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COMPOSITE METAL FOAMS COULD MAKE FOR STRONGER AND LIGHTER TANKS

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Tanks and other armoured vehicles need a lot of protection to keep their occupants safe in combat zones. The steel plates commonly used for such armour make the vehicles very heavy. Researchers at [North Carolina State University](#) have developed a range of Composite Metal Foams (CMFs) that can be used for the armour of tanks, to create lighter and stronger vehicles.

Composite [Metal Foam](#) is, as the name implies,

foam made from [metals](#). Thanks to its Swiss cheese-like structure, the material is much lighter than normal metal.

In earlier studies, researchers from North Carolina State University showed that CMFs are effective at blocking X-rays, gamma rays and neutron radiation, and are capable of absorbing the energy of high impact collisions. The material also insulates better against high heat than the conventional base metals



and alloys, such as steel. These findings mean the metal foams could be used in nuclear safety, space exploration and medical technology applications.

In addition, CMFs have been proven tough enough to turn an armour-piercing bullet into dust on impact. For this study, researchers fired a 23x152 mm HEI bullet, which are often used in anti-aircraft weapons, into an aluminum strikeplate of 2.3 mm thick. Steel-CMF plates from 9.5 mm and 16.75 mm thick were placed 46 cm (18 inches) behind the plate. The steel-CMF held up against the wave of blast pressure and against the copper and steel fragments created by the exploding round, as well as aluminum from the strikeplate (see video below). The impact left an indentation in the back of less than 8 mm. The current guidelines by the US National Institute of Justice allow up to 44 mm

of indentation in the back of the armour.

Not only direct hits can be absorbed by the metal foam, it also provides better protection from shockwaves from explosions than conventional materials.

These findings give the material the potential to be used in the armour of, for instance, tanks. Tanks are beasts, weighing normally around 60 tonnes. The new foam can provide enhanced protection, and reduce the weight of vehicles with 65 per cent!

To explore the potential of composite metal foams further, North Carolina State University is working on projects with the US Department of Defence, the Department of Transportation, and [NASA](#).



Photos: US Marine Corps / North Carolina State University

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