



CONGRESO INTERNACIONAL DE

IV DISEÑO E INGENIERÍA NAVAL

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A New Concept for the Construction of River Transportation Barges Using The Innovative Sandwich Plate System Technology

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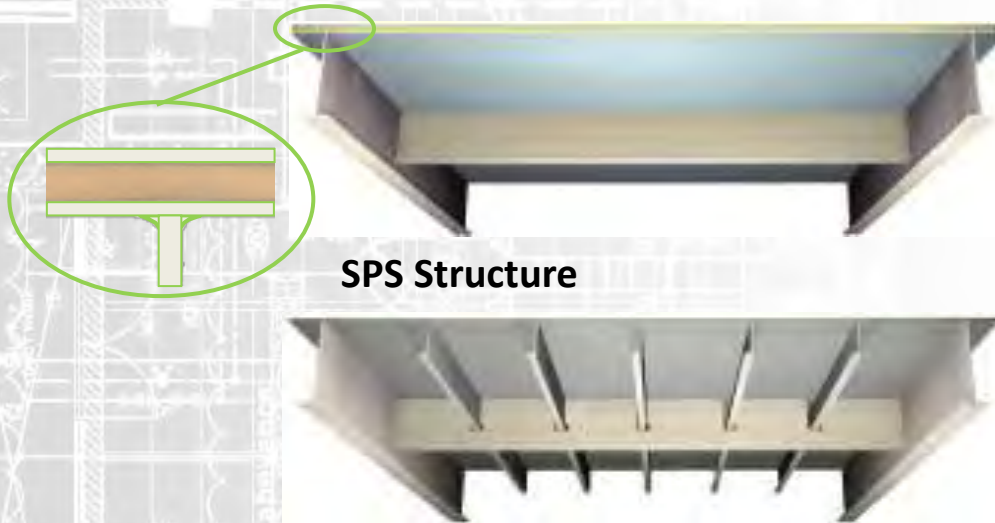
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Agenda

- Introduction to SPS technology
- Common Applications of SPS
- SPS Construction of River Transportation Barges
- Conclusions and discussion

Introduction to SPS Technology Concept and Terminology



SPS Structure

Conventional Stiffened Steel

- Two steel plates bonded to a solid elastomer core
- Continuous elastomer support to steel precludes local buckling
- SPS 4-25-4 : expresses the sandwich elements thickness in mm
- Patented system



Introduction to SPS Technology

SPS Core Business

Shipbuilding

- All elements of a ship or maritime structure: hull plating, decks, bulkheads
- Areas requiring special protection from impact, explosion and fire

SPS Overlay - Repair & Conversion

- All areas of ship structure
- Fast installation, minimises labour and saves vessel downtime

Civil Engineering

- Bridges, stadia, flooring system 75% lighter than concrete
- Prefabricated, very fast to erect, with a long service life



Introduction to SPS Technology

Marine Application Examples

Hull Structures and Tank Tops



Vehicle Deck Repairs



Hatch Cover Construction



Side-shell collision protection



Specialist Blast Protection

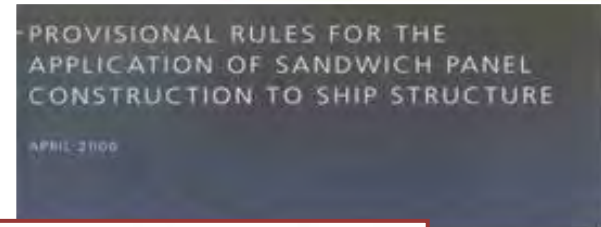


Helideck Upgrades



Introduction to SPS Technology Regulatory and Class Approvals

- Proven and predictable characteristics with over 10,000 tests completed
- Nearly 300 Class approved projects
- More than 300,000m² of SPS
- Flag and Classification societies:
 - USCG
 - MCA (A60)
 - Danish MA (A60)
 - Swedish MA (A60)
 - Marshall Islands
 - Transport Canada



- LR Class rules for the design and construction of SPS structures published in March 2006 – new updates due shortly.
- DNV Class Note 30.11 released 2013.
- ABS working on Rule requirements.



Introduction to SPS Technology

Established Track Record

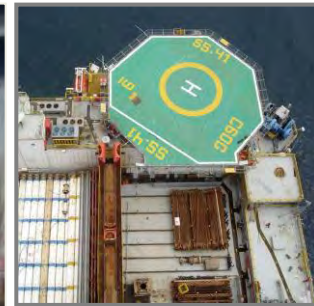
- Proven reliability of SPS structures in a wide range of applications
- Recognised and chosen as a superior solution among various owners



Drill ship - Pipe rack



Helideck



EBM
OFFSHORE

Stena Line
FREIGHT



Side impact protection



RoRo deck

BC Tank ton

CMA CGM

P&O Ferries

WALLENIUS LINES

Transocean

HYUNDAI
HEAVY INDUSTRIES CO., LTD.

Petrofac



BERNHARD SCHULTE

Keppel Shipyard



ConocoPhillips

TEEKAY CORPORATION

misc
MISC BERHAD

Introduction to SPS Technology Benefits

Reduced costs

- Simplified structures with reduced construction costs
- Improved space utilisation
- Enhanced fatigue and corrosion resistance
- Reduced through-life maintenance

Safer structures

- Resistant to impacts from grabs and heavy cargo
- Reduced risk of puncture and crack propagation
- Enhanced fire protection: A60, H60 and J30 certification

Better working environment

- Built-in damping to reduce structure borne noise and vibration
- Reduced fatigue damage

Enhanced blast, ballistics and fire protection

- Improved safety for crew and equipment



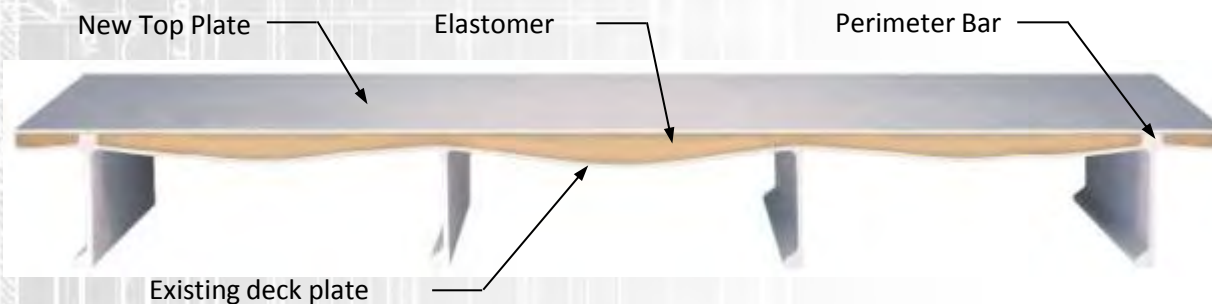
Introduction to SPS Technology

Two ways to make SPS structures

1. Prefabricated SPS panels: factory injection & on-site assembly



2. SPS Overlay: on-site injection, using existing structure



Introduction to SPS Technology

SPS Overlay installation process



Common applications of SPS Ships

Vehicle decks on ferries and ro-ro ships

- SPS is fast and easy to apply
- Shortens repair schedule by 60%, saving time and cost
- Long-lasting repairs requiring reduced maintenance



SPS Bulk carrier tank tops

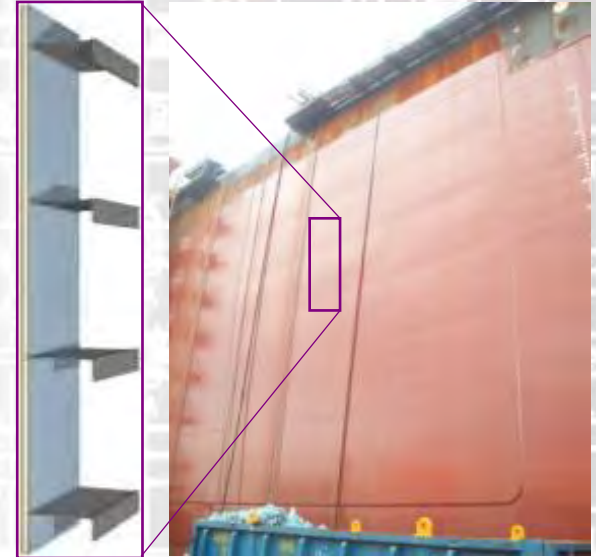
- Stay flat:
- Extending service life and reducing maintenance costs
- Faster unloading and ship turn-round
- Reduced corrosion, longer lasting coatings



Common applications of SPS Offshore structures

Side protection for FPSO

- High performance alternative to double hull
- Protects hull from collision impacts with Offshore Supply Vessels
- Meets MEPC guidelines for the application of MARPOL requirements



Blast and fire proof escape tunnel for FPSO

- Explosion and jet-fire proof
- Provides safe refuge and protected escape route in emergencies
- Constructed at Hyundai for BP
- Verified by Lloyd's Register



SPS Construction of River Transportation Barges

Double hulls on inland waterways vessels will impact badly on economics and safety

- Double hulls are more costly to build and maintain than single hull
- Double hulls reduce cargo capacity - by up to 40%
- Reduced capacity leads to increased numbers of barges; increasing the risk of collision and pollution.
- Higher operating costs of double hull will push cargo movements to trucks, placing the road network under higher stress.

SPS provides a safe and economic solution:

- Two layers of steel separated by a polyurethane core = Compact Double Hull (CDH)
- Equivalent collision/grounding protection to double hull
- Negligible reduction in cargo capacity
- Fast and easy to construct

SPS Construction of River Transportation Barges

SPS construction

- Simplified design – eliminates secondary stiffeners
- Fewer components – faster and easier to construct
- Longer lasting – better resistance to collisions, corrosion and fatigue
- Smooth internal structures – faster and easier to empty and clean tanks between cargoes

Conventional steel hull with internal stiffeners



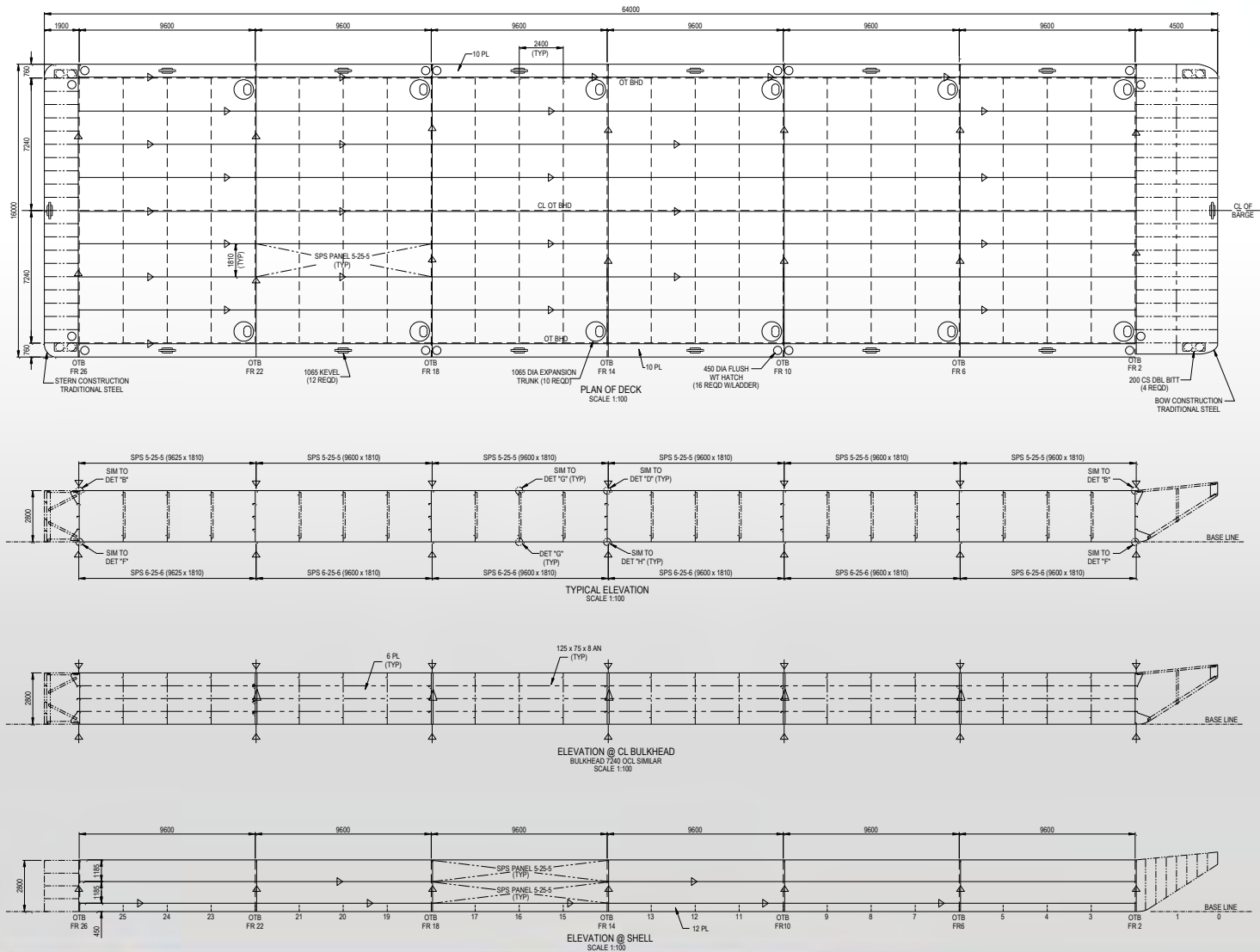
SPS hull with smooth internal surfaces – easy to clean and maintain



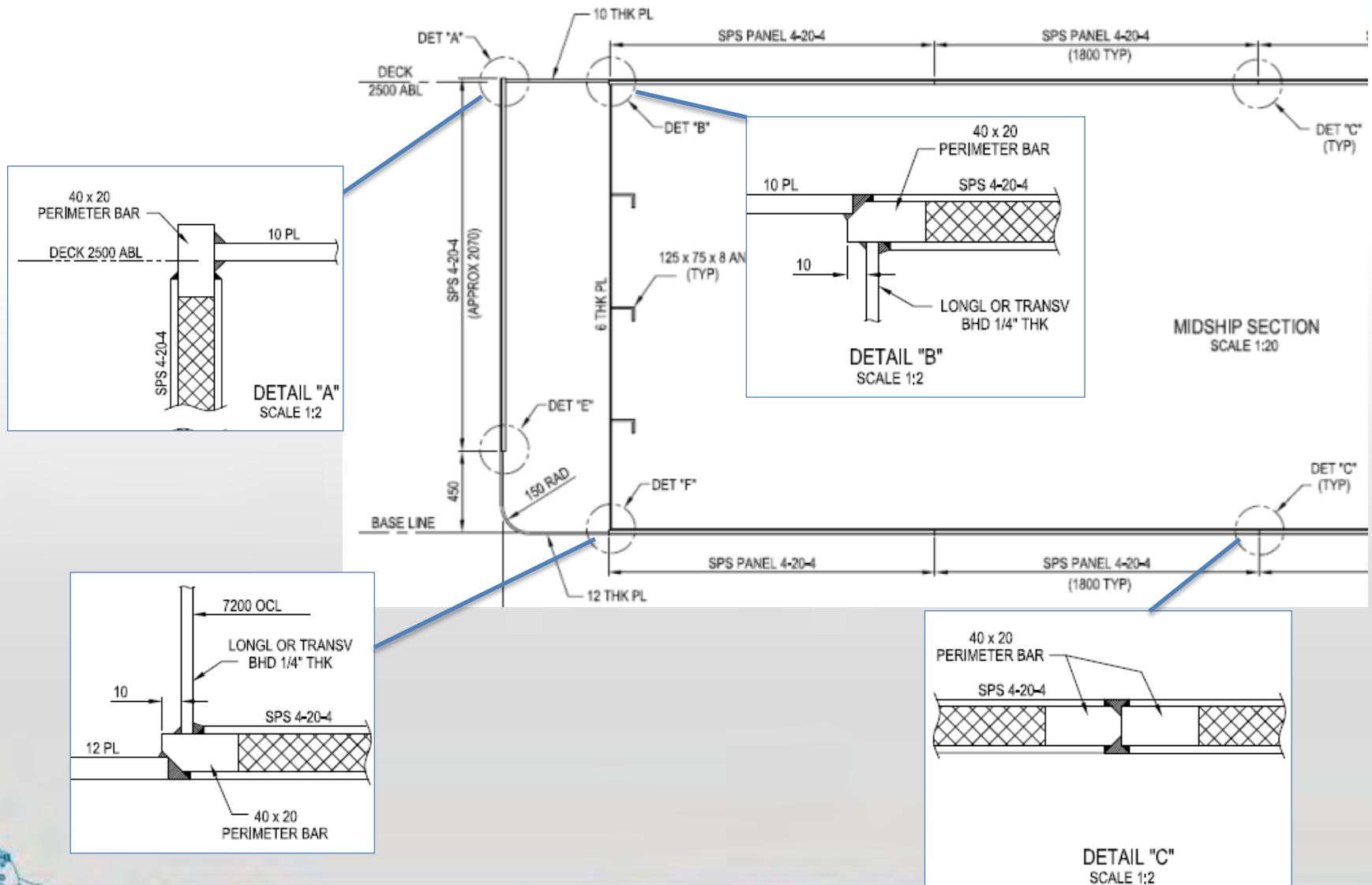
Example SPS river barge. In service since 2005



SPS Construction of River Transportation Barges



The Application of SPS to the Construction of River Transportation Barges – example design



Conclusions

- SPS is a proven technology – fully tested and approved
- SPS offers superior advantages over conventional solutions
 - Structural simplicity and cost-effective construction
 - Enhanced protection against impact, blast and fire
 - Longer lasting structures with reduced maintenance and lower lifetime costs
- Double-hull on inland waterways vessels will impact badly on economics and safety.
- SPS (Compact Double Hull) offers equivalent safety, but retains maximum cargo capacity.
- Use of SPS technology is available for inland transportation barges and can be used on both tank and dry cargo vessels.



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