Mazak
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Mazak
DIRECT DIODE LASER

INDUSTRY 4.0 OBSERVATORY

MAZAK'S VISION

L A S E R

ON-DEMAND TECHNOLOGY. **THE FLEXIBILITY OF LASER**

Yamazaki Mazak started manufacturing laser machines in the Eighties. With a wide and diversified portfolio of solutions, today the company is an industry reference. From the first laser cutting machine in 1984, developments have been constant: targeted automation, 3D tools, advanced CNC technology, innovative sources and software, without overlooking ergonomics, design, safety and energy efficiency.

Mazak's cutting products are full-featured laser machining centers: accurate, strong and reliable over time, with multiple application opportunities. There is no limit to processing materials and geometries. Laser opens up a world of opportunities still to be fully discovered, creating items with repeatable and unique features and offering solutions that meet the requirements of the Industry 4.0 "revolution".

The business world is going through a historical transition and the current industrial economy will develop towards a new configuration. Needless to say, it is more and more important for all companies to ponder on the revolutionary results of technologies. In the expanded scenario of global markets, machine tools users ask for excellent products and highly reliable service, because quality is a 'wide' concept which pervades an entire organization. To meet the demands of such a complex market, Yamazaki Mazak, an undisputed leader in mechanical engineering, has created an organization where each 'line of business' is considered in its entirety, allowing also small companies operating in local markets to leverage the most advanced technological solutions available. So, Mazak delivers a unique and consistent image to customers is different markets, offering "the essence of mechanical engineering", i.e. "the intelligence of machine" to each customer.

NEW GENERATION: HIGHER PRODUCTIVITY, LOWER CONSUMPTION

The third generation of Yamazaki Mazak laser cutting machines is ready to face the digital factory challenges also in sheet metal machining.

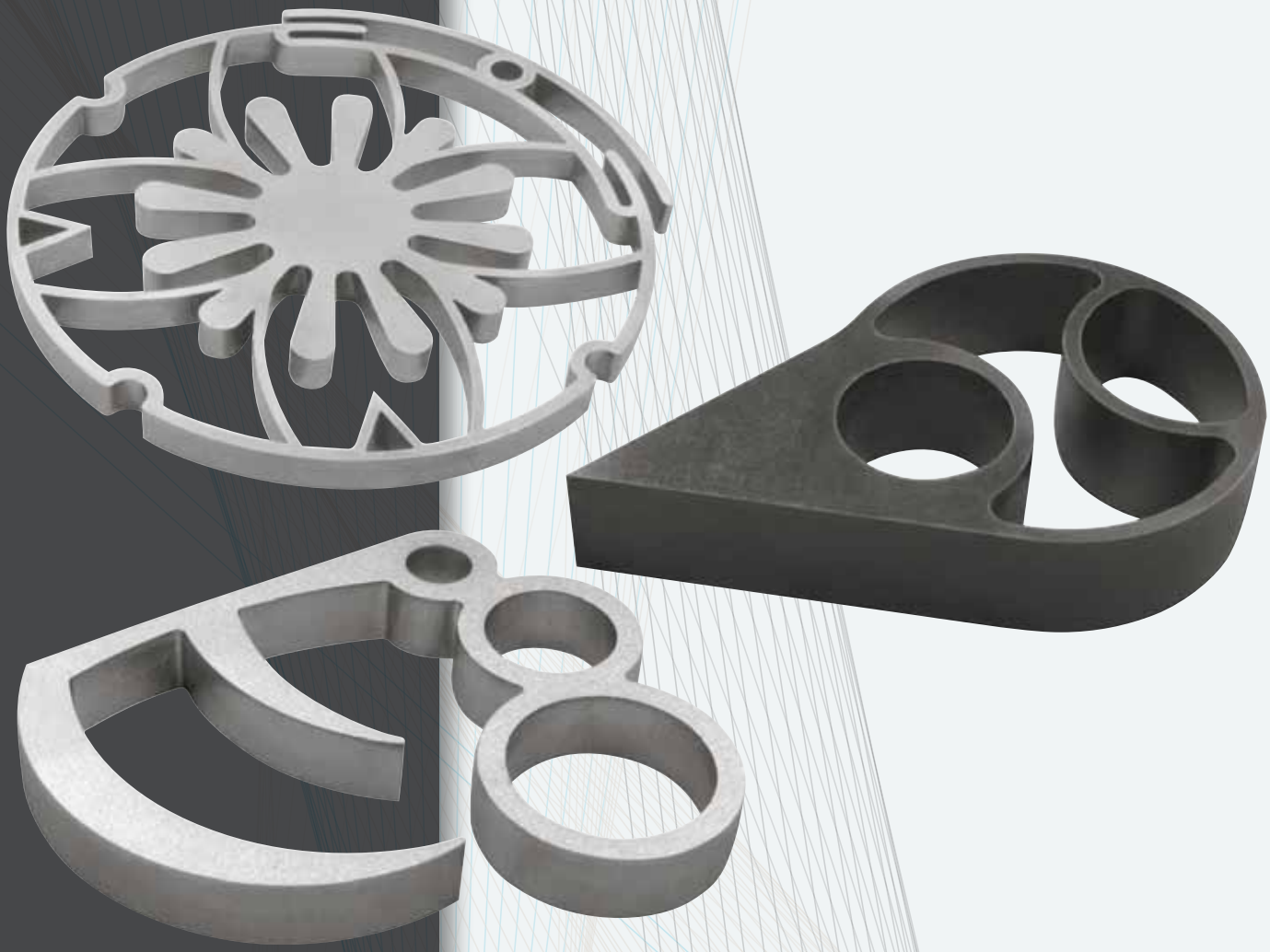
The creation of smart and connected companies, where the Internet of Things (IoT) and cyber-physical systems represent the foundations of the modern-age manufacturing paradigm, is strictly related to the development and availability of high-tech instrumental goods that can support such transformation. Furthermore, access to such goods must be offered to all manufacturers independently of their size. In Italy, the vast majority of companies are small-medium businesses that must have the opportunity to invest in leading-edge technology, so that they can produce small batches with a flexible and on-demand approach.

For several years, Yamazaki Mazak has been committed to developing and building smart machinery and software to support such production, integrating with the manufacturing and logistics systems of a factory. The Mazak iSMART Factory™ project fits into this vision, providing a solid industrial Internet platform that includes hardware and software monitoring solutions directly connected with the machines. From individual cell performance to plant overview, the system allows to supervise and monitor all stages and data, and then compare them with historical or target information, minimizing equipment downtime and enabling quick action in critical moments.

LASER OPTIPLEX: THE EVOLUTION OF PRODUCTION DEPARTMENTS

With Optiplex 3015 DDL featuring direct diode technology, designed and developed in house by Yamazaki Mazak, the Japanese corporation has opened a new age of laser sources. The machines combines a product with all the benefits of Industry 4.0 and leading-edge technological innovation currently available in the laser cutting business.

A direct diode source consists of a set of diode bars with different wavelengths, which are collimated to generate a beam with an even shorter wavelength than traditional lasers, around 975 Nm. This translates into increased power absorbed by metal, whereby the laser beam becomes particularly effective with high-reflecting materials (aluminum, copper, brass, stainless steel); furthermore, the cut features extremely low surface roughness, resulting into high-quality finishing.



Compared to previous laser generations, DDL is highly efficient (approximately 50% efficiency versus 30% of fiber and 10% of CO_2) and flexible: Mazak's Multi-Control Torch system allows to adjust laser beam focus and width to cut thin-to-thick metal sheets, with lower costs and higher speeds than fiber lasers, given the same material and thickness.
In the most popular variant (3015 with 3,110 x 1,595 mm strokes), the machine is equipped with a 4 kW source. Compared to previous generations, Optiplex 3015 DDL features an enhanced motor for improved dynamics, achieving fast X and Y traverse speeds up to 120 m/min and acceleration up to 1.8 g. All of this combined with accurate positioning (0.05 mm across 500 mm, with ± 0.03 mm).

HUMAN-SCALE MACHINES

Cutting speed, surface finishing quality and accuracy can be achieved with the easy and intuitive operation of the new Optiplex 3015 DDL, whereby the key tasks are entrusted to Intelligent Functions. During setup, Intelligent Setup Functions provide automatic radius diameter calibration, focus detection, nozzle changing, focus position, nozzle calibration and cleaning.

The possibility to monitor operating data and states through Intelligent Monitoring Functions is significantly enhanced in laser machines, as they are normally located at the roots of a company's production chain. The more the machine is independent and ready to handle productivity on demand, the bigger the benefits for the user. Mazak's laser machines have long been equipped with smart control based on activity monitoring (stainless steel plasma cutting, iron cutting burns...), in order to minimize operator tasks, while increasing processing efficiency and reducing the impact of production downtime. Finally, Intelligent Cutting Functions provide for effective, high-quality laser cutting. Optiplex 3015 DDL with Direct Diode technology, integrates all the devices in the production environment, contributing to the creation of the smart factory.

Besides interconnecting with other manufacturing, planning and automation resources, Mazak's new "child" is equipped with next-generation Preview G control, intuitive and consistent with Industry 4.0 philosophy, as it improves man-machine integration and reduces possible errors. The integration of IT systems with enterprise logistic and manufacturing operations and advanced automation translate into a high-end solution that fully leverages the Industry 4.0 potential.

As mentioned, Mazak's third-generation direct diode laser perfectly fits into 4.0 production environments, as it features three Intelligent Function to manage the entire laser cutting process efficiently, from setup to cutting. Intelligent Setup Functions automatically perform radius adjustment, focus detection, nozzle changing, positioning, calibration and cleaning. Operating status supervision is performed by Intelligent Monitoring Functions, IMF, while Intelligent Cutting Functions check the effectiveness and quality of cutting. The laser head is equipped with a sensor for plunge control; in addition, possible defects are detected, such as burns in iron cutting and plasma

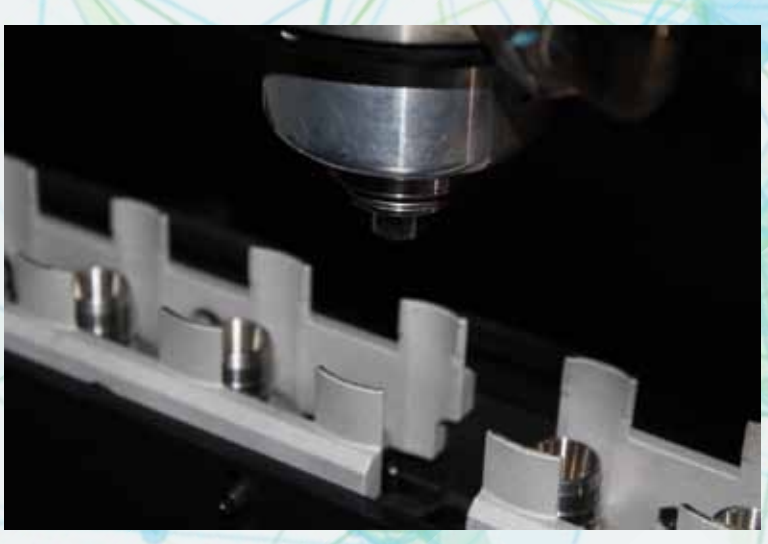
in stainless steel cutting. These three functions, combined with the Preview G numerical control interface, support man-machine interaction, reducing possible errors through an easy-to-use and intuitive interface. Mazak's Optiplex 3015 DDL laser, after getting positive feedback in Italy, is being presented officially at the Lamiera exhibition (Fieramilano, May 17-20), together with the latest solutions for productivity implementation by Mazak.

EASY OF USE FOR EVERYONE

To develop Optiplex 3015 DDL with third-generation laser source, Mazak has applied know-how acquired over 30 years in the construction of laser cutting machines, resulting into a high-efficiency (approx. 50%) system. Starting from the need to reduce consumption, a more and more critical factor especially for sheet metal processors, Mazak has improved the control of driver motors and numerical control.

Optimized electronics, drives and communications enable high-speed data exchange, and consequently enhance the quality of machines products, while increasing the quality of machined products and production efficiency. This is combined with user-friendly control interface that simplifies the operation of a complex machine, making 4.0 production accessible to companies of any size.

While for a large company with high automation levels it is easy to approach the advanced technology offered by Optiplex 3015 DDL, the real challenge for Mazak was to make it viable also for smaller enterprises. This is not a minor detail, considering the typical structure of the Italian industry, where small customer-oriented companies need to further increase their flexibility and reduce production costs to be competitive in small batches, where even one machine can make a difference. As one machine is enough to make a quality jump, next-generation systems like Optiplex 3015 DDL are designed to be inserted and to interact also with an existing automated system of a previous generation by Mazak, without impacting on the organization.



INTEGRATION AND SUPPORT

In Mazak's vision, one of the cornerstones of Industry 4.0 is to provide partners with technology that can be easily incorporated into their production system. "Easily" applies not only to integration with existing machines, but also to pre- and post-sales support offered by the Japanese corporation to customers. Mazak's SIV service complements sales staff with a team of sales engineers whose task is to help customers identify the target results and standards, so as to give proper advice about the most suitable machine to achieve the purpose.

The team also provides useful suggestions to position a plant inside a factory, taking into account future expansion. Mazak also supports customers in all bureaucratic operations to obtain the public subsidies offered by Italian Minister Calenda's industrial plan for those who invest in Industry 4.0 technology.

A key function of the Cyber Factory is the remote monitoring of operating conditions and the possibility to interrogate equipment to identify and solve possible failures. Mazak offers a free remote service option to customers to solve 85% of detected problems. With this approach, companies can minimize downtime; when remote service is not enough, an engineer can visit the factory having a clear view of the situation, thus fully restoring equipment efficiency faster.

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