A new material to cut weight of ships by 30 percent and save on fuel consumption, CO2 emissions

January 21 2011

A new material is tested to cut the weight of ships by 30 percent. For an average sized freight vessel with a capacity of 7000 m? this corresponds to a weight reduction of more than 1000 tons. Researchers from Fraunhofer Institute for Machine Tools and Forming Technology in Chemnitz, Germany, have experimented with an aluminum powder that foams when heated up. The new material is lighter than water and has a high stiffness.

Within seconds a cube made from aluminum starts to inflate into the shape of a sponge under the impact of heat. The secret of this reaction lies in the compounds of the new material. The metal is a mixture of aluminum and titanium hydride powder, which acts as a blowing agent just like yeast makes dough rise.

The aim of the researchers from the EU research project CREATING was to find a processing method to build large aluminum foam sandwich plates. These compounds could eventually replace steel plates of a vessel. To form such sandwich compounds, the powder is initially pressed into bars. The bars are then placed between two steel sheets and heated in an oven. At a temperature of more than 650° Celsius the new material expands and bonds with the steel sheets without the help of any adhesives.

Tests proved the stiffness of the new material. Put under high stress it

doesn't break but only deforms. The advantage: A ship hull can travel through Northern Europe all year round, as it can even withstand ice sheets on the waters.

Veikko Hintsanen, a captain from Finland, has helped the German researchers to design a super light ship which they call "Bioship 1". For shipping companies a lighter ship means more payload, less trips and therefore less fuel consumption and CO2 emissions. But besides that "Bioship 1" offers even more ecological features. For example, running with liquid natural gas (LNG) it will avoid oil pollution in case of an accident.

Hintsanen believes that the new ship could revolutionize freight transportation in Finland. In his country forestry is one of the cornerstones of the national economy. Its annual turnover is about 27 percent of the net exports. Paper or furniture productions are the typical usages. But there is also enough wood to supply Finland with heat and energy.

Today trucks are used to transport wood from the remote forests to bio energy plants. The problem: if the distance is more than 50 km, road transportation becomes too expensive. "Bioship1" offers a solution: the harvesting areas could be increased and thus more Finish households could be supplied by bio power plants in the future.

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