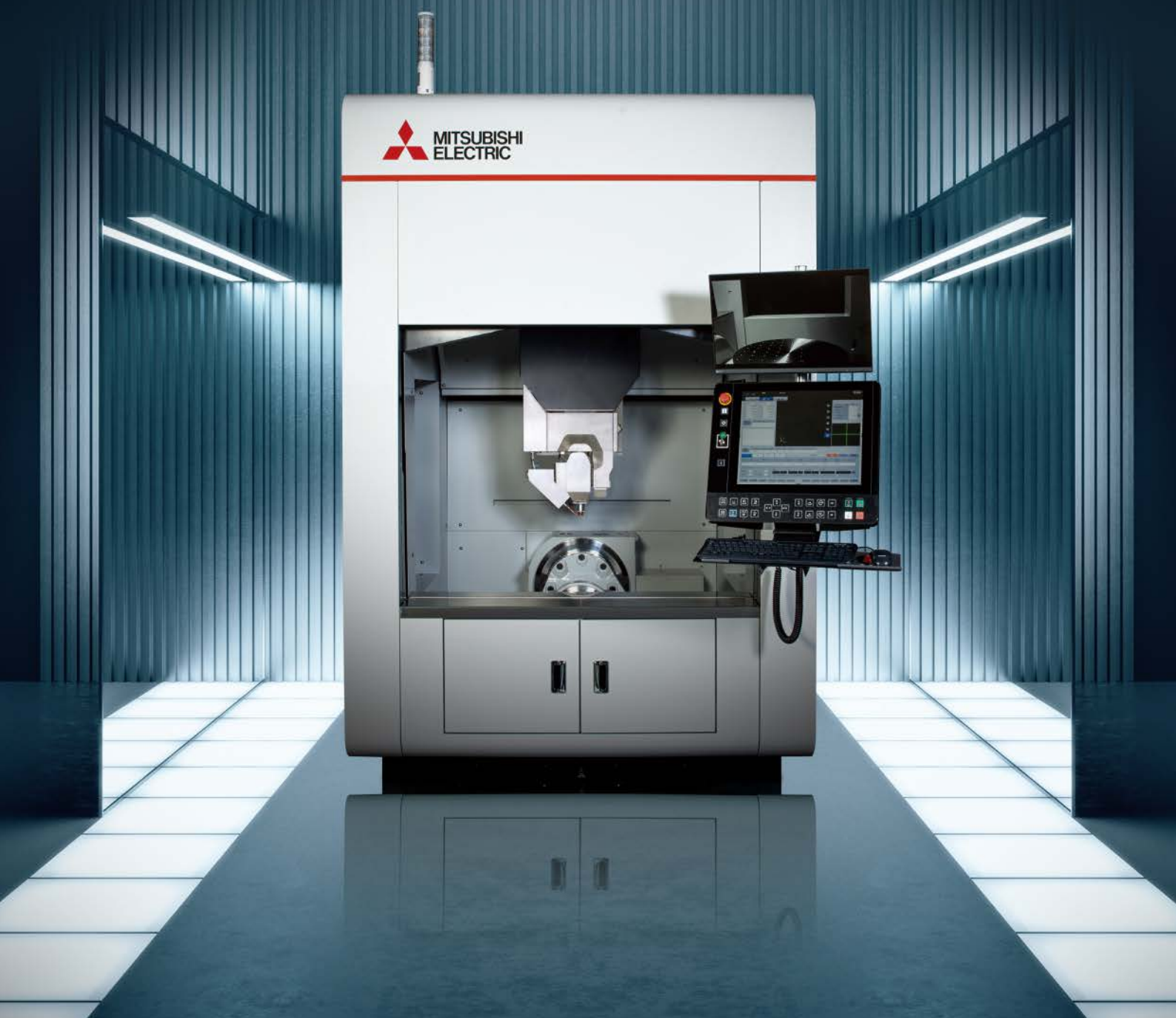
MITSUBISHI ELECTRIC

Changes for the Better

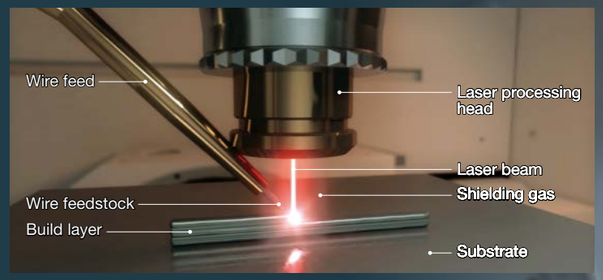
Wire-Laser Metal 3D Printer AZ600

Making Innovation Common Sense



High-speed & High-quality Additive Manufacturing using Wire-Laser DED*

*Directed Energy Deposition



Directed energy deposition (DED) process, in which the metal wire is melted with a laser beam and deposited melting material directly to build a part, has made high-speed additive manufacturing of high-quality 3D structures possible. It is also possible to add to parts manufactured using other process, making it effective for build-up welding for repairing as well. Welding wires that are easily available and currently widely used can be utilized.

High-speed

Using DED with laser beam suited to high-speed control as the heat source and accurately controlling the heat energy according to the build conditions makes high-speed additive manufacturing possible.

High-efficiency

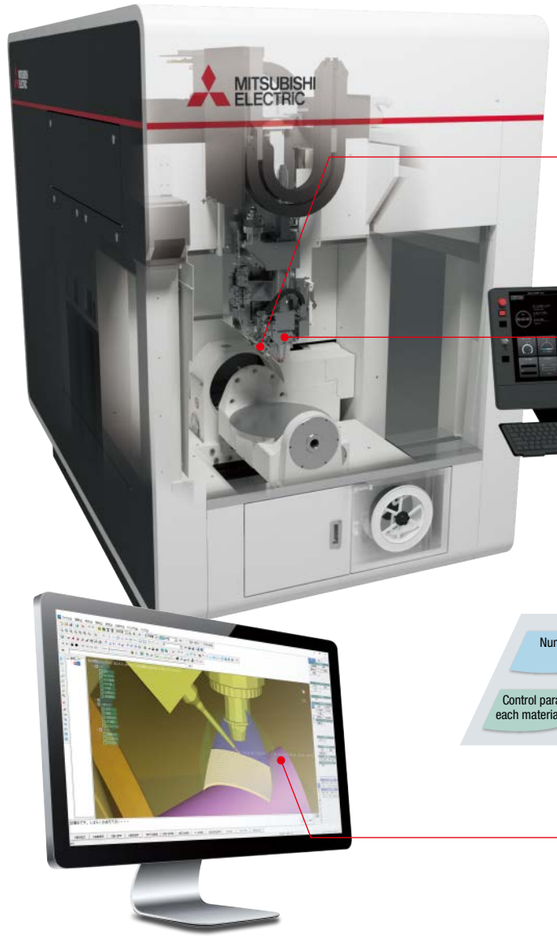
By using commercially available welding wire as the feedstock, a low-spatter process is realized, and the inside of the machine is kept clean. It is more efficient, human and environmentally friendly process than the powder feedstock process.

High-quality

The combination of wire and laser makes highly precise and low porosity build parts.
Adding our proprietary precise heat control allows for high-quality additive manufacturing.

Challenge your creativity

Additive manufacturing technology that brings together the comprehensive strengths of Mitsubishi Electric will change metal processing



Freedom of creation to manufacture key components in house

Wire feed mechanism

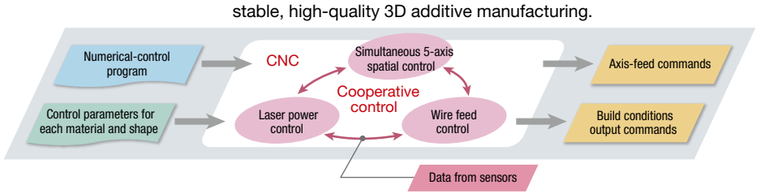
Wire feeding technology has been cultivated in the development of our wire electrical discharge machines.
Developing our own wire feeding technology has allowed us to feed exact amounts of wire to the target location based on the command. Placing the wire on the front of the machine makes it easier to replace the wire.

Laser oscillator/processing head

Get the reliability only available from our fiber laser oscillators. The newly developed laser processing head supplies effective shielding gas, preventing oxidation of the material and allowing high-quality build. No vacuum chamber is needed, allowing for increased freedom of manufacturing.

CNC control

Coordinated control of the axis command value, wire feed amount, and laser output command value ensuring the optimum values based on the build conditions detected by various sensors makes for a stable build process enabling stable, high-quality 3D additive manufacturing.



Dedicated CAM

Our dedicated CAM supports our proprietary build process. The simulation function makes it possible to check the build path generated by the dedicated CAM and the axis movement of the machine in advance.

Near-net shape method* improves productivity and reduces waste and loss

*A rough shape is initially formed, then cut down to finish it.

Conventional (cutting) process

Additive manufacturing + cutting method

80% reduction of processing time

Propeller

Build time: 8 h 47 min
Build size: dia.300(11.8)
Substrate: 304 stainless steel dia.90(3.5) x L120(4.7)
Wire feedstock: 630 stainless steel

A complex, twisted propeller blade was build on the curved surface of a cylindrical base material.
By machining after additive manufacturing, the near-net shape method can be expected to reduce processing time by about 80% compared to the conventional process of prototyping by cutting from the material.

Hollow hand

Build time : 19 h 45 min
Build size: L75(3.0)xW155(6.1)xH170(6.7)
Thickness: <5(0.2)
Substrate: Titanium alloy (Ti6Al4V)
Wire feedstock: : Titanium alloy (Ti6Al4V)

CNC program is created from the 3D scan data of the object to be manufactured using a dedicated CAM. The hollow structure reproduces the human hand.

Impeller

Build time : 2 h 30 min
Build size: dia.50(2.0)
Substrate: 304 stainless steel
Wire feedstock: : INCONEL® 718

*INCONEL is a registered trademark of Huntington Alloys Corporation.

An impeller made from heat resistant alloy is built on a shaft made from stainless steel. (Only part of it is machined in the photograph.)

Water Jacket

Build time: 8 h 44 min
Build size: dia.120(4.7) x H35(1.4)
Substrate: Aluminum alloy (A5083)
Wire feedstock: : Aluminum alloy (A5183WY)

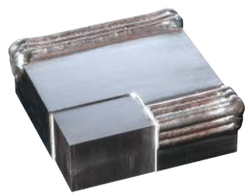
A cooling water channel is provided inside the formed object using additive manufacturing, which makes hollow structures possible.

Branching pipes

Build time: 10 h 20 min (Rear: HASTELLOY® X)
13 h 39 min (Front: MAT21®)
Build size: dia.40(1.6) x L90(3.5)
Substrate: 304 stainless steel
Wire feedstock: : HASTELLOY® X/MAT21®

*HASTELLOY X is a registered trademark of HAYNES International.
MAT21 is a registered trademark of Hitachi Metals, Ltd.

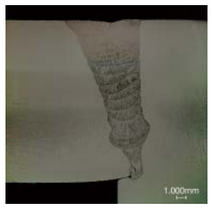
Corrosion resistant alloys were used to form the branches of the pipes used in the equipment. A more efficient manufacturing process reduces the number of prototype casting dies.



Mold repair

Weld time: 17 min per process
Weld size: chamfer10(0.4) x L60(2.4)
Substrate: Tool steel SKD61
Wire feedstock: : Maraging steel

Maraging material was deposited on the base material. This allowed high-quality repairing without defects such as pores. (Only part of it is machined in the photograph.)



Welding automation

Weld time: 10 min per process
Weld size: L 200(7.9)-depth14(0.6), 17 layers
Substrate: 304 stainless steel
Wire feedstock: : 308L stainless steel

Wire laser DED is used for groove welding. This process also addresses the automation and labor savings of the welding industry, which requires experience and know-how.

unit:mm(in)

Specifications

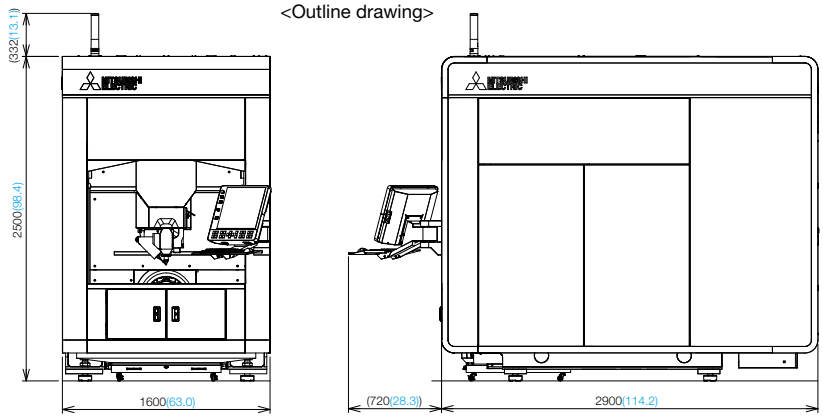
Model		AZ600-F20	AZ600-F40
Process category		Directed energy deposition (DED)	
Stroke (X x Y x Z)	[mm(in)]	600(23.6) × 600(23.6) × 600(23.6)	
Maximum workpiece size	[mm(in)]	Ø500(19.7) x 500(19.7)	
Maximum load capacity	[kg(lb)]	500(1100)	
Laser output power	[kW]	2	4
Main standard equipment		2-axis rotary table BC axis, height sensor, shielding gas NC control, process monitoring camera, automatic slide cover (front door)	
Main options		2-axis rotary table AC axis, automatic slide cover (side, top)	

*Fume extraction system not included among standard accessories.

Outline drawing/layout

unit:mm(in)

<Outline drawing>



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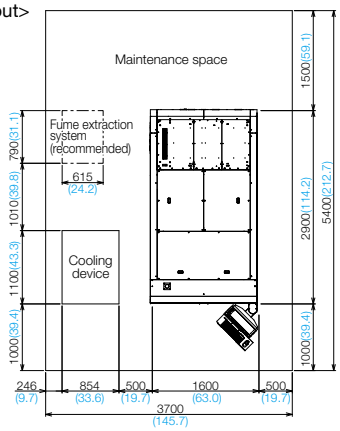

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MITSUBISHI ELECTRIC CORPORATION

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NAGOYA WORKS: 1-14, YADA-MINAMI, 5-CHOME, HIGASHI-KU, NAGOYA 461-8670, JAPAN

* Not all the models are supported in all the countries and regions.
* The machine specifications differ according to the countries and regions. Please check with your dealer.
* The processing data provided in this brochure is for reference only.