

# TECHNOLOGY OFFER

## PRECISION PLASMA WELDING FOR ADDITIVE MANUFACTURING

This invention introduces an innovative and cost-effective process for plasma welding with considerably higher precision, than can be achieved with common welding techniques. The achievable precision of 0.5 mm (and finer) and the possibility of working upside down open up opportunities for new manufacturing methods. The disclosed process allows constructing a metal 3D printer that consumes metal wire and causes only about one tenth of the running costs of a conventional metal 3D printer.

### BACKGROUND

3D printing is a small but rapidly growing part of the metal industry today. Key benefits of 3D metal printing include a faster time to value, cost and time savings by eliminating assembly lines, greater freedom of customisation and design, and minimal waste. But the technology still has significant challenges to overcome. These include the currently substantial price of 3D printers and running costs caused by the handling of the metal powder as well as limitations in the dimensions of the printed parts.

This new process allows variable process speeds and larger processing quantities. Due to its suitability for integration into any robotic system object sizes are practically unlimited. Another key advantage of the system is the ability to use wire as a feed material, which is easier and safer to handle, store, and operate than powders, which directly translates to significant cost savings.

### TECHNOLOGY

Metal wire (optionally powder) is introduced axially through the cathode of an arc or plasma welder into the plasma. The molten metal is transported precisely into the workpiece's weld pool and can be applied over a particularly short distance – even against the force of gravity – with a resolution finer than 0.5 mm. To achieve ideal material quality, the process is carried out in a controlled atmosphere.



Image: Proof of concept in laboratory, magnified

### ADVANTAGES

This technology is an inexpensive alternative to metal powder bed sintering with lasers or electron beams for patterned applications.

In addition to the well established areas of use in the automotive and aerospace industries, countless other possible fields of application are conceivable, from precision tool and parts production, on-demand printing of spare parts or bespoke components, rapid prototyping, to jewellery creation.

The 3D metal printer is about the size of a refrigerator and scalable, making it perfectly suitable for deployment in industry, SMEs and micro businesses.

- Higher precision than comparable techniques
- Significantly lower costs than methods of equivalent precision
- Improved 5-axis manufacturing processes and new applications
- Reduction of lead times and storage costs
- Technology applicable for SMEs and micro businesses

### REFERENCE

M054/2019

### DEVELOPMENT STATUS

Prototype

### APPLICATIONS

3D metal printing, rapid prototyping, engineering, industrial design, arts and crafts

### KEYWORDS

Additive manufacturing, precision processes

### IPR

AT patent granted  
International patents pending

### OPTIONS

Licensing, R&D collaboration, Sale

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