

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

e-chainsystems® for cranes & Heavy Duty applications

**12th ASEAN
PORTS & SHIPPING
2014**



...iglidur®.igubal®.drylin®.xiros®...plastics for longer life®

igus[®] - Headquater, Cologne Germany

33 igus subsidiaries world wide (and more to come)
More than 52 certified igus distributors around the world



igus® - Indonesia & Singapore ASEAN

New igus sales office in BSD City, Indonesia (Southwest of Jakarta)



igus office in Singapore (ASEAN)



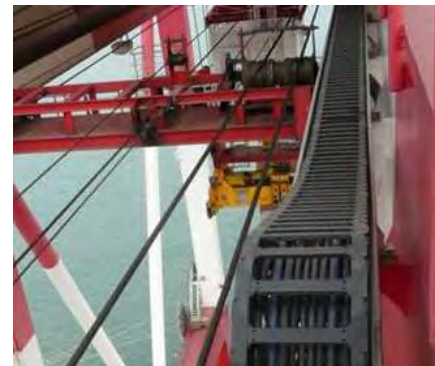
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...e-chainsystems® ...e-chains® ...readychain® ...chainflex® cables for...

igus® e-chainsystems®

What are the **igus®** benefits for crane and heavy duty applications?



igus® mobile cable systems for cranes

What can igus® do better?



Motor reel



Cable tender



Festoon



BusBar-Systems

igus[®] mobile cable systems for cranes

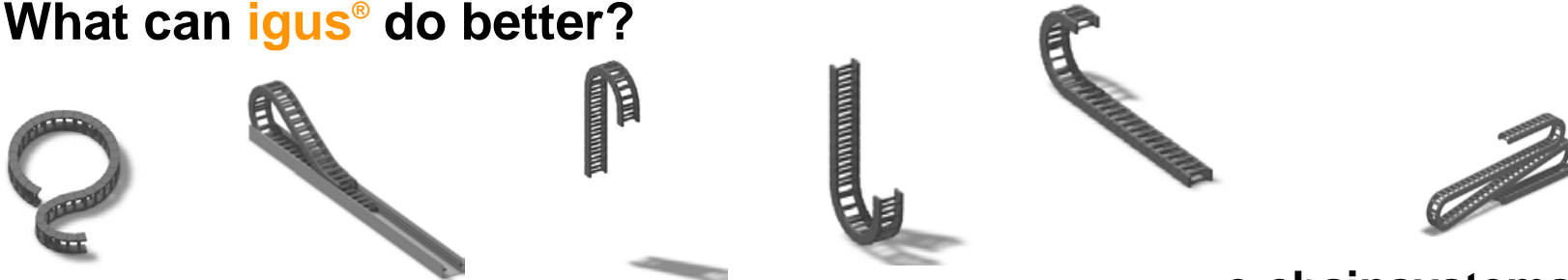
What can igus[®] do better?

igus[®] replaces those “old fashioned“ systems into ...



igus® mobile cable systems for cranes

What can igus® do better?



... into a modern turnkey **e-chainsystem®**

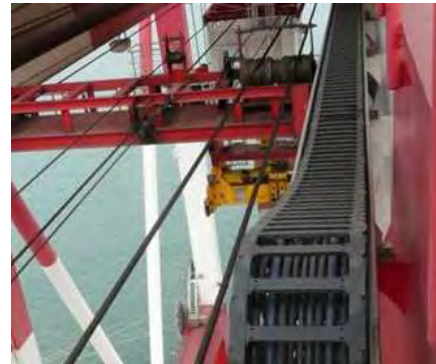
e-chainsystems®
completely delivered
with chainflex® cables
(readychain® system)



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

igus® e-chainsystems®

Benefits for machinery builder and end user



igus[®] - e-chain benefits for crane builder & end user

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



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



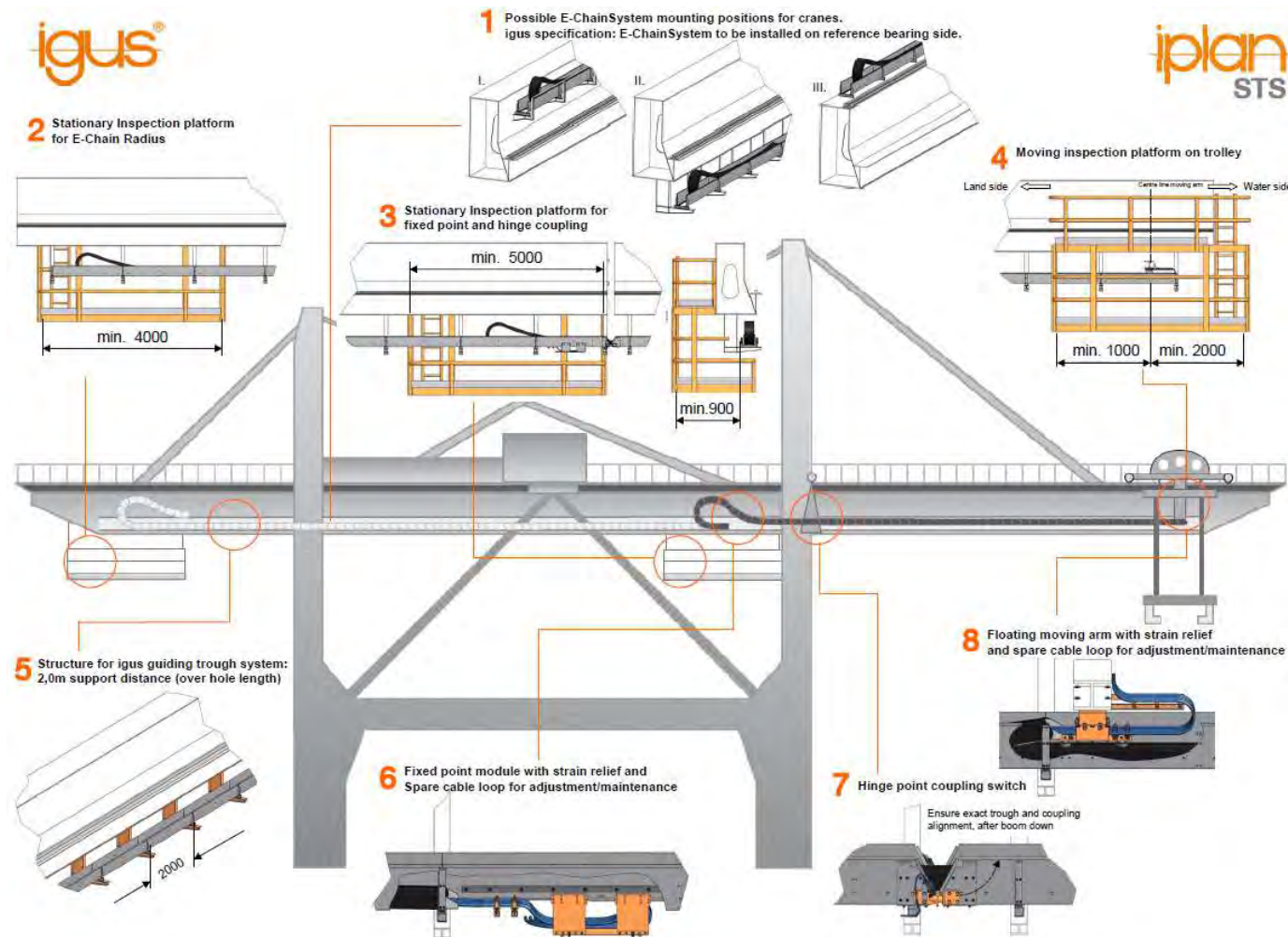
igus[®] - e-chain benefits for crane builder & end user

- ▶ 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)



igus® - e-chain benefits for crane builder & end user

- ▶ Low maintenance extravagance will reduce the crane downtimes
- ▶ Wind an weather resistant system
- ▶ Spare part guarantee for 10 years and more



igus® - e-chain technical limits

- ▶ Speed up to 600m/min

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

- ▶ Acceleration up to 10m/s²

- ▶ Travel length up to 900m

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 615m

- ▶ No limit to cable load

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

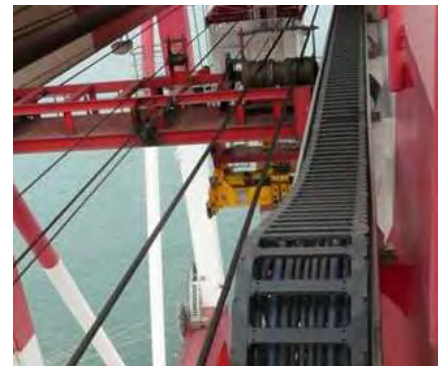
- ▶ Possible to use 6/10kV power-cables



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

igus® e-chainsystems®

Crane components & services



igus® - 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!



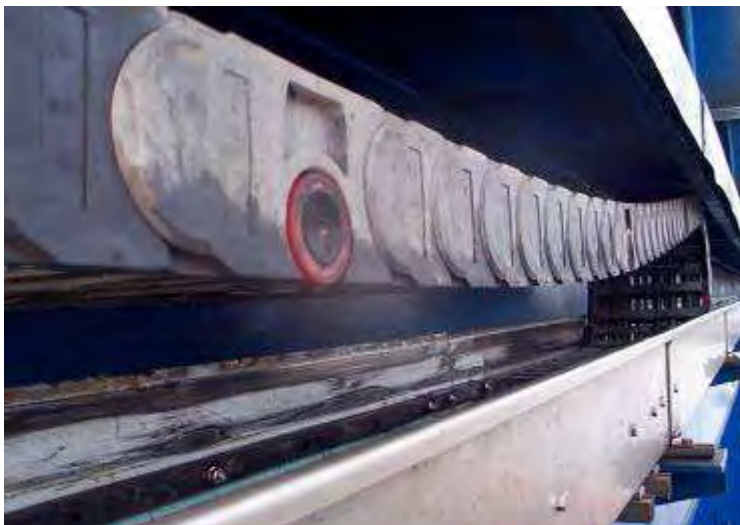
igus® - Crane components & services

rol-e-chain® series E4/4



- ▶ 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

Successfully used in various port applications since 1999!



igus® - Crane components & services

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

Successfully used in various port applications since 2004!



5050HD compared to classic 5050 series:
Y: +120 %, X: +7,5 mm

4040HD compared to classic 4040 series:
Y: +140 %, X: +9 mm

igus® - Crane components & services

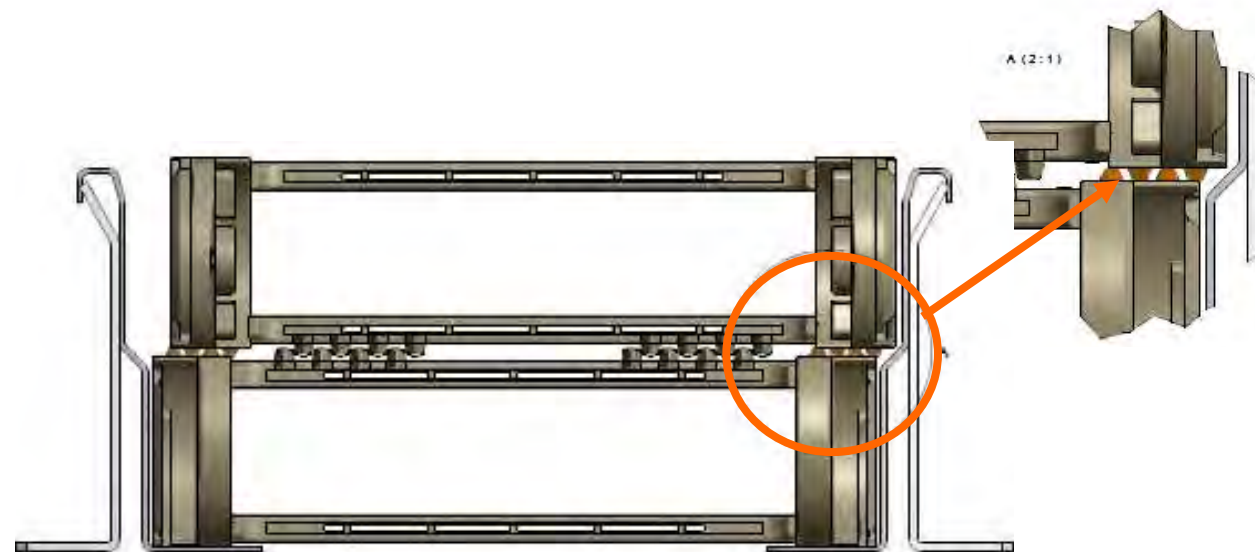
e-chain® series P4



Successfully used in various port applications since 2008!



- ▶ Smooth, low noise operation through identical pitch length for links with and without rollers
- ▶ Integrated grooved roller, running on an even, plain surface
- ▶ Designed for large fill weights and high travel speeds
- ▶ Same material strength as the proven E4/4 Heavy Duty e-chains®



igus® - Crane components & services

Guide trough systems

Steel & Aluminum guide troughs for long travel applications



For heavy applications: heavy duty installation sets, with reinforced brackets and special installation profiles



igus® - Crane components & services

chainflex® cables



Bus Cables

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

Fibre Optic & Coaxial Cables

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)

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.

igus® - Crane components & services

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.

igus® - Crane components & services

Test lab

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

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



igus® - Crane components & services

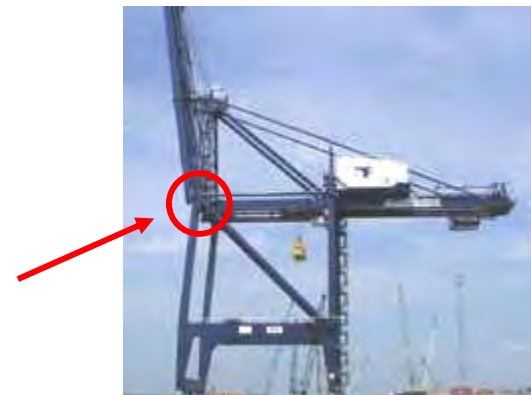
Special part - hinge clutch



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 including limit switch



igus® - Crane components & services

Special part

Floating moving arm



igus® floating moving arm for compensation of the lateral mismatch

Strain relief



Clamps for safe cable strain relief

igus® - Crane components & services

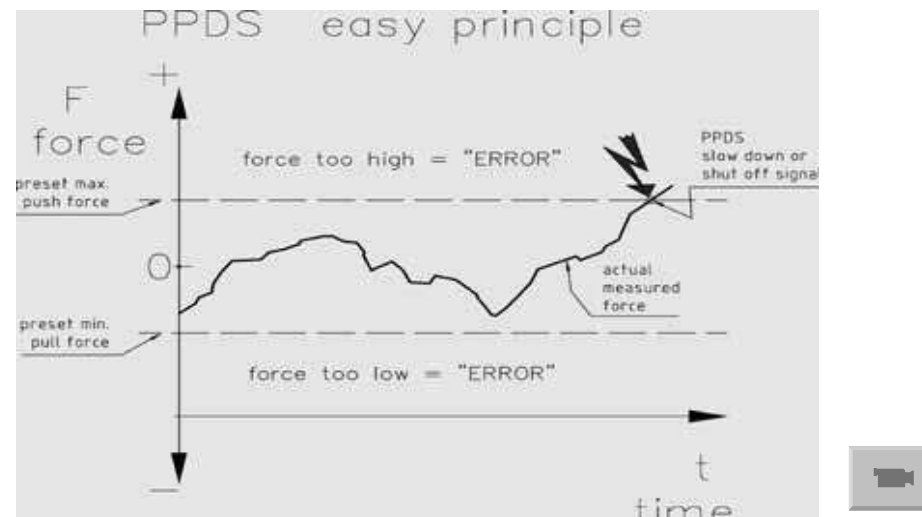
Special part – PPDS (Push Pull Detection System)



- ▶ 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

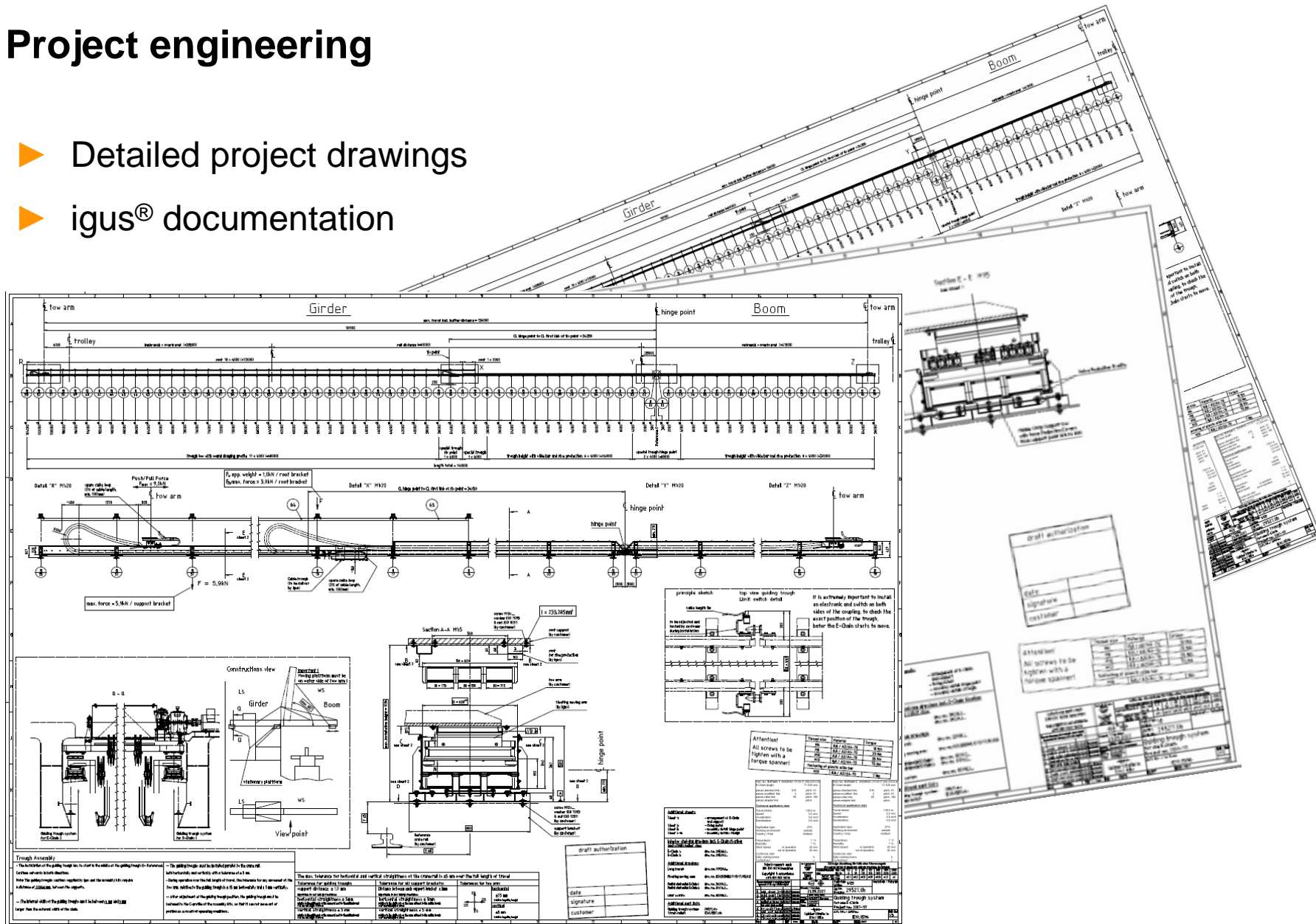


Easy PPDS – continuous real force measurement and limit comparison

igus® - Crane components & services

Project engineering

- ▶ Detailed project drawings
- ▶ igus® documentation



igus® - Crane components & services

Special part – e-rover

Main power supply for RTG`s



- ▶ Safe transmission of FOC signals
- ▶ Different fillings and travels up to 900m are possible
- ▶ Saves operating costs of RTG`s
- ▶ Protects the environment

Switch of your diesel engines!!!



... move too ...



... coupling ...

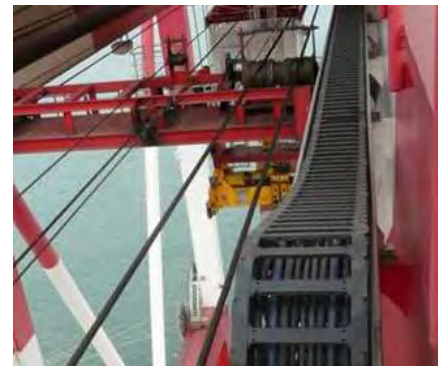


... continue ...

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

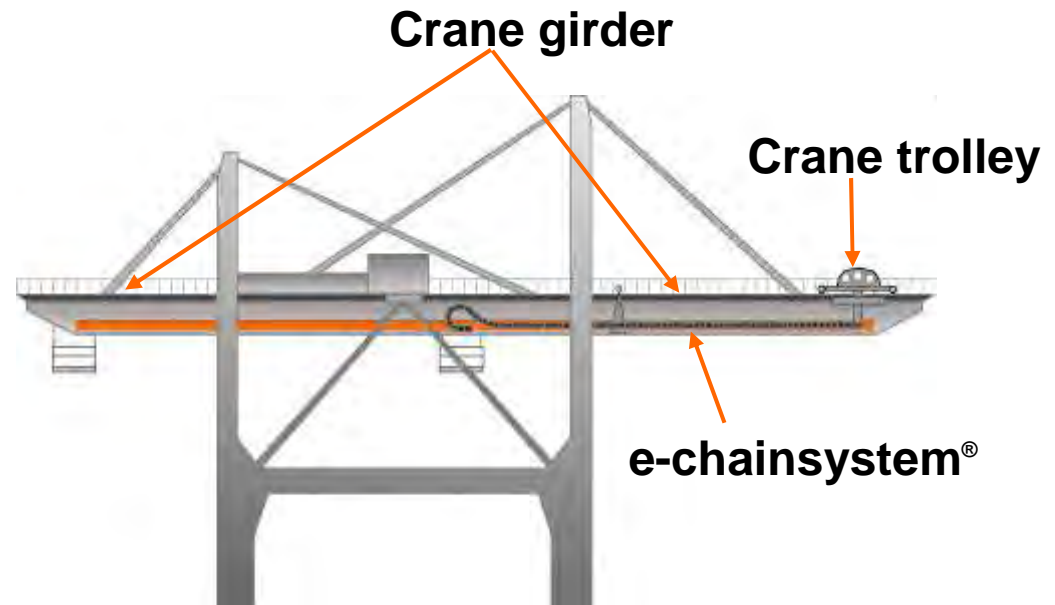
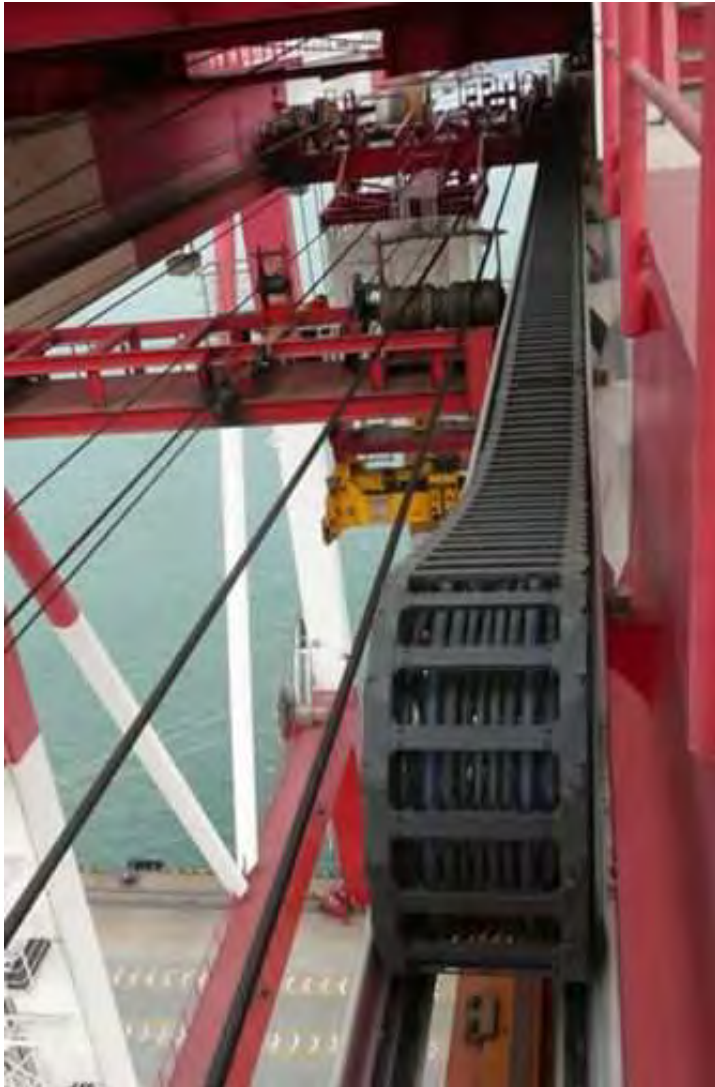
igus® e-chainsystems®

Crane applications for e-chainsystems®



igus® - Crane applications

Trolley travel STS



igus® - Crane applications

Trolley travel RMG



P4.56R-System is running successfully on 5 Künz RMG's



igus® - Crane applications

Trolley travel RTG



e-chainsystem®

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Crane travel



e-chainsystem®



Bulkhandling Crane

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

igus® - Crane applications

Crane travel



e-chainsystem®



Shipunloader Crane

<i>Travel:</i>	441m
<i>Speed max.:</i>	30 m/min
<i>Acceleration max.:</i>	0,1 m/sec ²
<i>energy chain®:</i>	5050R.28.300.0
<i>chainflex® Types:</i>	CFCRANE
<i>Location:</i>	Malaysia

igus® - Crane applications

Crane travel

First maintenance after nine (9) years running without downtimes!!!

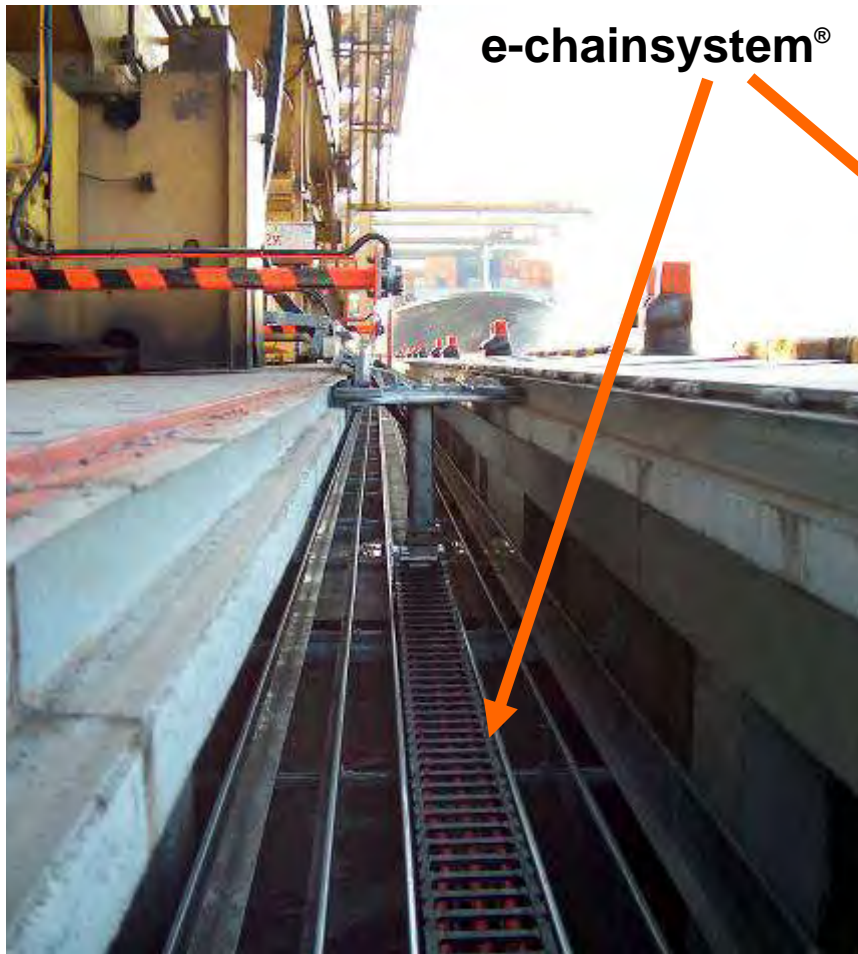


Ship to Shore Crane, Mainpower Supply

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

igus® - Crane applications

Crane travel



12 Container Cranes, Mainpower Supply

Travel: 500 m
Speed max.: 46 m/min
Acceleration max.: 0,2 m/sec²
energy chain®: 5050RHD.17.300.0
chainflex® Types: CFCrane
Location: Asia

igus® - Crane applications

Elevator applications



igus® - Crane applications

Spreader applications



e-chainsystem®

igus® - Crane applications

Reachstacker applications



e-chain®



e-chain®

igus® - Crane applications

Retrofit STS crane



Before: Festoon System



After: igus® e-chain®

igus® - Crane applications

Retrofit STS crane



Before: Festoon System



After: igus® e-chain®

igus® - Crane applications

Retrofit RMG crane



Before: Festoon System



After: igus® e-chain®

igus® - Crane applications

Retrofit RTG crane



Before: Cable tender



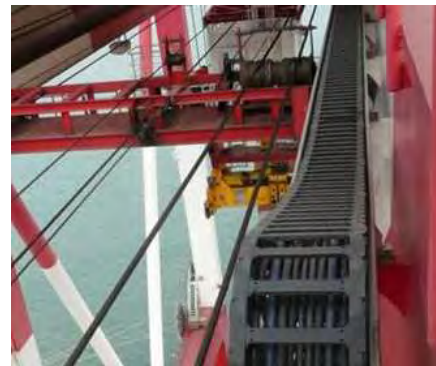
After: igus® e-chain®



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References for e-chainsystems®



igus® - Crane references:



Worldwide:

- ▶ Over 4.100* RTG's / RMG's (36 with P4 chain)
- ▶ Over 660* STS (82 with P4 chain)
- ▶ Over 14.000* Spreader
- ▶ Over 20.000* Indoor-, Gantry-, Bulkhandling-, Shipyard- and Special Cranes

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