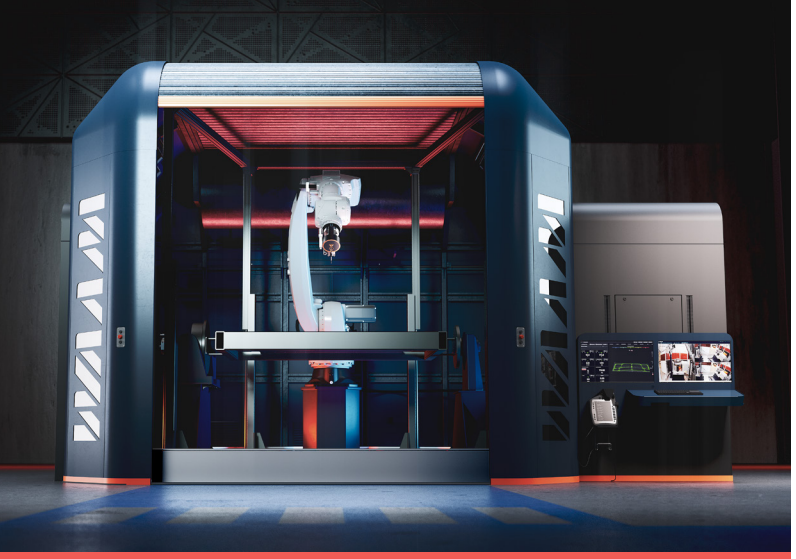
WAAM™

WIRE ARC ADDITIVE MANUFACTURING

Design and manufacture high quality 3D metal parts with **WAAM3D**

We turn your WAAM ideas into applications, through our state-of-the-art WAAM technologies for large-scale industrial metal components.



The hardware

Our award-winning RoboWAAM® large format 3D metal additive printing platform enables multi-metre metallic part development.

It features plenty of innovative proprietary solutions:

- Signature WAAM processes: high productivity plasma transferred arc, and the brand-new proprietary CWMIG process.
- Real time interferometric ShapeTech™ sensor - this innovative proprietary sensor gives live measurement of layer height.
- Double-point temperature measurement capability - ensures consistent printing conditions and enables in-process parameters checks.
- Electronic wire positioning - allows for increased process stability.
- Process camera, combined with CCTV - enables remote melt-pool imaging and safe machine supervision.
- Fume management system (FMS™) - with flexible enclosure with fume filtration and extraction.
- Bulk wire storage and large spool capability (70 kg) - allowing for longer uptimes and reduced operator's intervention.
- 2 m x 2 m x 2 m XYZ robot reach.

The software

The RoboWAAM system is fed and controlled by our own software suite, built on four fundamental blocks:

- **WAAMPlanner®** which turns a parts' pre-form into executable RoboWAAM code. It includes planar and non-planar slicing, 2D and 3D sectioning, and layer grouping. It is capable of best-in-class tool-path-planning with dedicated AM approaches and multi-material and multi-process capability.
- **WAAMKeys** which carries out automatic parameter calculations, with advanced thermal compensation modules to achieve the target layer height, regardless of changes in geometrical features, minimising the risk of non-conformities.
- **WAAMSim** which visualises RoboWAAM's deposition environment. It includes a virtual, gaming-inspired environment for collision detection and offline tool-path-plan validation and supports virtual reality headsets.
- **WAAMCtrl®** which is an all-encompassing operating system for RoboWAAM. It incorporates an operator's dashboard, the component's digital twin, interactive data navigation, and historical database with complete printing process record (parameter by parameter including all dependent variables such as temperature and shape), seamlessly integrated onto WAAM3D's hardware and sensors.

The power of WAAM

The WAAM technology has the ability to transform the way in which you design and manufacture large industrial parts. Here at WAAM3D we have experience with dozens of components for the aerospace, energy, defence, marine and mining industries. We also support a number of research and technologies organisations and other research bodies that are working on the latest innovations in manufacturing.

WAAM3D and our services

We are the only provider of a total, turnkey solution - delivered via a WAAM ecosystem - that is based on in-house developed hardware, software, services, and materials. We are now a leader in large-scale additive manufacturing, based on Cranfield University's pioneering research carried out since 2006. We work with organisations that include Airbus, GE, Thales Alenia Space, GKN Aerospace, Weir Group, Rolls Royce, Lockheed Martin and BAE Systems.

The materials

Our world-class quality wire has specially developed aluminium chemistries that match the WAAM process. Moreover, we have focussed on the wire production process, starting from cleaner, more controlled ingot melts, all the way to the drawing and packaging of the final product. Our aluminium wires have fewer impurities, tighter diameter tolerances, better external surface quality, and dedicated spooling approaches.

Our excellent feedstock delivers consistent, high-quality deposition - not just for WAAM but also for welding. In fact it is available in 70 kg marathon spools, but also in welding rods.

Our premium wires and rods are available in the 2319, 4043, 5183, 5386 and Mg-Scandium variants. However we can also produce test chemistries, if you can't find what you are looking for.

Our RoboWAAM will also run off of standard wire feedstock. Visit **www.waam3d.com/materials** for the list of aluminium, titanium, nickel, steel and refractory metal materials that we have in our WAAMKeys parameters database.

This list however is not exhaustive and other materials can be assessed for viability in conjunction with RoboWAAM.

Visit **WAAM3D.com/materials**

The service

Step 1 - Financial and technical assessment

- We help identify components suitable for WAAM in your bill of materials.
- Our experience in parts screening, cost estimations, life cycle assessment and business case evaluations enable us to provide production or procurement costs to help build the business case and support the implementation of WAAM technology.

Step 2 - Development, demonstration and validation

- We can supply specimens and components needed to qualify WAAM processes and technology within the organisation.
- We can also leverage our academic network to provide additional characterisation and a deeper understanding of the material and heat source interaction.

Step 3 - Optimisation and delivery

- We develop and validate build strategy and parameters for the components, optimising your application.
- We can then pass these to one of our manufacturing partners, or directly to you for serial production.

Training

- With our strong academic heritage and years of lecturing experience, we can train operators and engineers to become the WAAM experts of the future.

Industrialisation

- We can advise on industrialising WAAM processes and technologies:
  - Which RoboWAAM variant to use
  - Where to procure material
  - Which post-processing company to partner with
- We can offer capacity within our manufacturing network for finished part delivery, ready for installation.

Customisation

- For special requirements that go beyond our catalogue systems, contact us to see if we can make the seemingly impossible possible.

If you would like to learn more about the ways in which WAAM can help you with your next manufacturing project, please get in touch. There's no obligation and you may discover that we can help you revolutionise the way you work.

Visit **WAAM3D.com**

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