



# High performances

**SPARK IS A LINE OF INNOVATIVE DESIGN MACHINING CENTERS THAT HAS ALLOWED MANDELLI TO BE RANKED AMONG THE TOP 5-AXIS MACHINING CENTER MANUFACTURERS FOR AEROSPACE AND ENERGY / OIL & GAS APPLICATIONS, SECTORS WHERE THE NEED FOR PRECISION, FLEXIBILITY AND HIGH CHIP REMOVAL RATES IMPOSES HIGH PERFORMANCE LEVELS.**

by Daniele Agnesi

*Spark is a line of innovative design machining centers that has allowed Mandelli to be ranked among the top 5-axis machining center manufacturers for Aerospace and Energy / Oil & Gas applications*

The Spark line is Mandelli's flagship, a historical brand name in the Italian machine tool panorama for over 80 years with its headquarters in Piacenza. Today Mandelli belongs to Gruppo Riello Sistemi, a 100% Italian capital holding operating in the field of machine tools and composed by Mandelli, Riello Sistemi from Verona producing flexible and high production transfer machines and the Canadian Tri-Way, active in the development of special systems for the automotive industry. The Group also boasts a commercial / service structure in China

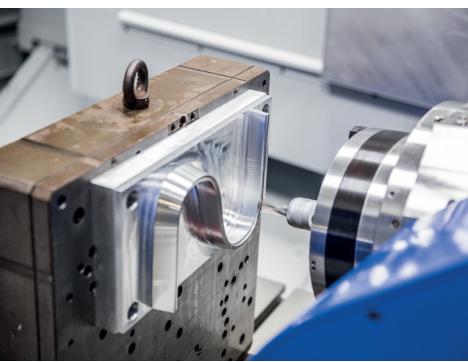
and a sales and service network covering all the markets worldwide. Spark is a line of innovative design machining centers that has allowed Mandelli to be ranked among the top 5-axis machining center manufacturers for Aerospace and Energy / Oil & Gas applications, sectors where the need for precision, flexibility and high chip removal rates imposes high performance levels. The "quantum leap" made by Mandelli with the Spark product comes from the basic constructive decisions aimed at combining the traditional strengths of the Mandelli brand, like precision, high stock removal and value retention over time, with an optimized axes dynamics and a configuration flexibility that allows for high machine customization for the toughest and more specialized applications.

The Y axis structure with staggered guideways and the closed section at the back of the HMC ensures double stiffness by halving the mass of a conventional structure; the rotary table morphology directly applied in the HMC base allows for an axes dynamics which does not depend on the loaded workpiece mass and for higher accuracy and stability in turning operations with the multitasking option. The new tilting head, available both as an electro-spindle and mechanical spindle, has a pre-loaded double pinion kinematic mechanism capable of generating up to a 12,000 Nm torque making the motion reverse backlash equal to zero. The Y axis structure, the rotary table morphology, the tilting axis patented solutions are the three pillars on which Mandelli has strengthened its reputation of top-OEM for high-end applications. From this solid foundation, Spark has evolved with the Spark-Ti version thanks to the use of innovative technologies dedicated to the applications and materials that characterize Mandelli's reference sectors, such as titanium (Ti-6Al-4V, Ti-5Al-5V-5mo-3Cr and Ti-10V-2Fe-3Al) and heat resistant super





*Spark can be equipped with tool magazines from 100 to 500 pockets. The unmanned production is possible thanks to roto-translating pallet systems and to several machining centers connected in FMS*



*Left : a Spark HMC by Mandelli during machining*

*Right : the new tilting head, available both as an electro-spindle and mechanical spindle, has a pre-loaded double pinion kinematic mechanism capable of generating up to a 12,000 Nm torque making the motion reverse backlash equal to zero*



alloys (Inconel 718, Inconel 718 Plus, Waspaloy, Nimonic to name the most common). These alloys are characterized by low thermal conductivity, high toughness and abrasion of cutting parts. To be able to work effectively, Mandelli proposes solutions characterized by high coolant pressure and flow rate, automatic vibration damping devices and intelligent systems able to modulate the spindle rotation speed to counterbalance the chattering. The automation of the production process is also a key aspect for the Western markets, where most of the aerospace / energy production is still concentrated, in order to ensure competitiveness in the presence of a high labor cost but it is also extending to many extra European areas thanks to the spreading of the Industry 4.0 principles. With decades of experience in high production sectors, Mandelli owns several automation solutions featuring different levels of complexity. Spark can be equipped with tool magazines from 100 to 500 pockets with an advanced organization logic

optimizing the tool arrangement according to frequency of use to minimize the downtime. The unmanned production is possible thanks to roto-translating pallet systems and to several machining centers connected in FMSs (Flexible Manufacturing Systems) governed by single, bi and tri-level shuttle systems. The Supervising software, developed by Mandelli and therefore customizable according to the customer's requirements, numbers more than 300 applications worldwide. The CSWWin supervising software is constantly evolving : it is equipped with features such as the production priorities dynamic updating, the available resources forecast, the support to the technical availability calculation and OEE (Overall Equipment Efficiency) based on advanced statistics features. The current main development lines are the predictive maintenance, the application of sensors, the access to remote information and the integration with the company's production/business management systems (MES), all key issues in the field of Industry 4.0 and the Internet of Things.



## COMPLETE SOLUTIONS

In order to offer innovative products and to be in close contact with the end user's needs, Mandelli has chosen to keep up to date with technological applications. The experience gained on the job and through frequent tests allows for a Sales Engineering Service which, starting from the design of a very complex aerospace part, is capable of identifying the most suitable HMC for the customer's production so as to propose a machining cycle complete solution, the development and construction of the fixtures, the design and supply of the tools, the development of a part program and the production start-up.

When talking about FMS production lines, Mandelli can coordinate the supply and integration of additional units such as anthropomorphic robots, washing systems, automatic deburring cells and measurement/ certification stations, offering the customer a unique partner capable of managing the entire project.



**mandelli**

**MANDELLI SISTEMI SPA**

Via Caorsana, 35 - 29122 Piacenza

Tel. +39 0523 548111 - Fax +39 0523 617775

[mandelli.info@mandelli.com](mailto:mandelli.info@mandelli.com) - [www.mandelli.com](http://www.mandelli.com)