Use and Reuse: MST CHEMICALS' Sustainable Corporate Philosophy

Alessia Venturi, ipcm®

A laboratory equipped with state-of-the-art technology for analysis, research, and development. An industrial approach based on sustainability and the concept of resource use and reuse. A focus on the water purification industry in the metal treatment sector in general and in the aluminium one in particular, but a wide range of applications available for its products. Numerous patented or patent pending processes. In short, these are the characteristic traits of MST CHEMICALS, an emerging star in the field of speciality chemicals for ZLD waste water treatment processes.

Reusing, that is, using materials or resources in the same production process from which they originate without transforming them into something else, is one of the many sustainable industrial approaches on which circular economy rests. MST CHEMICALS (San Zenone al Lambro, Milan, Italy) is one of those companies that, thanks to the effective development of chemical products and processes, has made reuse, particularly that of a precious commodity like water, its foundation as well as its industrial success.

MST CHEMICALS was established in 2015 with the purpose of providing speciality chemicals intended for the zero liquid discharge (ZLD) water treatment plants included in the metal treatment lines designed by CIE Srl. With thirty-nine years of experience, this company is a world leader in the design, development, construction, and installation of water treatment plants, which allow completely reusing waste water in their production cycle of origin. "With the development of the ZLD technology, especially for the treatment of aluminium, we soon realised that CIE could no longer rely on the well-known and widespread speciality chemicals available on the market. It needed ad hoc products, with very precise, high-level chemical and performance characteristics," states Franco Falcone, the patron of CIE and the founder of MST CHEMICALS, now successfully managed by Dafina Ianchis.

In December 2020, MST CHEMICALS moved to a new headquarters

MST CHEMICALS' new headquarters and the illuminated panel that stands proudly at the entrance to MST CHEMICALS' factory.

in San Zenone al Lambro, on the outskirts of Milan, which includes 1500 m^2 of production area and laboratories and about 300 m^2 of office spaces, with a super technological meeting room outfitted to hold webinars and host online technical events. "MST CHEMICALS was created in the form of a fully equipped, technological laboratory with staff dedicated to the research and analysis of materials aimed at formulating the speciality chemicals necessary for the operation of CIE's ZLD systems, which are mainly manufactured here at our factory and partly by external suppliers," indicates MST CHEMICALS COO, Dafina Ianchis.

"MST CHEMICALS works in close collaboration with CIE, but it also has an operational autonomy that enables it to produce speciality chemicals of a different type than those strictly necessary for CIE's plants. Clearly, our main activity is to develop chemical processes for water treatment – for example PUR-ALL®, which guarantees the zero liquid discharge purification of waste water by chemical means only, without the use of evaporators or osmosis plants – that CIE than engineers for its plants. We also develop the products necessary to different depuration technologies to operate systems, such as ultrafiltration, osmosis, or evaporation plants, requiring special products for the cleaning and preservation of membranes or products for COD abatement, which are made with carbon-based additives, bentone derivatives, adsorbents, and more.

"Founded as an emanation of CIE for carrying out R&D activities on ZLD treatment processes, therefore, over time MST CHEMICALS has become an autonomous company, also active in sectors where CIE is not," says Ianchis. "Ninety percent of our products are sold overseas, mainly in India and South Africa, thanks to the fact that MST CHEMICALS and CIE are leaders in water treatment applications both for coil and extruded aluminium finishing processes and for processes devoted to cans for soft drinks such as beers and sodas (called aluminium cans) – a category distributed worldwide."

The analysis laboratory: the flagship of MST CHEMICALS

"Our lab is equipped with high-level scientific instrumentation that very few private laboratories can boast, and similar to those available to environmental protection and research or public health care institutes," says Jessica Galeone, the research and development, analysis, and quality control manager. "For example, we can use the Inductively Coupled Plasma (ICP) spectrometry technology, which enables us to perform both qualitative and quantitative analyses in order to identify the chemical composition of a liquid sample and simultaneously determine the presence of individual metals in concentrations as low as few micrograms/litre. Through the ICP technique, a liquid sample is injected and dispersed into micronised aerosol particles. Depending on the

Clockwise from left: Alessia Venturi (ipcm®), Franco Falcone, Jessica Galeone, Dafina Ianchis, and Angelo Quaini.

The ICP-OES plasma spectrometer.

From left to right: a thermostatic heater, a mixer, a spectrometer, and a centrifuge.

A jar test instrument (left) and a vacuum filtration pump.

The lab's workbench.

emission wavelength of each ion already catalogued in the literature, we can assess its concentration in the sample analysed. This instrument guarantees the simultaneous analysis of all metals and cations in solution with a variety of parameters. It enables us to make a quick but very accurate screening of samples to verify the effectiveness of our processes. We have also already budgeted an advanced instrument in which we will insert an HPLC device, an ion chromatograph that will allow performing the same multi-parameter analyses on liquid samples, but for the detection of anions. With spectrophotometry, on the other hand, we analyse the elements generating COD and BOD to be cut down, reduced, or kept under control.
Our laboratory owns three spectrophotometers, one bench top and two field ones, with which we analyse all polluting elements (anions and metals) in a quick but efficient way, to be generally used directly on the field. Finally, our laboratory is equipped with an ion-selective electrode analyser for fluorides, conductivity meters, pH meters, turbidimeters, stoves, thermoreactors, centrifuges, and a pilot plant that we use for pre-industrialisation process simulations."

Aluminium treatment: MST's sector of choice, but not the only one

"MST is currently focussing on the R&D and production of speciality chemicals for the aluminium industry, especially the can sector," states MST Chemicals Sales and Technical Director, Angelo Quaini. "However, we also develop processes for many other sectors, including stainless steel pickling, phosphating, steel and HDG, plastic cleaning, and food, for recycling water containing any processing waste. Finally, we are waiting for patents to be granted on two important innovations: a sulphate removal process for various applications and a hydrochloric acid recovery process from stainless steel and aluminium pickling baths. These also confirm our choice to embrace the "use and reuse" philosophy".