

Setting Metalworking 4.0 in motion

21 October 2021

The future of CNC based metalworking is here – and it leverages next-level NC control and robots to deliver outstanding performance. Mitsubishi Electric’s comprehensive range of automated machine tool solutions is designed to help businesses enhance their competitiveness and succeed in realising Metalworking 4.0 applications.

Extreme accuracy and precision, coupled with high-speed and cost-effective operations, are essential features of state-of-the-art machine tools for metalworking. With a growing range of robots and other motion systems available to manufacturers in this sector, identifying solutions to deliver advanced performance is key.

Perfect dressing of superabrasive grinding wheels

When using profiled metal-bonded grinding wheels, the latest wire erosion electrical discharge machine (EDM) dressing solution from Mitsubishi Electric, EDM-DRESS, is the best solution for extended productivity. This multi-purpose machine can provide maximum accuracy and consistency while delivering best-in-class sharp, highly abrasive surfaces with complex designs.

By leveraging a spark erosion process, the machine does not apply any mechanical force on the grinding wheel. This eliminates grain breakouts and contour damages. Businesses can maintain robust wheels, characterised by an open surface topography with protruding abrasive grains. These can remove up to 280% more

material while being 4x faster than conventional solutions, offering users maximum efficiency, capital expenditure and profitability.

Furthermore, the wheels are sharp from the beginning, eliminating unnecessary start-up time and scraps. Lastly, open chip-space prevents the grinding burn, resulting in considerably reduced mechanical and thermal stressing, extending the service life of the grinding wheel several times.

Full control over robotic operations

In addition to EDM machines, Mitsubishi Electric can support a wide range of accurate and rapid automated operations with articulated robots. These can be used to load/unload machines, for example, or to conduct secondary operations, such as marking parts. Equipped with advanced controllers that feature Direct Robot Control (DRC) functionality, companies can benefit from streamlined coding activities.

This simplifies the integration of robots in metal forming applications by allowing machine tool operators to program and use robots quickly. Changes can be made directly from the CNC panel without requiring specialist programming skills. Users can set up and make changes to robot functions by utilising G-code, which is the most widely used programming language in the industry. The controller and robot communicate over high-speed Ethernet, supporting fast and convenient plug-and-play integration.

The integration of robots in metal forming applications can deliver significant benefits, including considerable cost savings, as uptime and productivity are maximised. Also, investment costs are optimised as neither a separate robot control unit nor robot specialists are required to ensure successful operations.

Creating collaborative environments

For metalworking applications where operators and robots work in close proximity without physical barriers, businesses can opt for MELFA Assista collaborative robots. These cobots can safely and effectively work together with humans and are very durable. At the same time, they offer very high positional repeatability, with a positional accuracy of $\pm 0.03\text{mm}$, thus addressing the key needs of the sector.

The MELFA Assista also supports flexible operations. When interacting with humans, it is designed to operate in a collaborative mode, where it runs at low speed. Equipped with proximity sensors, the MELFA Assista can also switch to run at higher speeds providing no people or objects enter their workspace. This enables them to be operated practically the same as industrial robots. As a result, businesses can benefit from two robots in one, maximising their return on investment.

Lastly, the MELFA Assista features direct teaching functionality, enabling users to manually move the robotic arm to the required positions, which are then saved by pressing a button on its built-in keypad. Complemented by visual programming tools, the cobot is particularly easy to use, and redeploy, as no specialised knowledge is required.

All of Mitsubishi Electric's motion solutions offer businesses a way to jump-start their machining operations and embrace the future of Metalworking 4.0 with reliable automated setups.

Image captions:



Image 1: EDM-DRESS – the perfect technology for an improved grinding process, using a multi-purpose high-precision wire cut EDM system.
[Source: Mitsubishi Electric Europe B.V.]



Image 2: Mitsubishi Electric's Direct Robot Control (DRC) functionality simplifies the integration of robots in metal forming applications by allowing machine tool operators to program and use robots quickly.
[Source: Mitsubishi Electric Europe B.V.]



Image 3: Mitsubishi Electric's MELFA Assista supports metalworking applications where operators and robots work in close proximity without physical barriers. [Source: Mitsubishi Electric Europe B.V.]

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About Mitsubishi Electric

With nearly 100 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, mobility and building technology, as well as heating, cooling and air-conditioning technology.

Embracing the spirit of its corporate statement, Changes for the Better, and its environmental statement, Eco Changes, Mitsubishi Electric endeavours to be a global, leading green company, enriching society with technology.

With around 146,500 employees the company recorded consolidated group sales of 40.9 billion US Dollar* in the fiscal year ended March 31, 2020.

Our sales offices, research & development centres and manufacturing plants are located in over 30 countries.

Since 1978, Mitsubishi Electric is represented in Germany as a branch of Mitsubishi Electric Europe. Mitsubishi Electric Europe is a wholly owned subsidiary of Mitsubishi Electric Corporation in Tokyo.

*At an exchange rate of 109 yen to the US dollar, the rate given by the Tokyo Foreign Exchange Market on March 31, 2020

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