RUAG, Defence unveil Laser Additive Deposition for high-strength steel repairs

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RUAG Australia and the Department of Defence (Defence) have completed a program to develop and demonstrate Laser Additive Deposition (LAD) as a technology for repairing damaged high-strength steel components, proving its capabilities with the full repair and return to service of an arrester hook from a Royal Australian Air Force (RAAF) F/A-18 Hornet.

LAD is an additive material technology which rebuilds damaged metal surfaces. A high-power laser beam creates a melt pool in the surface. Metal particles are injected into the melt pool, and fuse with the surface as it cools and solidifies. Overlapping passes build a 3D deposition structure, which can then be machined to the required shape. LAD is applicable to the repair of high-strength metal components and structures.

As part of the LAD technology validation in a real component repair situation, RUAG successfully repaired the high-strength steel arrester hook from an RAAF F/A-18 Hornet. The hook had been previously identified as worn 'beyond safe limits', due to operational activities. LAD technology restored the hook and ensured it met operational and design requirements. At the same time, the full repair significantly improved the component's return-to-service time, compared with the typical replacement options.

Neil Matthews, Senior Manager for Advanced Technologies and Engineering Services at RUAG Australia, states: "Additive material technologies such as LAD are now critical to sustaining Defence's equipment in the air, land and sea environments. The long-term cost reductions are significant as the reliable repair of components lowers the overhead attributed to logistics and inventory."

Speaking on behalf of Defence, Khan Sharp, Research Leader for Aerospace Materials Technologies at the Defence Science & Technology Group (DSTG), added: "To date, Defence and RUAG have recovered more than $6m of Defence equipment using additive material technologies. Reliability and repeatability are the keys to fully leveraging technologies such as RUAG's LAD and Supersonic Particle Deposition (SPD) repair-and-recover capabilities. Adding additive material technologies to repair capabilities is essential in view of the advanced materials and innovative manufacturing techniques used in building RAAF's Joint Strike Fighter, for example."

Defence and RUAG have a long history of researching additive material technologies, with RUAG now having 15 years of experience in the development and application of additive material repair technologies. Collaboration between Defence, industry and research organisations continues to be an Australian strength.

RUAG Australia is a major industry research centre for the development and application of powder deposition technologies focusing on both SPD (sometimes referred to as cold spray) and LAD for defence applications. These technologies offer a number of exciting and cost-effective outcomes, particularly in the areas of geometry restoration and corrosion protection. In addition, they enable the restoration of corroded/damaged metallic components and structures to an acceptable structural integrity and functionality. RUAG Australia maintains and operates a fixed and mobile SPD capability as well as a fixed LAD capability. RUAG Australia is a DASA 145, EASA Part 145, CASA 145 approved organisation.

www.ruag.com.au

Australian Manufacturing Technology Institute Limited

Suite 1, 673 Boronia Road
Wantirna, 3152
Victoria, Australia

www.amtil.com.au

T +61 3 9800 3666
F +61 3 9800 3436
E info@amtil.com.au

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