

ITALIAN MACHINE TOOLS, ROBOTICS & AUTOMATION INDUSTRY ~ NEWS

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PIATTAFORMA INDIA PROJECT

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Ficep's Gemini evolves and integrates automation to become an even more efficient production system. Gemini versatility, designed to perform drilling, milling and thermal cutting on thick plates, is complemented by the robot's speed in handling large and heavy components

Machine and robot

Ficep's new project was created to meet the needs of both the large service centre, which does not have its own production and needs to be flexible and well organized to manage activities ranging from a few batches with large volumes to many smaller batches, and to support the activities of companies with their own products for which the plate cutting phase represents the first step in preparing and sorting the cut parts towards the subsequent stations. In general, therefore, it is suitable for all companies in which Gemini in its traditional version risks not being used efficiently because the activity of unloading the finished parts from the workbench is not performed efficiently. An initial evolution was actually presented when Gemini was combined with Kronos: a tandem solution where the two gantry structures take turns to process the plate first by machining and then performing thermal cutting. With a similar concept, today Gemini has been equipped with a second handling carriage along the X-axis on which the robot dedicated to unloading the cut parts runs. More specifically, the plate placed on the working bench is first processed by Gemini, which performs drilling, milling and thermal cutting operations on medium to thick plates. Once the machining of the first plate is complete, the machine moves on to the next one and sends a consent signal to the robot, which activates to take the workpieces from the work area and place them in the unloading stations that run parallel to the longitudinal axis of the machine.



Working in sequence

The design developed by Ficep is characterized by a modular concept in terms of the length of the workbench, which can extend to accommodate a maximum of 8 plates. Pieces of any shape can be cut within the plate surface, which will be picked up by the FANUC robot, with which Ficep has decades of partnership in the forging industry, while the robot for thermal cutting in the steel construction division is newly developed. The collaboration is therefore extended with this robot, which is a 'traditional' 4-axis palletizer with a wrist parallel to the floor. It has a maximum load capacity of 700 kg and is equipped with a double pneumatically actuated magnetic gripper. The two magnetic elements that come into contact with the workpiece to lift it, can move synchronously, approaching or receding from each other depending on the size of the workpieces to be handled to always guarantee the best grip. Should the application not allow the use of a magnetic system, Ficep is available to evaluate the realization of a suction cup gripping device. In addition to the unloading of parts, a skeleton cutting strategy can be envisaged to allow the robot to also unload scrap in dedicated areas.



This temporal separation of tasks is essential to ensure the correct quality of the machined parts while preserving the machine. In fact, in lifting a component that is somehow slightly hooked to the skeleton, the robot could move the entire plate, causing errors in the position of a hole or in the spacing between two holes, while if such a movement were to occur while the drilling tool is engaged, there would be a risk of breaking the tool itself. However, the system thus configured can also be offered in a 'lighter' version. Ficep developed this project with the idea of being able to retrofit the Gemini already installed and used for the machining of lighter and thinner plate by combining a robot with a lower capacity and using the existing guides, without having to resort to a robust version specifically designed for heavy loads.

Single language

From the point of view of machine and robot management, even though the Gemini itself is controlled via FANUC CNCs, Ficep has chosen to manage the two systems separately and completely independently, also to ensure the correct distinction of activities and their timing in favour of the safety of the systems themselves: in addition to avoiding machining errors, possible collisions between robot and machine are prevented. From this point of view, adopting the same language for both systems is a further guarantee of perfect communication between the various moving parts.



Optimized management

Speaking of software, the nesting program is developed by Steel Projects, Ficep software house, in collaboration with Alma. From the technical department, nesting is created by optimizing the parts within a raw plate to minimize raw material consumption and reduce waste. All nesting information is transmitted to a second software that manages unloading and palletizing in the various dedicated areas. In particular, unloading is handled differently depending on company strategies and application needs: for example, it can be planned to always unload the same type of component into each individual bay, or to subdivide the parts according to the successive stages of the cycle and thus allocate each bay to the parts that will make up a specific sub-assembly to be assembled or welded.

Robust structure

Great attention to automation, therefore, combined with a machine that is now a consolidated solution and appreciated by the market for a series of technological choices adopted. Gemini is a machine for thermal and mechanical plate cutting equipped with spindle heads, plasma torches, oxyfuel and Bevel for drilling, milling and right-angled or inclined cuts. In order to perform all these different operations, the cutting table has been revised with the introduction of a series of brass pins that support the plate and ensure proper support during machining. In addition, since they are made of brass, they do not damage the tool when the latter goes to drill the plate and comes into contact with the support itself, preventing contact between the tool and the grid. The structure of Gemini machines is of the closed-tube double beam type, on which the guides on recirculating rolls are placed, with three times the load capacity of cheaper cutting benches and a long working life. The axes are moved by means of pinion and rack through hardened and ground planetary gearboxes with inclined teeth. The racks are mounted with overhead toothings so that any chips or dirt do not interfere with the coupling between the pinion and the rack. The choice of a helical toothings is due to the need for a system capable of performing a much smoother movement while generating less noise, capable of withstanding higher loads while offering a longer service life due to reduced wear compared to traditional straight-tooth solutions. In addition, the planetary gears used are of the low backlash type, ensuring centesimal positioning accuracy. Each gantry is designed to ensure easy installation: developed to be transported in standard containers, the machines are positioned on the rails provided at the destination workshop where the various services (electricity, gas and flue gas lines) only need to be connected to start production immediately.



From thermal to mechanical

On the thermal cutting side, Gemini can be equipped with Hypertherm's XPR generators, in the XPR 300 and HPR 400 XD models. The former can cut up to 45 mm (80 mm from the edge), the more powerful HPR 400 XD reaches 50 mm (80 from the edge). The switch to oxyfuel technology takes place when the 50 mm thickness is exceeded, reaching a maximum of 127 mm. A very important aspect should be emphasized, now more than ever: the XPR series generators reduce the overall operating and maintenance costs of the system and implement new functions. The XPR 300 achieves an ISO2 level, comparable to that of a laser machine. The service life of consumables and triggers is also increased, with the addition of new features to protect the torch in the event of an arc shutdown. In addition,

the availability of three different automatic consoles simplifies the work of the operator, who no longer has to worry about adjusting the cutting parameters but simply sets the type of material and thickness to achieve the optimum process values. The new torch holder allows infinite rotation and is equipped with integrated collision avoidance sensors and plate height probing. In the event of a collision, an automatic reset system allows the torch to be put back into position without manual intervention by letting the system itself recognize the position for axis resetting. To counteract the technical criticality linked to the tapering of holes, Ficep completes the Gemini with TrueHole technology that reduces this effect linked to the tapering of the flame itself, achieving holes that, to give an example, on a 10 mm depth can generate a taper of 0.5 mm. A result close to the 0.3 mm of laser cutting, testifying to the good quality of the cut made.

If, on the other hand, the need is for mechanical machining, Gemini relies on spindle heads with 15 kW motors and 95 Nm of torque. Thanks to its robust ISO 40 coupling and 6,000 rpm, it can also perform demanding drilling, milling and chamfering operations. Another popular feature of the Gemini family lies in the spindle sub-axis. In addition to the transversal movement of the gantry, the spindles can operate independently within a 400x3,600 mm area delimited by an hold-down that 'immobilizes' the plate during chip removal operations. Once the structure is positioned at a specific point, the hold-down is lowered through four electric axes controlled in pairs until the plate is clamped. In this way, the spindles can operate with greater speed and precision, benefiting final quality and cycle times.



Discover more about our GEMINI range on <https://ficepgroup.com/en/products/gemini/>

FICEP company profile

FICEP is the world's leading machine tool manufacturer for the fabrication of structural steel and forging industry, with an experience of over 9 decades. Our extensive and innovative product range and its aggressive penetration of the world market has been achieved by the creation of many subsidiaries all over the world.

Located next to the Alps in Varese, Italy, we have specialized production facilities. The main location in Gazzada Schianno, which comprises over 100.000 sqm, also contains Headquarters, R&D, Academy of Technology, Showroom and the main after sales service departments.

Our mission is to satisfy the demand of machinery and systems for the high quality processing of metal profiles in the most profitable markets on a global basis, promoting the Ficep brand and trademark with prestige. Our wide range of machinery fully satisfies always more demanding requests and cover all needs in the structural steel and fabrication industry.

Find out more on <https://ficepgroup.com/en/>



The project Piattaforma India has been promoted by UCIMU – Association of Italian Machine Tools Manufacturers and AMAPLAST – Italian Plastics and Rubber Processing Machinery and Moulds Manufacturers Association. The two associations agreed on the idea that promoting a network of associations and entrepreneurs who have developed knowledge and experience on the Indian market, can be useful in favoring of new paths of development for business. The Indian companies who are interested to form JV, cooperation, technical tie up, purchase machinery etc from/with Italian companies can contact below mentioned address for any assistance:

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