

LMD-wire Additive Manufacturing for medium to large-scale aerospace components

Factsheet

GKN Aerospace's LMD-wire development Printing features on component:

It all began in 2008 when a major decision was made to introduce Laser Metal Deposition – Wire (LMD-wire) into an engine program as a preferred solution for the Intermediate Pressure Compressor Casing (ICC) where a number of features (bosses) in Titanium were required on a large fabrication.

The design, material and process development and certification continued until 2012 when the product received certification. Currently GKN Aerospace is producing this hardware in Trollhättan, Sweden. Since this introduction GKN Aerospace's main focus has been given to developing a second-generation control system and advancing the process window for the LMD-W process that allows more advanced geometrical features to be developed.



Company: GKN Aerospace Engine Systems

Location: Trollhättan, Sweden

Technology: LMD-wire AM (Laser Metal Deposition with Wire Additive Manufacturing)

Industry: Aerospace



Printing structural flanges:

GKN Aerospace's continued innovation in Additive Manufacturing has enabled its development of a leading Fan Case Mount Ring (FCMR) structural design.

GKN Aerospace's fan blade housing structure allows significant reduction in source material use, energy consumption and product weight, with a view to reducing greenhouse gas emissions in both the manufacturing process and across the product life cycle. The project is currently in its production start-up. GKN Aerospace's new fabricated fan case mount ring promotes resource efficiency by reducing the buy-to-fly ratio from 15 in the original design to five. This represents a 60% reduction in material waste, which will save over 90 tonnes of forged titanium annually. This project illustrates how GKN Aerospace is using its unique fabrication capability to reduce costs to its customers, and provide broader societal benefits by accelerating the reduction of aircraft fuel consumption.

Integradde – 100% LMD-wire build demonstrator:

Continued development of the process capabilities will allow printing of complete structural parts. GKN is working on process development to enable production of large parts, completely printed with LMD-wire. The target is to print a structural titanium cases with Laser Metal Deposition with wire, LMD-w, for aeronautics.

A new LMD-w equipment pilot line has been built in Trollhättan, Sweden, designed with the capability to print large metallic parts, intended for research and development of LMD technology.

The pilot line uses online process control where inline techniques supervises the build to achieve high material quality. After the deposition is done the near net shape additive manufactured component is sent to heat treatment, the machining stage, and final inspection.

GKN is working together with Integradde partners on development of process parameters to achieve a high quality deposition, process modelling with multi-physics distortion simulations together with advanced path planning tools to mitigate the deformation that is tied with the welding process. This improves the capability to manufacture net as shaped parts as possible, minimizing the material waste. The quality of the material will be assessed, both with destructive, and non-destructive testing techniques.

