

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



light & quick
for heavy-weights...

8th PHILIPPINE
PORTS AND 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



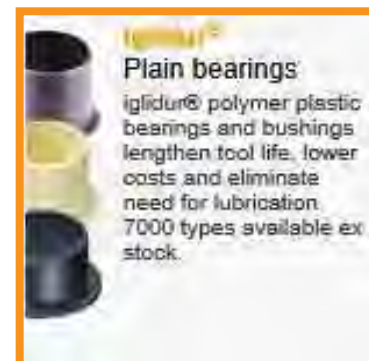
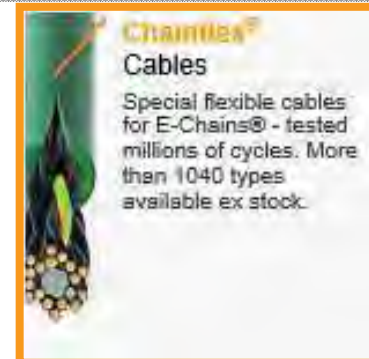


Location:

Unit 6A, 8414 D. A. Santos Ave.
Sucat, Parañaque City
Philippines 1700

sales@sieplus.ph

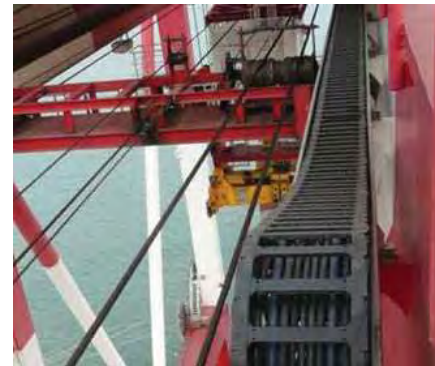
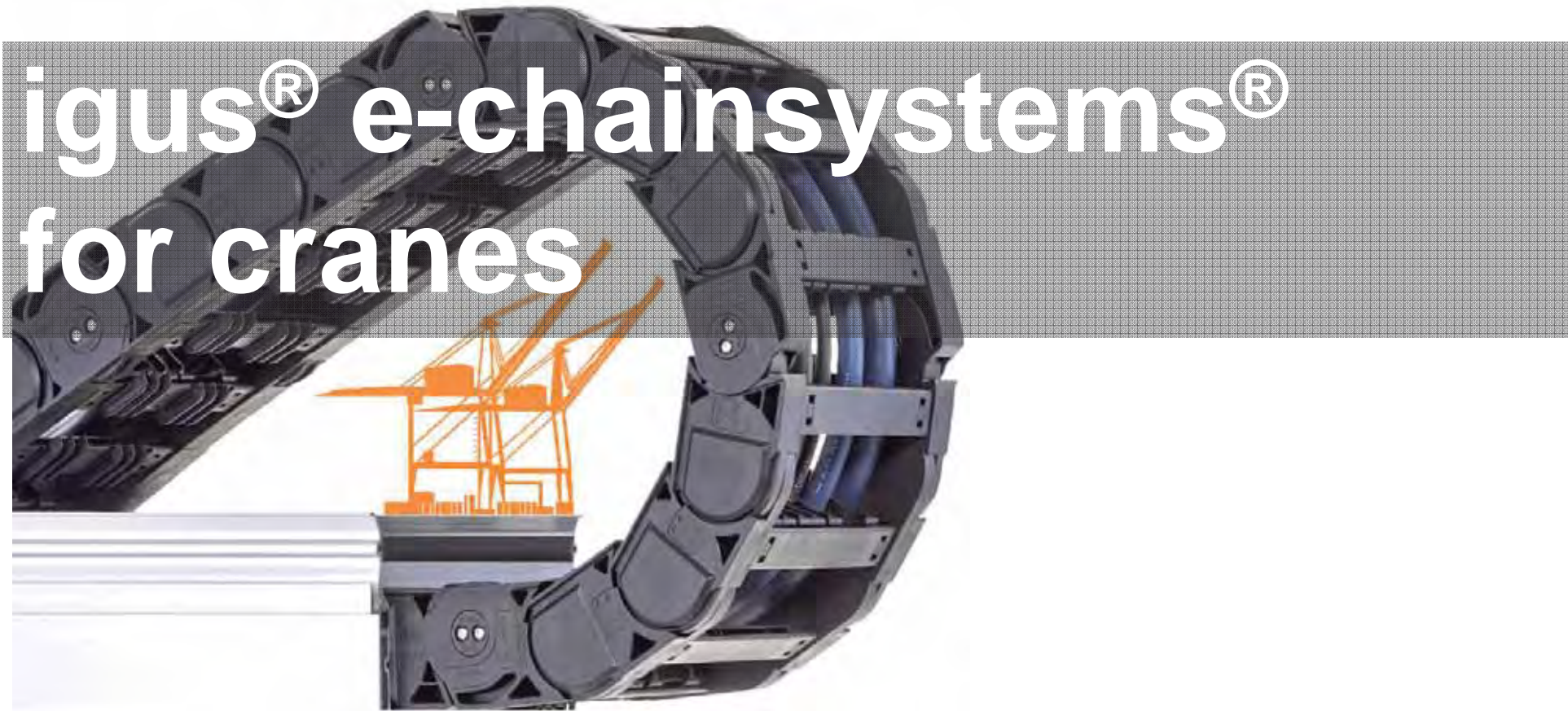
www.sieplus.ph



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

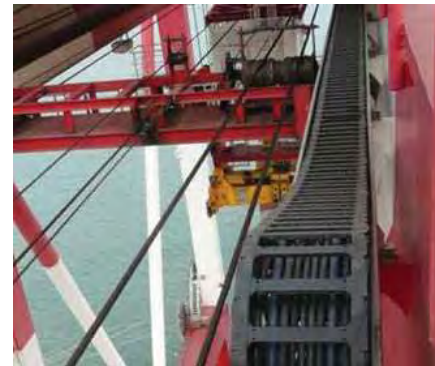
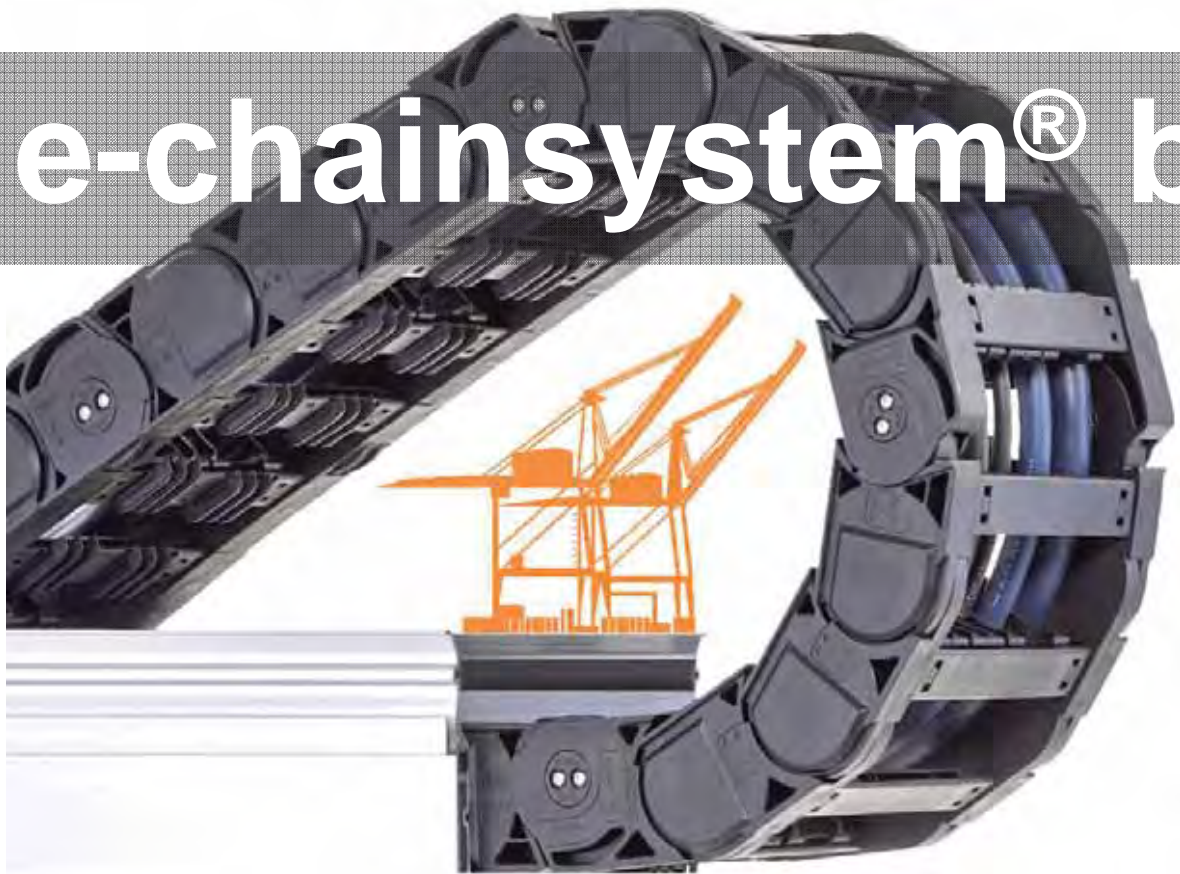


Cable tender

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



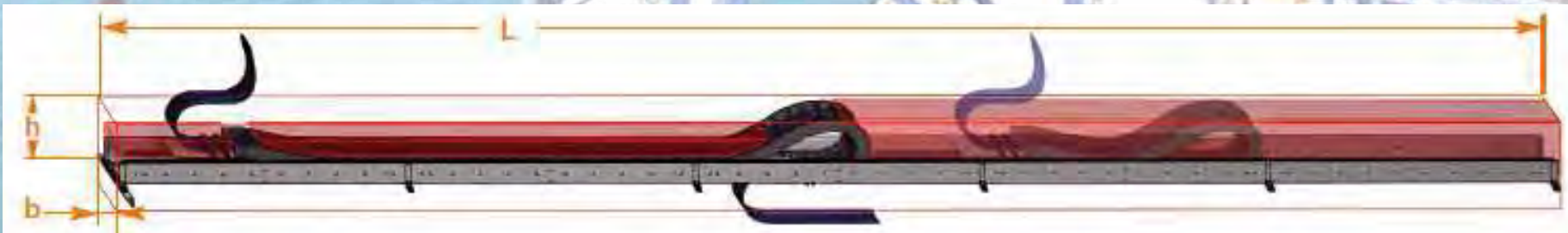
e-chainsystem® benefits



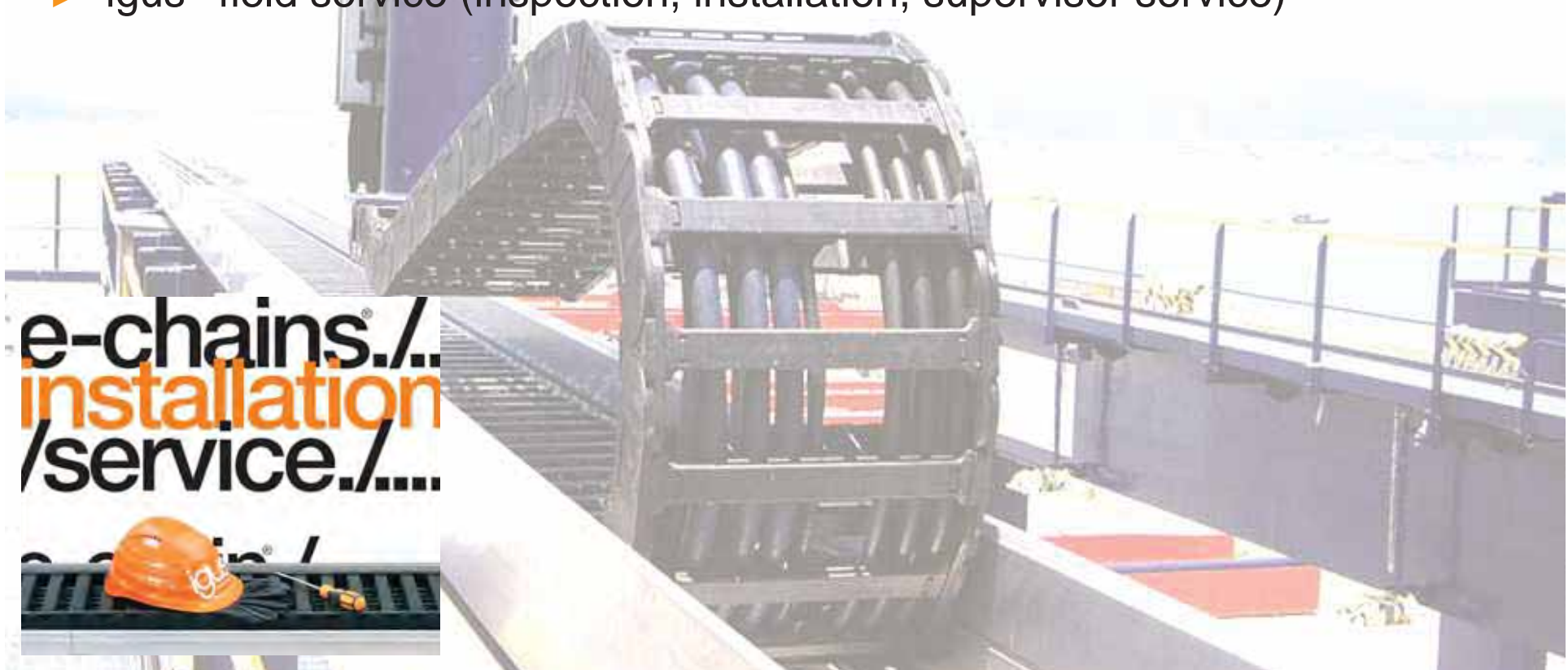
- ▶ Space saving design
- ▶ No cable loop station & no additional steel structure for loop station



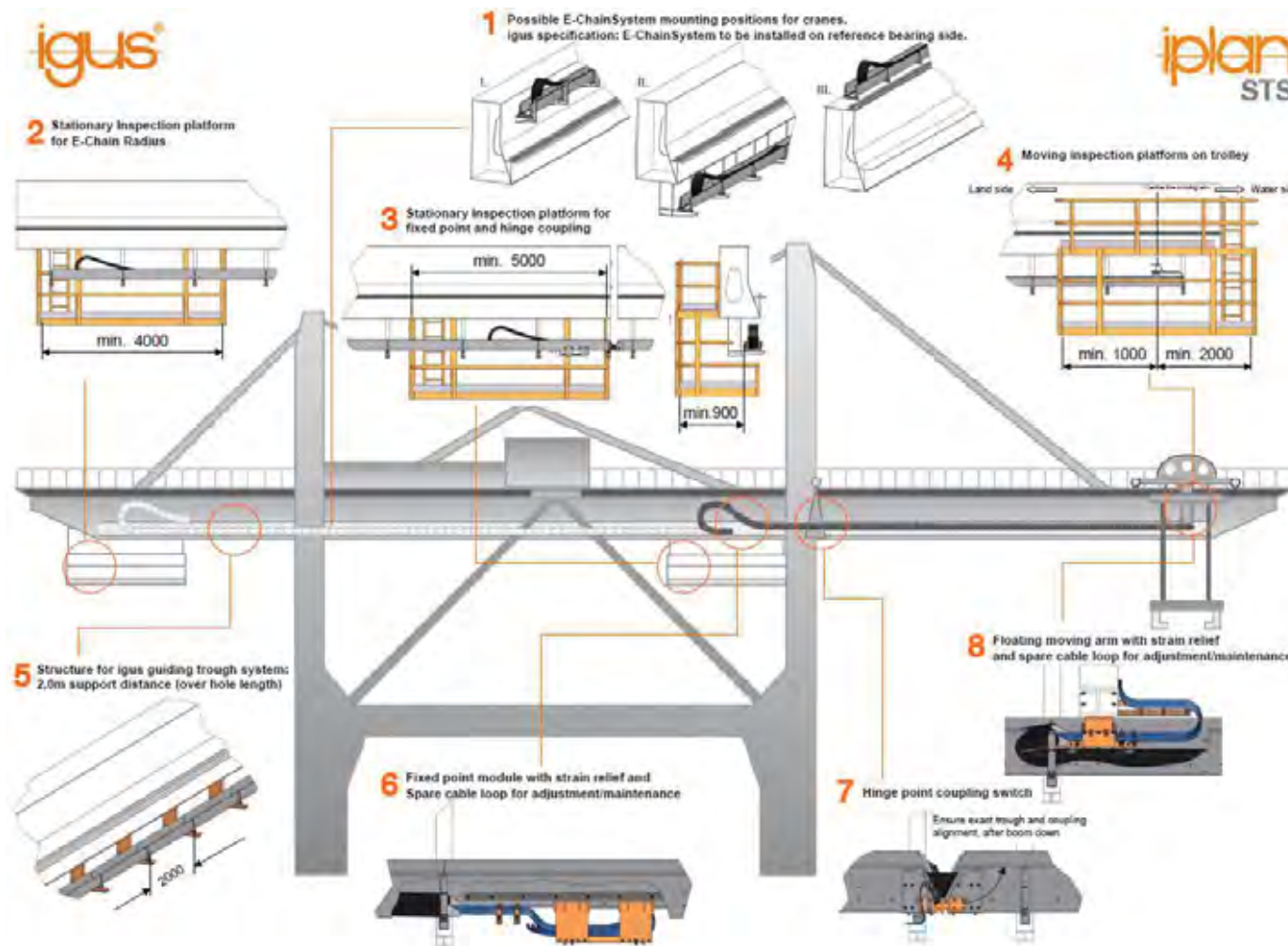
Required installation space for
e-chainsystem® $h = \text{approx. } 800 \text{ mm}$



- ▶ 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, ...) can be conveyed in one system
- ▶ Quick an easy installation of additional cables or hoses
- ▶ igus® field service (inspection, installation, supervisor service)



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



▶ **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**

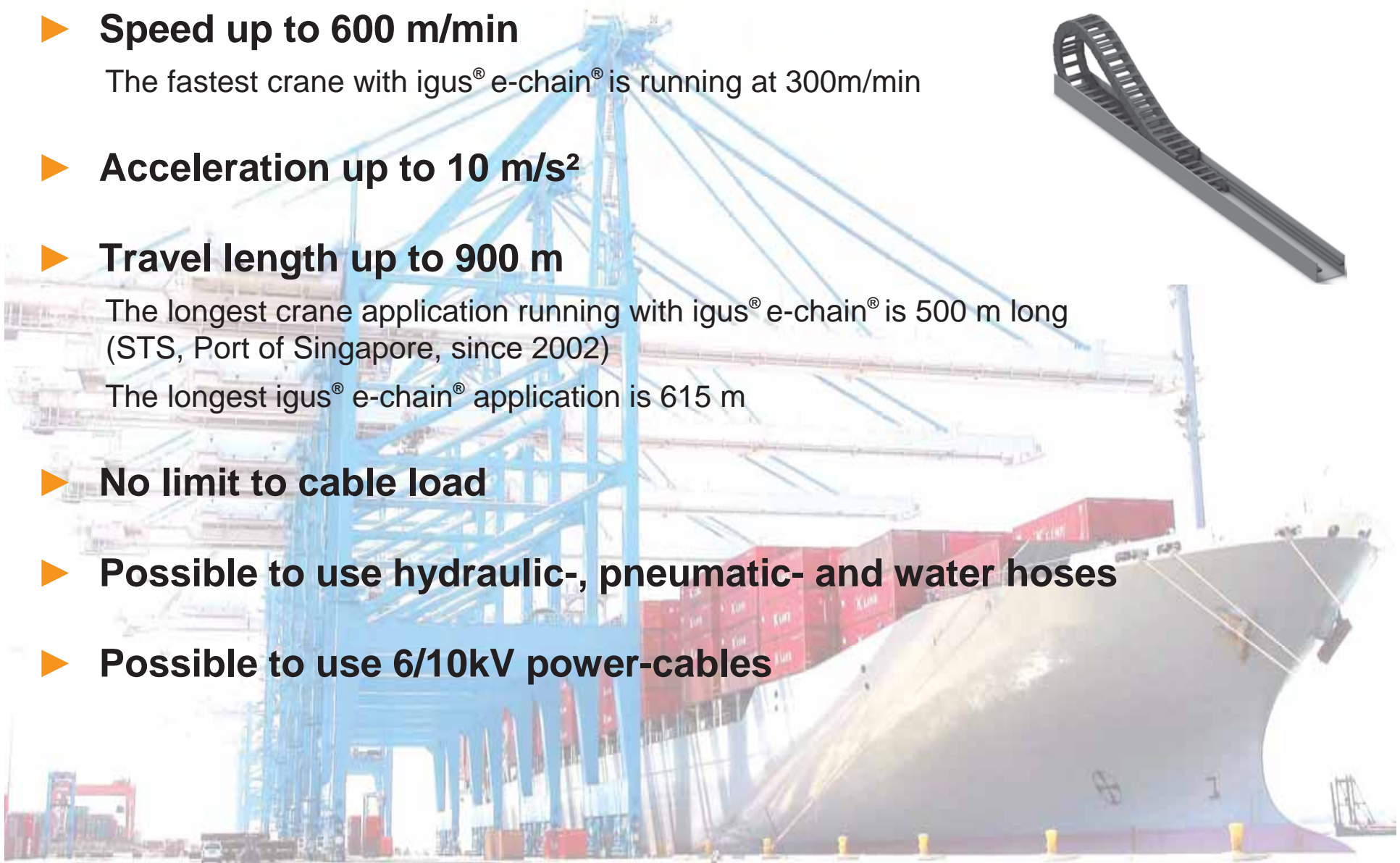
The longest crane application running with igus® e-chain® is 500 m long
(STS, Port of Singapore, since 2002)

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

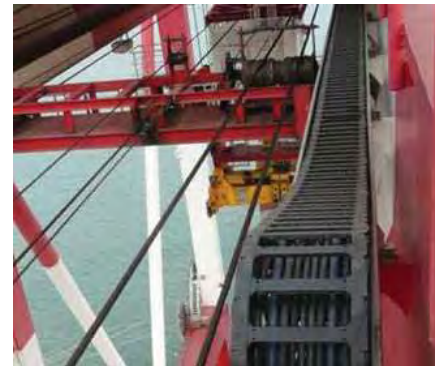
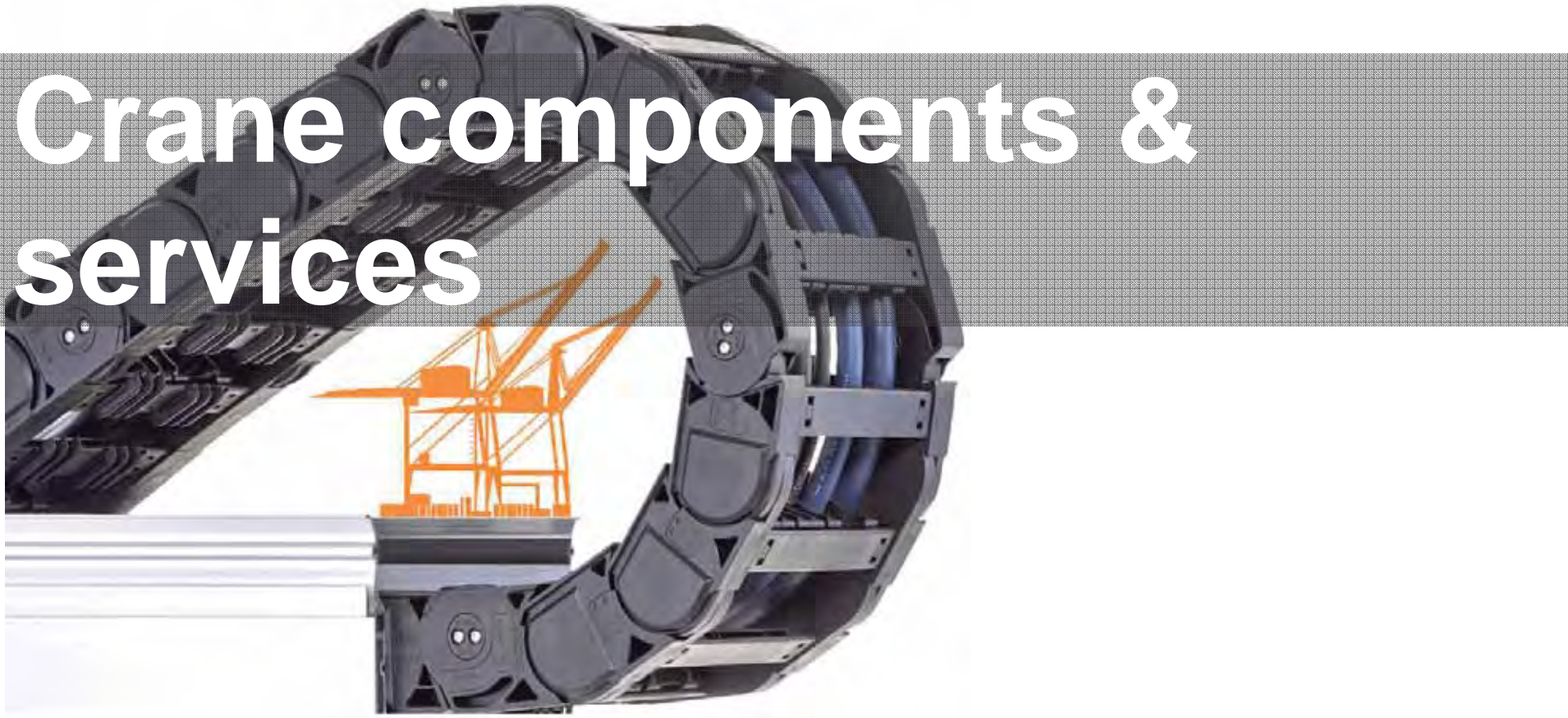
▶ **No limit to cable load**

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

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



Crane components & services



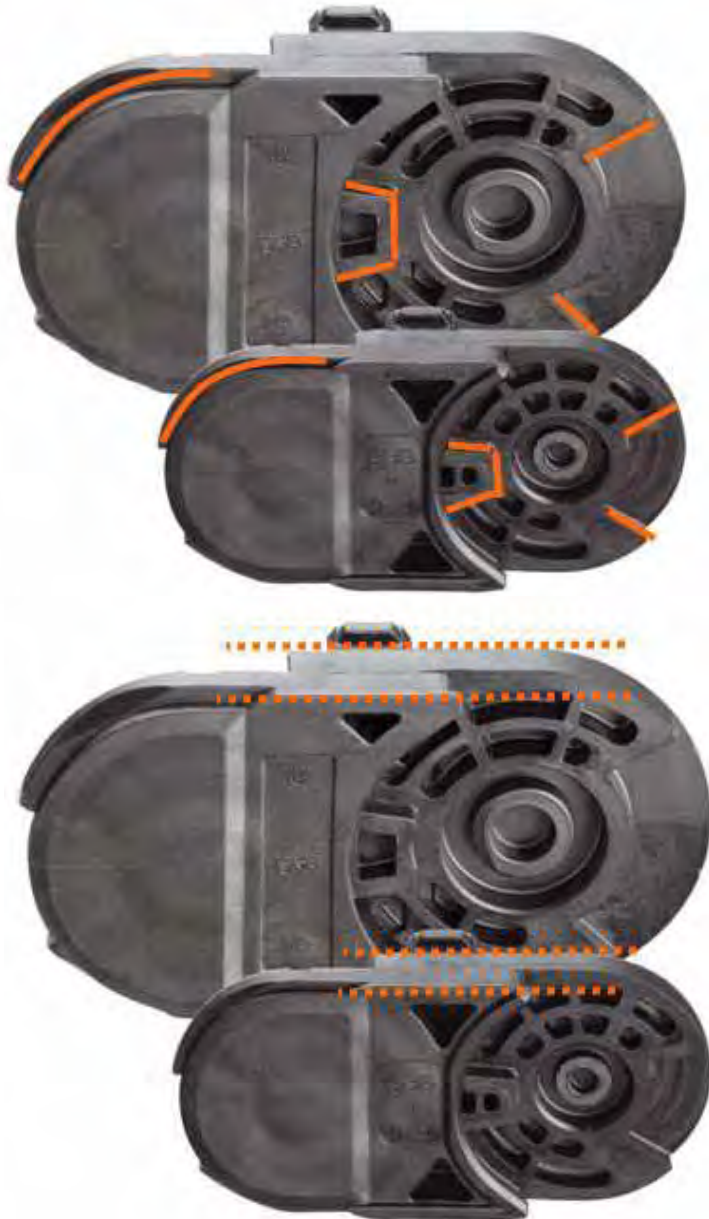
e-chain® series E4/4



- ▶ 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 required to assemble / disassemble the chain



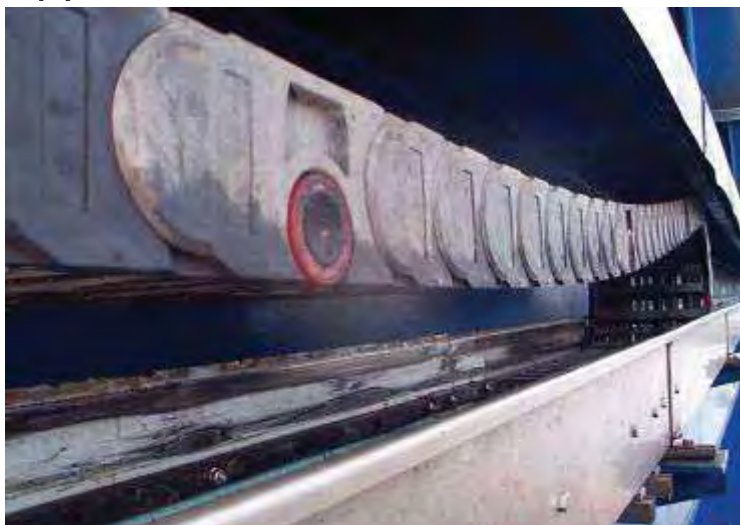
rol-e-chain® series E4/4



**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



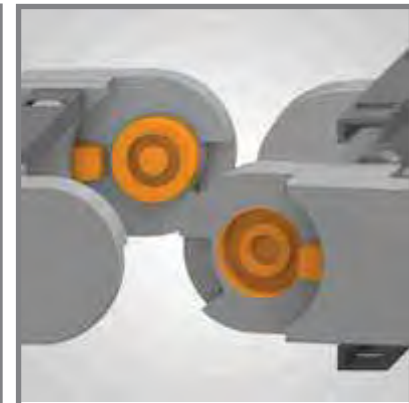
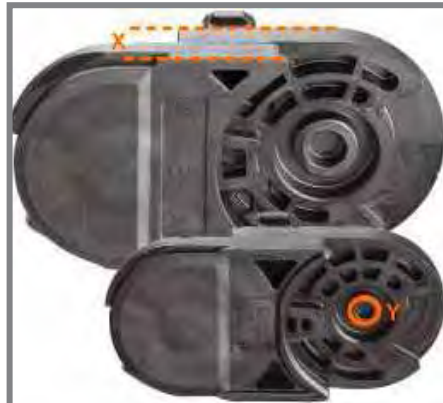
Heavy Duty rol-e-chain® series



- ▶ 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!

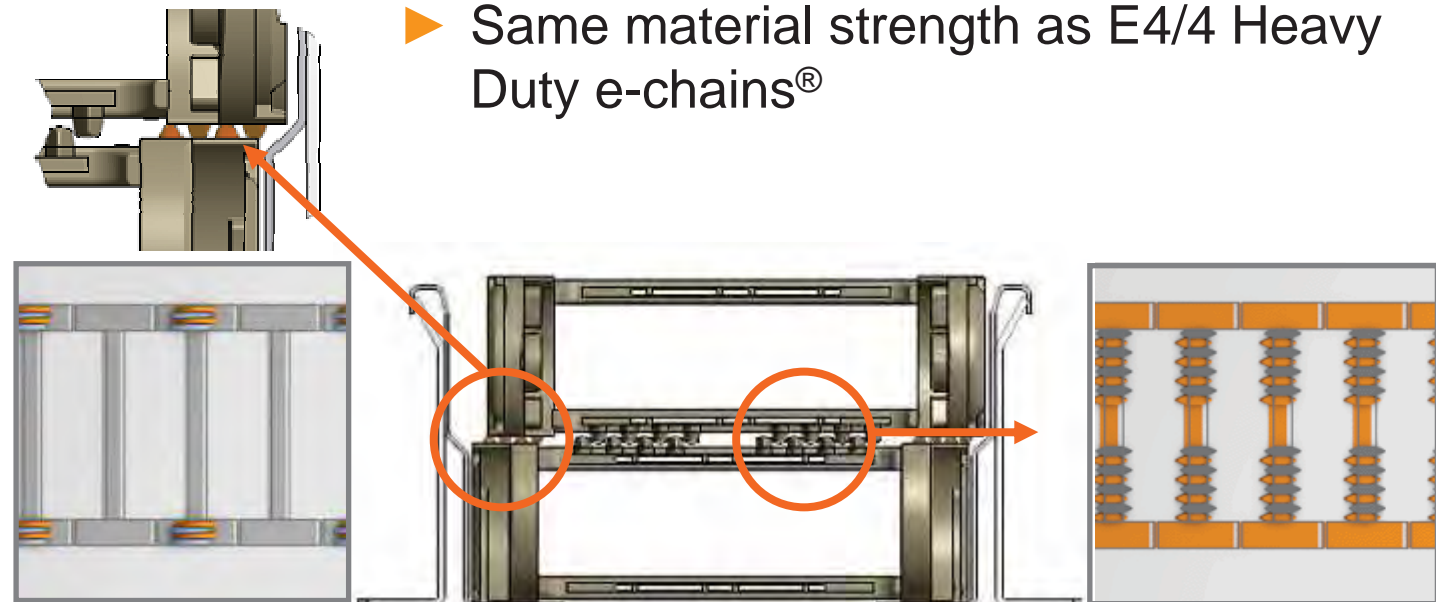


e-chain® series P4



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®



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)



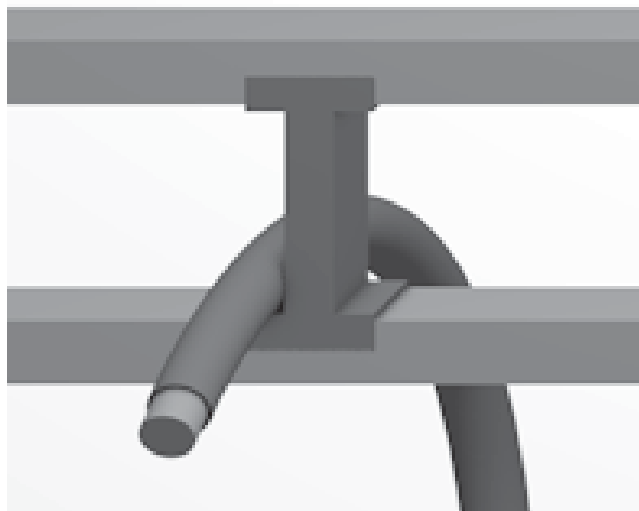
Climatic tests for all e-chain® & chainflex® cables.
Material tests from - 40°C up to +199°C.

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



readychain®



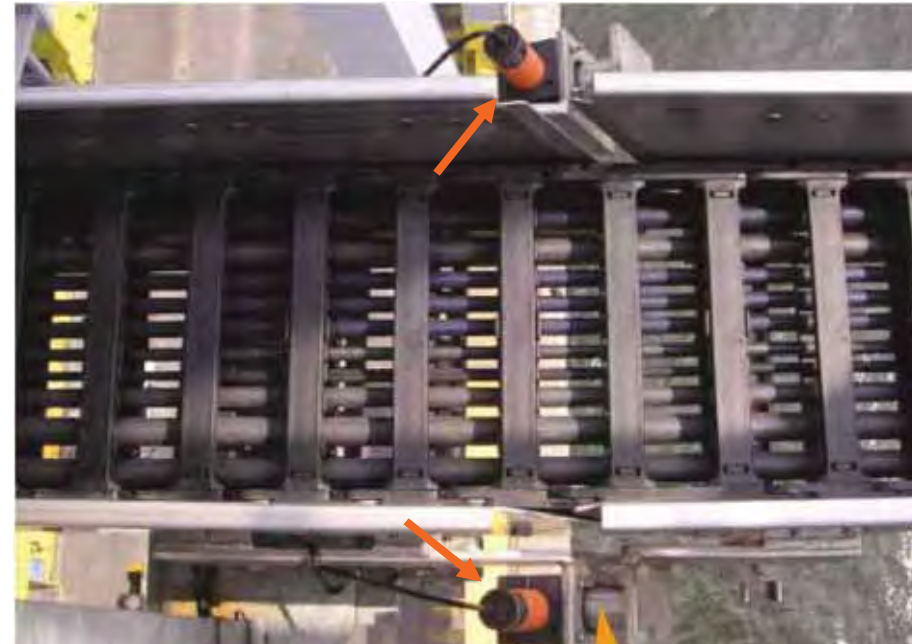
- ▶ The selected igus® chainflex® are inserted in the e-chain®
- ▶ The defined cable projecting lengths are marked and fixed
- ▶ Project-specific cable connections are mounted
- ▶ The complete readychain®-system is delivered on a special wooden drum



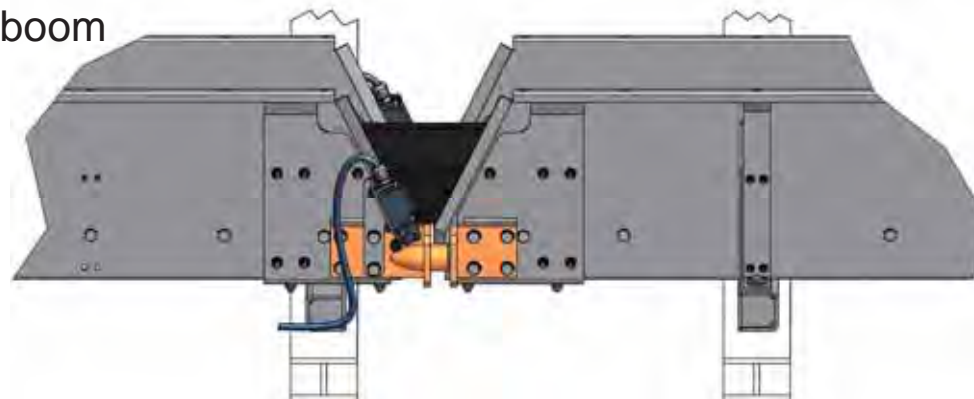
Special part - hinge clutch



Hinge clutch at the hinge point with bolts and holes to get a safe adjustment after bringing down the boom



Hinge clutch at hinge point incl. limit switch

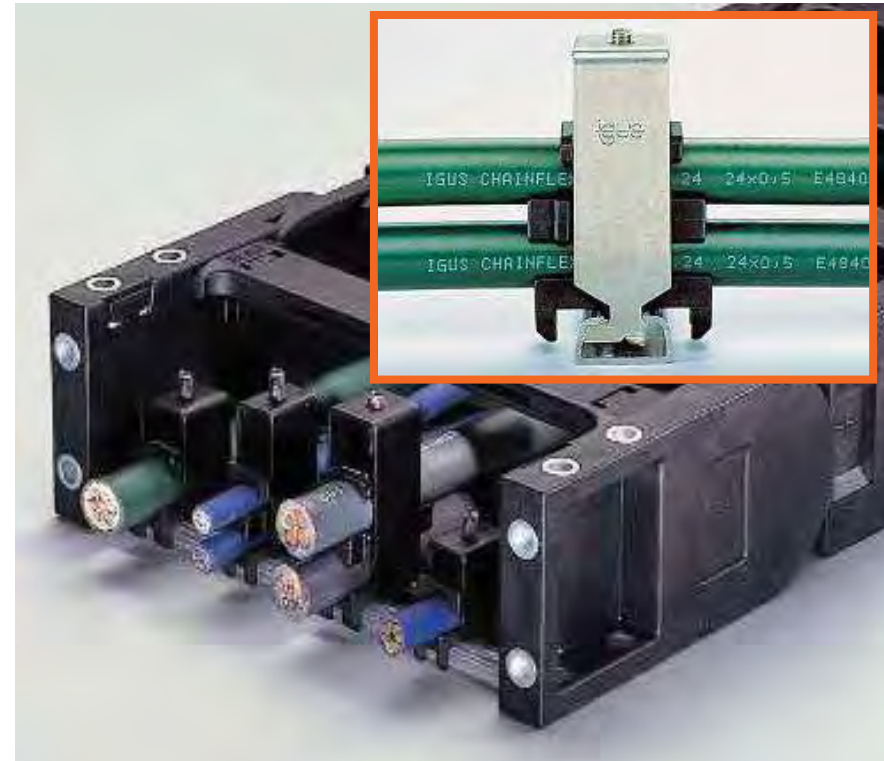


Floating moving arm



igus® floating moving arm for compensation of the lateral mismatch

Strain relief



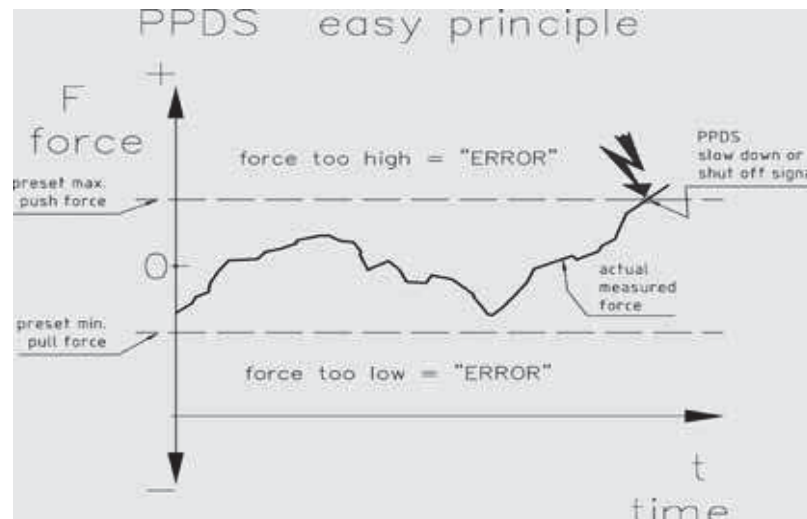
Clamps for safe cable strain relief

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

The image displays a comprehensive technical drawing for a crane system. It includes a main perspective view of the crane with labels for 'Girder', 'hinge point', 'Boom', and 'trolley'. Below this are several detailed views: 'Detail 10" H100' showing the trolley and guide system, 'Detail 11" H100' showing a hinge point, and 'Detail 12" H100' showing another section of the crane. A 'Construction view' shows the internal components of the guiding trough system. A 'Section A-A H100' provides a cross-sectional view of the trough assembly. The drawing is annotated with numerous dimensions, force values (e.g., $F_{app} = 1.5kN$, $F = 5,9kN$), and material specifications. It also features several tables, including a parts list and a bill of materials, and a 'draft authorization' box. The drawing is titled 'Guiding trough system' and includes a note about the importance of installing an electronic switch on both sides of the coupling.

Guiding trough system

Detail 10" H100
 max. force = 5,9kN / support bracket
 Push/Pull Force
 max. force = 2,5kN
 max. force = 1,5kN / roof bracket
 max. force = 3,0kN / roof bracket

Detail 11" H100
 max. force = 1,5kN / roof bracket
 max. force = 3,0kN / roof bracket

Detail 12" H100

Construction view
 The guiding trough system is composed of the following parts:
 - The guiding trough and its supporting structure
 - The guiding trough and its supporting structure
 - The guiding trough and its supporting structure
 - The guiding trough and its supporting structure

Section A-A H100
 max. force = 1,5kN / roof bracket
 max. force = 3,0kN / roof bracket

Bill of Materials

Part No.	Description	Quantity	Unit
1	Guiding trough system	1	set
2	Support bracket	2	pieces
3	Roof bracket	2	pieces
4	Roof bracket	2	pieces
5	Roof bracket	2	pieces
6	Roof bracket	2	pieces
7	Roof bracket	2	pieces
8	Roof bracket	2	pieces
9	Roof bracket	2	pieces
10	Roof bracket	2	pieces
11	Roof bracket	2	pieces
12	Roof bracket	2	pieces
13	Roof bracket	2	pieces
14	Roof bracket	2	pieces
15	Roof bracket	2	pieces
16	Roof bracket	2	pieces
17	Roof bracket	2	pieces
18	Roof bracket	2	pieces
19	Roof bracket	2	pieces
20	Roof bracket	2	pieces

Assembly Instructions

1. The guiding trough system is to be installed on the girder.
 2. The guiding trough system is to be installed on the girder.
 3. The guiding trough system is to be installed on the girder.
 4. The guiding trough system is to be installed on the girder.
 5. The guiding trough system is to be installed on the girder.
 6. The guiding trough system is to be installed on the girder.
 7. The guiding trough system is to be installed on the girder.
 8. The guiding trough system is to be installed on the girder.
 9. The guiding trough system is to be installed on the girder.
 10. The guiding trough system is to be installed on the girder.
 11. The guiding trough system is to be installed on the girder.
 12. The guiding trough system is to be installed on the girder.
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 14. The guiding trough system is to be installed on the girder.
 15. The guiding trough system is to be installed on the girder.
 16. The guiding trough system is to be installed on the girder.
 17. The guiding trough system is to be installed on the girder.
 18. The guiding trough system is to be installed on the girder.
 19. The guiding trough system is to be installed on the girder.
 20. The guiding trough system is to be installed on the girder.

Additional Information

It is extremely important to install an electronic switch on both sides of the coupling to check the exact position of the trough before the E-Drive starts to move.

Attention!
 All screws to be tightened with a torque spanner!

draft authorization

date: _____
 signature: _____
 customer: _____

Special part – e-rover

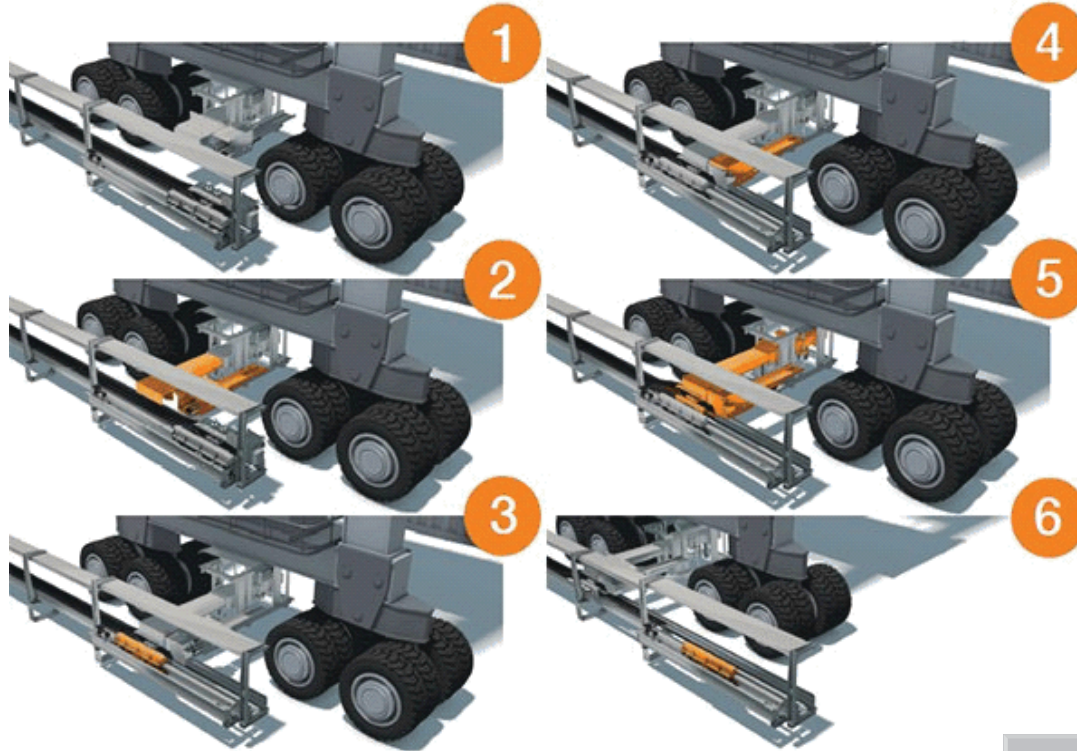
Automatic coupling system for RTGs



Switch of your diesel engines!!!

Special part – e-rover

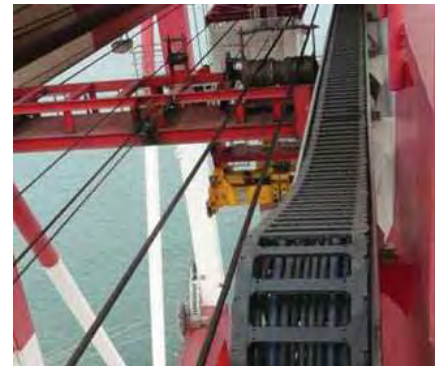
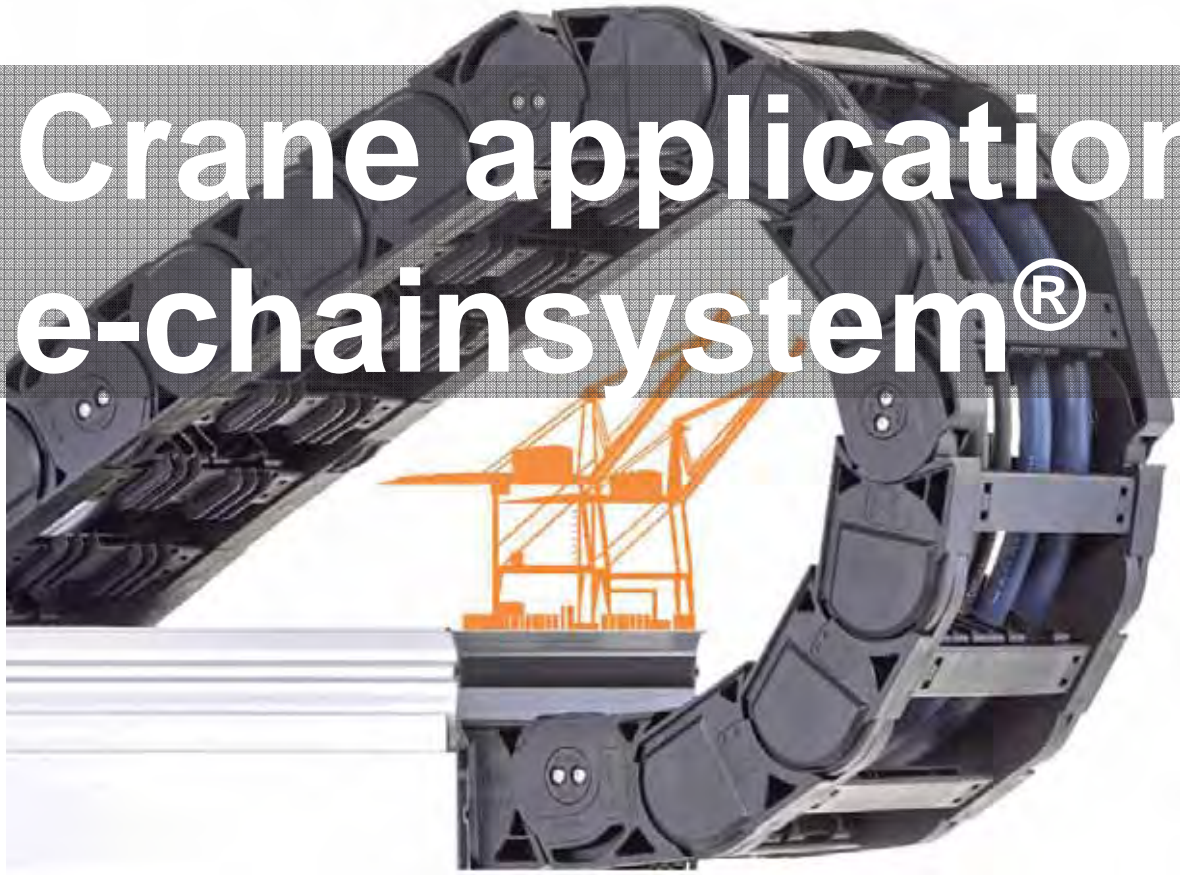
Main power supply for RTG's



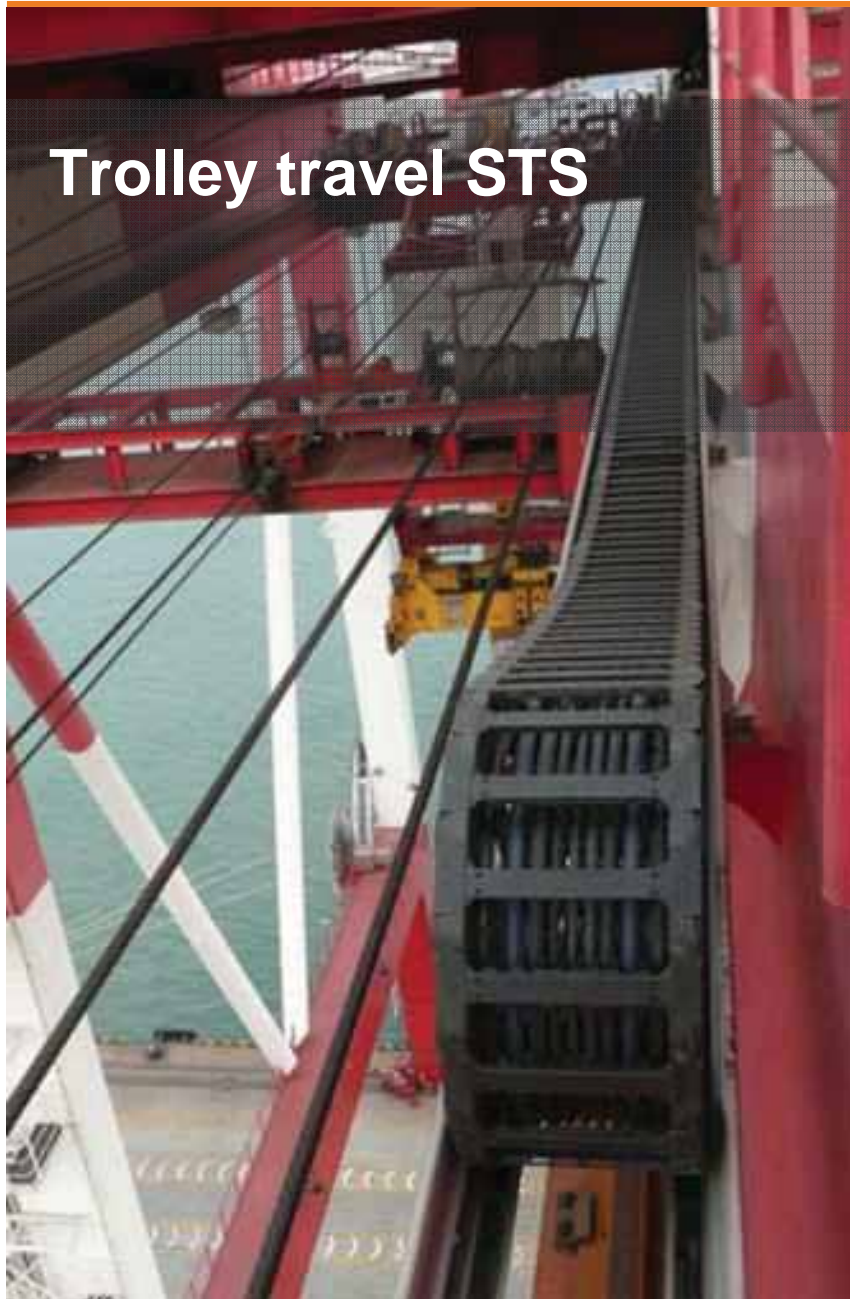
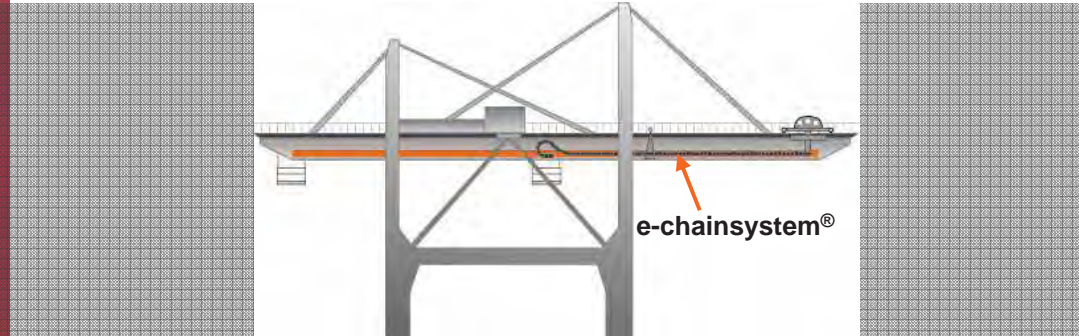
- ▶ Fast & secure automatic coupling system
- ▶ Coupling arm compensation +/- 400mm horizontally & +/- 300mm vertically
- ▶ Travels up to 800m possible
- ▶ Interference-free, high speed data transfer through igus® fiber optic cables
- ▶ All media can be conducted in one system
- ▶ Almost maintenance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



Crane applications for e-chainsystem®



Trolley travel STS



Trolley travel RMG

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



Trolley travel RTG

4040HD chain is running
successfully on Terex Noell RTG's

e-chainsystem®



Upper and Lower Trolley travel Goliath Crane

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



Crane and Trolley travel



Shipunloader Crane

Travel, crane / trolley:

441 / 90 m

Speed, crane / trolley:

30 / 190 m / min

Acceleration, crane / trolley:

0,1 / 1,0 m/s²

energy chain®:

5050R.28.300.S10.0.E

5050R.21/21/21.250.S10.0.E


chainflex® Types:

CFCRANE, CF330, CF31, CF11, CFLG

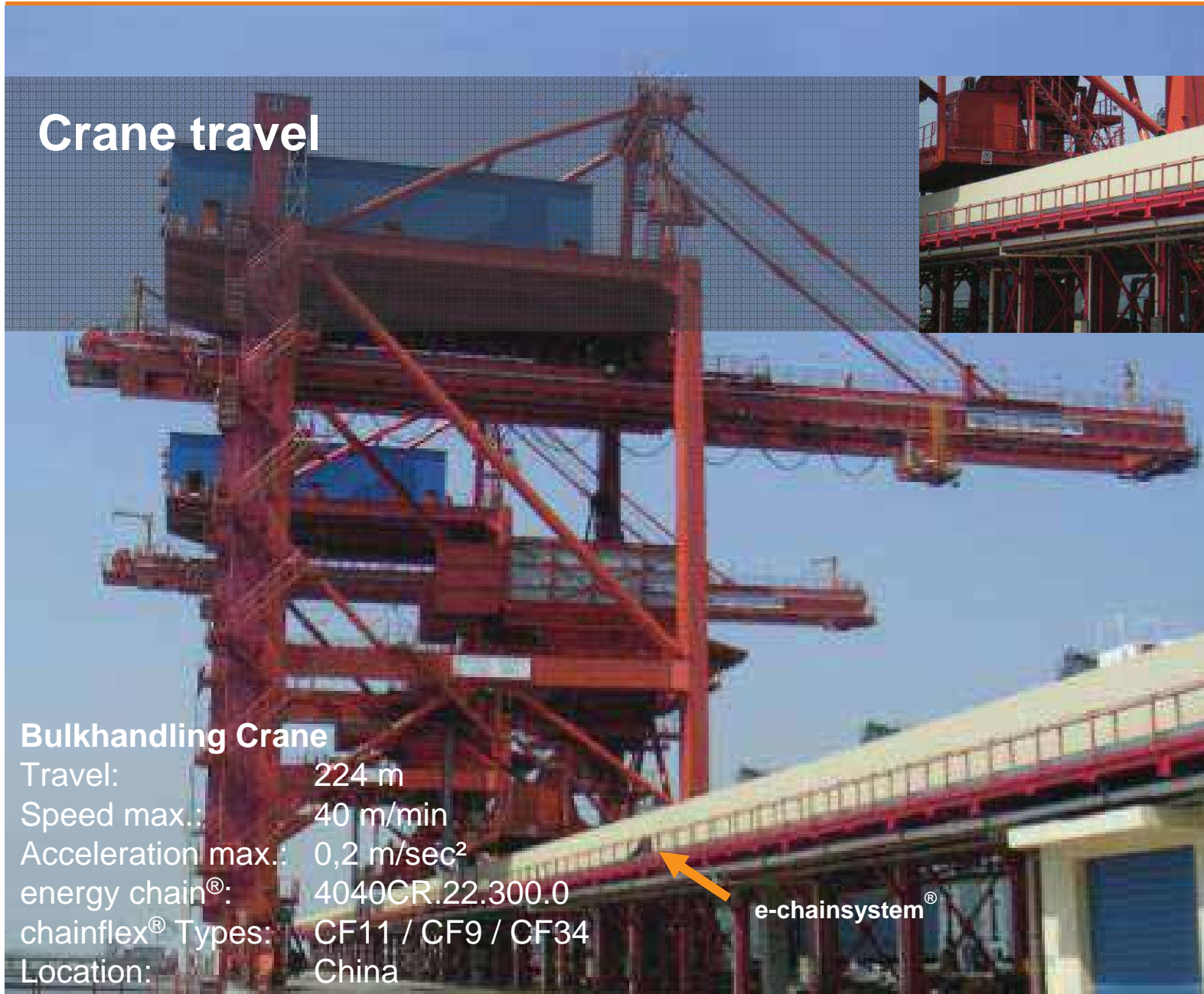
Crane travel

Bulkhandling Crane

Travel: 224 m
Speed max.: 40 m/min
Acceleration max.: 0,2 m/sec²
energy chain®: 4040CR.22.300.0
chainflex® Types: CF11 / CF9 / CF34
Location: China



e-chainsystem®





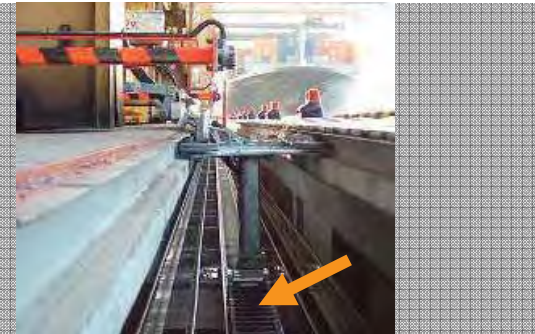
**First maintenance after nine (9) years
No downtime!!!**



Ship to Shore Crane, Mainpower Supply

Travel:	130 m
Speed max.:	100 m/min
energy chain®:	400R.20.250.0
chainflex® Types:	CFCrane/CF10
Location:	Germany

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



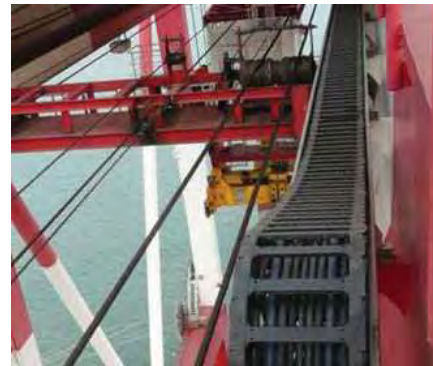
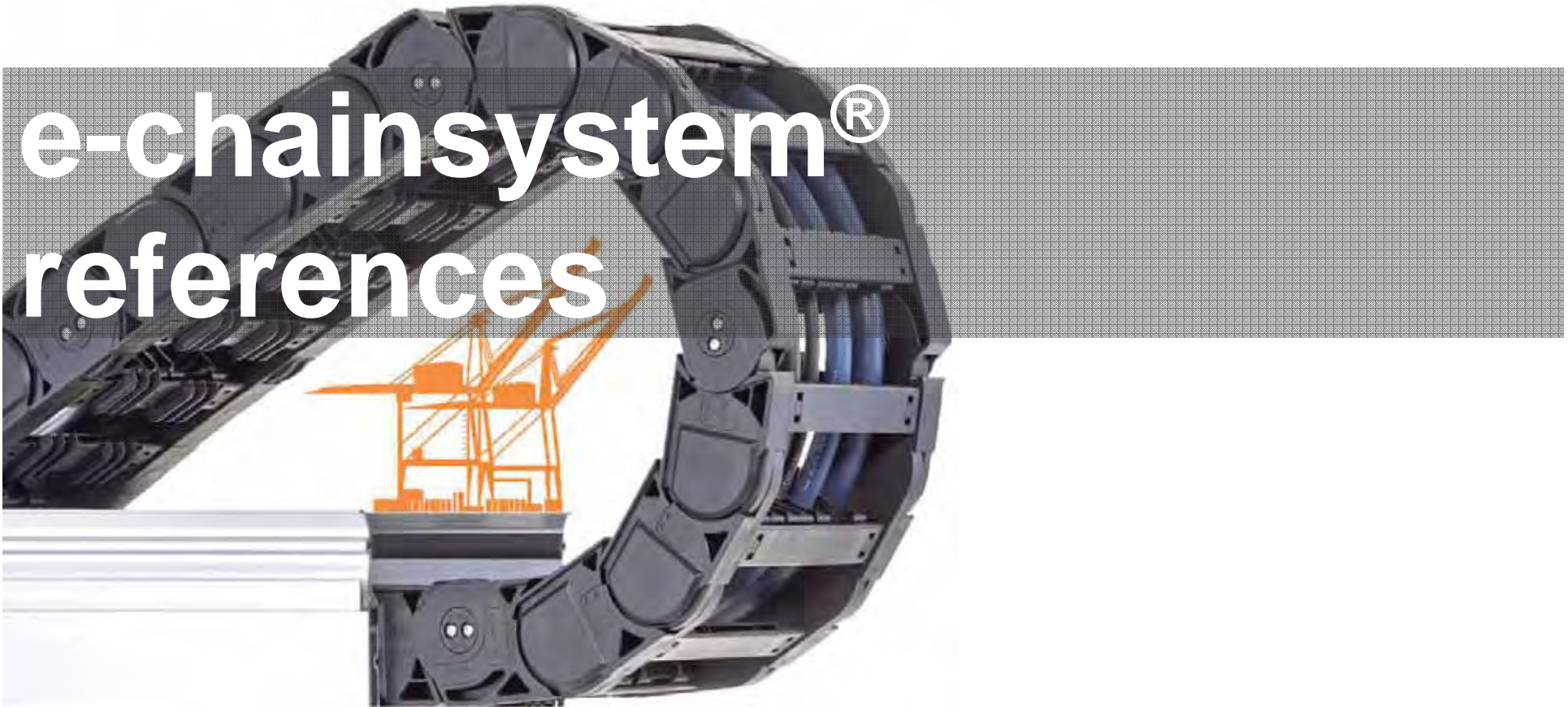
After: igus® e-chain®



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

* November 2014





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