The Future begins - Advanced Cable Technology made by PRYSMIAN

7th Intermodal Asia 2016 Melbourne

February 2016

Prysmian Group

PRYSMIAN

Draka

A multi brand strategy

ONE COMPANY

The corporate brand represents the organisation and all that it stands for

TWO COMMERCIAL BRANDS

The market leading commercial brands are the distinct offerings through which we serve our customers

Prysmian Group acts as the corporate brand. It stands for the organizational, financial and industrial platform that allows the two commercial brands to operate.

Prysmian and **Draka** are our commercial brands, embodying two differentiated and complementary offerings.

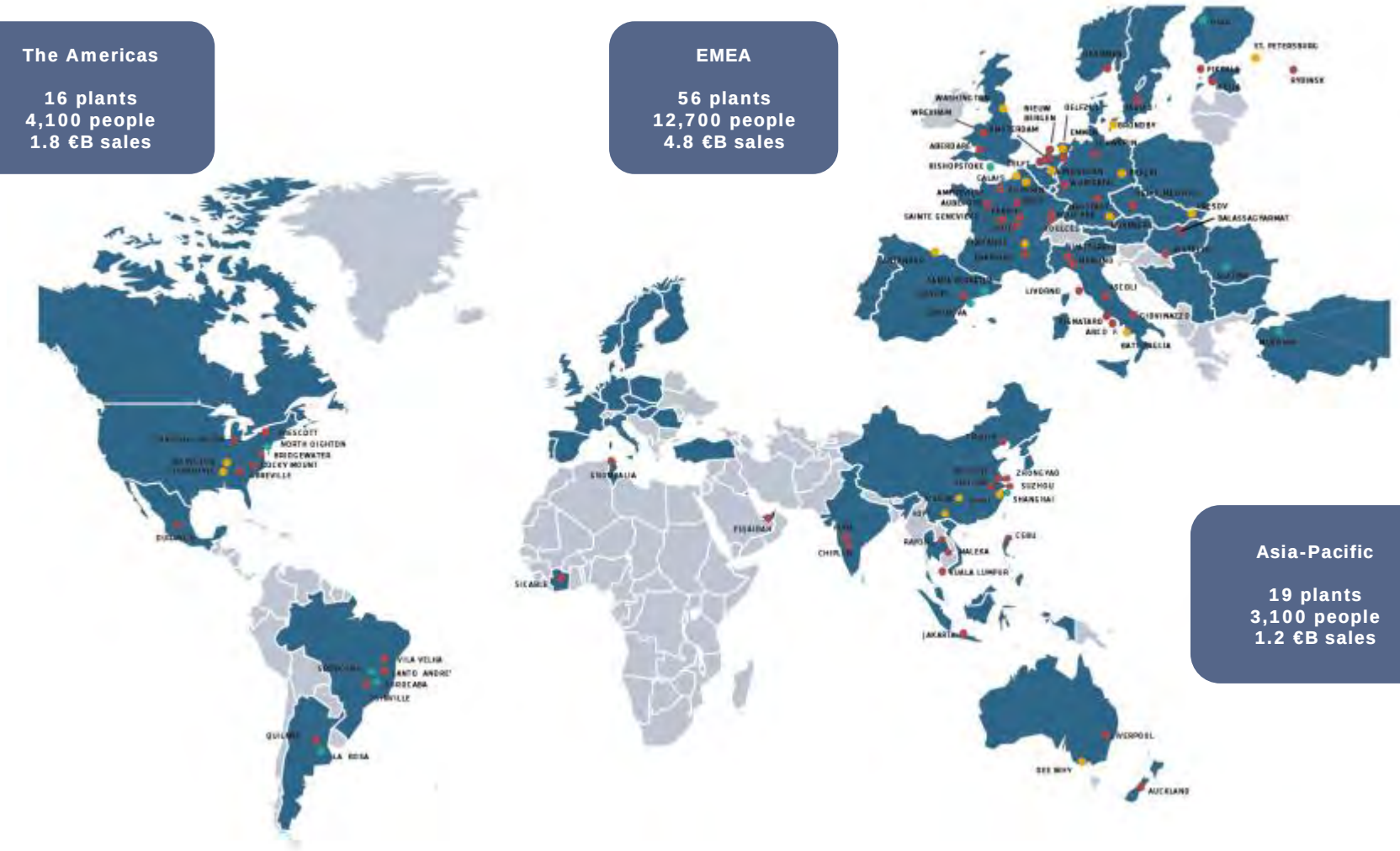
A truly global presence

The Americas

16 plants
4,100 people
1.8 €B sales

EMEA

56 plants
12,700 people
4.8 €B sales



Asia-Pacific

19 plants
3,100 people
1.2 €B sales

91 Plants	**50** Countries	**17** R&D Centres	about **20,000** employees

Crane Cables




No matter which crane type – cables are everywhere!

A) Flexible cables

Motor Reels	Festoons	Spreader reels	Baskets	Drag Chains
				
Up to 300m/min	270m/min	240m/min	180m/min	300m/min

B) Fixed cables

- Infra structure power supply
- Internal power distribution
- Internal wiring
- ...

Evolution - Increasing Requirements To All Crane Components

- Increased automation level on Container terminals
- FO and BUS technology in all cable applications
- Shift from RTG to RMG operations

„Hardware“
- higher
- longer
- faster

„E-ware“
- Power supply

„Software“
- Data rates
- Data flow
- Data quality

„Timeware“
- Operating time

- Increased power requirements of cranes
- Shift to higher operating voltage levels
- High-grade insulation compounds
- Cable Chains on STS

Advance cable technology – Milestones

1983
1st power cable with ***integrated optical fibers*** was born

Data rates have been still far away from nowadays but the „door“ got opened!

1998
New compound generation allows to optimize wall thicknesses up to 30% by increased safety

Impacting:
- *Design*
- *Shipment cost*
- *Longer crane travel or*
- *Smaller equipment*
- *Less power supply*

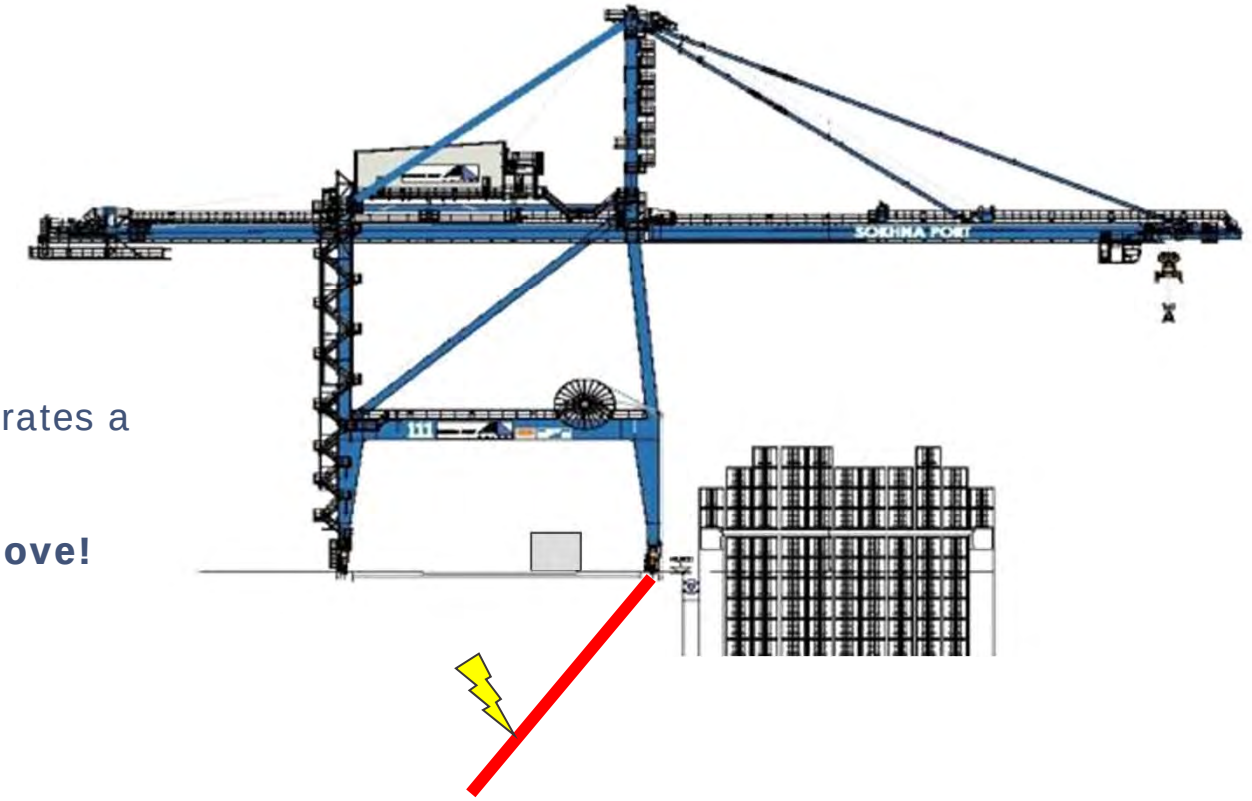
2013
Intelligent cables by integrated sensors to make the cable feel stress and strain.

Impacting:
- *Reliability*

→ avoid downtime
- *Efficency*
- *Lifetime*
- *Diagnostics*
- *Maintenance*
- *…*

Crane Cable – a key component



- Every component incorporates a risk to fail

Cable → no power → no move!

Advance cable technology – opportunities

New compound
generation allows
to optimize
wall thicknesses
up to 30%
by increased safety

In numbers:

10.000 x

Insulation resistance
from 10^12 Ohm*cm → 10^16 Ohm*cm

Dielectric strength
from n.a. → > 30kV/mm for 10min.

Reduction of transportation costs ~25%

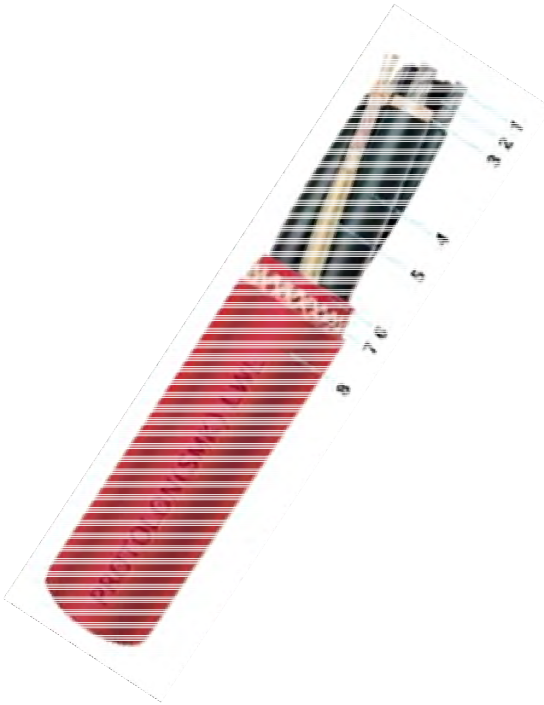
Smaller cables → smaller systems → less power supply → savings ~20%

Benefits are
on hand...

... but...

…Recent innovation → PROTOLON (SMK) FO *UPGRADE*

- **HIGH TENSILE FORCE**
  dynamic 30N/mm²+1,500N extra from CSE
- **NO SPEED LIMIT**
- **AIRBAG**
  further optimization of insulation due to high-grade insulation compound whilst giving more room for the extreme robust sheath system as a buffer to keep the mechanical stress away from core assembly (OD conform**)**
- **stronger anti-torsion** braid for better resistance to torsion
- **extra elements:** FO's, pilots, BUS



PROTOLON(iQ)

We can't control what we can't measure.

- Target: Terminal operators keep telling us:

Efficiency – Productivity - Zero-Downtime

- Use: System solution for monitoring and diagnostic of cable conditions in high-speed and highly stressed reeling applications
- Where: Main power supply

Advance cable technology – intelligent solutions

... and the future begins

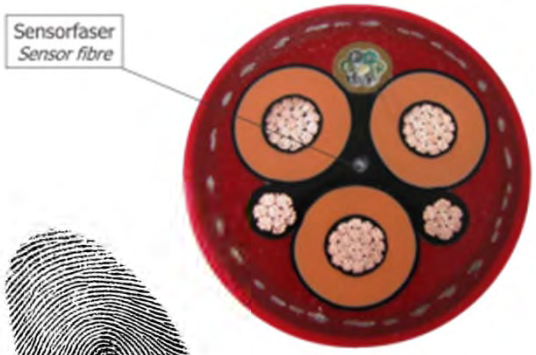
Where?

Main power supply cable

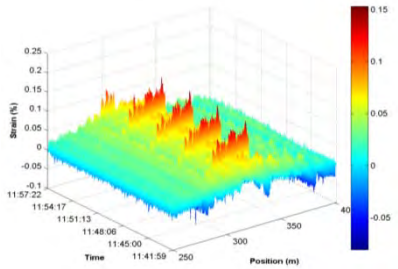
Why?

detect technical irregularities → to avoid downtime

How?



fingerprint



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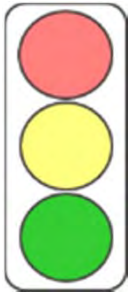
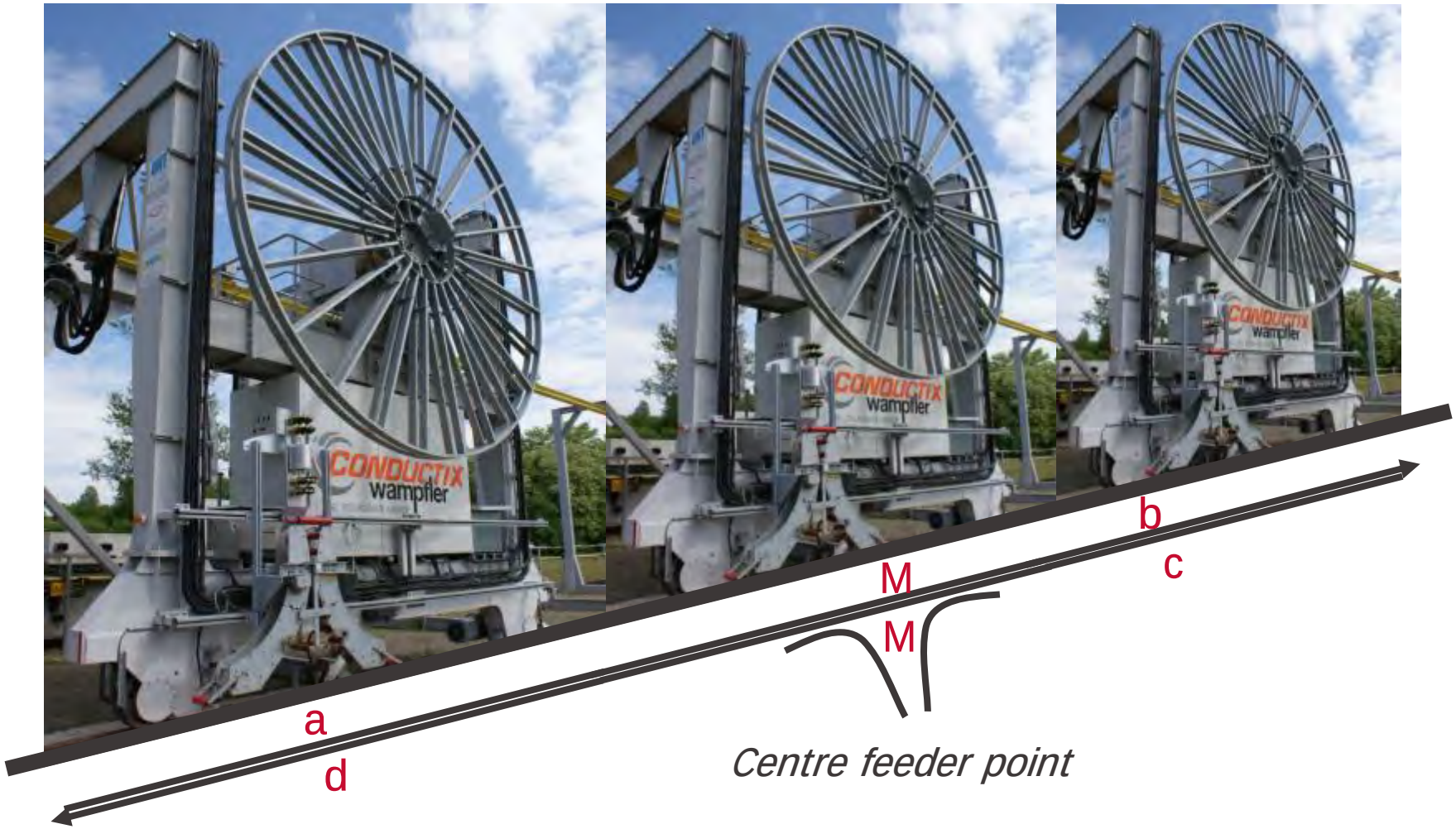


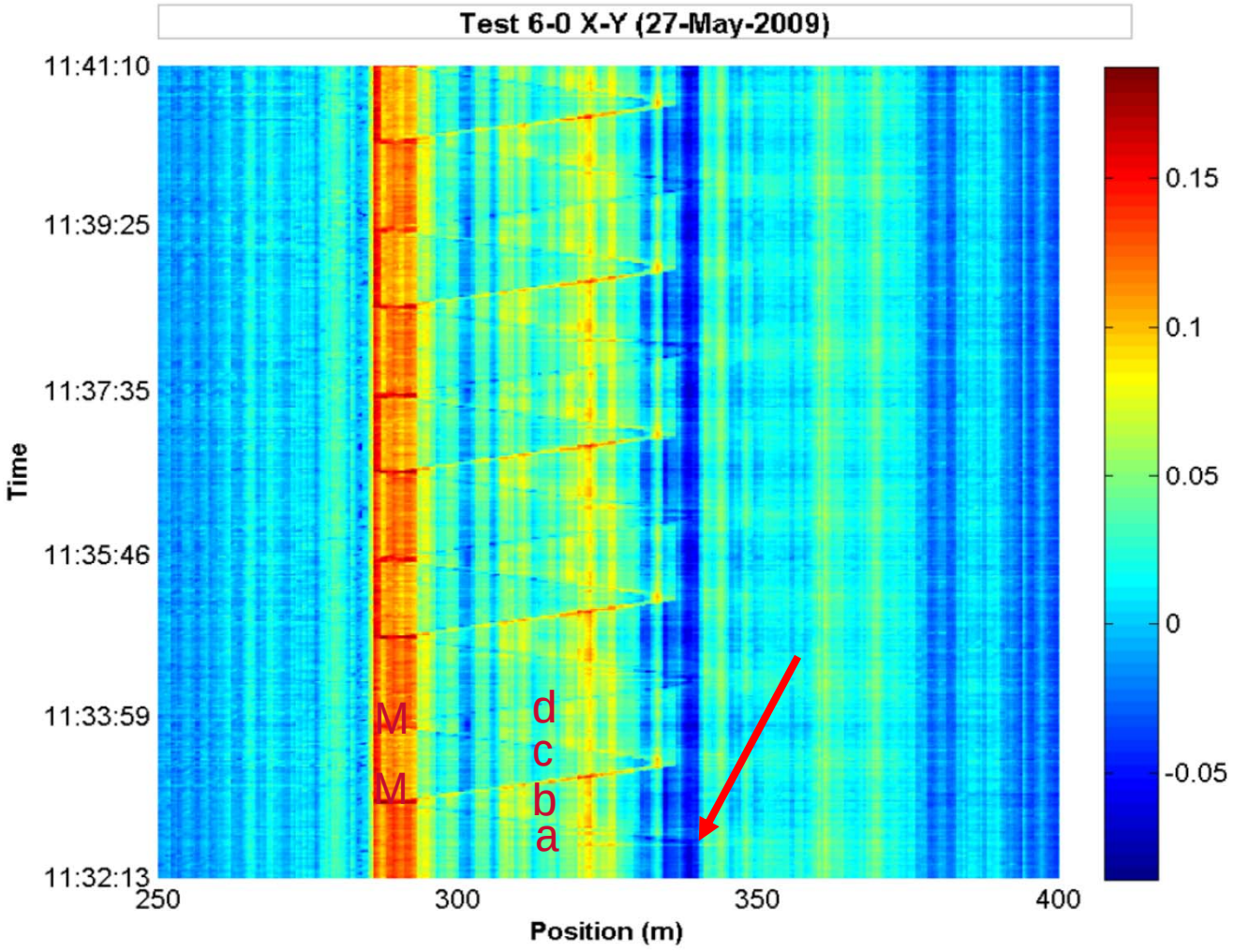
Intelligent field test

... and the future begins



Field test Example Results Tensile Force - TESE

... and the future begins



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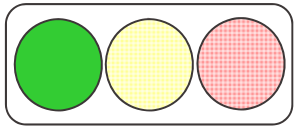

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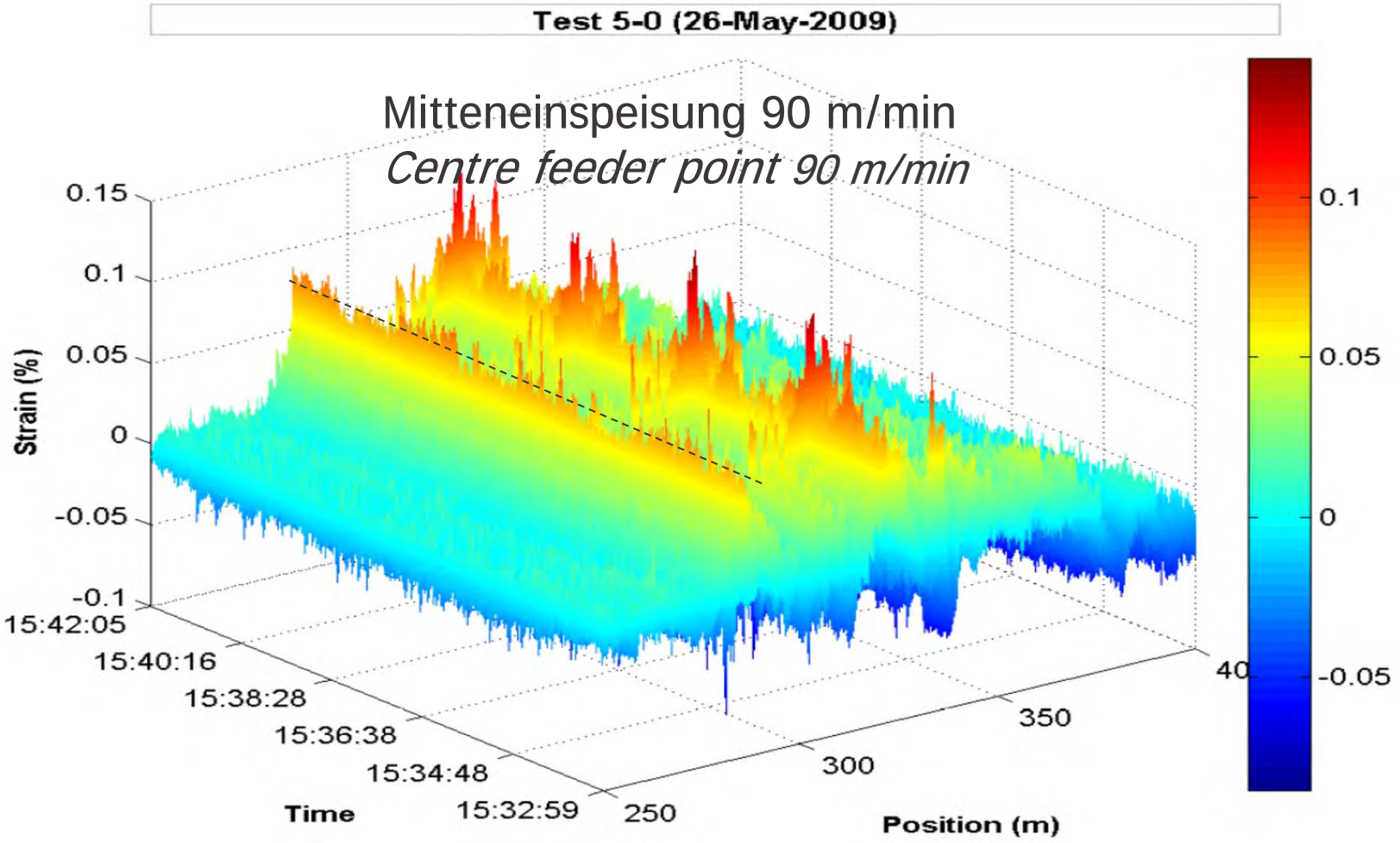

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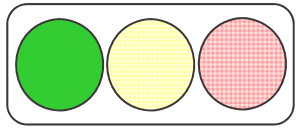

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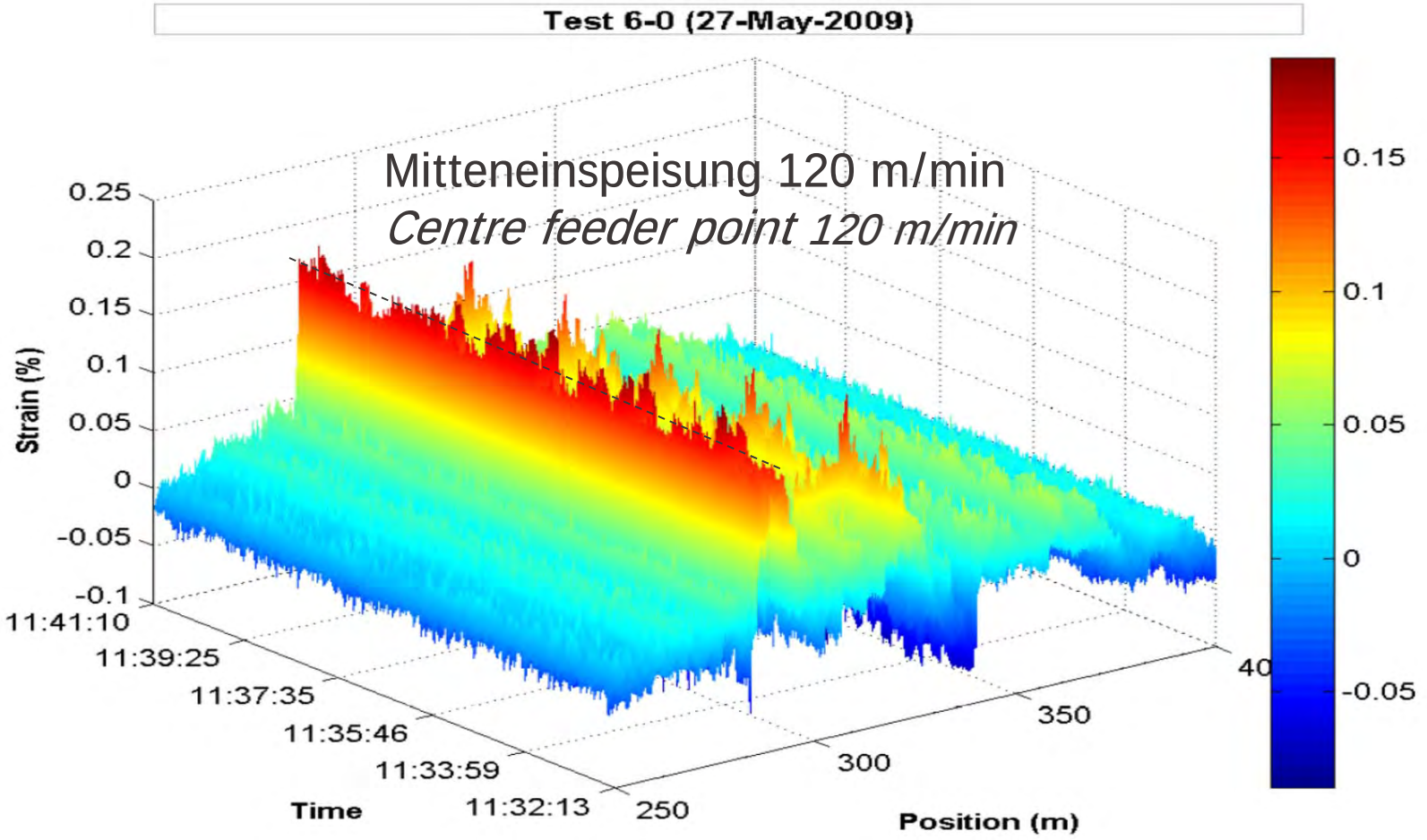


IQ SOLUTION:

Components Of The Diagnostic System

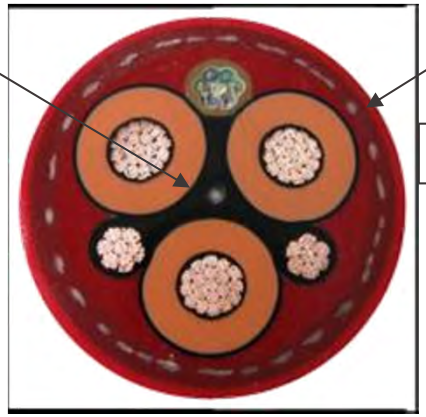
CABLE

Sensor fibre

Strain measurement

RFID

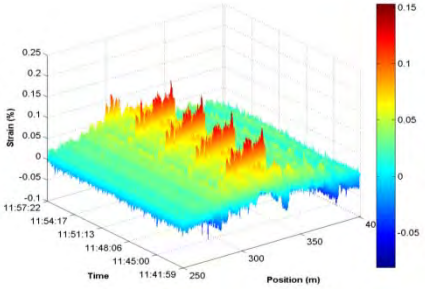
Data storage



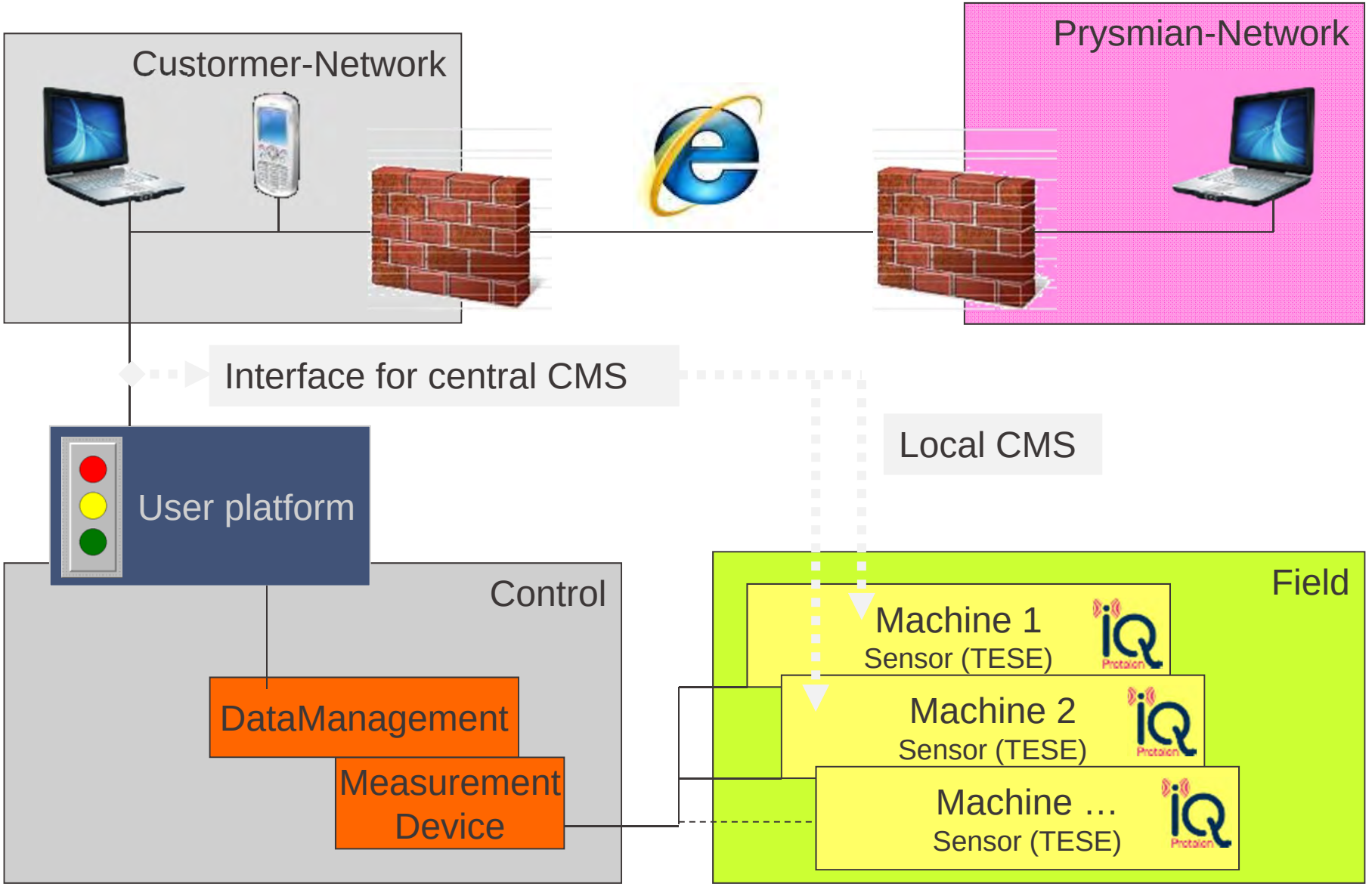
MEASUREMENT DEVICE

SERVICE

- Cables Status
- Physical Parameters



Advance cable technology – intelligent solution - Masterplan



Advance cable technology – intelligent solutions

Information:

WHERE → location of the impact

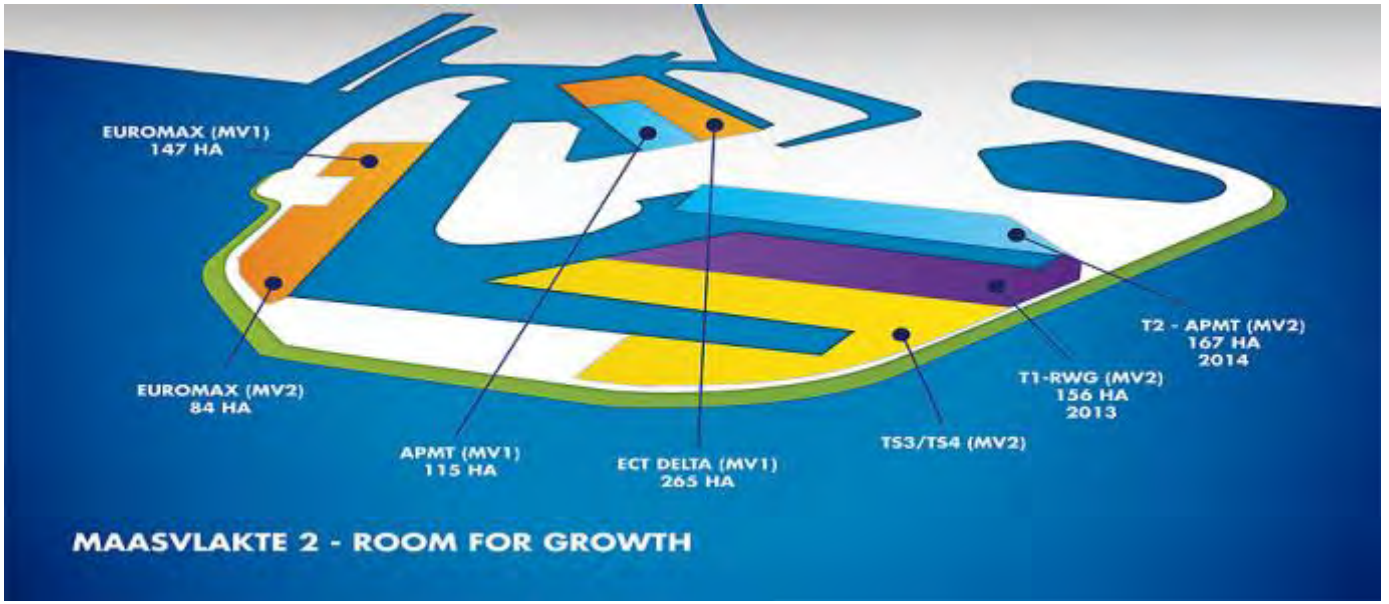
WHEN → time of the impact

WHAT → intensity of the impact

Usage:

- Commissioning (setup parameters)
- Maintenance planning
- Permanent monitoring
- Immediate feedback on irregularities
- Condition tracker
- Lifetime indicator
- …

iQ – reference projects Australia



Out of 16,000m installs already

Cranes: Brisbane & Sydney Patrick Terminal Australia

DPW Australia (9/2016)

Mining: Curragh Mine Australia (07/2016)

Our commitment for an innovative future in the Crane Market

Roller bending test with
→ smallest bending radius
→ highest tensile load
→ extreme short distance in S-type bending /turning

Reeling test

Track for reeling & track operations

Squeeze Test

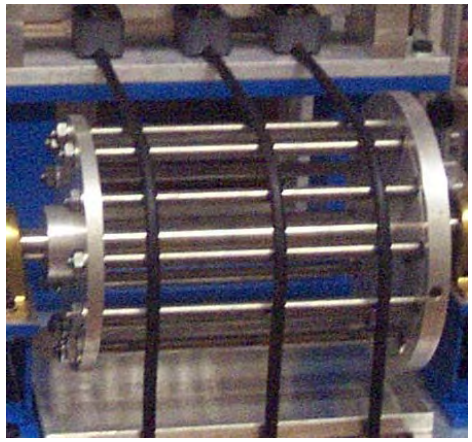
Cable squeezed down to 50% of its original diameter
→ No electrical failure
(earth fault, short circuit)

Torsion Test

Length for
360° : 100 x cable dia
Pull load : up to 10 N/mm²
No of cycles : 50,000

Our commitment for an innovative future in the Crane Market

Chain Test
Track length: 6 meters
Number of cycles: 1,000,000



Abrasion test:

Abrasion sheath against metall/plastic/rubber

Chain Test
Track length: 120 meters
Speed: 300m/min
Number of cycles: 1,000,000

Bending / Indentation Test

Diam. of pulley:	10x cable dia.
Pull load:	up to 20 N/mm²
Bending cycles:	30,000

Worldwide Refererences → PRYSMIAN cables installed in all TOP 100 ports

ECT Wilhelmshaven, CTA, HHLA Burchardkai -Germany

DPW Jebel Ali Terminal 1, 2 and 3

Port of Singapore

Port of Tianjin

Port of Shenzhen

Pusan New Port Korea

ECT EUROMAX Rotterdam NDL

APM Maasvlakte II Rotterdam NDL

VIT Norfolk USA

Long Beach Container Terminal USA

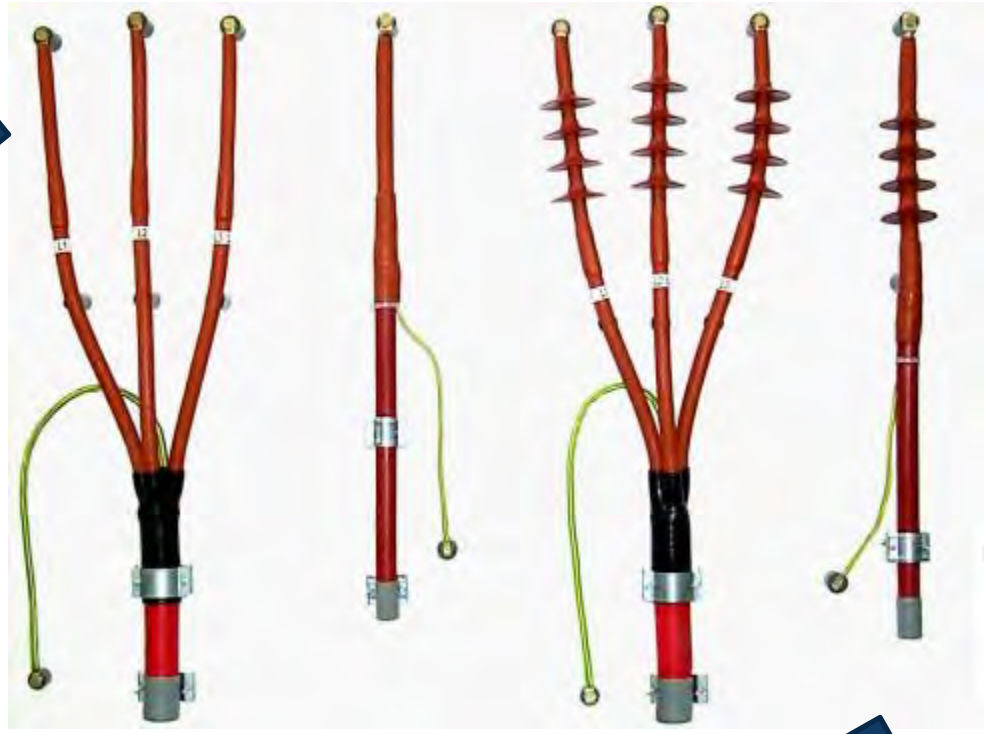
Port of Los Angeles USA

Port of Miami USA

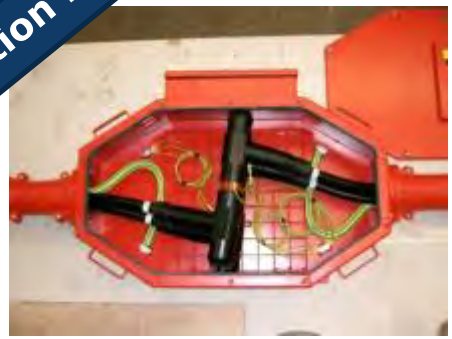
…and many other more

Harnessing

Sealing ends

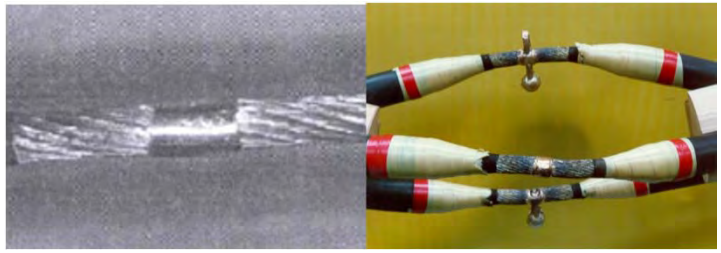
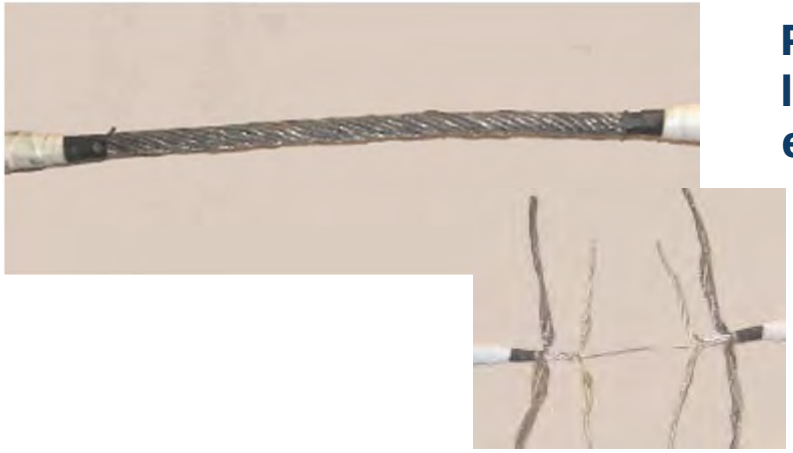


Junction boxes



Tool sets

After Sales Service

Cable repair technique	Energy	Application
Crimp		Fixed installation; sporadic movement
Cadweld		Simple application, connect different core sizes and core constructions
Splice		Permanent reeling with long lifetime expectations

After Sales Service - Repair technique

Vulcanization in the oven at 180° C

for approx. 2 hours!

After Sales Service

Repair technique

Energy

Splice

Fibre Optics

Fusion splice

Definition:

Cable repair for special cables means the reestablishment of the full cable features **without** any restrictions neither for the mechanical nor for the electrical performance whilst keeping the diameter of the cable.

What we can offer

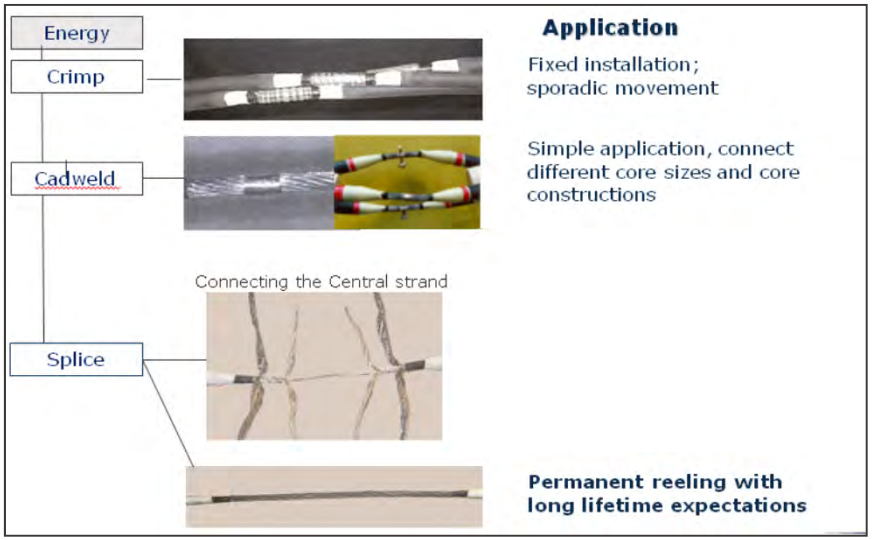
1. Comprehensive portfolio

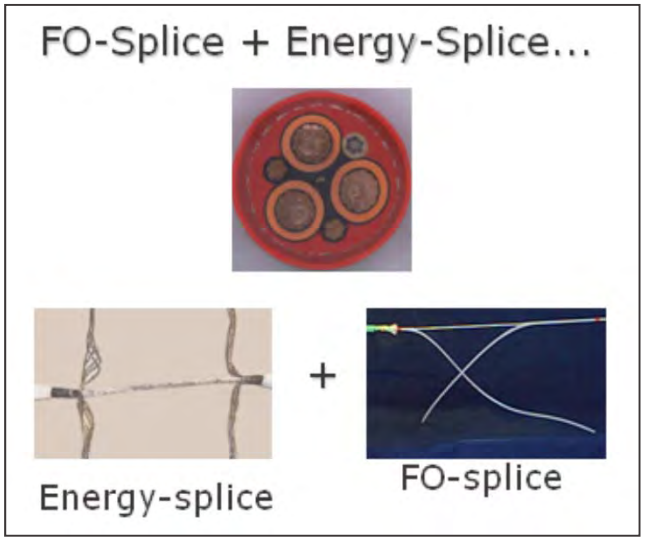
AS 2802

Europe

Premium	• **Long lifetime** • **Customized** • **Cable service**
Standard	• **Baseline products**

2. Service





More than just cables…

We supply:

- ✓ Specialized, customer-oriented solutions
- ✓ Tailored designs on customer's demands
- ✓ Best reliability
- ✓ Very long lifetime
- ✓ Innovative products (e.g. SMK-upgrade, iQ cable)
- ✓ Cost effective in the system view

Reliable Partner For Engineering, Delivery And After Sales Service

ONE STOP SHOP FOR ALL CUSTOMER'S NEED RELATED TO CRANE CABLES

Point of contact

Australia

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  jana.blechschmidt@prysmiangroup.com