

A&M offer fast turnaround manufacturing of bespoke high value, low volume components and tooling for all sectors of engineering. We specialise in intricate precision machined components in metals including inconel.

We are an award-winning engineering solutions company offering Pure Precision engineering services to aerospace, F1 and other sectors including components as suppliers to the Ventilator Challenge UK consortium.

We have 58 CNC's & EDM's machining materials including stainless steel, mild steel, aluminium, inconel, titanium and exotic alloys producing prototypes and bespoke short runs of components for customers.

- **One of the UK's largest commercial EDM Spark and Wire erosion capabilities**
- **Tool making** design and manufacture, rapid repairs to production assembly equipment
- **Design for Manufacture and machining capabilities – 30 CNC millers & turners**
 - 3,4 & 5 axis Milling
 - Turning, Grinding, Fabrication, Laser Welding
 - Metrology Inspection
 - 3D laser scanning for retro engineering
 - Additive manufacturing, 3D printing
 - CAD CAM programming and development

CNC Precision Engineering

Our policy is one of continuous investment working with tried and tested equipment suppliers, enabling us to operate a full range of machines with similar control systems, giving us operational flexibility.

Our HURCO CNC machines range from compact to large capacity 5 axis machines, enabling us to programme multiple operations and run 'lock and load' unmanned operations. We have invested in shrink fit tooling, to reduce vibration and extend tool life.

<u>CNC Turning lathes</u>	X/Y/Z axis	Manufacturer details
HURCO TM6 VDi	178 x 356 mm	https://www.hurco.com/en-gb/machine-tools/Documents/Europe-Hurco-iTurning-Centres.pdf
HURCO TM8	203 x 508 mm	
HURCO TM8H VDi	203 x 508 mm	
HURCO TMM10	250 x 750 mm	
HURCO TM10 VDi	250 x 750 mm	
MAZAK QUICK TURN 250MY	234 x 626 mm	

<u>Conventional Turning</u>	X/Y/Z axis	Manufacturer details
XYZ Proturn SLX 555	500 x 200 mm	http://www.xyzmachinetools.com/
XYZ Proturn 1630	1000 x 420 mm	
XYZ Manual turner	500 x 200 mm	

<u>Manual Millers</u>	X/Y/Z axis	Manufacturer details
XYZ 1500	660 x 305 x 406 mm	http://www.xyzmachinetools.com/
XYZ 2000	750 x 380 x 406 mm	
XYZ EMX 2000 Part CNC Pro trac manual miller	750 x 380 x 406 mm	
XYZ EMX 3000 Turret Part CNC Pro trac manual miller	810 x 430 x 406 mm	
Bridgeport Manual milling machine		

Electro Discharge Machining (EDM)

EDM Spark Erosion

Spark erosion EDM is used to machine complex materials, shapes and sizes with complete precision that cannot be achieved with CNC or manual milling and turning.

Spark EDM is a controlled metal-removal process, used to remove metal by means of electric spark erosion. In this process an electric spark is used as the cutting tool to cut (erode) and produce the finished part to the desired shape.

A&M use Sodick Spark eroders with linear motor technology to deliver high speeds, repeatability and accuracy.

<u>Sodick Spark Eroders</u>	<u>X/Y/Z axis travel</u>	<u>Manufacturer details</u>
AM35L	350 x 250 x 270 mm	
AQ35	350 x 250 x 270 mm	
AG60L (x4)	600 x 420 x 370 mm	http://www.sodick.org/products/die-sinking-edm/ag60l.html
AG80L	850 x 520 x 420 mm	http://www.sodick.org/products/die-sinking-edm/ag80l.html
AG100L	1200 x 650 x 500 mm	http://www.sodick.org/products/die-sinking-edm/ag100l.html
<u>EDM Hole Drilling</u>		
K1C hybrid	200 x 300 x 300 mm	http://www.sodick.org/products/hole-drilling-edm/k1c.html
K1C CNC	200 x 300 x 300 mm	
K1C (x2)	200 x 300 x 300 mm	

EDM Wire Erosion

In Wire-Cut EDM, a thin single-strand metal wire is fed through the work piece, which is in a submerged tank of dielectric fluid or deionized water. This fluid helps to cool the process and flush away the cut material. The Wire EDM process uses electric current to cut conductive materials leaving a smooth surface that requires no further finishing or polishing.

Our comprehensive range of Sodick wire erosion machines includes some of the largest machines in the UK, enabling us to schedule work flexibly and deliver rapid turnaround times.

<u>Sodick Wire Eroders</u>	X/Y/Z axis	Manufacturer details
AG600L (x 4)	700 x 500 x 400 mm	
ALC 600G (x3)	600x 400 x 350 mm	http://www.sodick.org/products/precision-wire-edm/ag600l.html
AQ325L (x 2)	350 x 250 x 220 mm	http://www.sodick.org/products/precision-wire-edm/alc600g.html
AQ537 (x 2)	750 x 500 x 400 mm	
AQ750L	750 x 500 x 400 mm	
AQ750L Premium (x 2)	600 x 400 x 300 mm	https://www.sodick.com/products/wire-edm/aq750l
AQ900L Premium	900 x 600 x 400 mm	http://www.sodick.org/products/precision-wire-edm/aq750l-premium.html
AQ1200L	1200 x 800 x 400 mm	https://www.sodick.com/products/wire-edm/aq900l
EPOC 1100	1100 x 700 x 350 mm	https://www.sodick.com/products/wire-edm/aq1200l

Metrology Coordinate Measuring Machines and quality inspection

Quality assurance and quality control are critical to our manufacturing process.

We have a climate-controlled metrology room and testing equipment to ensure we consistently manufacture to the micron specific tolerances our OEM customers require.

<u>Metrology measurement</u> <u>Coordinate Measuring Machines (CMM)</u>	Capacity
<p>Hexagon Global Performance 12.30.10 with Leitz scanning head Technology https://www.hexagonmi.com/products/coordinate-measuring-machines/bridge-cmms/global-s</p> <p>IMS Merlin</p> <p>Aberlink Axiom Too https://www.aberlink.com/en-gb/products/cmm/axiom-too-cnc/</p> <p>Mitutoyo CRYSTA-Apex V CNC CMM https://www.mitutoyo.co.uk/news-and-events/mitutoyo-crysta-v</p>	<p>1200 x 3000 x 1000 mm</p> <p>1000 x 2500 x 750 mm</p> <p>600 x 1000 x 400 mm</p> <p>500 x 400 x 400 mm Real-time temperature compensation High accuracy of 1.7 µm Rapid measurement regardless of shape High-speed optimal path scanning</p>

Quality Inspection & Testing equipment

3D Handheld Laser scanner - HandySCAN 700 3D

<https://www.creaform3d.com/en/metrology-solutions/portable-3d-scanner-handyscan-3d>

Analyser - Hitachi Vulcan handheld XRF LIBS laser analyser

<https://hha.hitachi-hightech.com/en/product-range/products/handheld-xrf-libs-analysers/handheld-libs-analysers>

Digimar 817 CLM Height Measuring Instrument

<https://www.mahr.com/en/Services/Production-metrology/Products/Digimar---Height-Gages/Digimar-817-CLM---Height-measuring-instrument/>

Digital Bore Micrometres - Mahr, Mitutoyo

Digital Imagery Measurement for small and delicate parts – Keyonce 7000, Project X, Aberlink

Dynamic Balancing Machine to less than 1g.mm

Dynamometer - Land and Sea DYNO-mite C 50 hp, eddy-current brake

<https://www.dynomitedynamometer.com/eddy-current-liquid-dynamometer/liquid-cooled-eddy-current-dynamometer-specifications.htm>

Dynascopes - Vision Engineering, Digimax DX1 Micro Height

Hardness testing equipment - Zwick Roell ZMU

Injector Tester and ultra-sonic cleaner – ASNU

Keyence IM 7000 Image Dimension Measuring System

https://www.keyence.co.uk/landing/lpc/lp_ppc_im_measurementdevice.jsp?aw=googleUKinfo0070059&gclid=EAlaIqobChMI8s33nI3S4gIVg53VCh0MsAmoEAAYASAAEgLbwvD_BwE

- Up to 100 simultaneous measurements performed in seconds to a repeatability of +/-0.1 microns.
- Measure up to 99 dimensions in seconds
- One button, 'Just Place & Press' operation
- Intuitive point-and-click programming

Micro height gauge - Sylvac Hi-Cal 300 <https://www.sylvac.ch/download-en/manuals/height-gauges/height-gauge-hi-cal>

Microscopes - Mantis Elite, Photonic PL2000

Renishaw XL-80 laser calibration <http://www.renishaw.com/en/xl-80-laser-system--8268>

- High performance measurement and calibration for motion systems, including CMMs and machine tools.

Shadowgraphs - Mitutoyo PH3500, Starrett 400

Surface Testers - Mitutoyo S-400, Mitutoyo SJ400

Non-Destructive Testing (NDT) undertaken by registered approved supplier

<p><u>Welding, Fabrication</u></p>	<p>We have a dedicated welding bay and bespoke welding table.</p>
<p><u>Laser</u> Rofin Integral Rofin Select Rofin Star Laser Weld Tool Open</p> <p><u>Manual</u> Mig, Tig and Arc welders</p> <p>Box & Pan Folder Morgan Rushworth 2 mm</p>	<p>Spot welds using a galvo head to deflect the beam, and seam welds using overlapping spots or with a continuous beam.</p> <p>https://www.rofin.com/en/products/systems-and-solutions/manual-welding-lasers/performance/</p> <p>Standalone portable system, enabling laser welding at a customer's site.</p> <p>Up to 2mm bending thickness capacity and a maximum bending length of 2000mm. The counter balance weights assist performing bends</p> <p>https://www.morganrushworth.com/productlist/morgan-rushworth-bpc-counterbalance-box-pan-folders/</p>

Other equipment

Bandsaw – vertical, Addison V2812 <https://addisonsaws.co.uk/products/addison-jubilee-v2812-f-h>

Cranes – 4 cranes up to 10 tonnes

Cylindrical Grinders x 9

Deburring – TFM 83/37 Walther Trowal vibratory finishing machine, cleaning trough

Drills – Pedestal drills x 3, Radial drills x 2

Part Marking – Dot matrix, Laser, Chemical

Power Saws – 3x horizontal, 1 band saw

Shot Blasters – dry and wet

Surface Grinders

Andmar YSG 1640 Surface Grinder with attached crane up to 500 kg
https://www.andmar.co.uk/ysg-ts-machines-1224-1640_p310

8 Surface Grinders, up to 1000 x 500 x 400

Try out Press – up to 150 tonnes

Ultrasonic cleaners – EMX 2000 & 3000, manual MCS

CAD CAM Software

Autodesk PowerMill Ultimate 2020

- **Blisk Machine**
- **Five Axis**
- **Machining**

Autodesk PowerShape Premium 2020

EZ EDM

A 2 through 5 axis wire EDM system, automatic machining strategies such as multi-pass contouring with stop, retract and cutoff options, and no-core-cut pocketing.

GearTrax - gear, spline, sprocket and pulley modelling mathematical software

Rhino 6

3D CAD modelling software package to accurately model designs ready for rendering, animation, drafting, engineering, analysis, and manufacturing. It translates curves, surfaces, and solids, point clouds, and polygon meshes.

Solidworks Premium with Finite Element Analysis

Vero PEPS wire EDM CAM

PEPS Wire is an industry leading Wire EDM CAD/CAM system developed specifically for the precision engineering, tool-making, mould & die, press and extrusion tool industries. It offers an intuitive environment for the comprehensive programming of all Wire EDM machines tools.

Additive Manufacturing

Form 2 SLA 3D Printer x 2 <https://formlabs.com/store/uk/form-2/>

Ultimaker 3 Professional 3D printer <https://ultimaker.com/3d-printers/ultimaker-3>

Mark Two Desktop 3D Printer carbon fibre

https://markforged.com/mark-two/?mfa=sga-em-bof-branded&adg=101430127115&kw=mark%20two&device=c&gclid=Cj0KCQjwrlf3BRD1ARIsAMuugNv_zoFZ_2wk55tD7IDwgtZNXOxW_UqcZyCp6Gliq4b00Ne2VRRUqClaAh7XEALw_wcB