Airbags for ships save lives, environment and cargo

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Innovative rapidly inflating balloon technology could keep damaged ships afloat. But more fine-tuning needs to be done and there are some concerns about reliability.

When a ship runs aground, or two vessels crash into each other, the damaged one may lose its stability, or worse, sink. But imagine if after a ship accident, balloons popped up like car airbags to keep the disabled

vessel upright and afloat. This would help to avoid pollution of seas and beaches and gain valuable time for evacuation. Now, the EU-funded project SuSy, completed in 2013, have turned such an idea into a proof of concept. The project developed a proposal to install inflatables on ships including a system to blow them up vary rapidly.

The proof of concept culminated in 2013 with a demonstration of the idea on a model bottom of a medium-sized tanker in the port of Chalkida, in Greece. "Our challenge was to produce enormous amounts of gas from small cartridges which is quickly released into inflatables," describes project partner Reinhard Ahlers, managing director of Balance, a maritime consultancy in Bremen, Germany.

The technologies used by the project are not new, but the combination is. Kevlar reinforced balloons can be installed anywhere on a ship. Suitable places to install the balloons would be in between double hulls and in ballast water tanks. The gadgets needed to inflate them are taken from submarine rescue systems, based on rapid blow out devices originally developed for satellite launchers.

However, one expert voices concern at the project's approach. "Given the location of balloons in the double hull, not only will the construction of the ship be much more difficult and costly. But inspection and maintenance will be almost impossible – hence these systems will be unreliable," says Egbert Ypma, researcher at the Maritime Research Institute Netherlands in Wageningen, in the Netherlands.

To ensure that prompt inflation, the project devised cartridges attached to balloons holding potassium nitrate, used in gunpowder, an epoxy resin and ferric oxide commonly known as rust. When initiated, the gunpowder oxidises the epoxy resin which puffs into the balloons inflating them. What is more, rust improves the explosion process. But blasts produce heat, which may harm the plastic skin of the balloons or

inflammable cargo. Therefore ambient cool air is mixed into the chemical explosion process. This comes either from a second cartridge containing compressed air. Or by using a heat exchanger device just before the gas enters the balloon.

In addition to solving the inflation problem, further fine-tuning needs to be done, according to project scientists. "For example, it would be desirable to have controls at the gas exhaust, as we do not always need the entire outflow," Ahlers tells CommNet. The German rocket technology company Astrium in Bremen, Germany, now part of Airbus Defence and Space, continues to look for a solution. Whereas Survitec, a specialist in marine, defence and aerospace survival technology with its headquarters in Dunmurry near Belfast, UK, who bought the original project partner Deutsche Schlauchboot in Eschershausen, Germany, will optimise the inflatable material of the balloons. Thus, there is still some way to go. "None of the partners assume that the system will be bought immediately," says Ahlers.

One expert believes the system is worth investigating further. "I think that the idea to have a balloon in the ballast tanks in order to push out the water, or try to reduce a damage opening due to those in between a double hull, will be one step forward to enhance maritime safety," concludes Jonas Ringsberg, professor in marine structures and head of the Division of Marine Design at Chalmers University of Technology in Gothenburg, Sweden.

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