Low-cost titanium armor for land-based defense platforms

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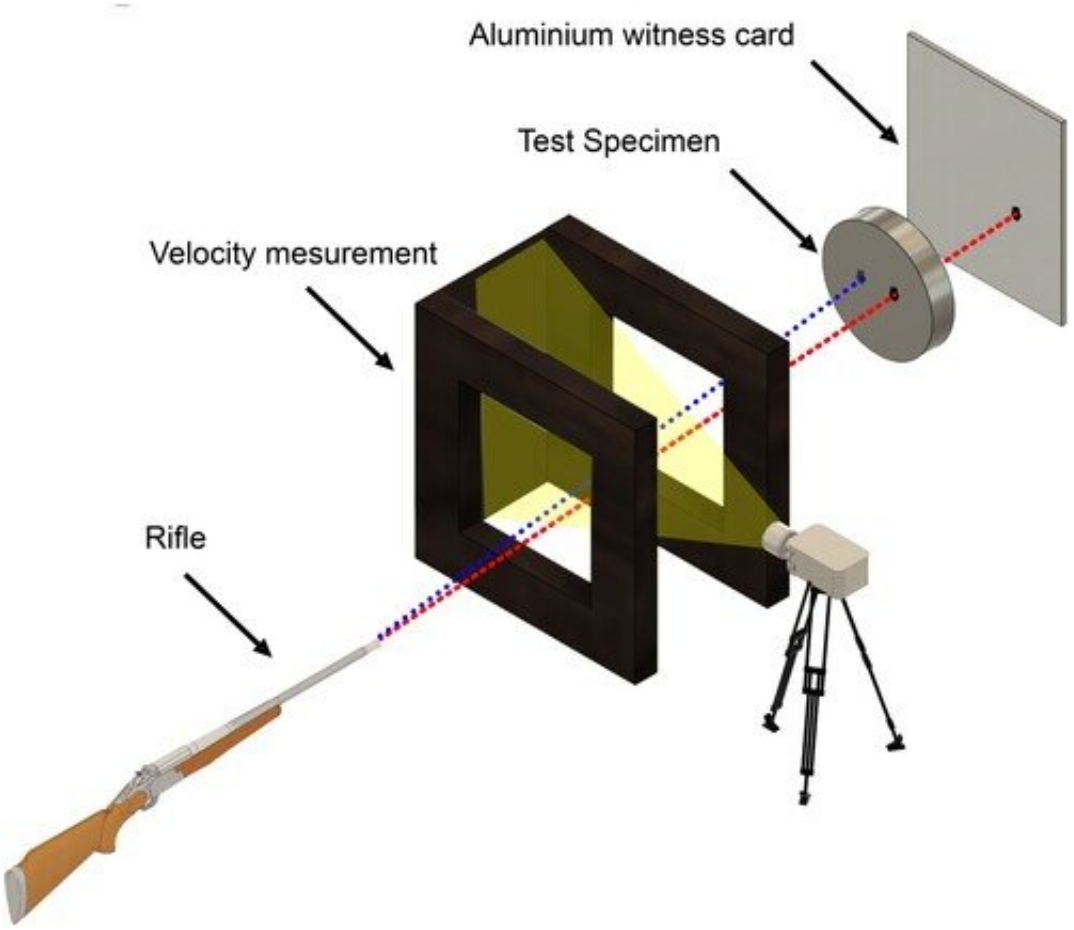

The attack and rear faces of the perforated plates were photographed. Pass and fail shots were selected from each plate and sectioned parallel and across the penetration direction for further examination. Credit: *Materials Science and Technology* (2023). DOI: 10.1080/02670836.2023.2229175

The aim of the Affordable Titanium to Useable Defense Equipment (ATiTUDE) program is to develop a processing route for low-cost titanium for exploitation across the land, maritime and air defense sectors. The project is led by Rheinmetall BAE Systems Land (RBSL). Other members that make up the consortium are the University of Sheffield (UoS), BAE Systems, MBDA, Transition International and the Advanced Forming Research Center (AFRC).

By using the FCT HP D 250 (FAST/SPS) followed by the FENN Hot Rolling Mill in Phase 2 (both accessed at the Royce Discovery Center at the University of Sheffield) it has been possible to create armor plate for ballistic protection in land-based applications.

The majority of land-based military vehicles employ Rolled Homogeneous Armor (RHA) or high hardness steel (HHS) armors, which are comparatively cheaper than titanium. However, titanium alloys have a high mass efficiency in comparison to RHA and can provide a 30%–40% weight reduction while maintaining survivability.

The development of a powder metallurgy processing route for titanium alloys has the potential to eliminate many thermo-mechanical processing steps, especially if this can be combined with a low-cost feedstock such as oversized Ti powder or machining swarf.

Ballistic testing of Ti-64 armor plate produced from both low-cost powder and swarf via the FAST process, has demonstrated that it meets the MIL-Spec V50 ballistic limit requirement against a given threat. This work presents an exciting opportunity for the development of a sustainable closed-loop production route for low cost armor in a range of new applications.

The paper is published in the journal *Materials Science and Technology*.

More information: Beatriz Fernández Silva et al, Effect of processing route on ballistic performance of Ti-6Al-4V armour plate, *Materials Science and Technology* (2023). DOI: 10.1080/02670836.2023.2229175

Provided by University of Sheffield

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