Appearance matters

FOR PROM FACILITY, AM SOLUTIONS TECHNOLOGIES ARE THE OPTIMAL RESPONSE TO POST-PROCESSING PROBLEMS ON ADDITIVE MANUFACTURED COMPONENTS, AS THEY OPTIMISE PROCESSING TIMES AND GUARANTEE HIGH PRODUCT QUALITY.

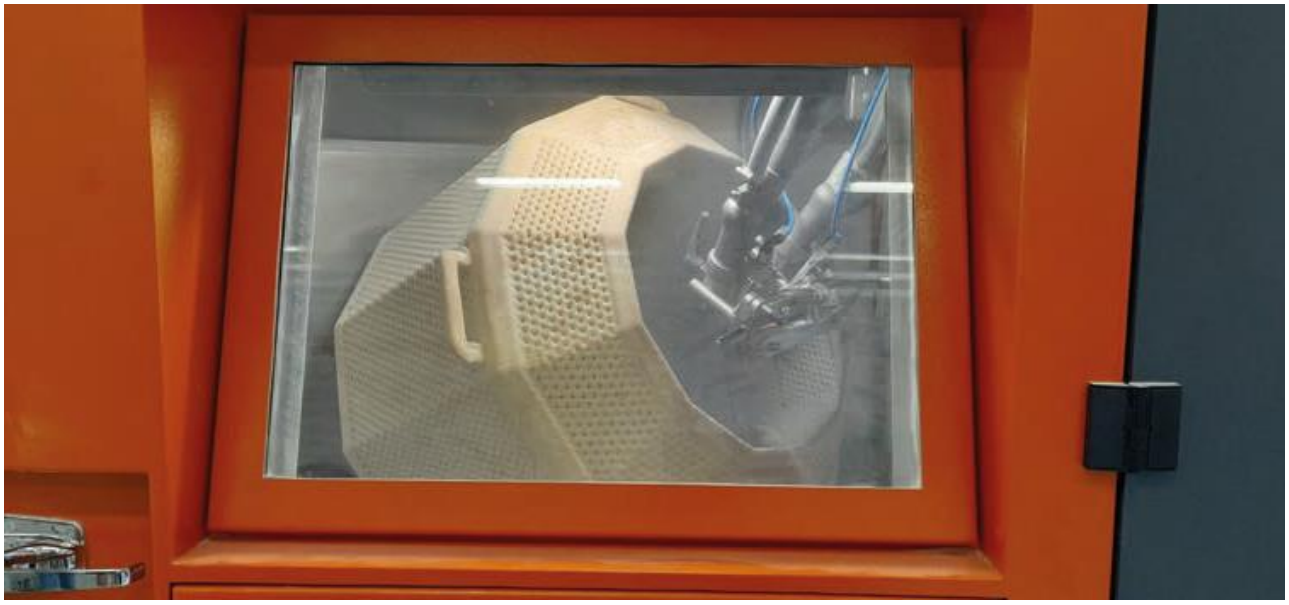
By Stefano Belviolandi and Andrea Baruffi

In the heart of the Italian region of Trentino, in Rovereto, there is a “Silicon Valley” of mechatronics focusing on technologies, machinery, prototyping skills, and the qualification of mechatronic systems. The mechatronic prototyping centre ProM Facility was established under the European Regional Development Fund Operational Programme 2014-2020 of the Autonomous Province of Trento thanks to the financial support of the EU, the Italian State, and the Autonomous Province of Trento itself and covers several hectares of land.

HISTORY

The idea behind ProM Facility was conceived as early as 2013 and it was realised over time by confirming the project’s initial objectives: the creation of infrastructure at the service of businesses, in which highly qualified technicians could work to integrate industry and research-related needs thanks to their expertise and the provision of innovative machinery and technology. Operating in the Polo Meccatronica hub since 2017, ProM Facility brings together the services, skills, know-how, and network of Trentino Sviluppo and its partners: University of Trento, Fondazione Bruno Kessler, and Confindustria Trento. *The Next Factory* magazine met Paolo Gregori, the director of ProM Facility, who immediately emphasised: “Although we also provide specific services to companies that need our skills and technologies, we are not a simple subcontractor but more of a 'solution provider', supporting industrial research and product development with innovative solutions”. In fact, ProM Facility is the innovative mechatronic prototyping laboratory of Trentino Sviluppo, the in-house company of the Autonomous Province of Trento acting as a 'one-stop shop' to assist companies interested in locating in Trentino, offering space and production facilities, consultancy and support services. Its assets include over 1.5 million square metres of industrial sites and production areas. Its Polo Meccatronica hub, a special project of Trentino Sviluppo within which about 50 companies are currently established, has a strong focus both on training young people and on the development of *ad hoc* training for companies needing advice on post-processing or surface finishing of additive manufactured parts.

AM Solutions' Series 2 S1 machine is a multifunctional solution: it performs cleaning and surface finishing in one independent unit


Close-up of the processing phase with the AM Solutions S1 plant

CONSTANT DEVELOPMENT

"We are constantly on the lookout for partners both in the software area, with tools that can allow us to design at our best, and in the machinery field, to offer better services and custom solutions, but also to expand our network of customer-supplier contacts that enables us to focus on technology transfer work," stated Gregori. ProM Facility has a strong focus on the AM world thanks to its design and manufacturing laboratory for the creation of components and the integration with mechatronic systems or subsystems. This includes three phases: design for additive manufacturing (DfAM), 3D printing with various polymeric and metallic materials, and finishing and post-processing. "The ProM Facility's laboratory delivered its first service at the end of 2017. We started working a lot on our DfAM skills and then we moved on to additive manufacturing expertise and technologies applied to our in-house machines, positioning ourselves as a hub for innovative solutions. The post-processing phase," noted Gregori, "often represents the 'business card' of companies, which are identified with the finished products they present. That is why it is becoming increasingly important for B2C applications."

Today, post-processing plays an increasingly important role from the prototyping phase onwards, since it affects the actual cost of an object as a complex activity that must be carried out manually or semi-manually and in a precise and customised manner; at the same time, it produces the object's 'interface' with both the

outside world and the part's functionality. To meet all these requirements, ProM Facility chose AM Solutions, a brand of the Rösler Group active in the supply of post-processing solutions for 3D printed components, as its ideal partner. Together, they installed two technologies, one based on the shot blasting technology and the other on the mass finishing one (vibratory finishing by abrasion). But let us proceed in order.

Paolo Gregori, the director of ProM Facility

Riccardo Leoni, the Mass Finishing/AM Solutions sales manager (centre) between two laboratory technicians at ProM Facility

A MULTIFACETED SOLUTION

For the post-processing of parts made with powder bed printing systems, the S1 machine from AM Solutions' Series 2 is a multifunctional solution that allows cleaning and surface finishing in one independent unit. In addition to automatic or manual shot blasting, it is also capable of removing residual powder after the cycle. As explained by Ciro Malacarne, a laboratory technician at ProM Facility: "This system enables us to clean and finish workpieces automatically, guaranteeing excellent results and efficient processing times even with complex geometries that previously called for manual post-finishing operations. In addition, it is very gentle on parts, even the most fragile ones, preventing breakage. It can handle components ranging from 30-40 centimetres, also quite substantial in weight, down to under a millimetre or a few tenths of a millimetre. The machine's front has an area for manual operations, as well as being equipped with a removable basket to allow the insertion of large workpieces."

Its main features also include an internal screen to separate waste powder from blasting media, which are then recirculated. "This is a fundamental feature that ensures a constant and homogenous process, as the very fine print powder mixes easily with the media and, if it were not separated and removed, there would be a risk of shot blasting the parts with waste powder, making the process no longer stable," added Malacarne. The presence of a media collector that can be isolated also allows the abrasive material to be replaced quickly, including glass grit, polyamide, special polystyrene spheres, or other types. The operator interface is very user-friendly and guarantees easy handling of the machine. At the same time, AM Solutions provides technical support and staff training.

Riccardo Leoni, the Mass Finishing/AM Solutions sales manager

AM Solutions' M1 Basic line is ideal for sanding and polishing surfaces

The Series 2 S1 machine internally separates waste powder from blasting media to ensure a constant and homogenous process

MAXIMUM FLEXIBILITY

On the other hand, for the surface finishing and roughening of 3D printed metal and plastic components, as well as of machined parts to remove machining marks, a M1 Basic plant was selected, which is ideal for smoothing and polishing surfaces and guaranteeing excellent results on both individual AM components and small batches. This machine is also equipped with an integrated system for purifying and recovering process water and monitoring its treatment. “Thanks to vibration, the abrasive material is set in motion and comes into contact with the workpieces to be polished. Flexibility is achieved through the possibility of using the full length of the tank or sectioning it by inserting bulkheads, in order to use several different methods at the same time,” illustrated Malacarne.

As can be seen, the combination of skills and technologies enables the creation of added value for AM components, thus fully exploiting the potential of 3D printing.