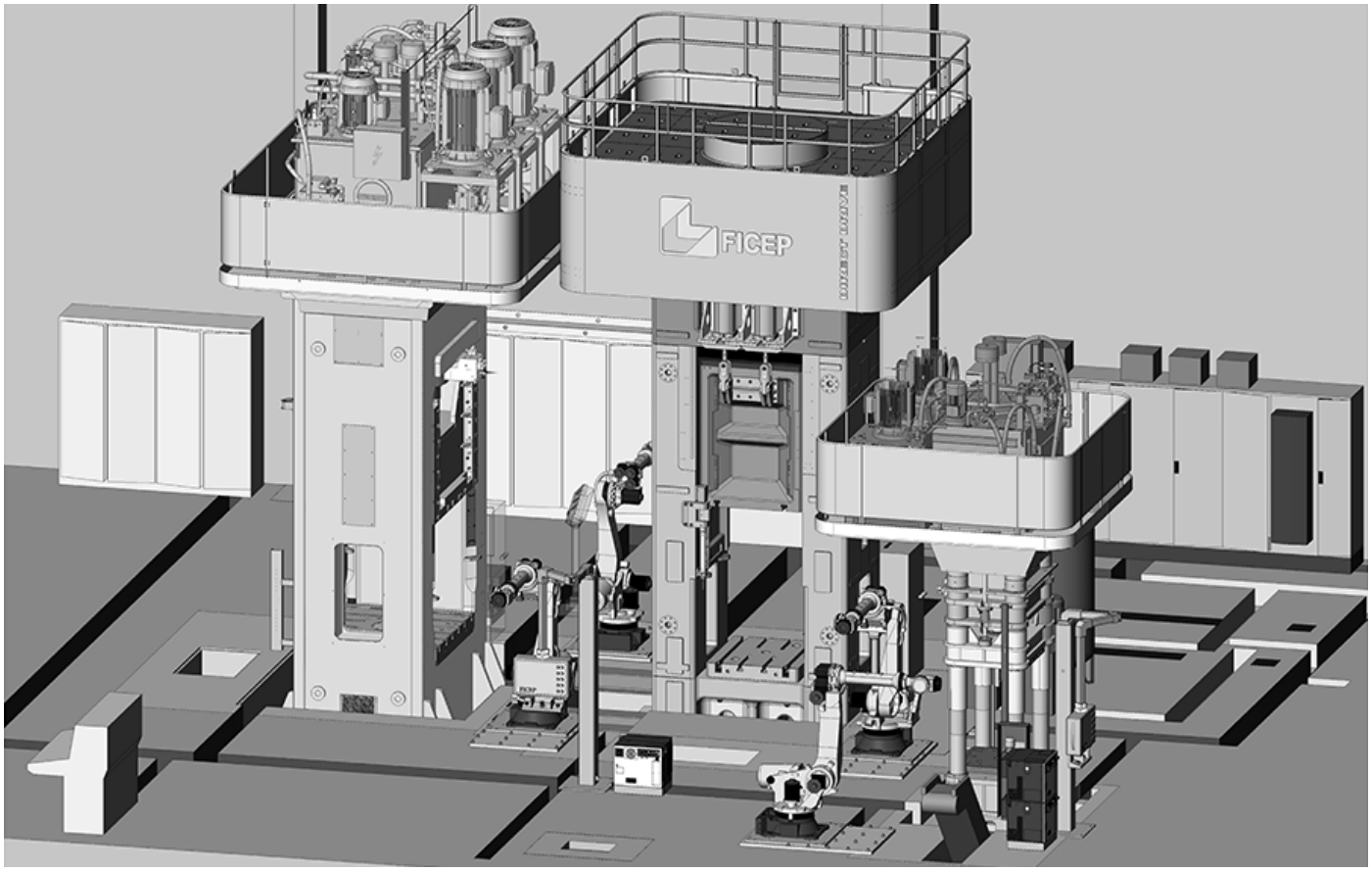
Flexibility and Productivity: The New FICEP Precision Forging Line

By Carlo Maffei



The forging industry has reached a new level of flexibility and versatility with the introduction of the **revolutionary Precision Forging production line developed by FICEP**. This advanced production system was specially designed for a major automotive customer, which manufactures its heavy-duty truck components in-house. The line offers a wide range of process combinations for the production of gears with forged teeth of various sizes and complexities. Since forging automotive components demand continual advanced and flexible technologies: **FICEP is redefining the future of flexible forging with this new line.**

Flexibility = Productivity

Flexibility is synonymous with productivity, the key to efficient and optimized production that fits every need. The precision forging of gears and other automotive components requires highly sophisticated presses and state-of-the-art technologies that can guarantee high-level performance, both from a tolerance and productivity standpoint. Integrated in are FICEP's robotic systems providing flow automation, in a variety of configurations meeting a wide range of manufacturing needs.

A Single Line with Multiple Operating Combinations

The line can handle different operating combinations, allowing a wide range of finished parts. In the basic version, there are five operating combinations (expandable to seven), revolutionizing the traditional approach based on separate production lines for each type of part. Instead of following the conventional route, this line allows parts to enter at any point, as different sections can work independently. The result is a significant **reduction in costs** and a significant **optimization of production efficiency**, all thanks to the outstanding flexibility of this production line. Instead of relying on multiple lines, following a standard industrial model, in this case we have **a single line that can handle all aspects of the production process**.

The FICEP line makes it is possible to produce a complex part that needs the full cycle-preforming and stamping-or to forge two even **very different parts at the same time**. To enable this optimization, the robotic systems play a key role in loading & unloading, operating in a harmonized and integrated manner with the other systems on the line.

Perfect Combination

The essential aspect of this new line installed by FICEP is **the synergy between the custom configuration tailored to the specific needs of the customer and the harmonized integration of robotic automation**. This combination generates concrete benefits for the customer who has access to increased productivity, adaptive capabilities and greater precision.

The preliminary stage of the line involves a **high-performance S-series disc saw from FICEP**. This type of sawing machine is characterized by a particularly strong and rigid construction that guarantees speed, precision, cutting quality and reduced scrap. The cutting line also includes weighing, control, and grading functions. The billets produced by the sawing machine are graded and distributed in different bins.

The entire production line is controlled by a central system, which generates labels with QR codes showing all the product data, quantity and weight of the piece in the bin. Throughout the process, **QR codes enable monitoring and quality control**, ensuring the overall efficiency and accuracy of the production line.

A Complete System

Downstream from the main furnace, the production cycle includes **two 6-axis robots from the RF series** capable of meeting any handling requirements during all phases of the molding cycle. One robot retrieves the part and transfers it to a **hydraulic press model HF 2000**. This press is designed with a dual station, one side and one center, to perform dual operations. Although not always necessary, in the case of hot molded parts, the initial operation involves scorifying the oxidized billet to remove any slag that might contaminate the mold. Next, the same robot transfers the part to the second central mold, where it can undergo both molding and pre-forming. The introduction of a second robot marks the next step in the process. This robot retrieves the part from the first or second station and moves it to **FICEP's Direct Drive DD 270 screw press** deputed to shaping and stamping operations.

FICEP's Direct Drive DD 270 press is distinguished by:

- Increased impact speed and thus reduced die wear.
- Significant reduction in cycle time, thus enabling higher productivity.
- Very high efficiency that under certain conditions allows electricity savings of more than 50 percent. More energy available and totally achievable as early as three-quarters of the ram stroke.
- Programmable energy with absolute precision and repeatability for both single and multiple strokes with different energy values.
- Simplified maintenance.

After forging, a third robot retrieves the part from the DD 270 and places it on the **HF 400 hydraulic press**, which has a capacity of 400 tons. This particular press is used exclusively for one or two operations, such as blanking the outer flash and removing the inner bottom on larger parts. **This complete process constitutes the first part of the plant's operations: pre-forming, forging and trimming.**

Downstream from the forging line we find the **calibration process of both cold and hot molded parts**, which previously undergoes a normalization step in an oven. This normalization is necessary to eliminate any stresses within the material after forging. This process also causes oxidation of the part, which must be removed by sandblasting. Although sandblasting compromises the surface to some extent, it is essential to remove this oxidation before final calibration. The parts are then taken to a dedicated area, where **another HF 2000 hydraulic press**-similar to the previous one, **is used to cold calibrate the parts**. The purpose of this calibration process is twofold: to obtain the correct surface roughness of the teeth and to restore all the tolerances expected for the part. This area consists, in addition to the HF 2000, of two 6-axis robots from the RF series deputed to loading and unloading parts in the press: the robot deputed to loading is equipped with a 3D vision system that allows it to be positioned correctly in the mold. A third RF robot goes in for special mist lubrication to improve material micro-slides during calibration.

FICEP's new Precision Forging line represents an important milestone in the forging industry, bringing with it an extraordinary combination of flexibility and productivity. This innovative custom line, designed for a leading automotive customer, has proven that flexibility is the key to efficient and optimized production that can adapt to any requirement.

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