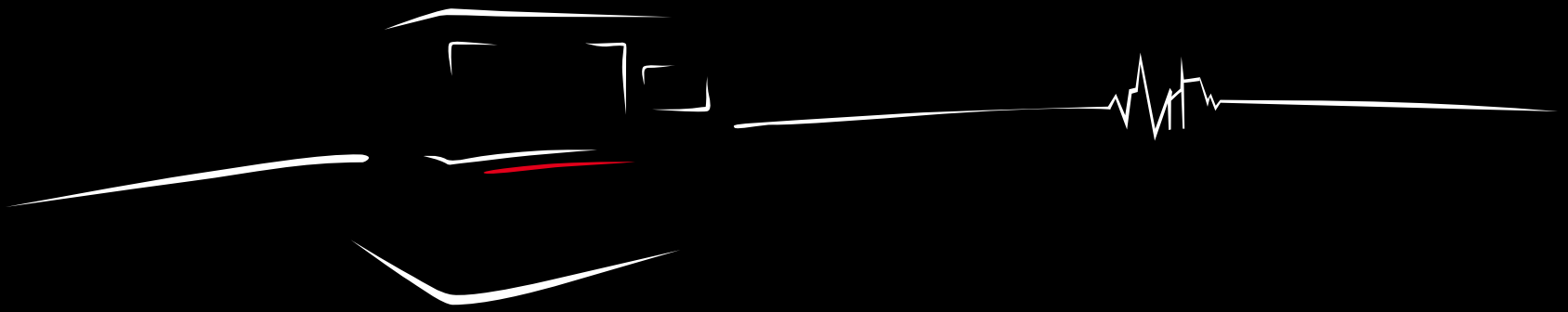
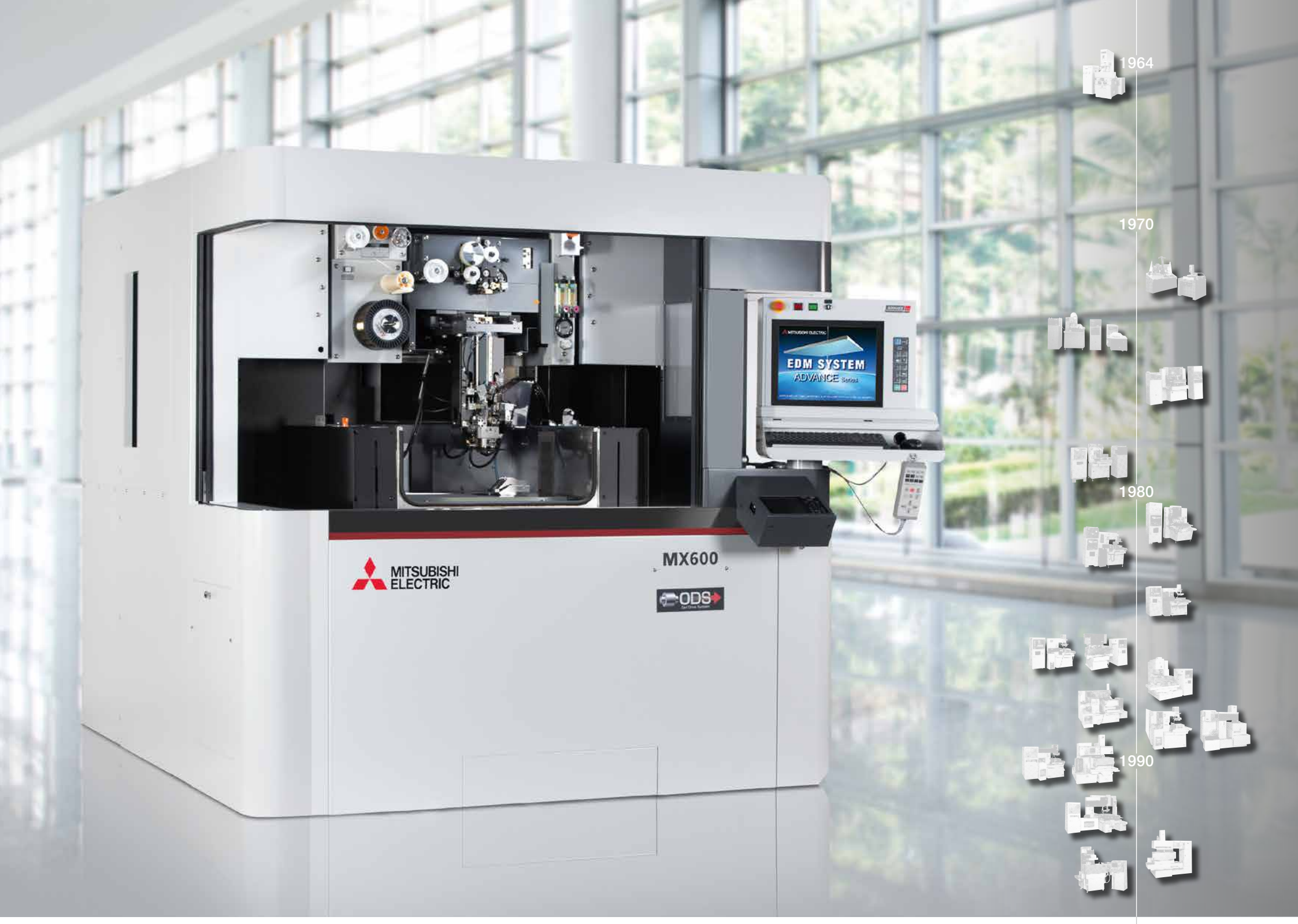
MITSUBISHI ELECTRIC

The Art of Economy



Wire-cut EDM – Precision in Oil

MX600



36 model series since 1964.

An assurance of dependability.

Over

7,000
patent applications per year

63,000
produced wire-cut EDM machines

125,000
employees

90 years
of dependable technology

If you’ve got grand designs,
you need someone strong you can count on.

Since 1970, a growing number of European companies have therefore been turning to high-performance EDM machines from world market leader Mitsubishi Electric.

Only by producing components in-house is it possible to tailor them perfectly to the intended task. Mitsubishi Electric resorts to its own controls, semiconductors, motors and other items, which are adapted in detail to all requirements. The only thing you notice is that it works – and often for many decades after purchase.

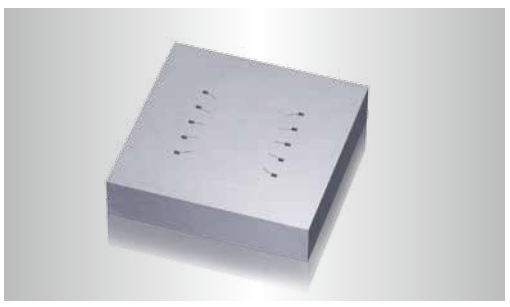
If you want to invest soundly in a durable EDM machine, choose **Mitsubishi Electric**.

MX600

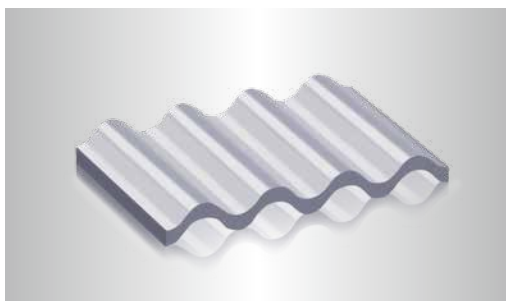
This way I know I’m in good hands.

Perfection in oil
that’s second to none.

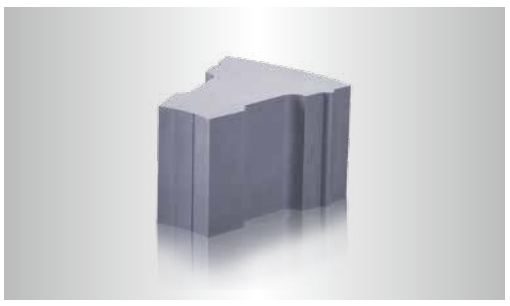
The MX600 marks the dawn of a new era in precision.
Developed for a combination of extreme accuracy and superlative surface quality.



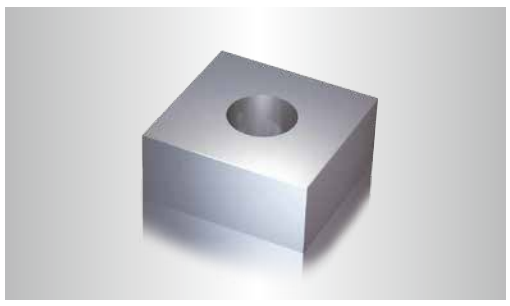
Positional accuracy < ± 1 µm



Surface roughness Ra 0.04 µm



Geometrical accuracy < + 1 µm



Roundness < 1 µm

RIS
RIGIDITY & ISOLATION STRUCTURE

Solid machine construction – decoupled periphery
Good machining results depend on a solid machine construction – made of proven ductile iron. We’re now going a step further and are decoupling the machine base from all peripheral equipment. In doing so, we’re eliminating all vibration and thermal effects on the machine – for the benefit of machining accuracy.
Continued on page 9

ODS
OPTICAL DRIVE SYSTEM

The speed of light ...
... for communication by fibre optics.
The Tubular Shaft Drive with its highly responsive control fully exploits the benefits of high communication speed. No heat, no maintenance and no contact – just extra precision for good. At Mitsubishi Electric, this is known as “Changes for the Better”.
Continued on page 11

PFC
PRECISE FINISH CIRCIUT

Extra precision and speed thanks to the generator that not only thinks, but also thinks ahead.
If you want to achieve better surface quality with fewer recuts, you need the right blend of mutually adapted technologies. With Precise Finish Cut, you achieve more precise results faster.
Continued on page 13

nPV
NANO PULSE V-POWER SUPPLY

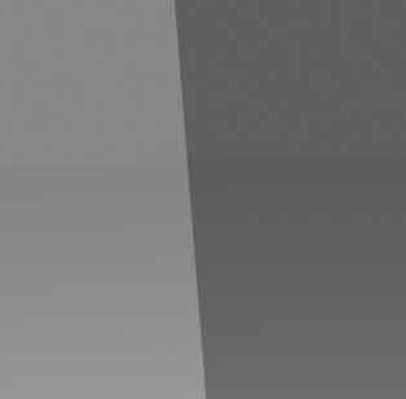
The finest sparks ...
... are essential for superlative wire-cutting results in terms of surface quality and geometrical accuracy. The nano-pulse generator is the source of these fine sparks, creating a precisely controlled, uniform spark pattern along the entire cutting path – all in the service of optimal machining in the oil dielectric.
Continued on page 15

INTELLIGENT AT

Reliable threading and rethreading – even with the smallest-diameter wire
Process autonomy even with 0.03 mm diameter wire – that was the developers’ goal in designing the new automatic wire threader. And the result is certainly something to write home about: reliable and secure threading of 0.03 mm cutting wire in a 0.15 mm start hole – success rate close to 100% and less than 10% at second attempt. See for yourself!
Continued on page 17

NUI
NATURAL USER INTERFACE

Operation must be simple and assist the user.
The directly retrievable operating instructions, Windows-based user guidance and automatic 3D workpiece position measurement make it easy to relax.
Continued on page 19



Configured for precision
The MX600 has a split-axis design, with the table moving on the X and the column on the Y axis – proven for maximum precision with medium loads. The machine's solid construction providing a firm basis ensures precision for the machine's entire life.

Ductile iron.

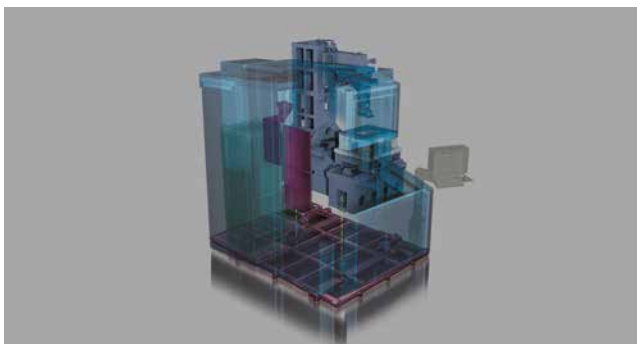
A micrometre removed from the future.

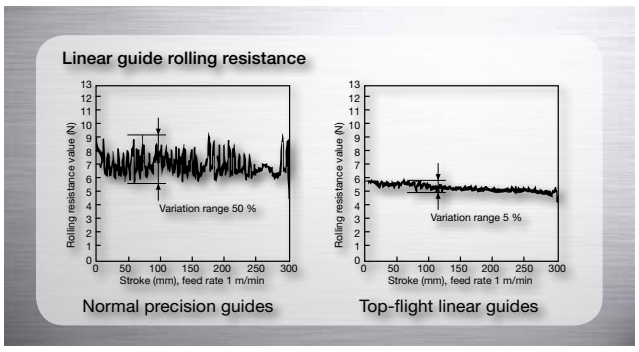
RIS
RIGIDITY &
ISOLATION
STRUCTURE

Decoupled from vibration and heat
The wire-cutting machine stands within a fully enclosed housing – but on its own machine feet. All additional units are arranged on a surrounding floor slab and are fully decoupled from the machine. This eliminates disturbance caused by vibration and thermal effects on the machine.

Even more precise axis movement – whatever the load
The exceptionally heavy-duty machine bed, only the best, top-flight linear guides and precision assembly ensure the best wire-cutting results in the long term. The slides of the linear guides come with play-free bearings without contact between the ball bearings during movement – for maximum smoothness of motion and almost no rolling resistance.

Perfect climate – accurate to the decimal place
Only if you have exact control of the machine, workpiece and dielectric do you have control of true precision. The inbuilt temperature regulation automatically controls all parameters and synchronises them so as to suppress temperature variation during the cutting process. All for the sake of accuracy.





Less elaborate designs may be cheaper at first, but ...

Floating on air: no friction, no wear ...
The Tubular Shaft Motor converts energy directly into motion, without contact, without maintenance and above all without loss of precision – long-term. Combined with the 400% faster fibre-optic-based control, this superior technology can truly show what it is capable of.

The 12-year genuine manufacturer warranty on positioning accuracy is a guarantee of top-level durability.

Your company's technological edge has a name: Tubular Shaft Motor – from world market leader Mitsubishi Electric.

Find out more about it here:
www.mitsubishi-edm.de/tsm

The perfect drive.

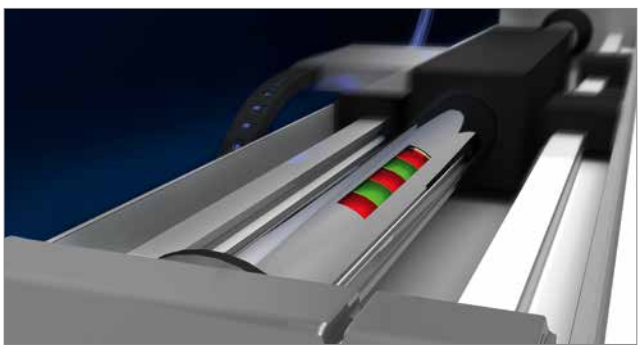
Precise motion, extremely rapid control – for immaculate results.

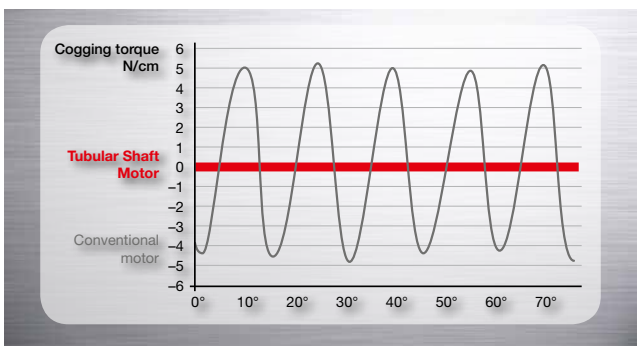
ODS
OPTICAL
DRIVE SYSTEM

Perfect drive
What was it about conventional drive systems that bothered developers at Mitsubishi Electric? The need for lubrication, the friction and frictional heat, power consumption, backlash, the cogging moment and above all the possible wear. Only a non-contact drive overcomes these drawbacks from the outset and is thus an assurance of better results and enhanced dependability over decades.

Speed of light
The Mitsubishi Electric polymer optical fibres have decisive advantages – not only over conventional copper cables, but also over glass fibres. Not only their total resistance to water, but also their high transmission rates combined with minimal space requirements and maximum flexibility are essential for truly progressive EDM systems. The only thing that you as a user notice is the longer service life and enhanced precision.

No disruptive cogging torque
You're surely familiar with the cogging torque manifested by a conventional electric motor. It is precisely this cogging torque that is undesirable, as are variations in torque. The Tubular Shaft Motor – the optimal drive for precision applications like electrical discharge machining – particularly when combined with the specially selected linear guides.





Non-contact drive = trouble-free long-term drive.

Brilliant finish
as good as Ra 0.04 µm in tungsten carbide in steel < Ra 0.10 µm even and particularly where complex geometries are concerned

It’s the result that counts.

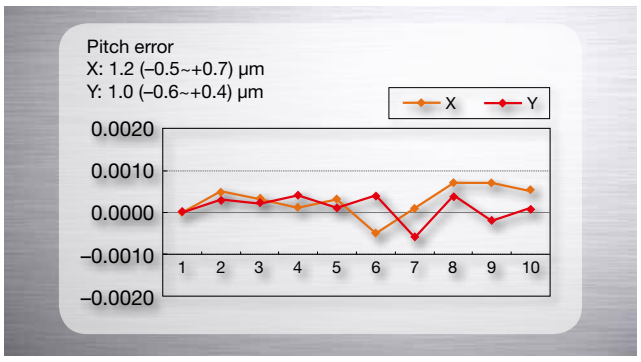
How to achieve it with µm precision.

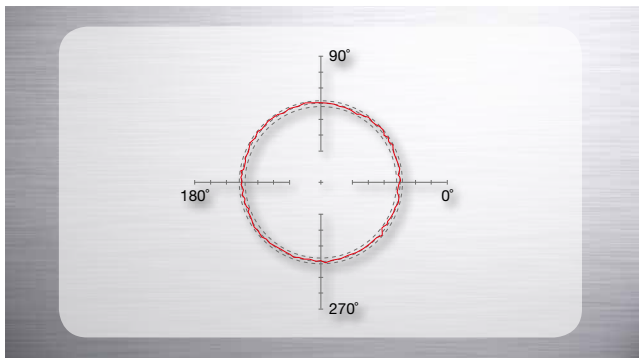
PFC
PRECISE FINISH CIRCIUT

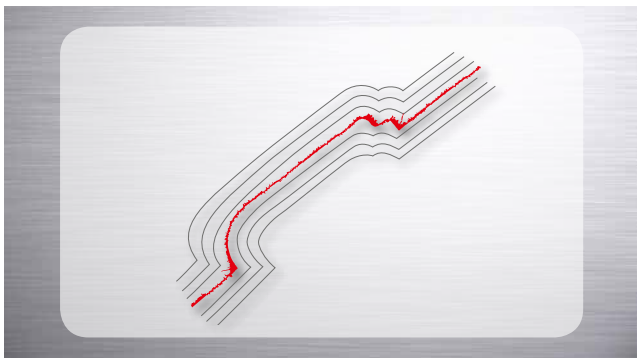
Positioning accuracy all the way
Positional variation less than 1 µm over the entire 300 mm travel path.

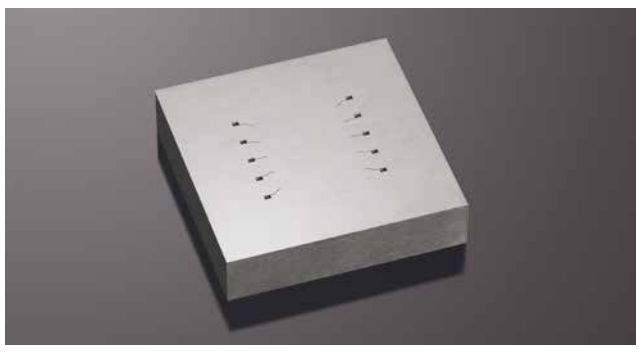
Full circle
30 mm circle and 20 mm cutting height with precision of 0.73 µm in circularity.

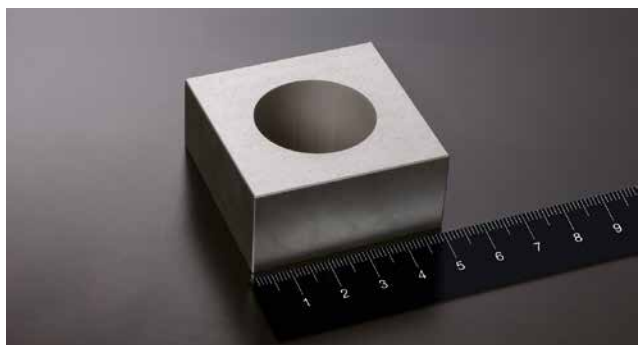
It’s the contour that counts
± 2 µm – maximum dimensional accuracy here taking the example of a 20 mm tall component.

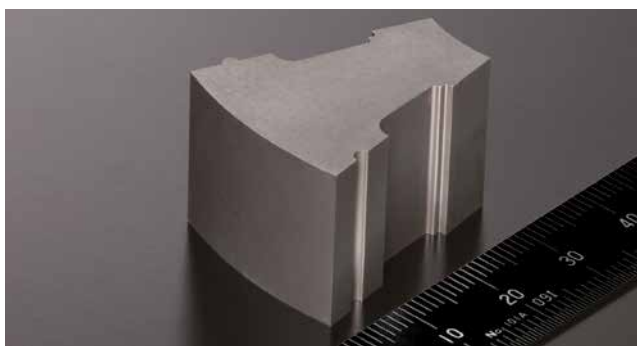












Precision for workpieces large and small.

Twice-as-fast spark detection
The high-speed digital control works up to twice as fast as traditional machines. A great basis for immaculate component results – in terms of geometrical trueness and surface roughness.

Pulse duration: 1 billionth of a second.

The royal road to nanoprecision.

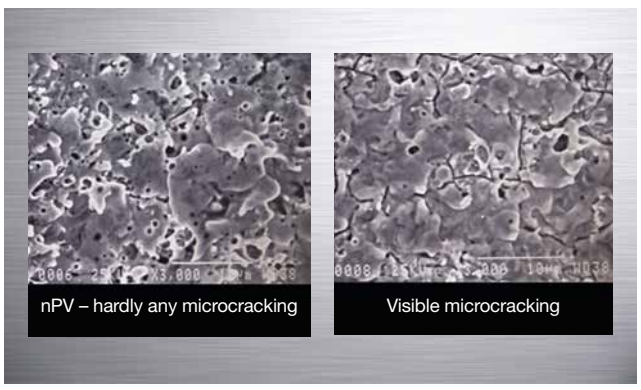
nPV
NANO PULSE V-POWER SUPPLY

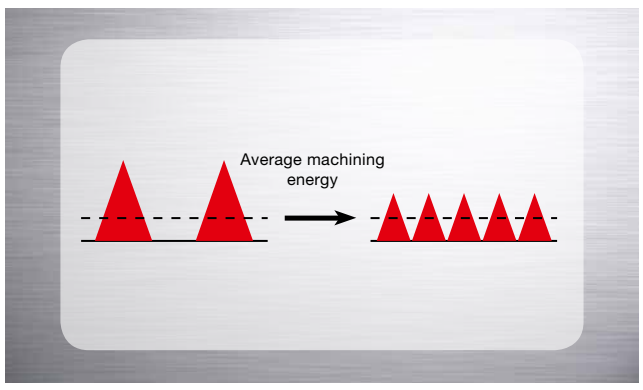
Response time is decisive
The lower the energy input, the better and more stabile the cut edges. A larger number of shorter pulses achieve the highest precision ever coupled with good cutting speed – minimising microcracking in the material as a side-effect. The reduced damage in the edge zones and better structural integrity yield much extended service life, and not only that of stamping tools.

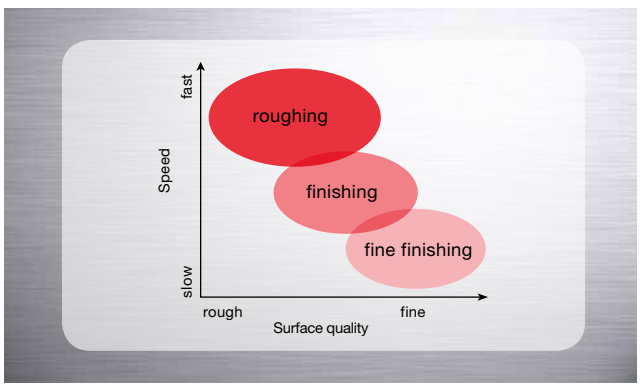
Extremely low risk of microcracking
The special feature of the MX600's nPV Generator designed for oil dielectric is its gentle application of energy to the workpiece. Extended tool life for cutting punches and other similarly stressed components is an inevitable consequence.

Good erosion rate and superlative surface quality
The new nPV Generator succeeds in using the same quantity of energy to machine the material while significantly reducing the energy peaks on the workpiece. This is achieved by applying lower energy to the workpiece at higher frequency.

The nPV Generator
The various units of the generator have been perfectly matched, making it possible to achieve a good erosion rate combined with a superlative surface finish.







Precise Finish Circuit – a boost to productivity.

Patented
Automatic wire threading
for any eventuality

Maximum precision from the outset.

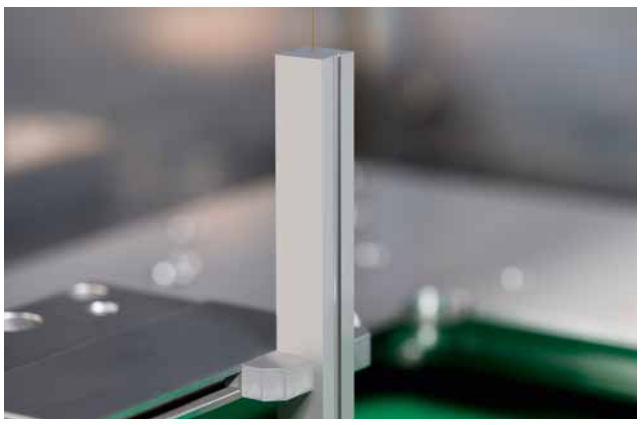
INTELLIGENT AT

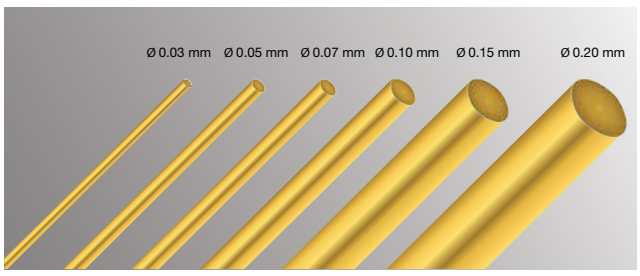
Automatic wire threader for superfine wire.

Automatic wire threading – equipped for any situation
Automatic threading in the tiniest bores, even in difficult applications. The innovative flow analysis for the jet stream takes the effort out of your work. The entire process has been optimised to the point where wire diameters of 0.03–0.20 mm can be threaded with absolute dependability.

Round diamond guide
Maximum precision and durability ensure the best results in the long run – inclusive of maintenance-friendliness due to a small number of parts and simple design.

Flexibility – when it comes to wire thickness as well
The Intelligent AT in the MX600 is designed as standard for wire thicknesses of 0.03–0.20 mm. The right range for all applications.





Find out more about it here:
www.mitsubishi-edm.de/threader-mx

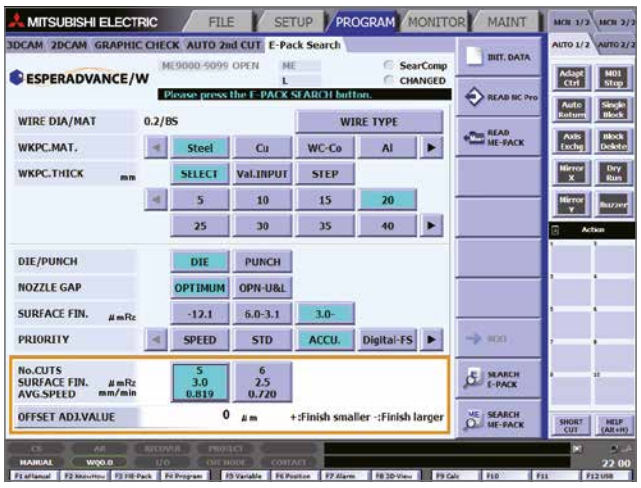
Intuitive operation
and knowledge at a keystroke.

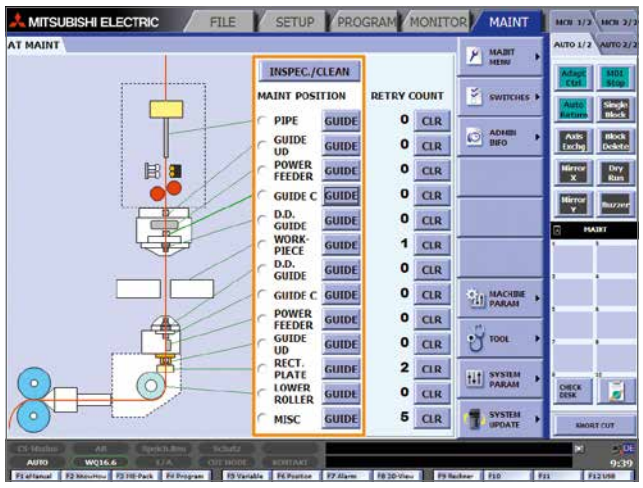
NUI
NATURAL USER INTERFACE

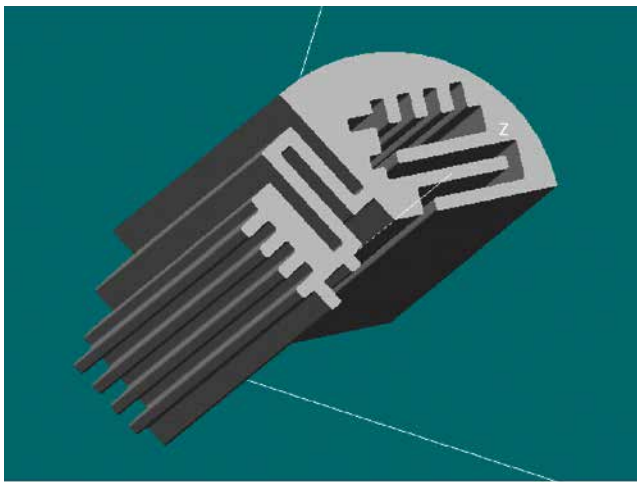
In dialogue with the machine
Produce NC data the easy way. Machining technologies are assigned intuitively and with menu guidance. Optimise the parameters of the machining technologies and store these as an ME-Pack.

Help at a keystroke
The complete machine documents inclusive of maintenance instructions are always available, and the right help is quickly found. Comprehensibility is aided by photos and 3D depiction.

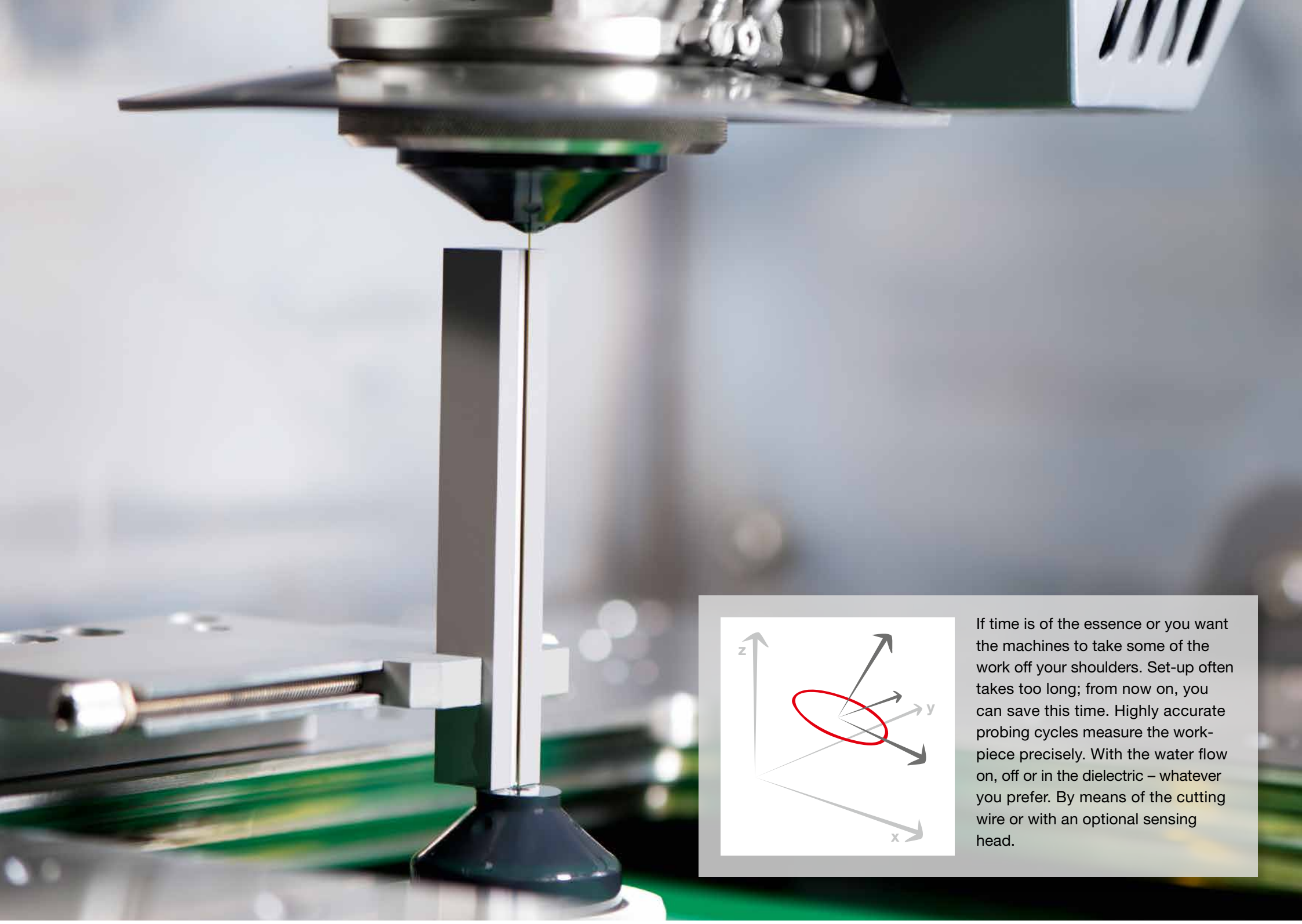
3D data import
Import 3D data in Parasolid® format and create 3D shapes with the integrated 3D CAD/CAM. By using them, you can generate NC data with the associated machining parameters. Even more precise results are achieved with intelligent analysis of the machining conditions by the Power Master 3D that thinks ahead.







Parasolid is a registered trade mark of UGS PLM Solutions Co. Ltd.



If time is of the essence or you want the machines to take some of the work off your shoulders. Set-up often takes too long; from now on, you can save this time. Highly accurate probing cycles measure the work-piece precisely. With the water flow on, off or in the dielectric – whatever you prefer. By means of the cutting wire or with an optional sensing head.

Clamp it and press *Start*!

Precise and simple workpiece measurement.

NUI
NATURAL USER INTERFACE

Fully automatic alignment cycles

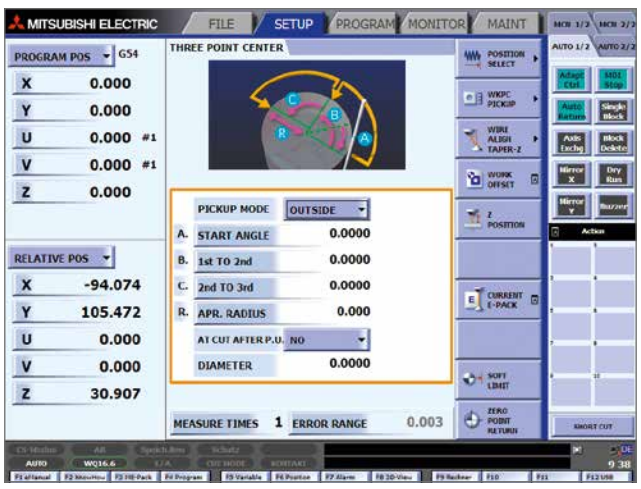
Intelligent user guidance takes you to the finish. The electrical discharge machine takes you quickly to your goal.

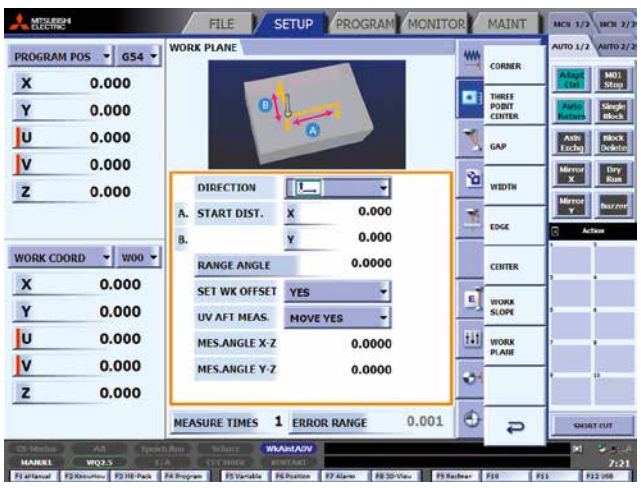
Manual control

Comfortable set-up with the manual control box: standard equipment with Mitsubishi Electric.
All essential control functions at hand – wherever you need them.

3D position measuring – manual or automatic

Both are possible. As a user, you decide whether you do set-up classically by hand or the machine automatically defines the position of your work-piece. Using the cutting wire or pick-up coil – the machine takes care of it for you. It only takes the press of a button.





Remote control with mcAnywhere

Always in charge –
wherever you are.

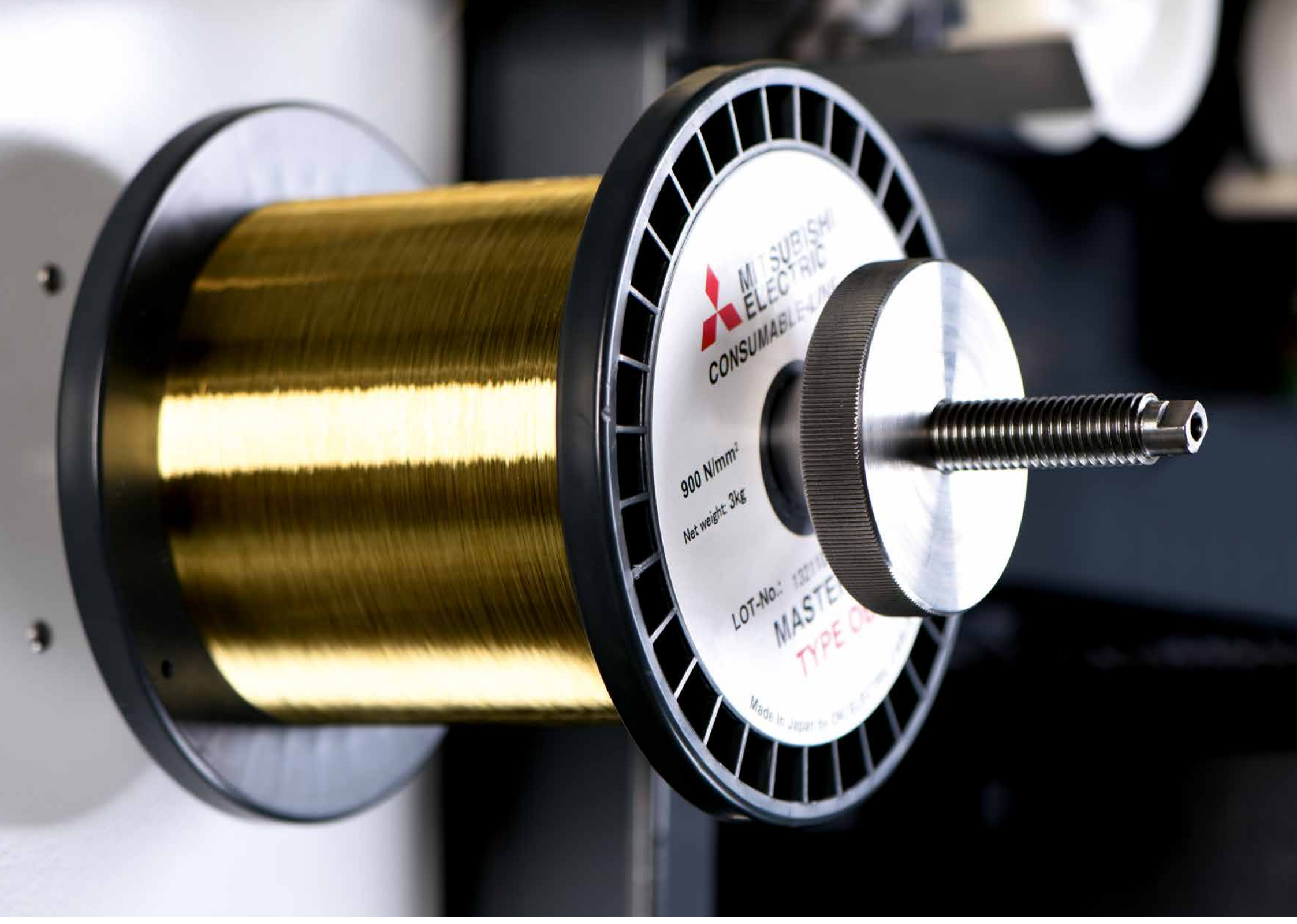
NUI
NATURAL USER INTERFACE

You can control the machine and keep an eye on processes, wherever you are. Intelligent communication takes the pressure out of work. Ideal combined with automation solutions and high process autonomy with the intelligent AT wire threader.

mcAnywhere Control
Comfortable and reliable remote control for your EDM system – powered by TeamViewer.

mcAnywhere Service
Rapid help from Mitsubishi Electric experts.

mcAnywhere Contact
Any place, any time … always up to date with direct status messages.



Lasting precision

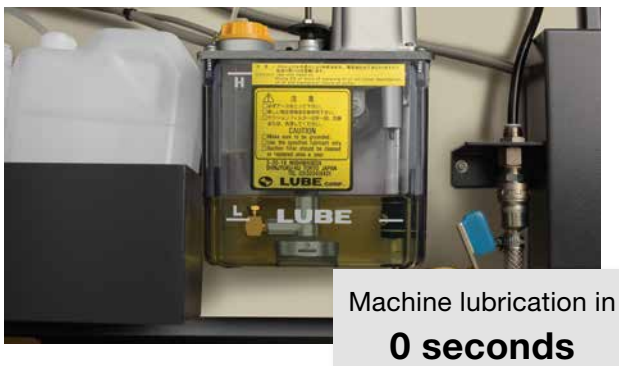
and extra maintenance-friendliness.

Cutting wire replacement
Simply replace the spool and feed the cutting wire over the feed rollers. Everything ready for work again in 92 seconds.

Spool change in
92 seconds

Now watch:
www.mitsubishi-edm.de/spool-mx

Automatic central lubrication
Makes for smooth running long-term – entirely without stoppages, lubrication nipples or cumbersome grease guns. You can now make more productive use of this time.



Machine lubrication in
0 seconds

Now watch:
www.mitsubishi-edm.de/oil

Changing the power feed contact
Replace the power feed contact with just one hand and a small gauge – at a speed befitting Formula One.

Power feed contact change in
5 seconds

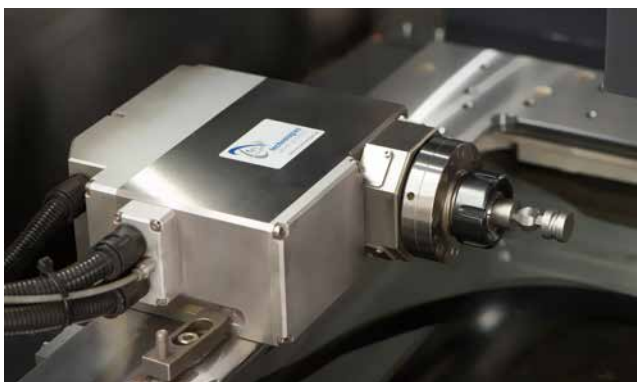
Now watch:
www.mitsubishi-edm.de/power-mx

Technical Partner of Sauber F1 Team

More axes.

A chance to extend your options.

B-axis



A servo-controlled B-axis fully integrated in the machine controls permits wire cutting on a rotating carried workpiece. Separation and multi-sided machining can be performed in a single clamping as well as simultaneously.

Mini-rotational axis

Rotating spindle also fully integrated in the machine control with positioning for the most minute high-precision components, e.g. the manufacture of ejector pins with a diameter of ≥ 0.05 mm, the realisation of conical threads in medical technology, erosive grinding, turning and simultaneous machining.

ERGO-LUX

Working conditions that are kind to your eyes – for the sake of users and for the benefit of machining results.

Warning lamp

Under scrutiny at all times – the status light visible from a distance leaves you in no doubt. LED technology makes the difference.

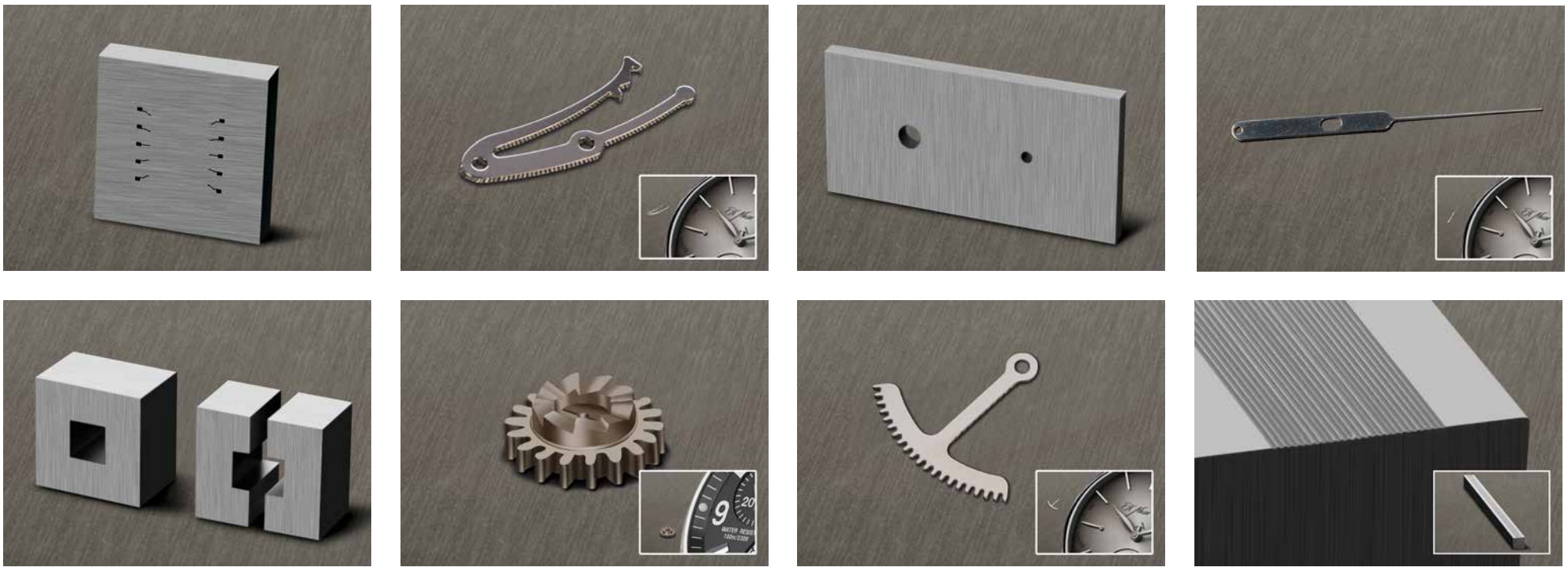
Extra axes: Expand your possibilities – boost your earnings.

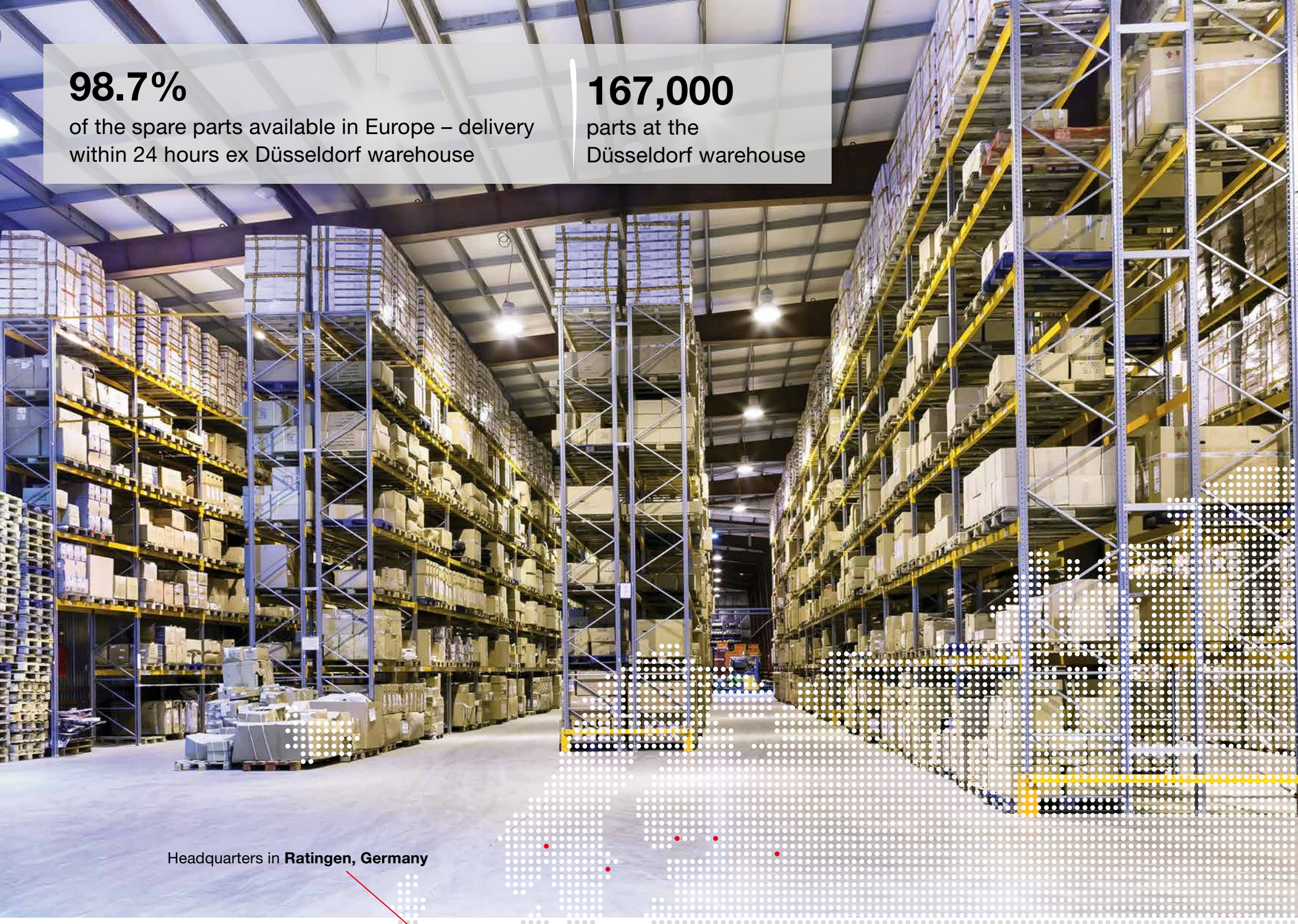
Everything from intricate clock components and tungsten carbide stamps for toolmaking to medical components and more: a machine system for pure precision.

Successfully mastered!

The success factor in a wide range of fields.

Medicine · Vehicle industry · Communications/electrics · Aerospace · Clock industry





Headquarters in **Ratingen, Germany**

Service.
Always there.

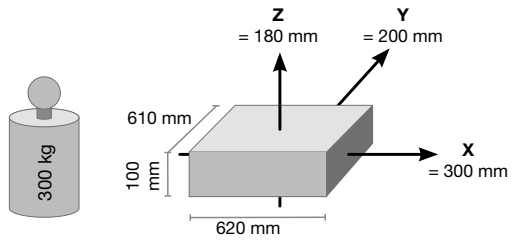
Training
Users acquire skills at the machine and at specially equipped PC workstations. This way they benefit most from the direct transfer of know-how.

You don't like call centres and queuing systems? We don't either. With every Mitsubishi Electric EDM system you buy excellent service as part of the package.
With 167,000 parts in stock in Ratingen near Düsseldorf, you have a swift and reliable source of parts – on request by express in less than 24 hours. Service is performed by our own highly skilled service technicians so that production is kept dependably up and running.

Users are assisted over the phone and benefit from the expertise and wealth of experience of Mitsubishi Electric specialists.

Service hotline: +49 (0) 1801 486-600
Application support: +49 (0) 1801 486-700
Monday to Friday: 7.30 am to 8 pm
Saturday: 9 am to 4 pm

We're there to help you.



Machine body weight . . . . . 3400 kg
Machine height . . . . . 2100 mm
Required minimum dimensions
for doorways (WxH) in mm . . . . . .1970 x 2100
Travel (U/V) in mm . . . . . 70 x 70

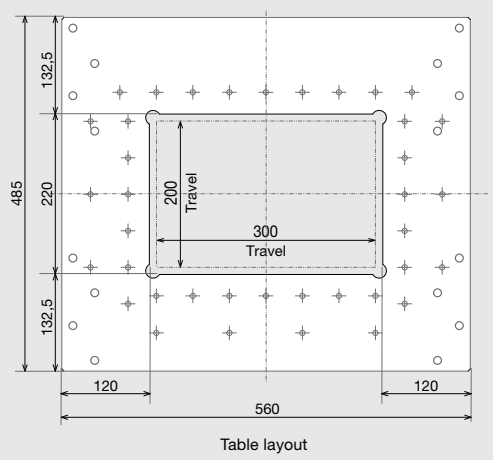
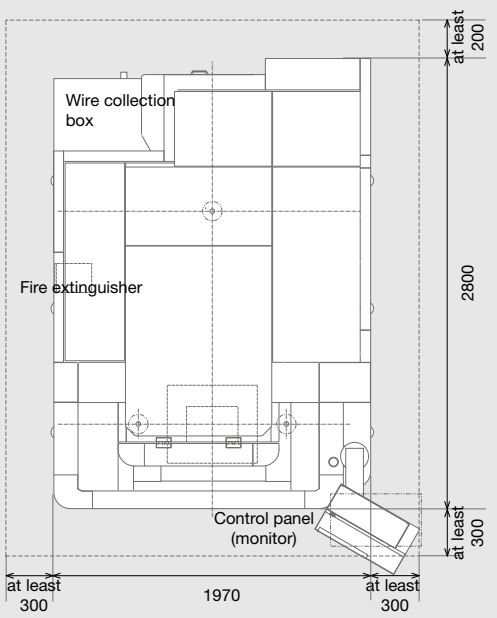


Table layout



MX600
ADVANCE TUBULAR

Technical data

		MX600
Machine	Travel (X/Y/Z) in mm	300 / 200 / 180
	Travel (U/V) in mm	70 / 70
	Taper angle (workpiece height) in °/mm	15 / 100
	Max. workpiece dimensions (W x D x H) in mm	620 x 610 x 100
	Max. workpiece weight in kg	300
	Table dimensions (W x D) in mm	560 x 485
	Table layout	Hardened 4-side table
	Possible wire diameters in mm	0.03–0.20
	Wire spool capacity in kg	10
	Automatic wire threader	Yes
	Overall dimensions (W x D x H) in mm	1970 x 2800 x 2100
	Machine weight in kg	3400
	Mains voltage	3-phase 400 V/AC ± 10%, 50/60 Hz, 20 kVA
Filter system	Tank capacity in l	300
	Filter particle size in µm/Filter elements	3/2
	Temperature control	Dielectric cooling unit
	Weight (dry) in kg	Included in machine weight
Generator	Power supply unit	Regenerative transistor pulse type
	Cooling method	Fully sealed/indirect air cooling
	Max. output current in A	50
	Dimensions (W x D x H) in mm	Integrated in the machine module
	Weight in kg	Included in machine weight

		MX600
Control	Input method	Keyboard, USB flash drive, Ethernet
	TFT colour monitor/Control system	15" touchscreen/CNC, closed circuit
	Min. command step (X/Y/Z/U/V) in µm	0.1
	Min. axis resolution in µm	0.05
Equipment	Optical drive system with linear scales (X/Y/U/V)	Yes
	Automatic vertical front door	Yes
	Thin Wire Device 0.02 mm	Optional
	Angle Master Advance II	Optional
	Ethernet/DNC/FTP/Anti-virus protection/Sleep mode	Yes
	mcAnywhere Control/Contact/Service	Optional
	External signal output	Optional
	Tricolour status lamp	Optional
	ERGO-LUX	Optional
	Easy 3D-Setup Software	Yes
	Renishaw probe on sleeve	Optional
	Additional axes/rotational axis	Optional

Power connection: 3-phase 400 V/AC, PE, ± 10%, 50/60 Hz, primary fuse 32 A slow

Pneumatic connection: 5–7 kgf/cm³, 500–700 kpa, minimum air flow rate 75 l/min, 3/8" hose connection

The EDM system should be set up on a suitable hard industrial floor and preferably on a consolidated concrete floor. Any shielding that may be necessary in conformity with the EMC Directive is not included in the equipment supplied by Mitsubishi Electric.

The cooling unit contains fluorinated greenhouse gas R410A. For further information, please refer to the associated operating instructions.

Details can be found in the assembly plan of the machine:
www.mitsubishi-edm.de/download

Partner

Advanced Manufacturing Research Centre

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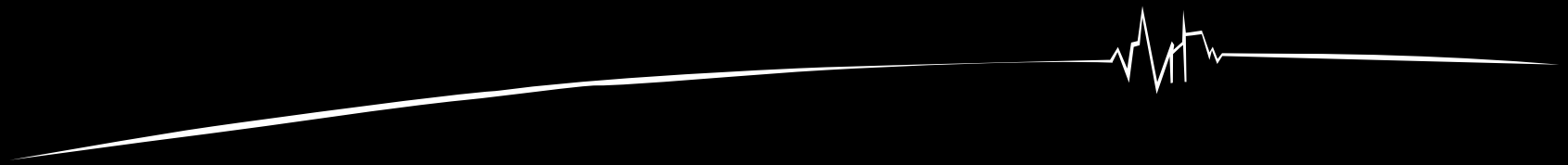

Subject to technical modification and error / 02.03.2016 / Art. No. 282576

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MITSUBISHI ELECTRIC EUROPE B.V.

Mechatronics Machinery / Mitsubishi-Electric-Platz 1 / 40882 Ratingen / Germany / Tel. +49 (0) 2102 486-6120 / Fax +49 (0) 2102 486-7090

edm.sales@meg.mee.com / www.mitsubishi-edm.de

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