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Use of Composite Piping Offshore

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EMERGING CONSTRUCTION TECHNOLOGIES

Civil - Composite Materials & Technologies

USE OF COMPOSITE PIPING OFFSHORE

THE NEED

The corrosive nature of offshore facilities has owners looking for alternatives to traditional steel pipe. The high cost to replace steel piping in retrofit applications and increased longevity in new construction is driving the search for composite materials which are able to withstand the severe conditions experienced by offshore facilities. In addition to the problem of finding acceptable materials the use of composites must be accepted by owners, contractors, regulatory agencies and insurance companies, all of whom are in a "steel pipe" paradigm

FIGURE 1EXAMPLE COMPOSITE PIPING OFFSHORE

THE TECHNOLOGY

Advantages of composite piping compared to steel piping are: inherent corrosion resistance, lighter weight, ease of fabrication, lower maintenance costs, and lower life cycle costs. These result in reduced problems with corrosion and blockage of fire lines, reduced hot work from welding, reduction in structural support sizes and reduction in material handling during construction. The limited use composite piping can be attributed to the lack of engineering experience on the owner and designer side in addition to a lack of standardization of materials between manufacturers. Not only will the use of composites increase in higher pressure process piping there is hope that they can be used in various structural applications such as tethers and production risers.

THE BENEFITS

In the offshore oil and gas industry, the cost of manufacturing and erecting offshore oil rigs could be cut significantly if heavy metal pipelines could be replaced with lighter pipelines made of composites. By reducing the topside weight of deep-water offshore

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rigs, the Department of commerce estimates $250,000 could be saved per meter of water depth-an average of about $150 million per unit. Composite material pipes also could be used for fire water piping, sea water cooling draining systems, and sewerage without the worry of corrosion. About $20 billion is spent annually by the petrochemical industry, the pulp and paper industry, and marine industries in combating corrosion damage to conventional piping.

It has been estimated ("Composites" 1994) that the costs of a new, medium sized offshore oil platform could be cut significantly if composites, specifically, Glass Reinforced Plastics, were used. As a result of this type of estimate, Dupont feels that offshore composites could be a $13 billion market within ten years.

STATUS

Applications of composite piping are increasing. Research at the University of Houston, in the Composite Engineering and Applications Center, includes prediction of life expectancy, cost effective manufacture, joining technology, inspection methods, standardization of materials systems, and database development. This research will hopefully result in some performance based specifications that will spur additional use of composites.

The Marshall Space Flight Center, Louisiana State University, and Specialty Plastics, Inc., of Baton Rouge, LA, are developing high-performance composite materials to dramatically enhance the physical properties of hardware used in offshore oil drilling rigs.

BARRIERS

Some barriers are lack of acceptance of "plastic pipe", concerns about fire resistance, vulnerability to impact loading and vibrations.

To date, the cost of composite materials, along with design and manufacturing complexity, have restricted such materials to areas such a s national defense or high-performance sporting goods.

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References

1. 'Composites hit an oil boom', Reinforced Plastics, December 1994.
2. Nasa Techtracs.
3. Sarplast Website <http://www.sarplast.com/eng/index.php>.

Reviewers

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