FENDERTEAM GROUP

GERMANY | FRANCE | AMERICAS

Technical presentation - 4th Black Sea Ports and Shipping 2015
Istanbul, Turkey – 28 May 2015

Presented by: D. Polte

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CONTENT

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FENDERTEAM GROUP

TURNOVER : > 35,000,000.00 EUR

DELIVERED PROJECTS: > 2,500 worldwide since 2006

PROJECT SIZES:
200+ Fender-Systems/project
>5,000,000 USD/project

PRODUCTION (in-house):
Rubber Fender production in Japan and Malaysia
Steel fabrication mainly in Germany
Foam Filled Fender production in Germany and the US

ACHIEVEMENTS:
ISO 9001
ISO 14001
PIANC Type Approval for std. Range

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CASE STUDY

Typical steps for the Design of a high performance, reliable and high quality Fender-System!

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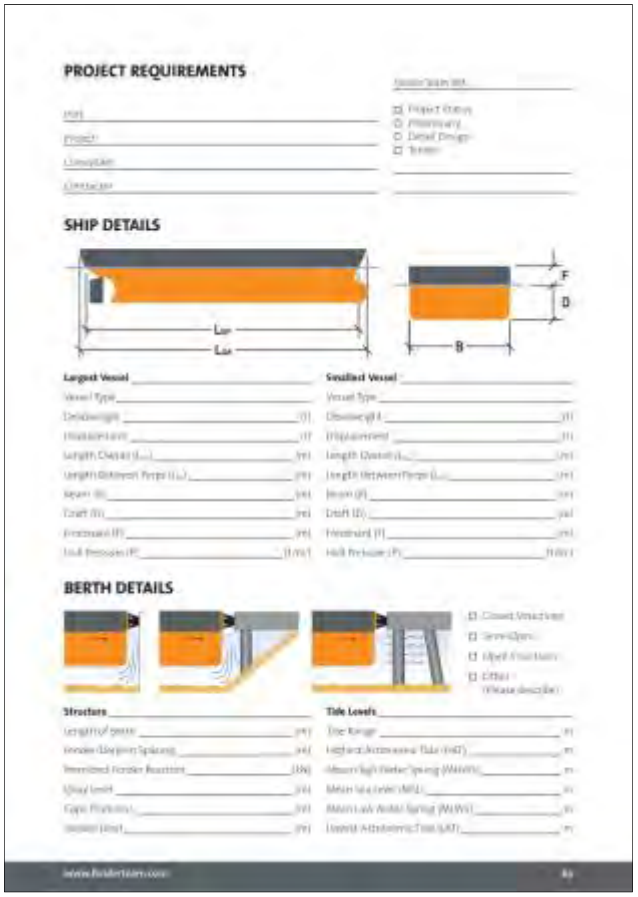
FIRST STEP - BASICS COLLECTION OF DATA

- Reliable data is vital for a technically and economically sound Fender Design
- Use FT questionnaire to collect all key data
- Discuss each individual fact in detail
- However, be aware which data is most important for the project and next step (next slide)


PROJECT REQUIREMENTS

SHIP DETAILS

BERTH DETAILS

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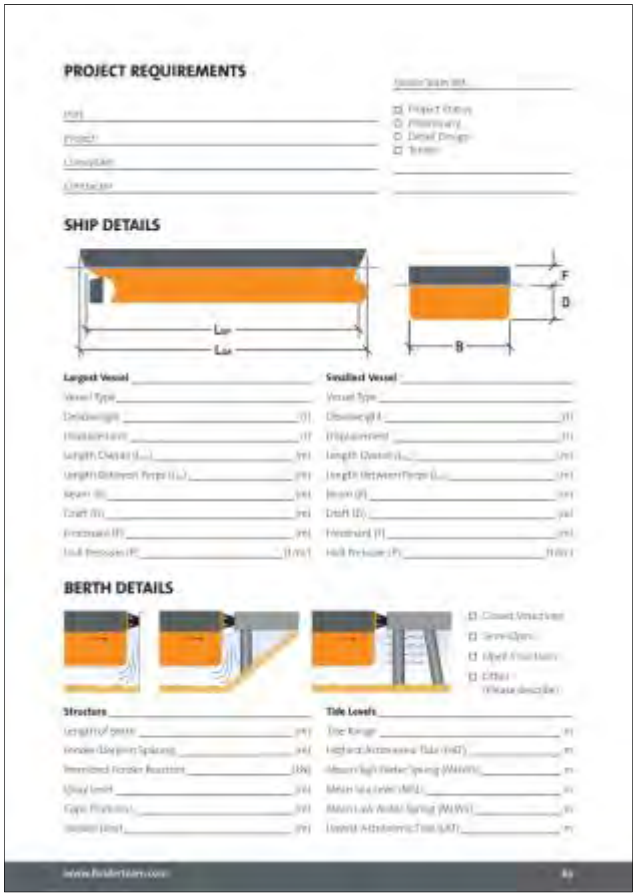
FIRST STEP - BASICS COLLECTION OF DATA

Most Important Data:

- Design Vessel / Energy Absorption
- Max. Reaction Force and Hull Pressure
- Berthing Speed and Angle
- Load Cases, Flat, Belting, Line/Point Loads
- Largest and Smallest Vessel
- Factor of Safety (FOS)
- Quay Wall Design



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FIRST STEP - BASICS
DETERMINATION OF APPLICABLE STANDARDS

- PIANC2002: Guidelines for the Design of Fender-Systems

- British Standard 6349: Maritime Structures

- EAU 2004: Recommendations of the Committee for Waterfront Structures

- DIN 18800: Design and Construction of Structural Steelwork

- EUROCODE 3: Design and Construction of Structural Steelwork

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SECOND STEP - DESIGN
PREPARE ENERGY CALCULATIONS

- Add carefully all available data
- Adjust factors accordingly
- Be aware of the most severe factor

→ **Berthing Speed**

$$E = \frac{1}{2} M * v^2 * C_e * C_m * C_s * C_c$$

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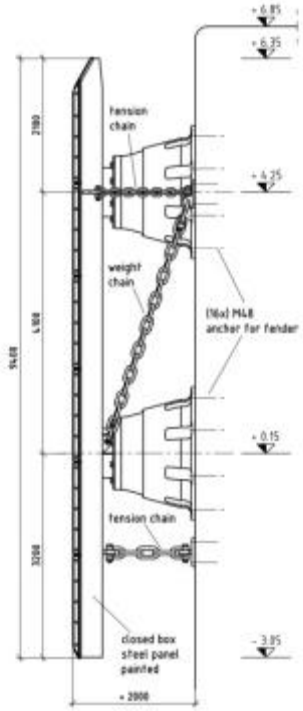
SECOND STEP - DESIGN
SELECTION OF THE RUBBER FENDER UNIT

Consideration of the following issues:

- Quay Wall Designs
    - Sheet Pile Wall
    - Combi Wall (Sheet Pile Section with Piles, or Beams)
    - Open / Semi-Open Pile Structure
    - Concrete deep-wall
    - Gravity Structures (Caissons, Concrete Blocks)
- Max. Stand-off Distance
- Preferences of the Consultant / Client



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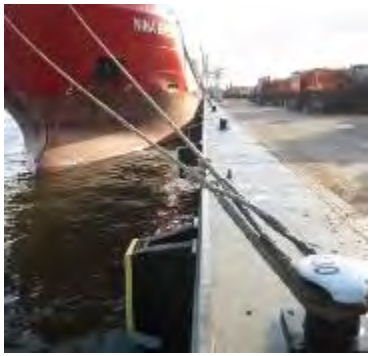
SECOND STEP - DESIGN
SELECTION OF THE RUBBER FENDER UNIT

Standard Types of Rubber Fender Units





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SECOND STEP - DESIGN
SELECTION OF THE RUBBER FENDER UNIT

Design criteria:

- Energy = 2281 kNm
- Reaction = <3500 kN
- Hull Pressure = < 250 kN/m²
- Berthing Angle = 6°
- Stand-off = <2000 mm

=> Tolerance and correction factor to be discussed!

Selected Fender: 2nos. SPC-1300H G2.3

E = 1168 kNm * 2 = 2336 kNm (>2281)

R = 1705 kN * 2 = 3410 kN (<3500)

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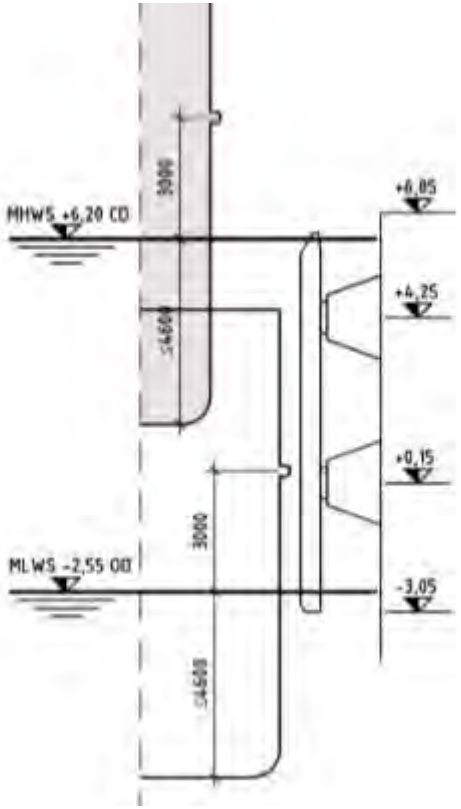
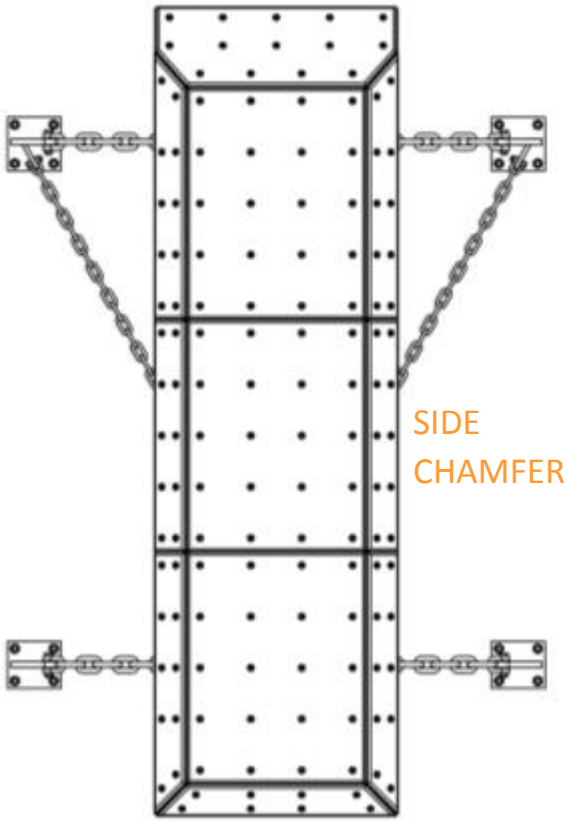
SECOND STEP - DESIGN
PRELIMINARY DESIGN OF THE STEEL FENDER PANEL

Why Chamfers?





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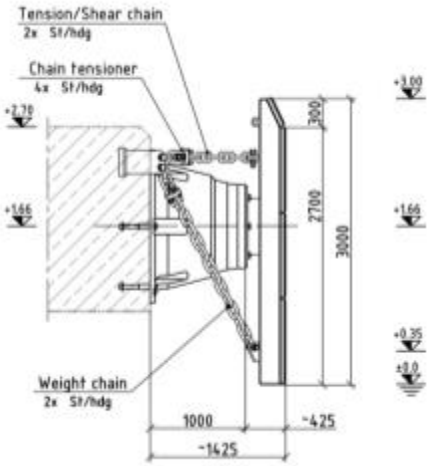
SECOND STEP - DESIGN SELECTION OF ACCESSORIES



Chain and Shackle Assembly
- Weight Chains
- Tension Chains
- Shear Chains
- Chain Tensioner

=> Make sure you consider angles!

Anchors
- Cast-In Anchors (New Concrete)
- Resin Anchors (Existing Concrete)

UHMW-PE Low Friction Plates
- Reclaimed (FQ Material, Multicolour)
- Virgin Material

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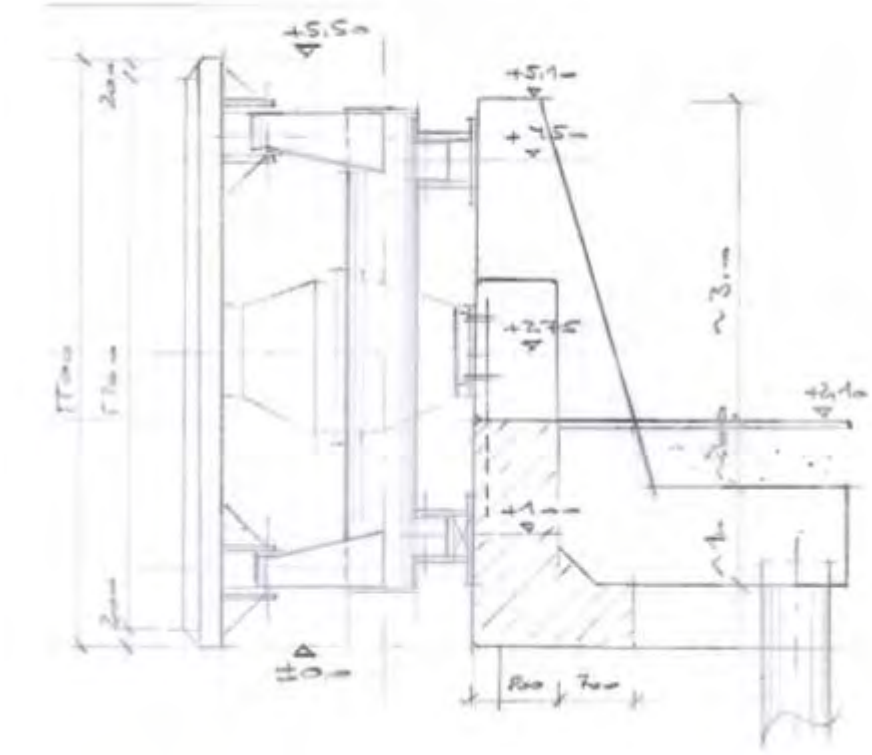
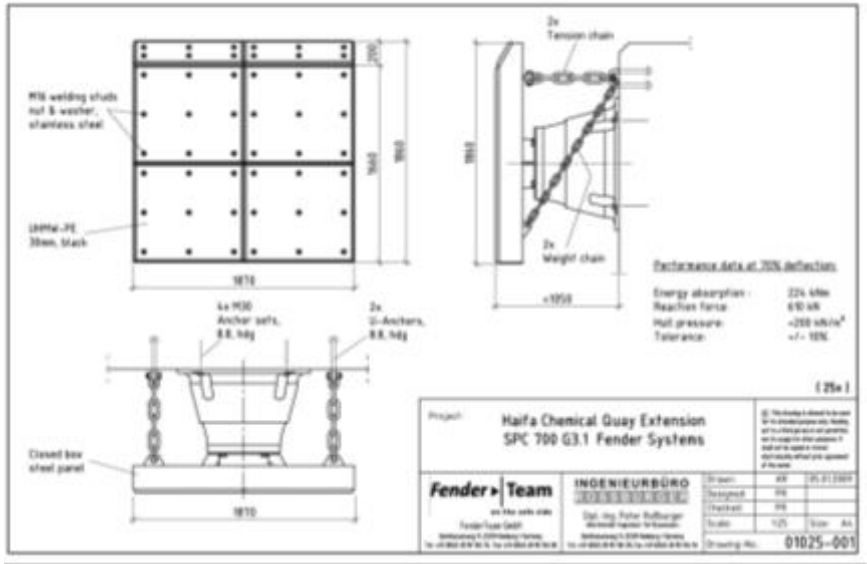
SECOND STEP - DESIGN
PREPARATION AND SUBMISSION OF SKETCHES/ DRAWINGS





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THIRD STEP - FINALISATION

The Final Steps in preparing a high performance Fender Design:

- Detailed discussion/evaluation of the submitted proposal
- Review and consideration of stakeholders' comments
- Submission of final design and drawings (dwg/pdf Files)
- Prepare specifications for high performance fenders
- Additional requirements to allow only highly qualified bidders to participate
    - PIANC Certification
    - Product Liability Insurance up to 5M USD
    - Claim free record
    - Determination of panel weight range for specific project

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SUMMARY

- Collection and establishment of proper data bases is vital
- Agreement on applicable standards and recommendations
- Awareness of severe factors within the energy calculation
- Wide range of steel panels weights per m^2, depending on the applied load cases
- Specifications of accessories should not be underestimated
- Importance of detailed evaluation of Fender Design proposals

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REFERENCE PROJECTS

FENDERTEAM GROUP – GERMANY | FRANCE | AMERICAS

issued: 05/2014

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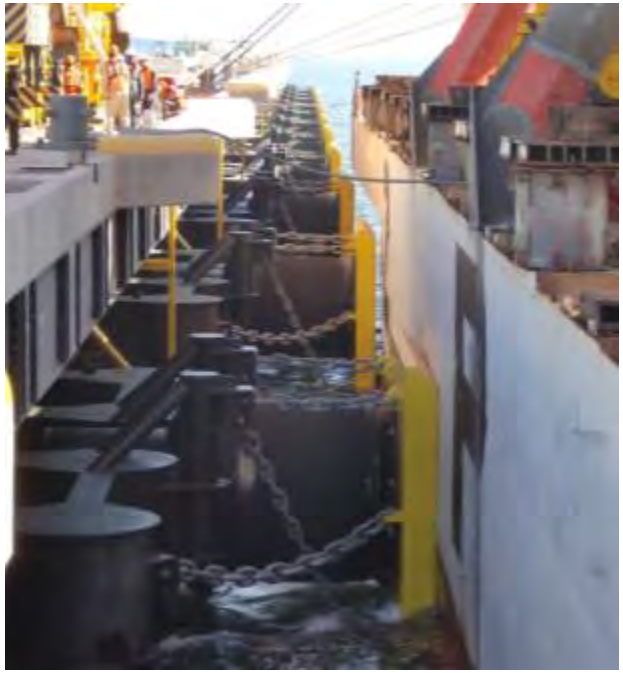
SPC/CSS-Fender System for Bulk Jetty - Sohar, Oman



CSS-3000H, E/A = 7,906kNm (5,830ft-kip)

SPC-2000H, E/A = 4,242kNm (3,128ft-kip)

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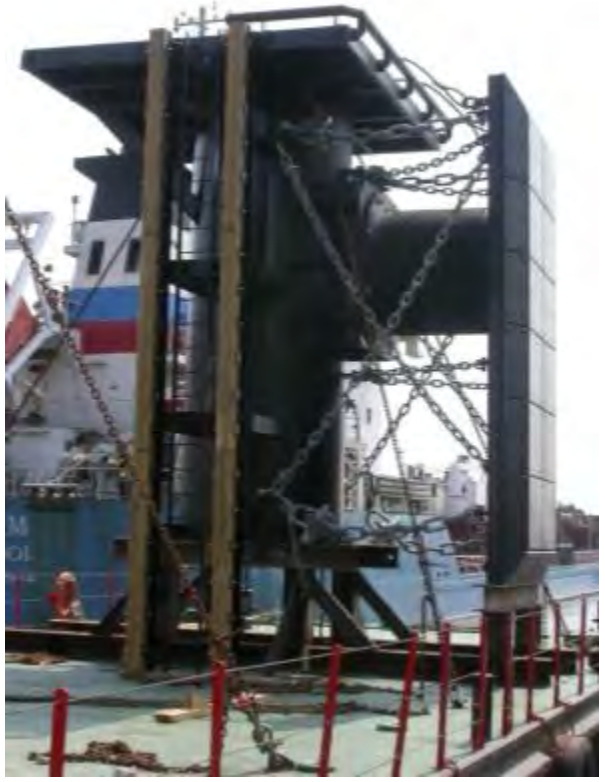
CSS-Fender System for LNG-Terminal - Montoirs, France



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CSS-Fender System Khalifa Port - Abu Dhabi, U.A.E

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SPC-Fender System for Bulk Terminal - Amsterdam, The Netherlands

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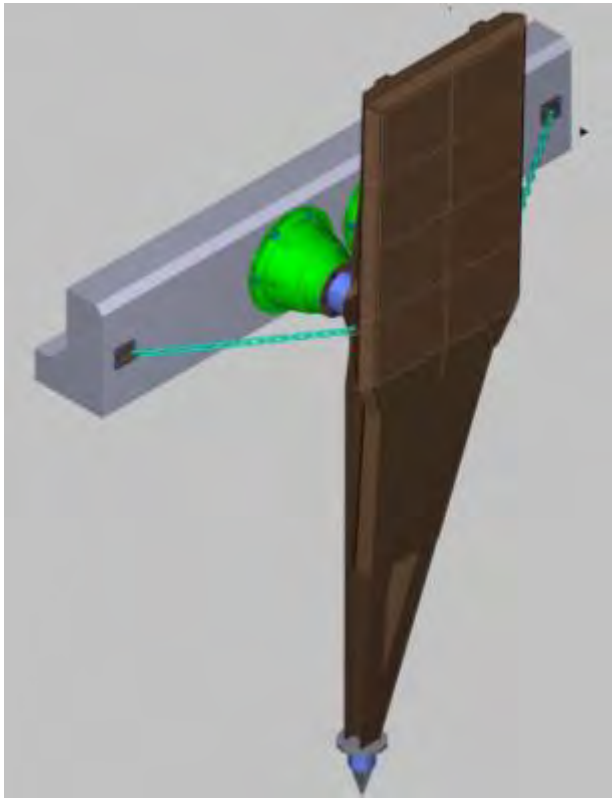
SPC Pile-Fender System for Ferry Terminal - Hirtshals, Denmark



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Special Side Fender System for JDN Dredger

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FE-Element Fender System with Belt Deflectors - Port of Sochi, Russia

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FE-Element Fender System for Ferry Terminal - Ystad, Sweden

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Foam / Donut and Hydro-Pneumatic Fender System for Navy Base

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SPC-Fender and Steel Accessories - Terneuzen, The Netherlands

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Double SPC-Fender System - Wilhelminahaven, The Netherlands

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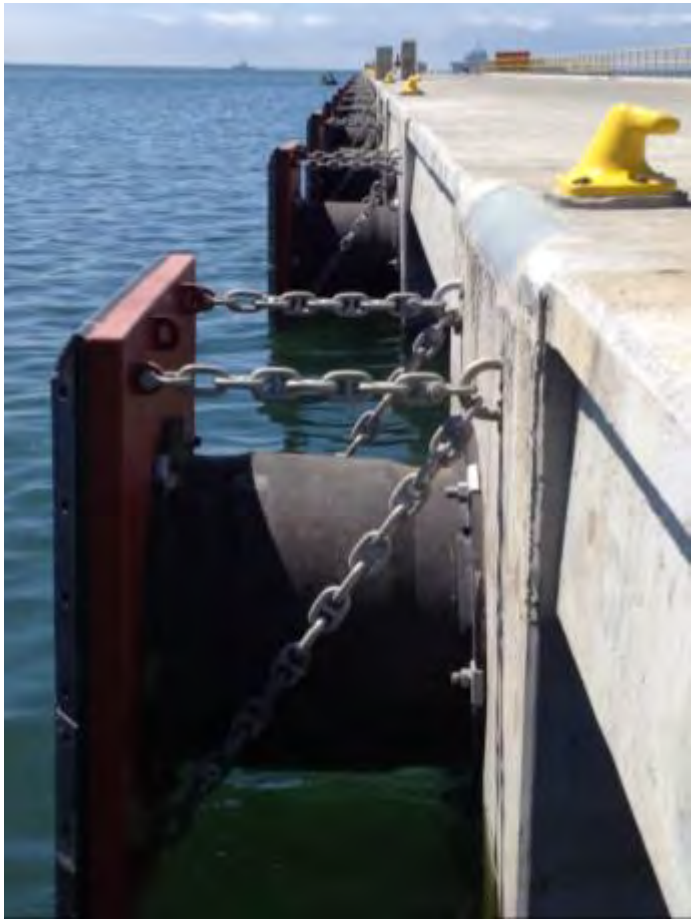
123nos. CSS-Fender System for Navy Shipyard, Chile



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Special Arch-Fender System and PMF-System - Port of Dover, UK

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Parallel Motion Fender System for Ferry Terminal - Gedser, Denmark

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SPC-Fender System for Port of Zadar, Croatia

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Customised Fender Solution Mooring/Waiting Piles - Kiel, Germany

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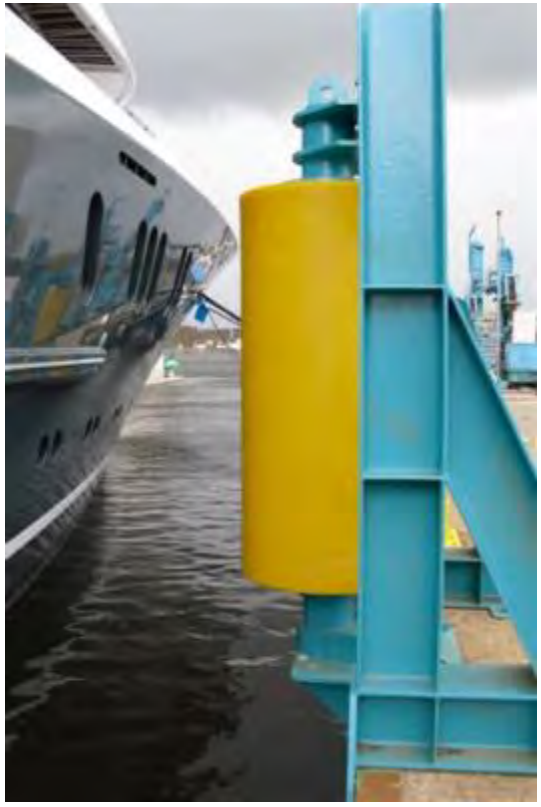
Polyurethane Special Roller-Fender for Super-Yacht Shipyard, Germany



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Parallel Motion Fender System for Oil Terminal - Labuan, Malaysia

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Parallel Motion Fender System for Ferry Terminal - Hirtshals, Denmark

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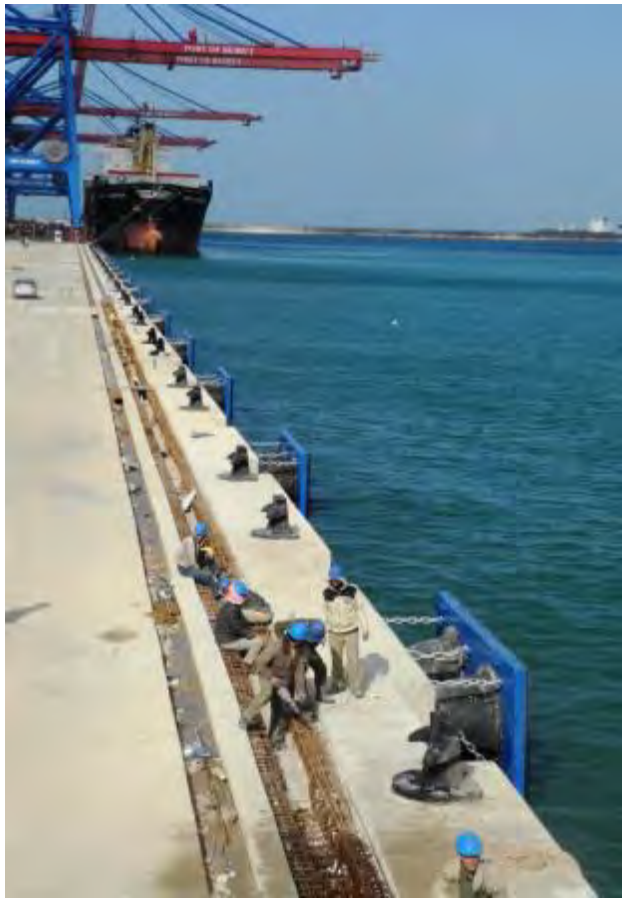
Double SPC System for Container Terminal - Port of Beirut, Lebanon



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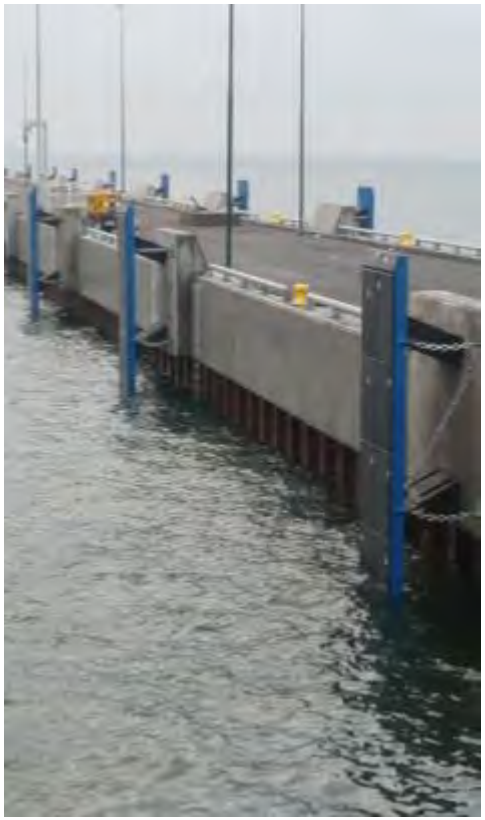
FE-Element Fender System for Norra Hamnen Ferry Pier - Malmö, Sweden



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CSS-Corner Fender System, Pier E - Port of Dover, UK

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SPC-Fender System - Sillamäe, Estonia

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Ship Separator (10mx7.6m) for Oil Terminal - Guatemala

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SPC-Pile Fender System - IJmuiden, The Netherlands

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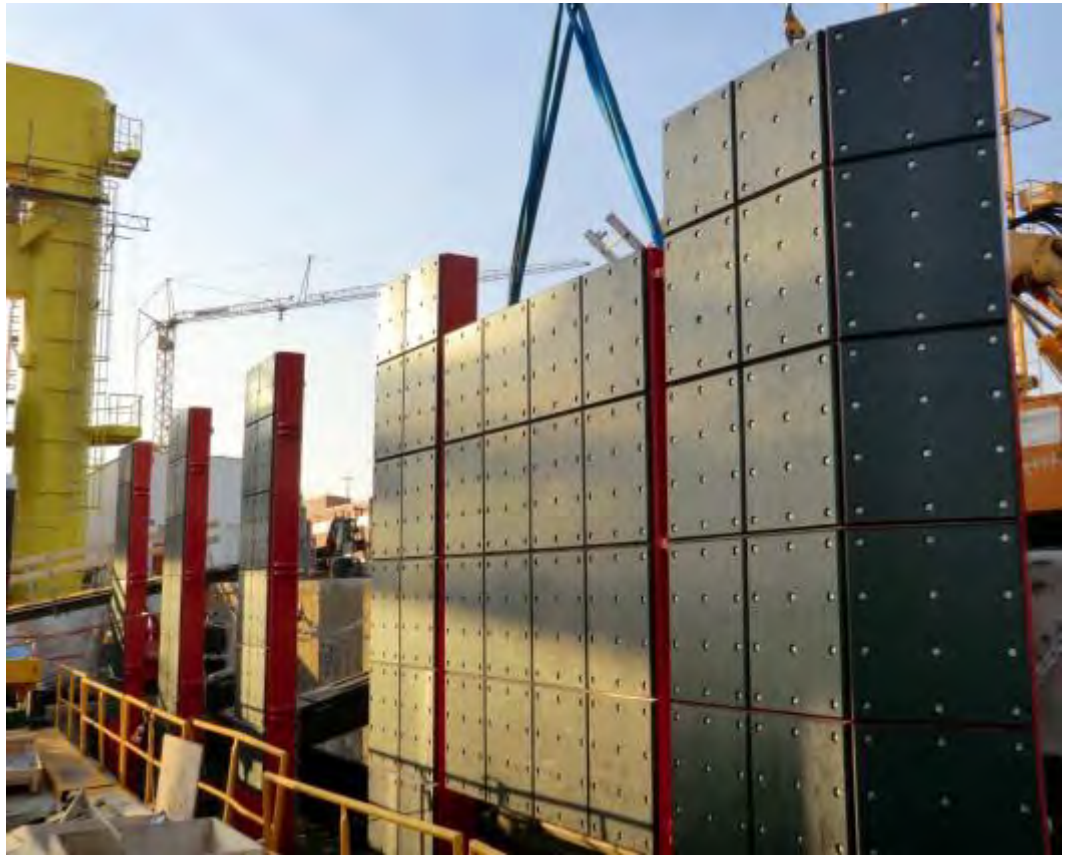
FE-Element/CSS-Cell Pile Fender System for Ferry Pier 1 - Rostock, Germany



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60pcs. 10’ x 16’ Ocean Guard Foam Filled Fender for Container Terminal - Port of Miami, FL - USA

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FE-Element Fender System for Ferry Terminal - Lincolnville/Islesboro, ME - USA

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CSS-Fender System for Oil Terminal - Novorossisk, Russia

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SPC-Fender System for Cruise Terminal - Rostock, Germany

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SPC-Fender System - Pepel Island, Sierra Leone

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SPC-Fender System for new Aqaba Port - Jordan

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SPC-Fender System - Paramaribo, Suriname

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Cylindrical Fender System for Burchardkai LP2 - Hamburg, Germany

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SPC-Fender System for TIOGA I Terminal - Philadelphia, PA - USA

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SPC-Fender System for Pier G - Port of Long Beach, CA - USA

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SX-P Fenders for Pile Fendering System - Beaumont, TX - USA

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FE-Element Fender System – Ventspils, Latvia

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Donut Fender System for Ferry Terminal - Egholm, Denmark

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SPC-Fender System for Container Terminal - Long Beach, CA - USA

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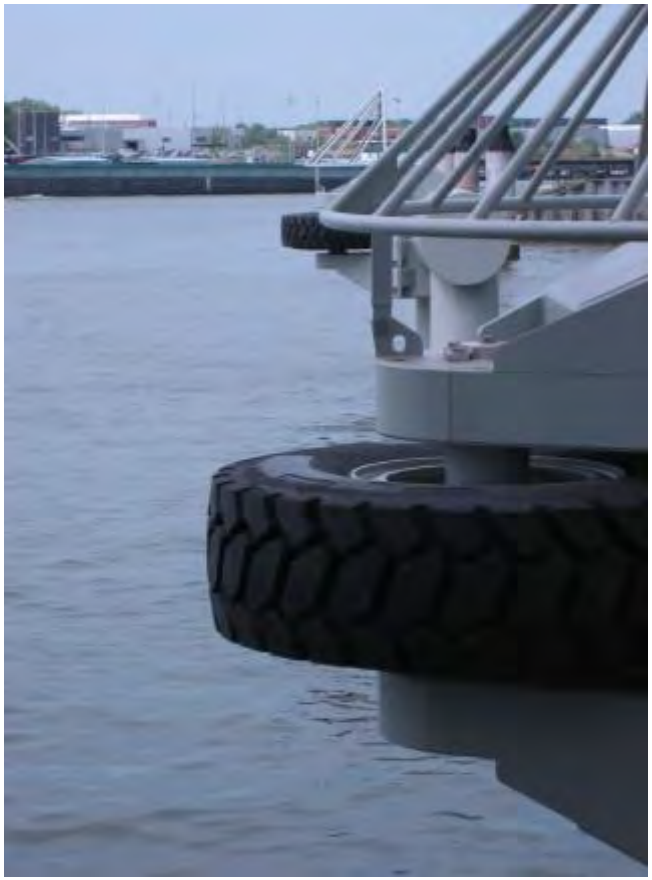
Roller-Fender System - Shipyard, The Netherlands



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SPC-Fender System for Oil Terminal - Amsterdam, The Netherlands

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>200nos. SPC-Fender Systems for Maasvlakte II - Rotterdam, The Netherlands

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SPC-Fender System for Fuel Terminal - Sierra Leone

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Parallel Motion Fender System for Exxon - Paramaribo, Suriname

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Thank you for your attention!