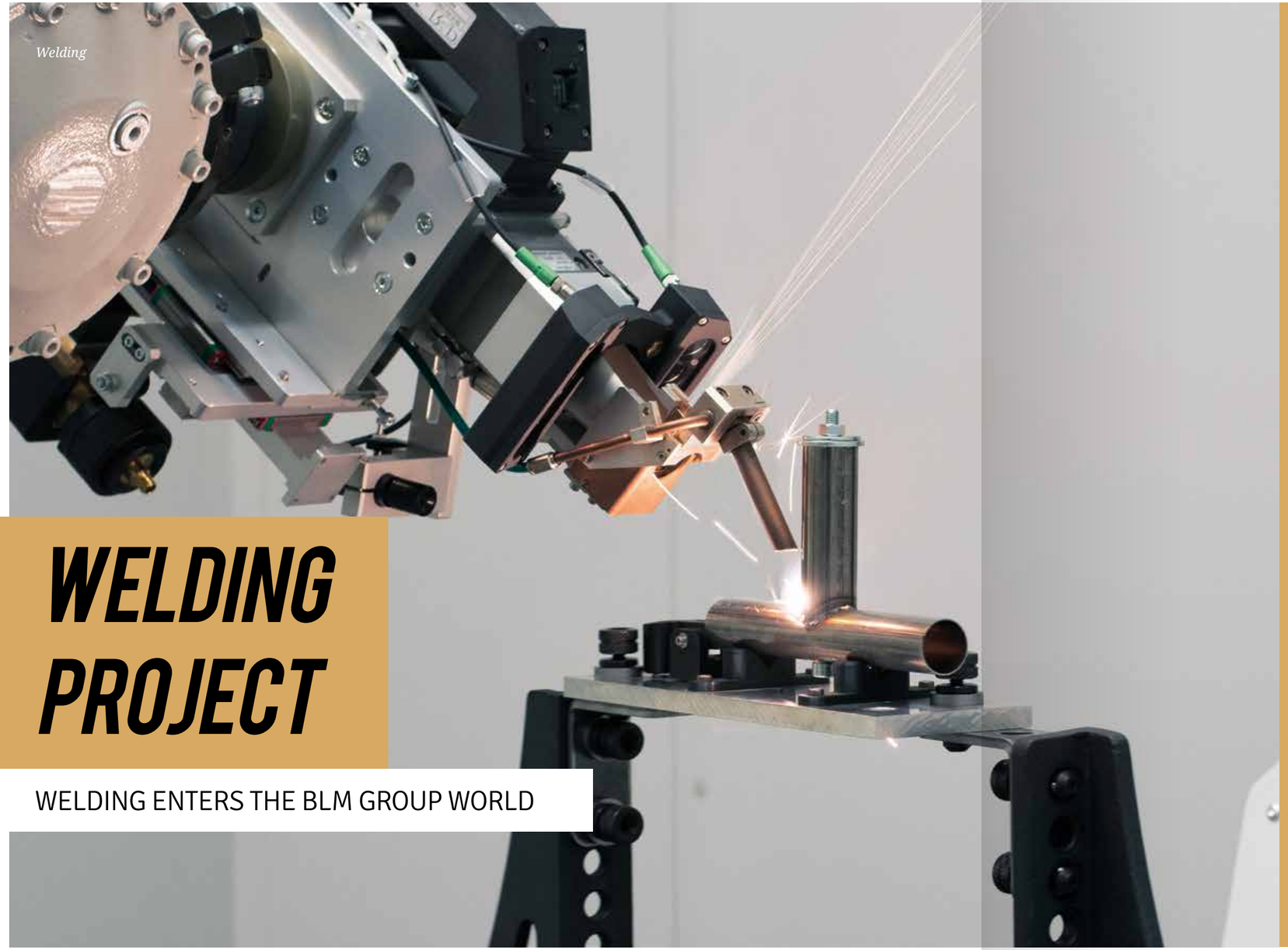


Welding

WELDING PROJECT

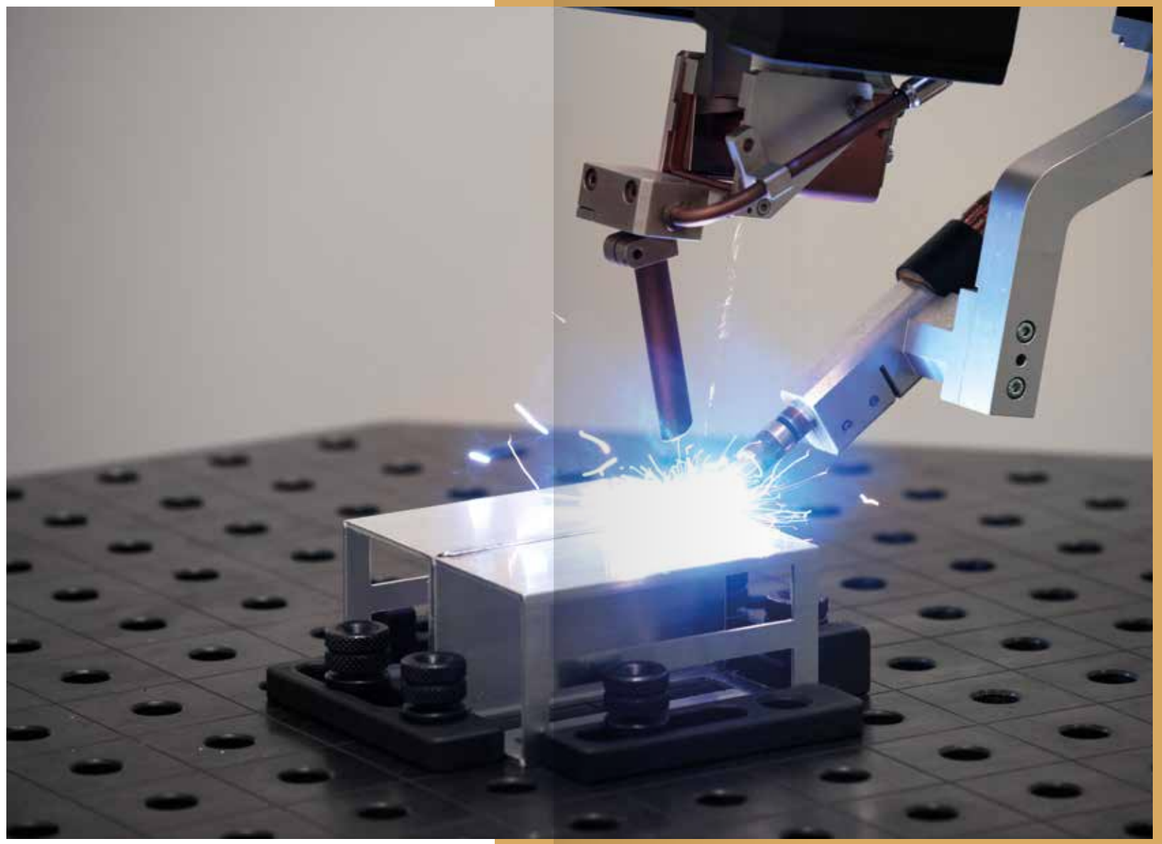
WELDING ENTERS THE BLM GROUP WORLD

If we analyze the BLM GROUP product range, we see that our machines contribute to the production of parts that will normally require assembly to create a finished product. Laser cutting of sheet metal, like all operations on the tube, such as saw cutting, laser cutting, bending, end-forming and machining, prepare parts to be assembled. Welding completes the cycle from parts to a finished product. It was therefore natural for BLM GROUP to focus on the (laser) welding process and expand its technological offering to the customer in this area. We interviewed Daniele Colombo, a member of the Adige Research & Development Team who, with the constant support of an important pilot customer, was involved in the design and development of this completely new product line for the BLM GROUP.

Daniele, metal welding is not exactly a novelty, why is it worth replacing established technologies with lasers?
The continuous interest in high quality and productivity joining technologies, as well as the reduction in the cost [€ / W] of laser sources is leading to a renewed interest in automated applications based on laser technology, primarily welding.
Unlike the more traditional and widespread arc joining technologies, laser robotic welding has undeniable advantages for welded products, especially from the point of view of the quality of the weld and the associated time and cost of the process itself.

1. Increased quality of the welded joint.
With laser technology it is possible, to reduce the heat input associated with the melting process and consequently the thermal deformation of the welded piece. It is also possible to perform welds with an aesthetic surface finish level or that do not require expensive secondary surface finishing operations by, mainly manual, means of material removal processes. Equally significant, the high energy density [W / mm2] of the laser beam allows welding configurations otherwise impossible with arc joining technologies, allowing product simplification when applying BLM's reDesign for Laser Welding techniques. Moreover, if other systems of the BLM group are available, such as laser tube or sheet metal cutting systems, it is possible to implement simple methods of product design and realization based on the more general reDesign for Laser Manufacturing; leading to an optimization of the finished product and its production cycle in terms of quality, time and cost.

2. reduction of processing times and costs.
Laser welding, taking into account the aforementioned advantages related to the use of a high energy density beam, allows faster welding speeds than that of traditional arc welding systems, with a consequent reduction in welding time. As also previously mentioned,



the high quality of the weld does not require subsequent rework and finishing operations of the joint thus reducing not only the overall cycle time of the assembly but also the uniformity of welds between different pieces resulting in greater control of the final quality of the welded assembly.

What are the objectives of the BLM GROUP in the development of this new product?
We immediately wanted to focus on the typical market of our customers who, in the logic of production departments (job-shops), already deal with the processing of 1D (sheet metal) and 2D (tubes and bars) semi-finished products, but also when necessary welding on more or less massive 3D components (die-cast, molded, extruded, etc.). The solution of automated construction on a robotic basis, guaranteeing high flexibility, immediately seemed the most logical to us.
Furthermore, considering the current development directions of the manufacturing world (energy saving, flexibility and reconfigurability of the production required increasingly in the "lean" meaning) and future (light-weight design and e-mobility for example), we have immediately foreseen the adoption - and sometimes also the internal development - of enabling technologies to support welding in order to be able to propose a complete set of solutions that can be adapted to the greatest possible range of welding applications. CAM programming software, optional cold wire (Cold Wire) and joint follower (SeamTacker) device are a few examples of these enabling technologies.
Furthermore, aware of the current lower diffusion of laser welding compared to traditional arc welding techniques, we have also provided for the defined tools, methods and training courses in order to be able to immediately provide services to the customer in their approach, characterization and optimization of their laser welding processes and products.
However, the real added value to the project was the

continuous involvement of a pilot customer with whom Adige has been collaborating with for years in the development of new products.
Starting the design and development process of a new product from the initial Research and Development tables is not easy, especially in the initial stages of defining the development trajectories. However, thanks to the presence of this pilot partner in the project, in their role representing the real needs of the customer, we were able to define a solution that we now consider tailored to the expectations and needs of the market.

What were the most challenging aspects of the project and how were they addressed?
I am happy to mention three challenges, significant for the project, relating to different moments.

1. The initial phase of defining the product specifications. Unlike a tube laser or flat sheet Laser, a welding system is much more oriented towards the product, or the product family, that it will have to weld.
The identification of the components to be welded is therefore often a mandatory prerequisite for the design itself.
But when the welding system is targeted for use at a job shop, it is often difficult to define the set of pieces that will have to be machined by the system. Indeed, the risk is that the process of defining the specifications is never ending. It is no longer just a problem of defining product specifications, but also of negotiating and selecting them.

To resolve these hurdles it was decided that the layout of the system must incorporate multiple positioners but, above all, it was imparative to include the integration of different "technological packages" and related accessory systems, in order to guarantee the maximum flexibility in all cases.

2. The initial development phase of the product platform. Following the design and construction of the prototype, we decided to develop a product line starting from the previous experience of the first system. Here the difficulty was to break down the prototype into simple, modular and integrable subsystems, thereby widening the range of possible product configurations. We then defined the distinct specifications and development trajectories for each one, in order to be market ready today with a complete platform offering.

3. The distance from the "garage", during periods of lock-down from Covid-19.
The "garage" is the name of the space used to build the alpha prototype of the system. It was also the place used for continuous development of the welding technology and validation of the various sub-prototypes and later a Beta prototype which was very close to the finished product. The multi-disciplined development team from different parts of Italy has always made the garage their second home. It is therefore easy to understand how, even in the "dark" of the necessary months of the lock down, resilience is the soft skill that the team had to draw on in an extra-ordinary way.