



Cosmogas Redefines Its Production Cycle with a New 4.0 Cleaning Plant

Cosmogas, an Italian manufacturer of heat pumps and condensing boilers, has recently installed a new cleaning system supplied by IFP Europe (Galliera Veneta, Padua, Italy) to enhance its production process, improve product quality, and optimise energy management.

In this era of rapid technological development, the industrial cleaning sector is seeing a significant acceleration, pushing companies to implement increasingly efficient strategies to meet growing demands for quality and environmental sustainability. Such transformation is taking place in the context of Industry 5.0, a paradigm that integrates advanced technological innovation with environmentally conscious practices to promote human-machine collaboration in creating customised and sustainable production environments. Cosmogas stands out as an emblematic example of this evolution. Positioning among the leading players in the field of heat pumps and condensing boilers, it has improved its production efficiency by adopting Industry 5.0 principles for responsible and environmentally friendly production with the installation of a new cleaning plant.

Alberto Alessandrini, Head of the Research & Development Center at Cosmogas Srl, emphasises the importance of its in-house development, production, and patenting capability to drive innovation in the industry – its Research & Development Center enables Cosmogas to remain

at the forefront of the condensing boilers and heat pumps market by anticipating market trends, developing innovative products that meet emerging needs, and constantly improving production processes: “Our Research & Development Center plays a crucial role in future-proofing our products. It improves Cosmogas’ competitiveness while contributing to developing more efficient and sustainable solutions, thus positioning us as an industry leader.”

“In particular, we have expanded our range by introducing state-of-the-art, 4.0 heat pumps to meet growing market demand. This development, however, made implementing a dedicated cleaning system for tubes and gas circuits essential to meet the highest cleanliness and performance standards. For this critical project, we relied on IFP Europe, which designed and installed our new plant,” states Alessandrini.

About Cosmogas

Cosmogas is an Italian family business based in Meldola, Forlì Cesena, founded by Arturo Alessandrini in 1966. Originally specialising in the



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Cosmogas Srl produces boilers, heat pumps, water heaters, and hybrid systems using renewable energy.



IFP Europe's KP 600 MAX modified alcohol cleaning plant.

production of kerosene boilers, it later expanded its product portfolio with methane gas boilers following the advent of methane in Italy. Today, Cosmogas designs, manufactures, and markets a wide range of technologies including hybrid systems using renewable energy and heat pumps, as well as condensing boilers and water heaters. "Condensing boilers are our flagship product, along with hybrid systems and heat pumps. Starting with raw materials, we can design, produce, and deliver finished products to installers and distributors," Alessandrini explains. "Cosmogas has a strong global presence, with significant market shares in Europe (especially England, France, Austria, Greece, and Spain), America (Canada, USA, and Mexico), and Asia (China and South Korea). We serve both the residential and the commercial and industrial sectors, offering advanced solutions that meet the growing need for energy efficiency and environmental sustainability," adds Alessandrini. "We have a special focus on quality for both domestic and high-power systems, including schools, hotels, restaurants, and universities. In addition, we have established ourselves in the swimming pool market with condensing pool heaters built with pure titanium tubes, a popular solution in the US."

A production cycle for high-end solutions

Cosmogas' manufacturing cycle is characterised by an organised process aimed at ensuring the highest quality and efficiency of products. "Our workflow starts with the procurement of the essential materials for heat pumps and boilers production, such as sheet metal and tubes as well as other components. The former are sent to the sheet metal and tube working departments, whereas the latter are stored in a dedicated warehouse. Once prepared, the materials are processed to build the heat exchanger, the heart of our boilers, for which we hold several patents," illustrates Alessandrini. "The process continues with the assembly of the kits with all the required components and the transfer of the resulting materials to our production lines. These steps occur in a tense flow environment, meaning they take place continuously without interruption, minimising waiting times between operations and ensuring optimal production synchronisation. This approach reduces waste and costs but also improves our end products' quality by ensuring they are assembled and manufactured efficiently and smoothly."



The vacuum cleaning process

Within this manufacturing cycle, the cleaning phase is vital to guarantee the excellent quality and functionality of products. Their components are often contaminated with oils and emulsions left by machining or moulding operations, and they must be perfectly cleaned before laser cutting, as even a simple fingerprint could compromise the entire process. "The gas circuits of heat pumps must be completely free of impurities. Previously, we had some external contractors clean our workpieces, but this posed several problems related to quality and cleanliness. For example, residual dirt could cause defects during welding, especially with our new-generation heat pumps. That is why we installed a cleaning machine capable of guaranteeing a high level of cleanliness, also suitable for sheet metal mouldings. It is a closed-loop modified alcohol machine, and it has been operational for about two months now. Since we use photovoltaic energy, we have also implemented software to schedule distillation and stripping cycles, each lasting six hours, during weekends: this prepares the machine for the Monday cleaning operations, thus ensuring an uninterrupted start to the week. In parallel, we installed a double filter to guarantee the machine's operational continuity, even during automatic draining and drying of the clogged filter, a measure taken in anticipation of the growing demand for our products," says Alessandrini.

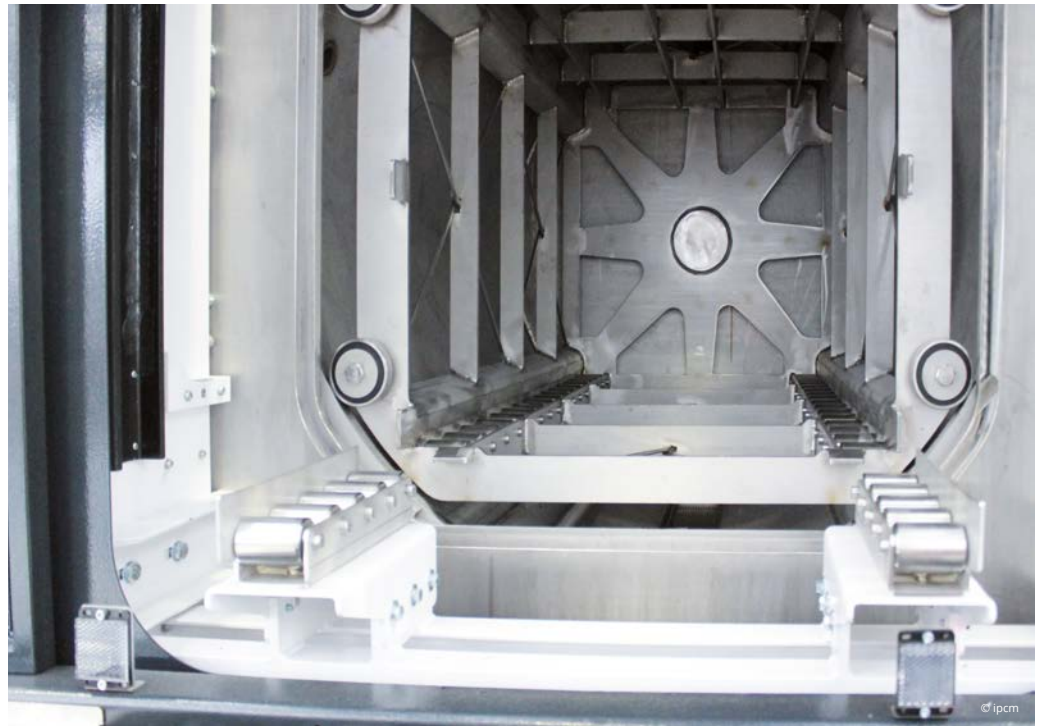
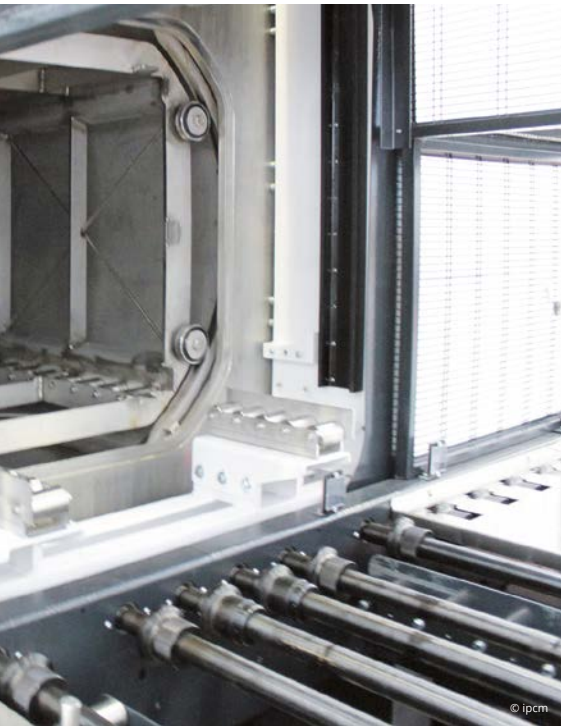
"The complete cleaning process, performed under vacuum, comprises several essential steps. The first is the preliminary vacuum phase, during

which air is removed from the chamber to ensure that the cleaning fluid can reach every surface of the part to be treated without encountering resistance from air bubbles. This is followed by the cleaning phase, which includes a spray cleaning stage with a fluid from a tank at a temperature of around 40 °C and an immersion cleaning stage with a fluid taken from a second tank at around 70 °C. The chamber is then saturated with solvent vapours generated by an integrated boiler, which condense on the part's surfaces to perform the final rinsing and heating phase. For the drying phase, vapours are evaporated and diffused in a cold trap fed by an internal chiller, with the gas expanding at around -30 °C. Finally, during the door pre-opening phase, outside air is fed into the chamber to pressurise it, allowing the door to open safely," explains IFP Europe's CEO Giacomo Sabbadin.

The new KP 600 MAX cleaning system

The cleaning system installed by IFP Europe is a KP 600 MAX plant designed to carry out a full vacuum treatment cycle down to 1 millibar, providing excellent results for the most demanding applications. "The system has a nominal load capacity of 600 x 1200 x 600 mm and can handle parts up to 600 kg. Its productivity rate is 4 cycles/hour, adaptable to the type of workpieces and their contamination level. It uses modified alcohols as solvents," Sabbadin explains.

"The cleaning cycle takes place entirely under vacuum and can include up to two consecutive cleaning phases with different types



of mechanical activation, using inverter-controlled basket movement for thorough and deep cleaning. The rinsing phase uses vapours with precise electronic control of the chamber's saturation degree. During the drying phase, the plant operates under vacuum down to 1 millibar, thanks to two high vacuum pumps and stainless steel heat exchangers fed by a direct refrigeration system that reaches -30 °C. Solvent distillation is carried out with a continuous flow and completely under vacuum, with a capacity of up to 300 litres/hour of distilled alcohol and the complete separation of oil and alcohol, and it is followed by the continuous-flow automatic discharge of residues. Solvent filtration also occurs under vacuum and with a continuous flow, with automatic filter drainage and automatic chip drying steps before opening," indicates Sabbadin.

"The machine is equipped with control systems to constantly monitor all functional parameters, such as the vacuum, temperature, and pressure values in the cleaning chamber, software redundancy detection, and hardware safety control, with network connection capability for monitoring and troubleshooting. In addition, the fact that the treatment cycle, including cleaning, drying, deodorising, and distillation, occurs fully under vacuum has positive consequences on the type of solvent used and its management, the quality of the cleaning results, and the operation's environmental impact. This treatment makes it possible to safely use class AIII non-chlorinated hydrocarbon solvents and modified alcohols, achieving quality results comparable to those obtainable with more toxic and dangerous solvents but without the associated risks."

Exceptional cleanliness and other advantages of vacuum cleaning

"Vacuum cleaning provides excellent results and is particularly effective with complex-shaped surfaces and narrow cavities, penetrating down to the microstructure of sintered materials. The absence of air bubbles in the cleaning liquid ensures homogenous and optimal treatment. And, at the end of the process, the parts are deodorised and free of solvent residues, preventing any risk of environmental contamination," states Sabbadin. "Our cleaning machines are flexible and able to perform various treatment processes depending on the degree of contamination, adapting to a wide range of parts and allowing programming the required operations and cycle times via the control panel. Moreover, vacuum treatment at low temperatures prevents the thermal dissociation of solvent, thus eliminating the need for stabilisers.

From left to right:

- The cleaning plant's loading and unloading roller conveyor.
- The entrance to the cleaning booth.
- The cleaning booth.



Our cleaning machine can perform a continuous-flow, complete distillation process ensuring the total recovery of solvent – and making the residue reusable without solvent: residue stripping also takes place under vacuum, reducing the residual solvent content to 1% without compromising productivity.”

Conclusions

Cosmogas maintains a leading position in the industry through a combination of family tradition and constant innovation. Installing this new cleaning system represented a significant step towards excellence in boiler and heat pump production, meeting future challenges and improving workplace safety. “We are extremely satisfied with our purchase and our cooperation with IFP Europe. After extensive assessment and practical tests on IFP’s machines, we can confirm this was a high-quality investment. The ability to treat simple and complex parts with specific recipes and an average cycle time of 15 to 20 minutes demonstrates the flexibility and efficiency of our new system,” concludes Alberto Alessandrini, Head of the Research & Development Center at Cosmogas. “It complies with the Industry 4.0 requirements and includes an integrated PLC, also allowing IFP Europe to provide remote technical assistance and perform remote checks and modifications – an added value we will take advantage of starting next year.” Giacomo Sabbadin, the CEO of IFP Europe, emphasises the importance of the high degree of environmental quality and work safety offered by the new cleaning plant: “The full vacuum treatment provides greater environmental protection both within the working area and in the outside atmosphere. The depressurisation of the plant prevents the escape of any vapours or gases, whereas the installed safety systems manage these functions effectively and consistently. Finally, throughout the whole cycle, the operators never come into contact with the cleaning liquid.”



From top to bottom:

The touchscreen.

Fittings cleaned in the new IFP Europe plant.

Arturo Alessandrini, the founder of Cosmogas (left), and Alberto Alessandrini, Head of the Research & Development Center at Cosmogas (right).

KP HMA 2024

KP KLEEN POWER, IL NUOVO MODO DI CONCEPIRE IL LAVAGGIO.



Lavatrici Sottovuoto Alcoli Modificati . Idrocarburi

KPKleen Power

IL LAVAGGIO DEL FUTURO... **ADESSO**

- ULTERIORE RIDUZIONE DEL CONSUMO ENERGETICO DEL 30%
- POMPE A VUOTO POTENZIATE ESENTI DA MANUTENZIONE
- DISTILLATORE PRINCIPALE RADDOPPIATO
- SISTEMA DI RISCALDAMENTO INNOVATIVO
- DRASTICA RIDUZIONE DEL TEMPO CICLO
- NUOVO SOFTWARE DI GESTIONE INTUITIVO
- RIDUZIONE DEGLI INGOMBRI ESTERNI
- ACCESSO FACILITATO PER LA MANUTENZIONE
- NUOVO DESIGN

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