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

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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

- 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
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
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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
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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