Elastic fuel tank research is underway in Poland

Experts at the Gdansk University of Technology, Poland, are developing a novel way of preventing oil spills in the case of collision or grounding. The research is the brainchild of Professor Janusz Kozak. His idea is to add an internal elastic oil-resistant coating inside a tank, supported by a light concrete foundation, which will be able to move enough to prevent a spill if the outer plating is ruptured.

Prof Kozak has calculated deformation energy values using finite element analysis models and is planning full-scale laboratory tests to evaluate the likely effectiveness of an elastic coating.

A key design consideration is the choice of filling material to support the elastic barrier. To this end, lightweight concrete has been chosen since it is relatively inexpensive, non-flammable, non-gassing at elevated temperatures, non-toxic, non-corrosive and easy to install. Suitable concretes have a density less than 2,000 kg/m³ in their dry state and are made by mixing cement mortar with various natural or artificial aggregates.

Strengths exceeding 60 MPa can be obtained for materials 25 per cent lighter than standard concrete. This saves on costs for scaffolding and reinforcement but, because of their porous structure and variations in the manufacturing processes used to produce them, full testing of the mechanical properties of various

The test rig at Gdansk University of Technology in Poland

formulations is being undertaken. Both performance under tension and defo properties are being evaluated. This ini will be completed by the end of Septem

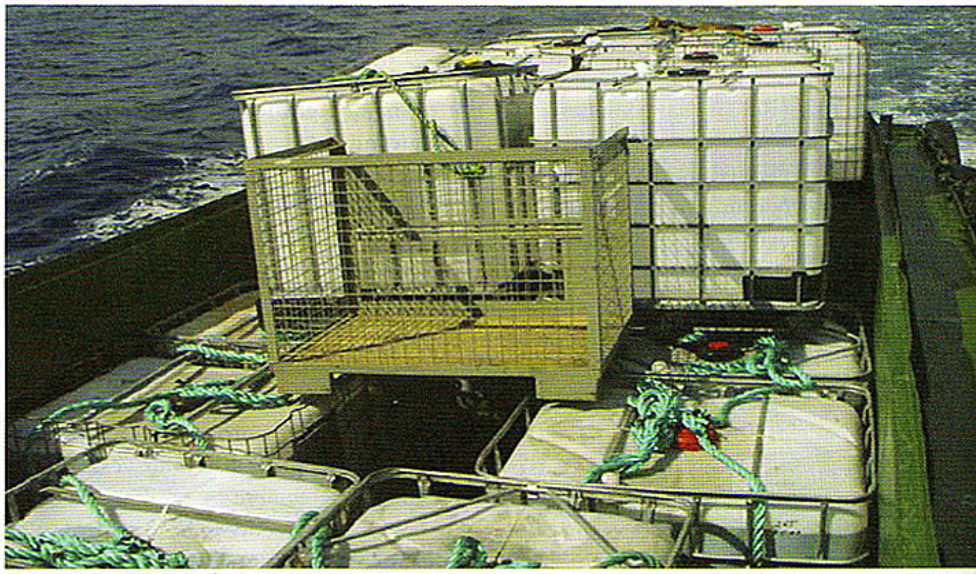
Clean approach reclaims residues from oil and ballast ta

Global Concept of Germany has developed a tank cleaning protocol suitable for oil cargo, fuel oil and ballast tanks based on its experience of successful environmental clean-ups following oil spills. The company has established a 24 hour, seven day a week, mobile call-out team capable of operating anywhere in the world.

The cleaning agent used is Cytosol, a formulation designed to minimise the formation of oil/water emulsions. "Cytosol is a 100 per cent biological product, produced from growing raw materials. It will never crack the structure of oil as chemicals do. It moves between the oil and the tank surface and re-mobilises the oil," explains Global Concept's Klaus Vrey.

Mr Vrey says there are no hazardous residues requiring expensive disposal, and the recovered oil and water can be re-used, making the system attractive both financially and environmentally. "The bunker oil after treatment with Cytosol has a lower content of sulphur and a lower viscosity, but in its structure it is still bunker oil."

The Global Concept team arrives on board and sprays the tanks, allowing the Cytosol to coat and isolate the oil for approximately one hour. The tank is then cleaned by low-pressure water and the oil and water c in containers. After a short settling time can be pumped out for reuse. TST



After spraying and cleaning tanks, the oil and water are collected in containers

Lindenau seeks to reduce impact of oil spills

If the inner shell of a double hull were able to deform on impact it would reduce the incidence of oil spills. To this end, German shipbuilder, Lindenau Schiffswerft & Maschinenfabrik is developing the concept of 'pre-determined breaking points' so that an inner tank barrier of highly ductile steel could separate from the supports of the outer hull on high impact, enabling it to deform more readily.

Ingo Tautz, project leader at Lindenau, is working in collaboration with Hamburg-Harburg Technical University and Germanischer Lloyd researchers to test a design where a series of holes are made in vertical tank frames in the sections closest to the hull. In a collision, the frames are intended to rupture and release the inner shell, resulting in an inward bulge rather than a rupture.

The concept was first developed by partner and former managing director of Lindenau, Günter Stehn, who estimated that a break of 20m along the frames would allow an austenitic inner shell to bulge inwards by several metres without rupturing, in all but the worst case collision scenarios. A crucial factor is the timing of the rupture. If the tank shell separates too late, a striking impact will still result in a rupture. Lindenau is running a series of crash tests to test this, some involving scale models ship's side.

Another key design issue involves ens that ruptures only occur as a result of a impact, without cracking or failing from fatig loads experienced in heavy seas. Compute modelling is now being verified by sea on a recent Lindenau completion, *Seych Patriot*, a 189m tanker owned by Seych Petroleum, which has been fitted with a t frame side section with the perforated brea points. Mr Tautz reports that after some months of service the perforations are in good condition.