables for inverter operation up to 600/1000 V.
Shielded & unshielded motor cables from 1,5 to 95mm²



Single Core Motor Cables

Shielded & unshielded single core motor cables for most demanding requirements.



Single Core CF Crane

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

Test lab

- ▶ 1750 m² test area
- ▶ More than 80 e-chain® & chainflex® tests running at a time
- ▶ Function & life time testing
- ▶ Simulating real conditions (travels of up to 300 m and speeds up to 300 m/min)



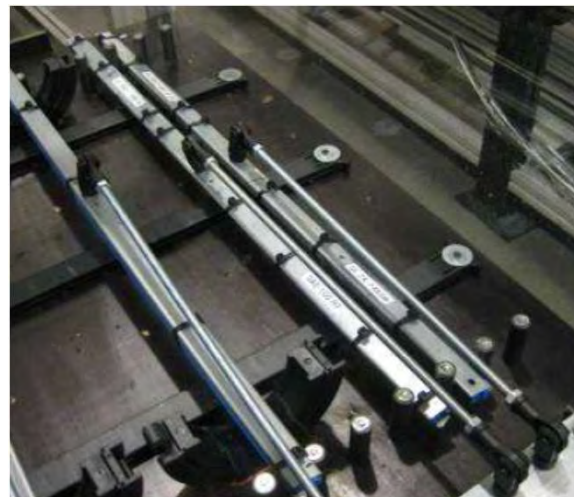
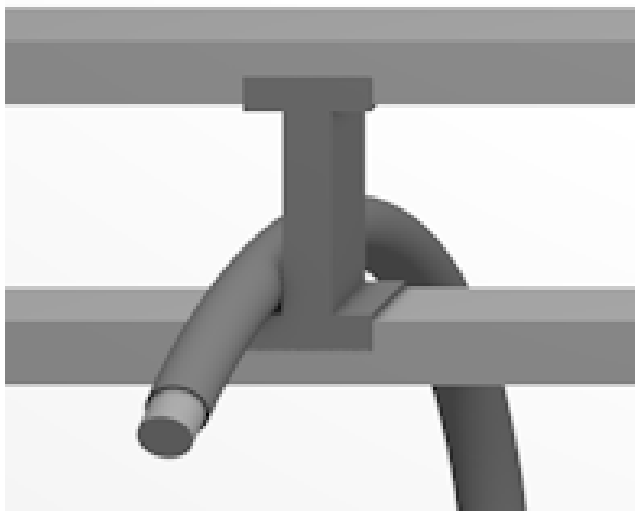
Climatic tests for all e-chain® & chainflex® cables.
Material tests from - 40°C up to +199°C.

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



Test lab

- ▶ Cable outer jacket wear tests with interior separation and crossbars
- ▶ Cable friendly design for longer life time

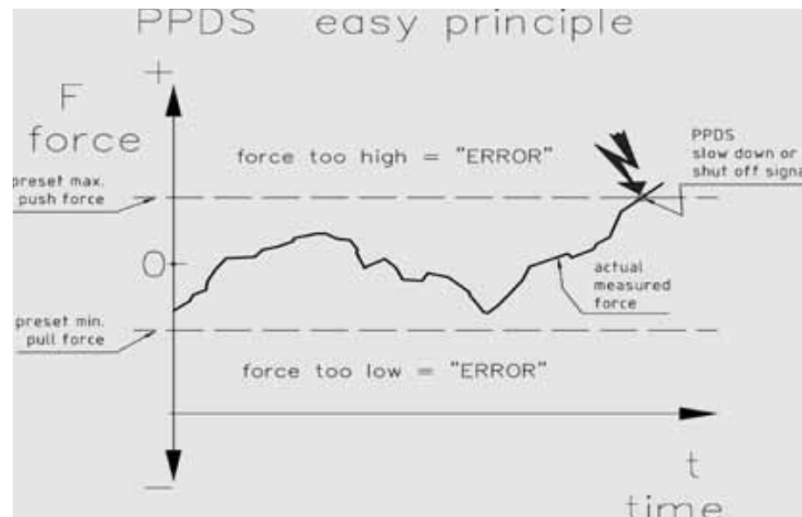


Special part – PPDS (Push Pull Detection System)

- ▶ Prevents down time
- ▶ Prevents damage to equipment (max. force is programmed, system stops when force is exceeded)
- ▶ Saves money
- ▶ Improves operational safety through preventive maintenance & fine tuning of the system



Push-/Pull-force monitoring with the igus® PPDS System



Easy PPDS – continuous real force measurement and limit comparison



Project engineering

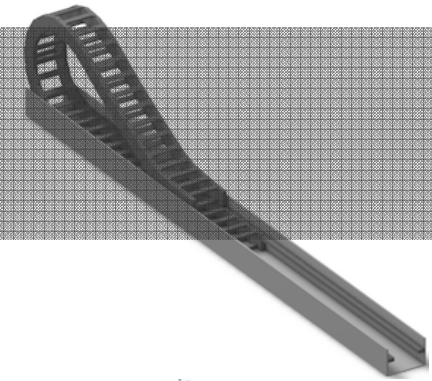
- ▶ Detailed project drawings
- ▶ igus® documentation

Technical drawing details:

- Views:** Section E-E HW5, Guiding trough system, Roof support, Girders, Boom, Hinge point, Tow arm, Detail 'Y' HW20, Detail 'Z' HW20.
- Tables:**

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	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	17.19 m	17.19 m	84.00 m	39.3 kg	5.0 x	17.6 x	
3 CF9 25.12		16 G 2.5	1	21.0 mm	0.80 kg/m	17.19 m	17.19 m	84.00 m	50.4 kg	5.0 x	14.3 x	
4 CFLG 62.42 S/125.TC		8x 062.5/125m	2	11.5 mm	0.11 kg/m	0.22 kg/m	17.19 m	17.19 m	48.5 kg	15.0 x	29.1 x	
5 CF12-10.06.02		8 x (2 x 1.0/C/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	3.88 kg/m	17.19 m	17.19 m	84.00 m	324.2 kg	5.0 x	13.8 x
7 CF38 160.04		(4 G 16.0/C)	4	22.0 mm	0.97 kg/m	3.88 kg/m	17.19 m	17.19 m	84.00 m	302.8 kg	5.0 x	13.8 x

Zusatzlast / additional load:	11.58 kg/m	Gesamtgewicht Leitungen / total weight cables:	1.011.4 kg
Kettengewicht / chain weight:	8.99 kg/m	Gesamtgewicht Kette / total weight chain:	445.1 kg
Gesamtgewicht / total weight:	20.57 kg/m	Gesamtgewicht / total weight:	1.457.5 kg
- Technical Data of the Drum:**
 - chain fixed on centre of drum with...
 - Technical drawing of Drum typ II showing cable arrangement.
- Additional sheets:**
 - sheet 1/2 - interior shelving
 - sheet 2/2 - coil arrangement
- Project Information:**
 - View: from fixed point into the chain
 - Production runs to: according with DIN 34
 - Issue: 02.11.2009
 - Scale: 1:1
 - Drawing: 25279.1d
 - Interior shelving
 - Project: HT Alex 4 025
 - Project-no.: 2005-227



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**

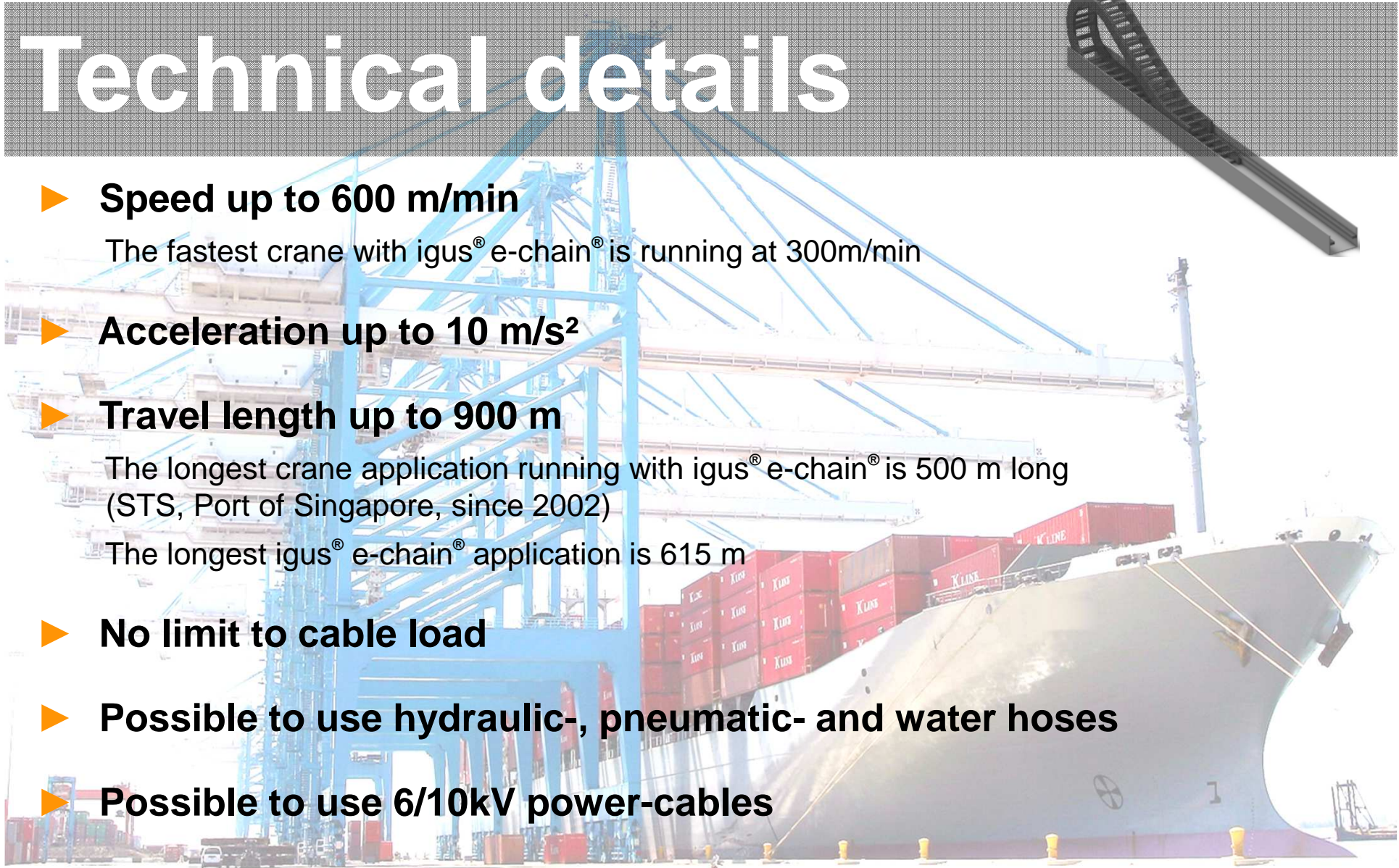
The longest crane application running with igus® e-chain® is 500 m long
(STS, Port of Singapore, since 2002)

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

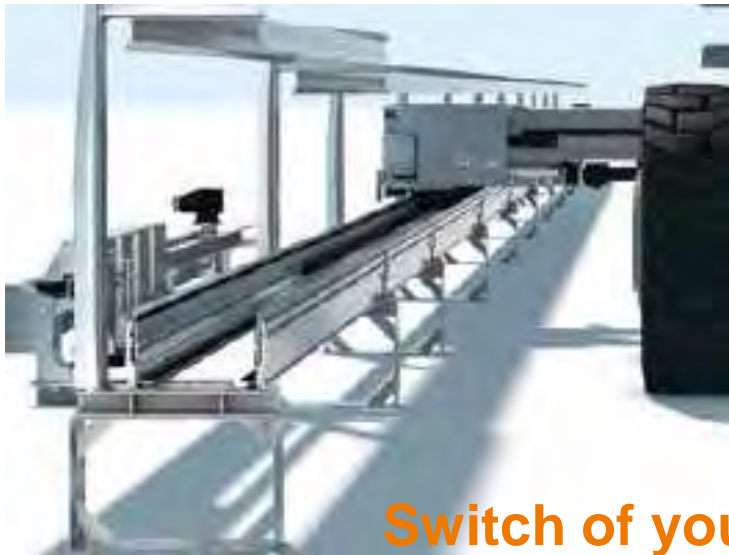
▶ **No limit to cable load**

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

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



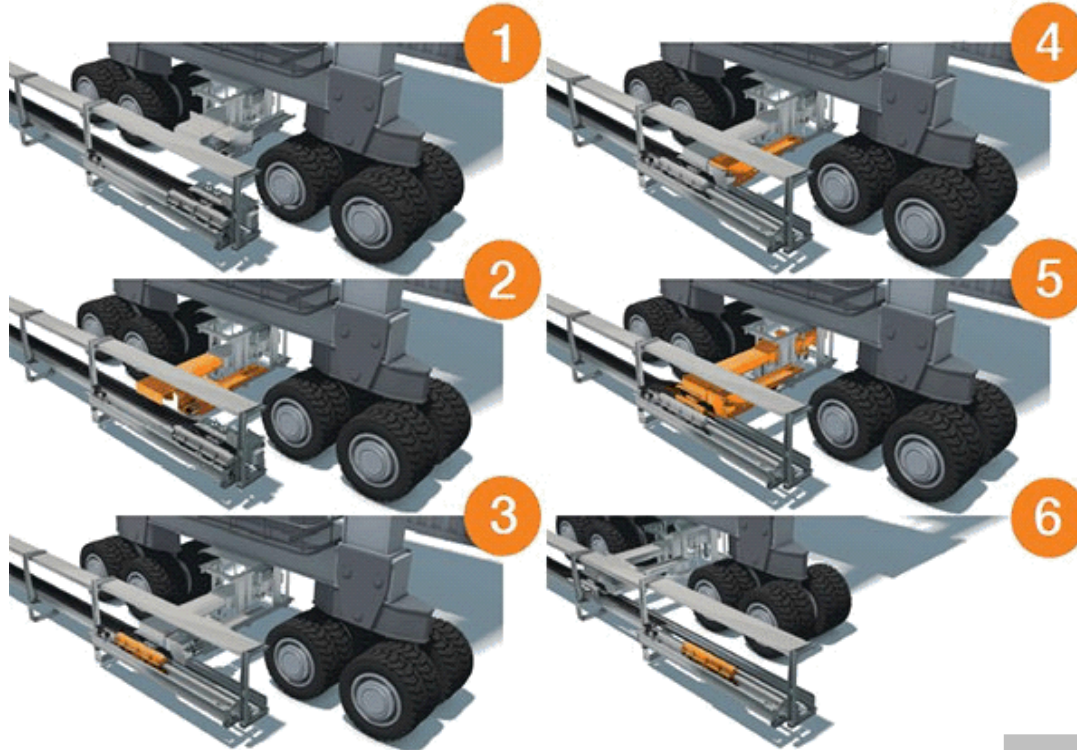
igus® e-rover – Automatic coupling system for RTGs



Switch of your diesel engines!!!

Special part – e-rover

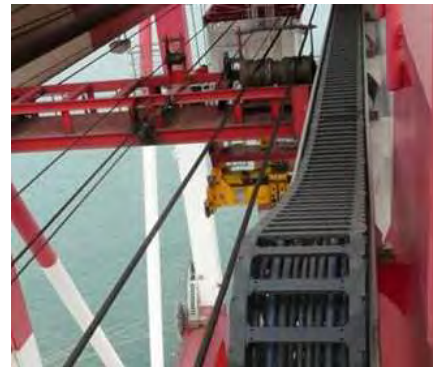
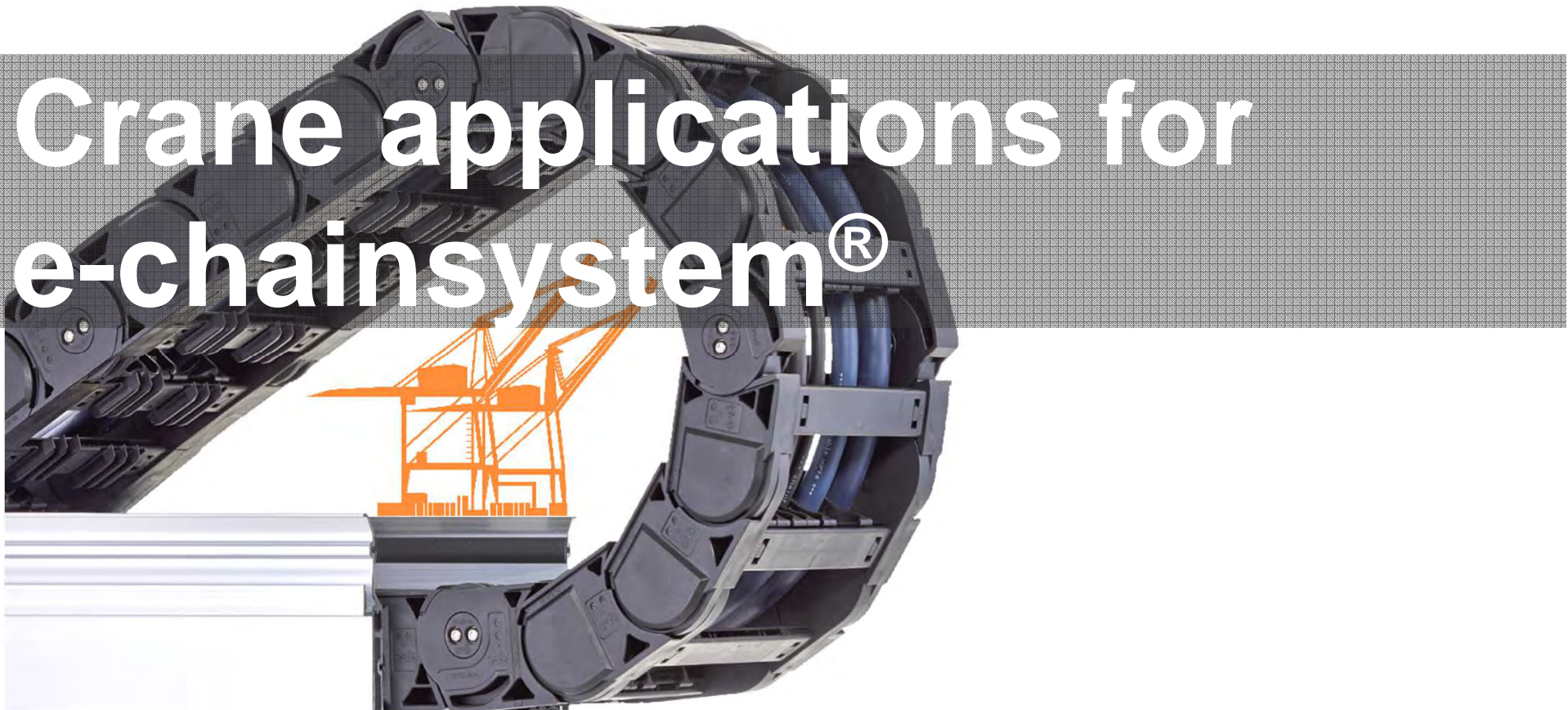
Main power supply for RTG's



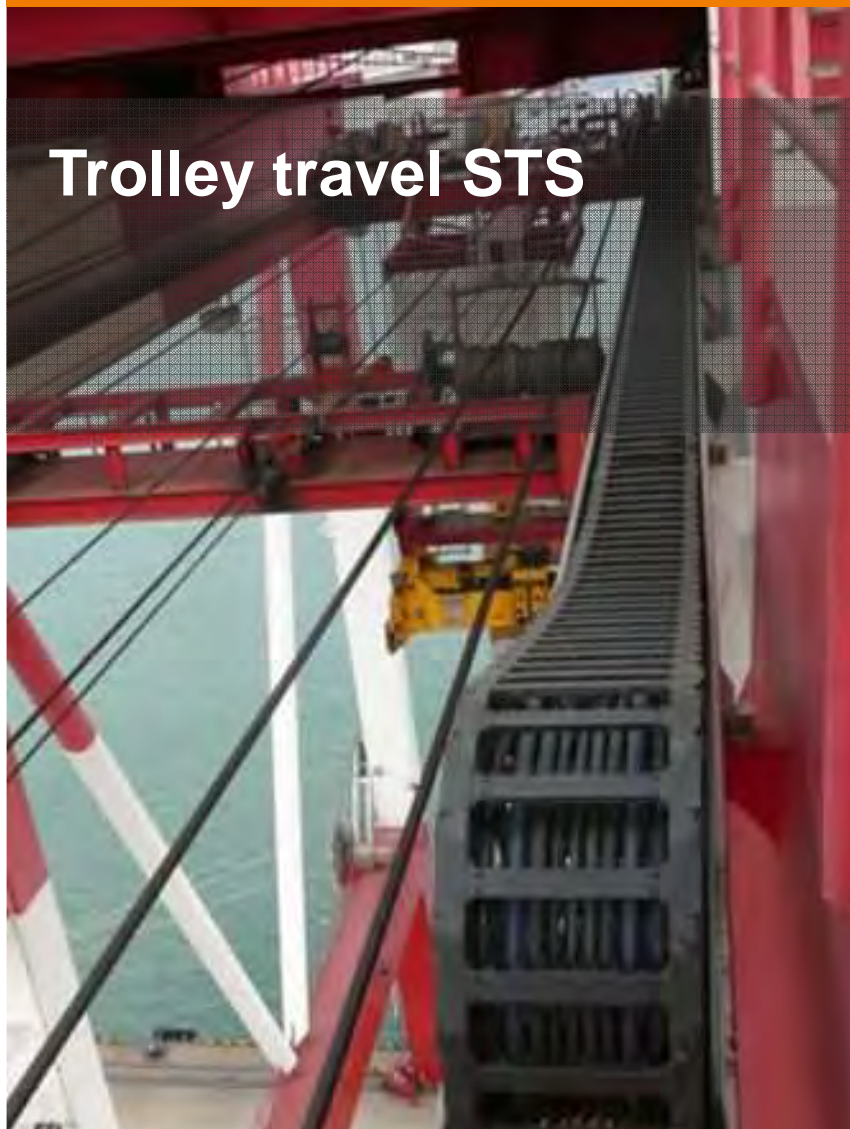
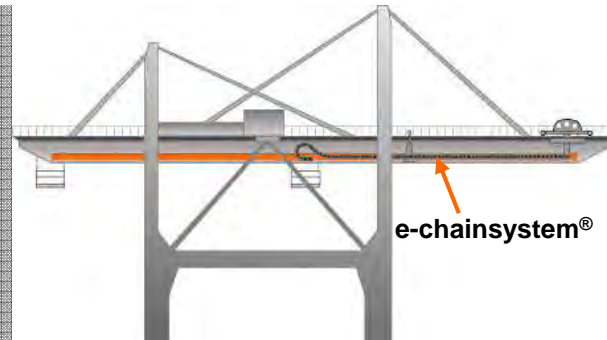
- ▶ Fast & secure automatic coupling system
- ▶ Coupling arm compensation +/- 400mm horizontally & +/- 300mm vertically
- ▶ Travels up to 800m possible
- ▶ Interference-free, high speed data transfer through igus® fiber optic cables
- ▶ All media can be conducted in one system
- ▶ Almost maintenance free



Crane applications for e-chainsystem®



Trolley travel STS



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



...Paceco STS cranes with e-chainsystem® & aluminum trough system...



e-chainsystem®

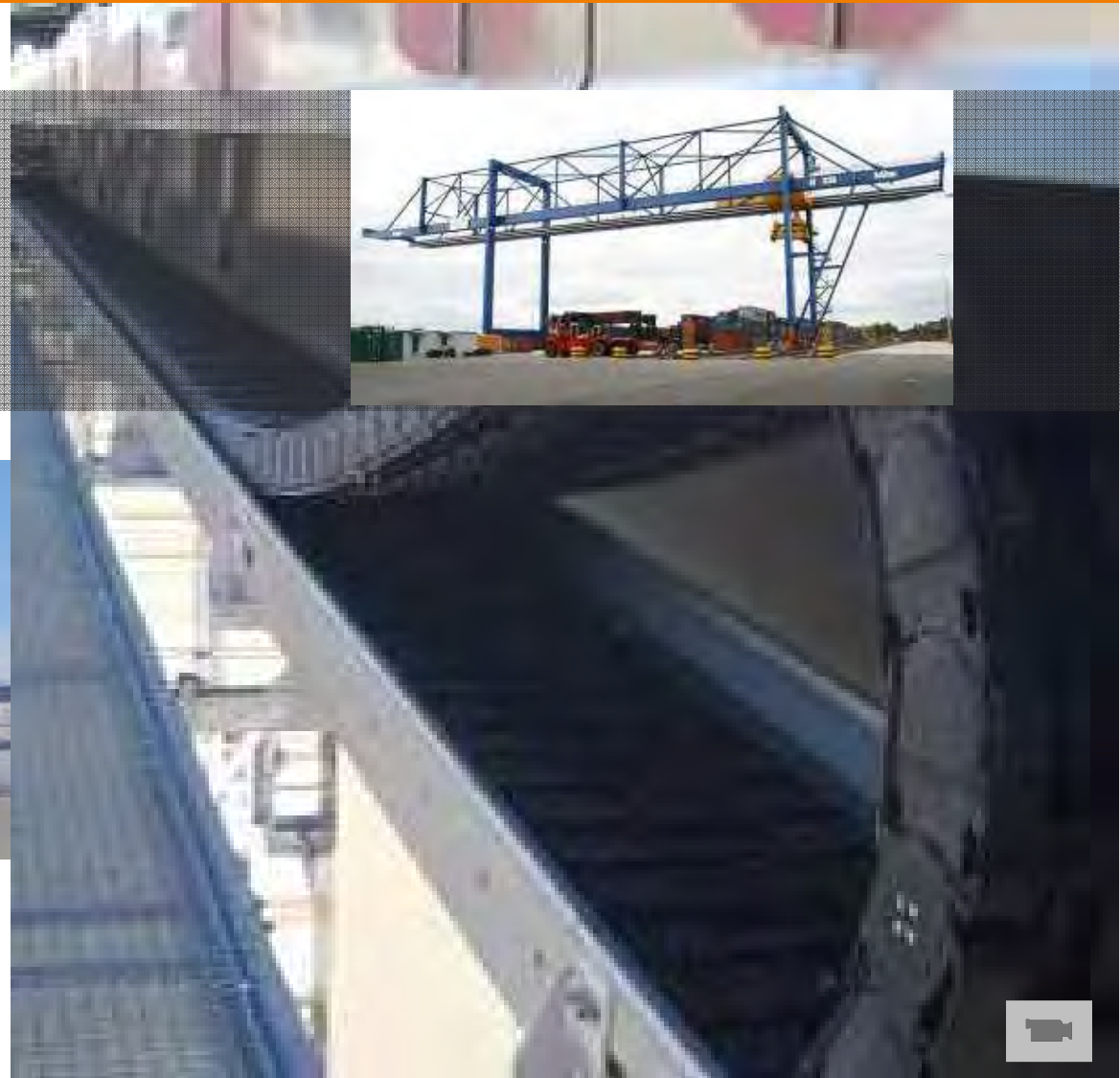


Travel length: 69,64 m
Speed: 3,0 m/s
Acceleration: 0,63 m/s²

e-chain®: 4040RHD.25.250.S10.0.E
chainflex®: CF300, CFPE, CF10, CF9, CFLG
guide trough: HD aluminum

Trolley travel RMG

P4.56R-System is running
successfully on Künz RMG's



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



Trolley travel RTG

4040(R)HD chain is running successfully on ZPMC,
Konecranes, Kalmar and Terex Noell RTG's



Upper and Lower Trolley travel Goliath Crane

5050RHD chain is running
successfully on various Goliath cranes around the world



e-chainsystem®



Crane and Trolley travel



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

Crane travel

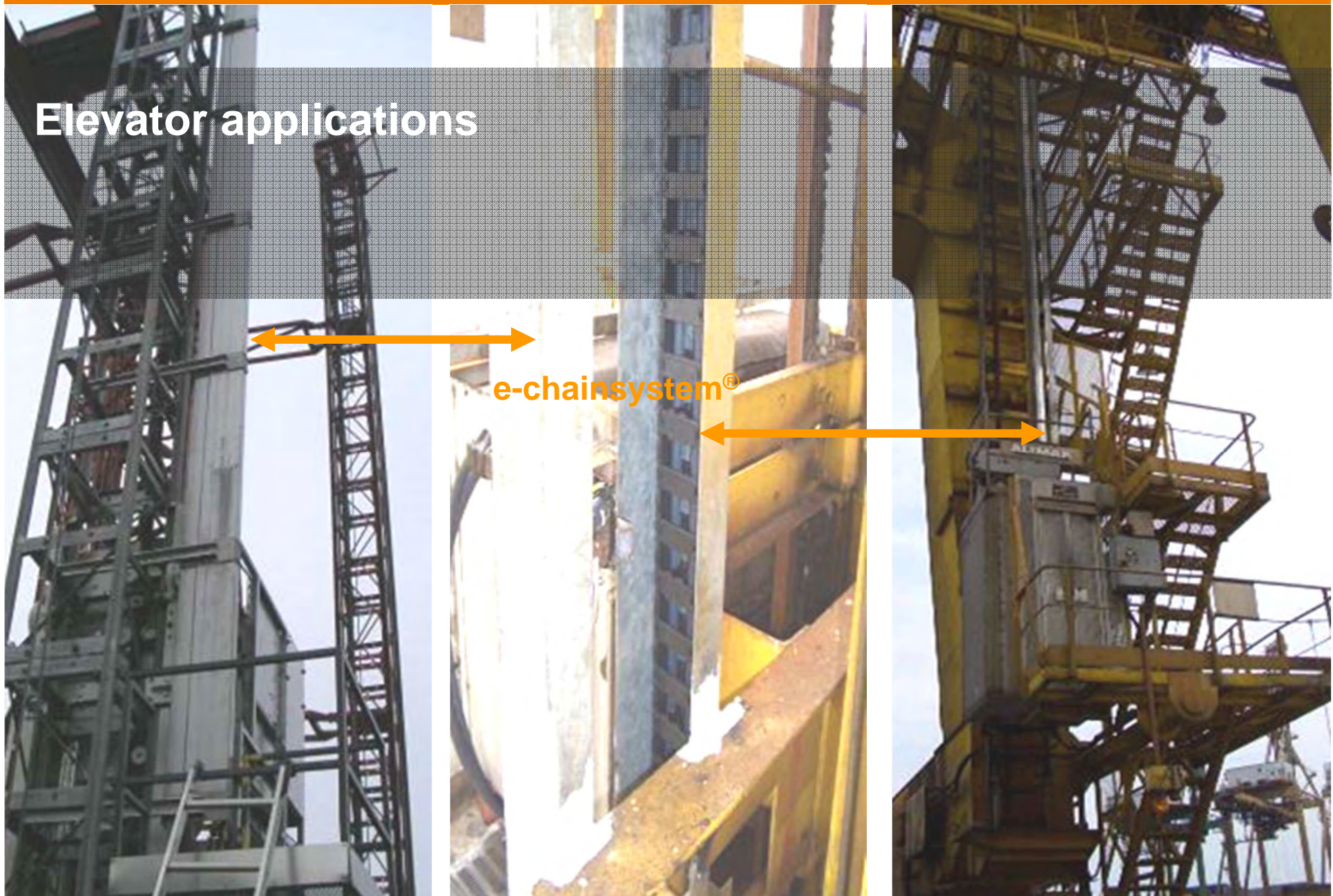


e-chainsystem®

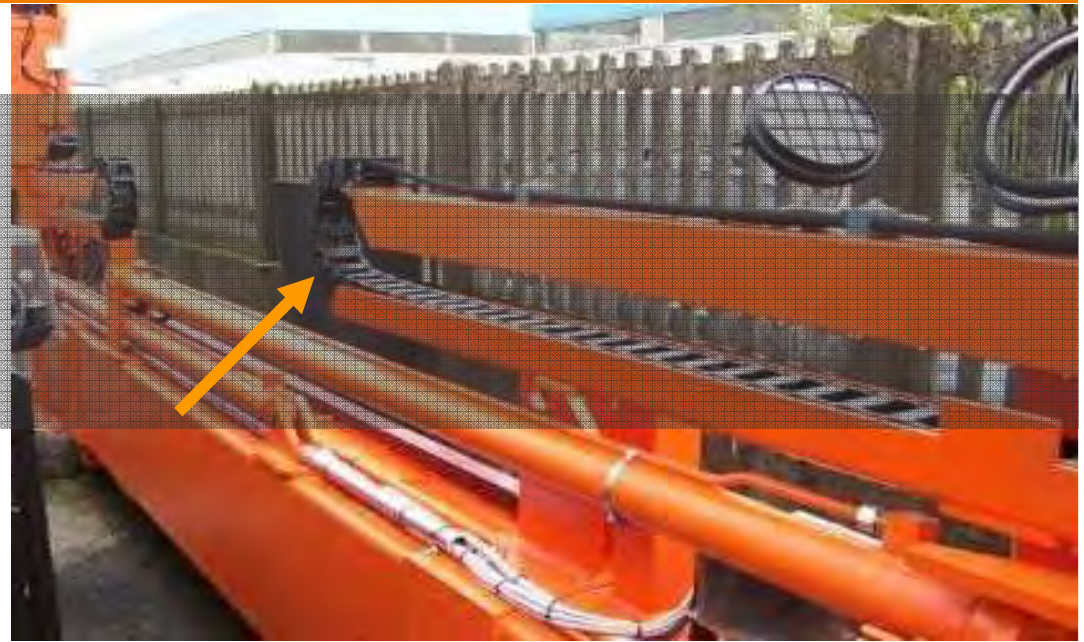
12 Container Cranes, Mainpower Supply

Travel:	500 m
Speed max.:	46 m/min
Acceleration max.:	0,2 m/sec ²
energychain®:	5050RHD
chainflex® Types:	CFCrane
Location:	Asia

Elevator applications



Spreader applications



e-chainsystem®



Reachstacker applications



Retrofit STS crane

Before: Festoon System



After: igus® e-chain®



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



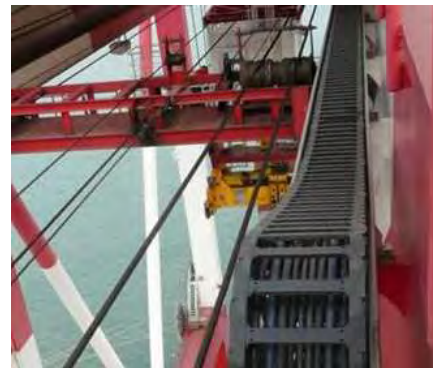
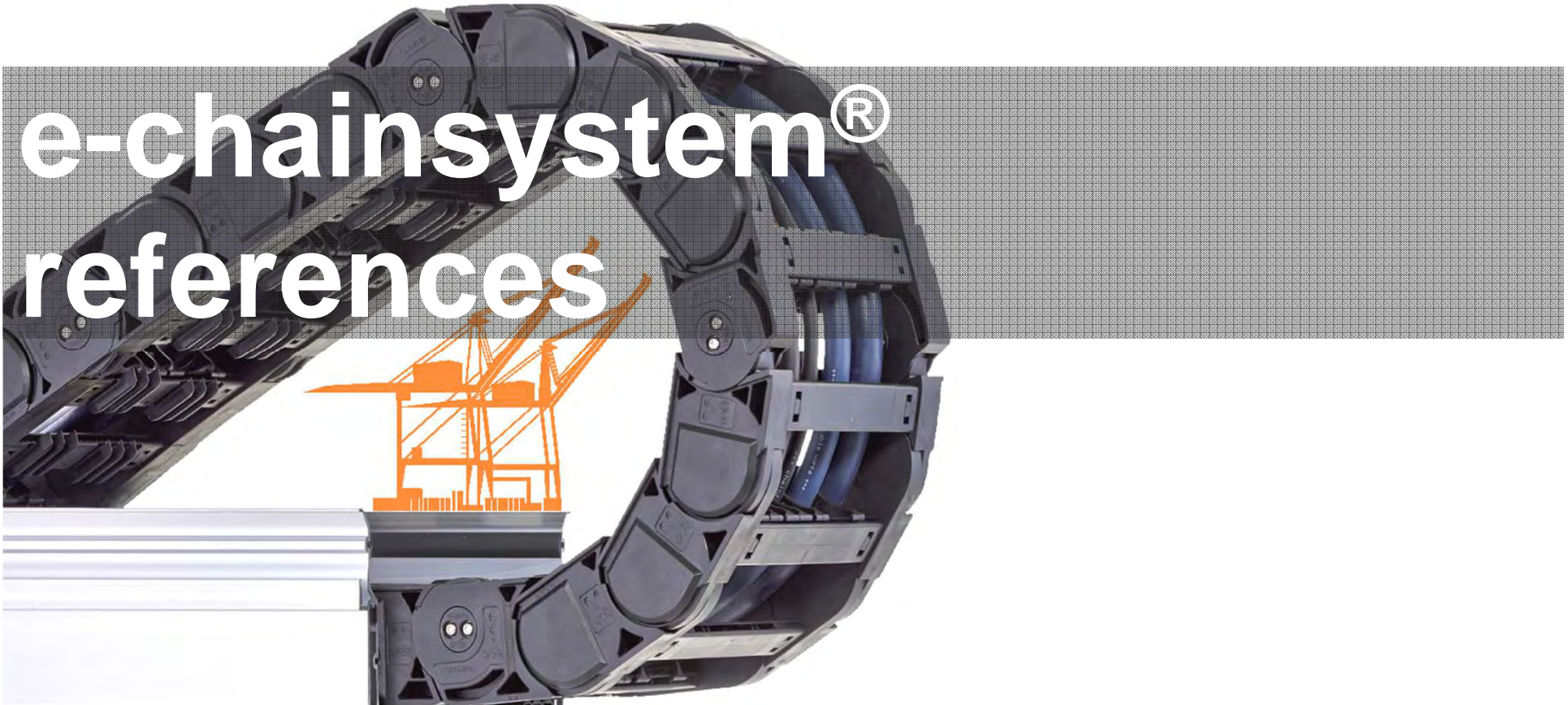
After: igus® e-chain®



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



e-chainsystem® references





Worldwide:

- ▶ Over 4.650* RTG's / RMG's (100 with P4 chain)
- ▶ Over 720* STS (200 with P4 chain)
- ▶ Over 15.500* Spreader
- ▶ Over 26.000* Indoor-, Gantry-, Bulkhandling-, Shipyard- and Special Cranes

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igus® GmbH **Crane-Department**

Spicher Straße 1a
51147 Köln (Cologne)
Germany

Tel: +49(0)2203/9649-800

Fax: +49(0)2203/9649-222

E-mail: cranes@igus.de
www.igus-cranes.com



Theo Diehl
Tel. +49 (0)6162 / 6808
tdiehl@igus.de



Jens Göbel
Tel. +49 (0)2203 / 9649-114
jgoebel@igus.de