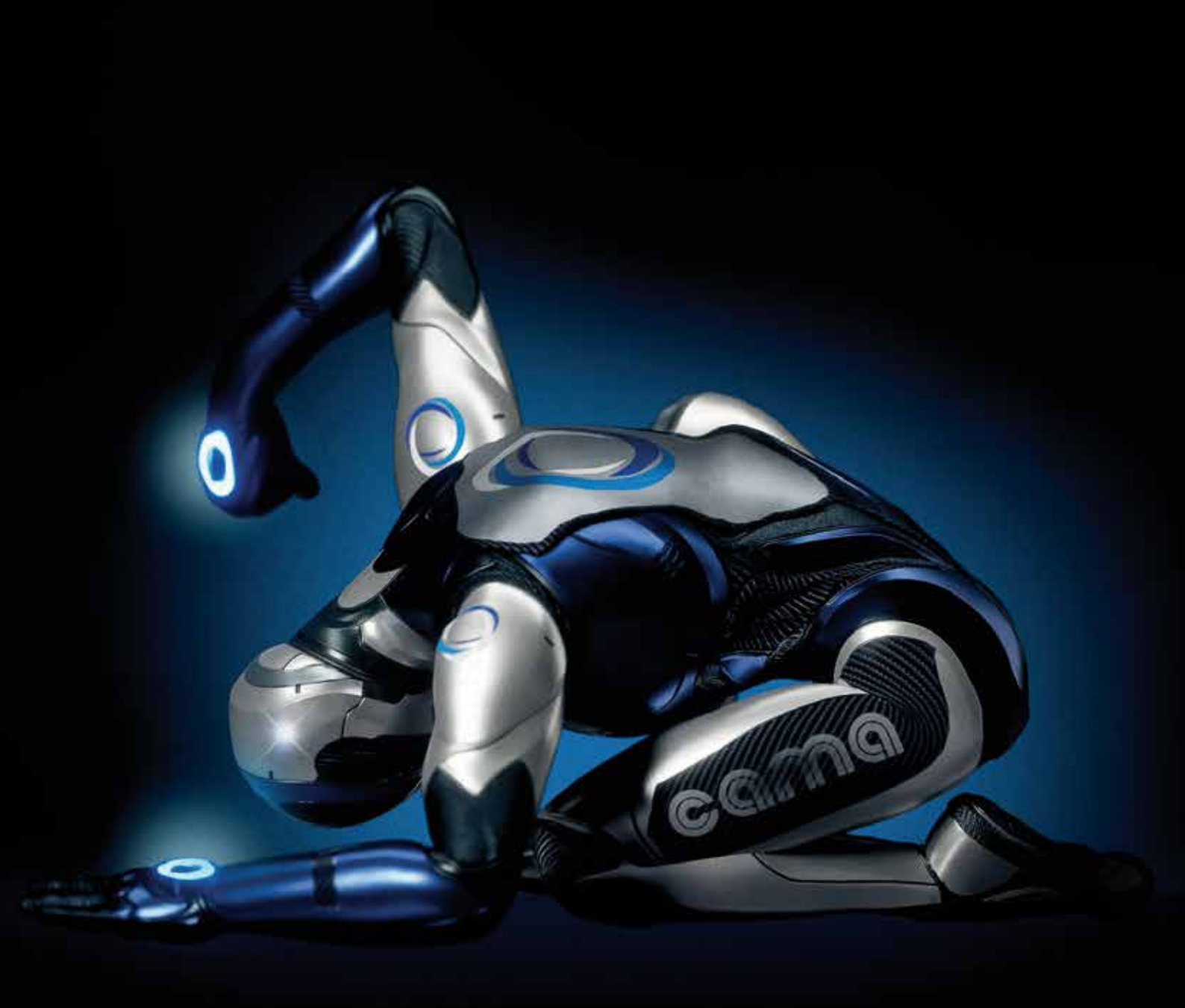


NATIVE PACKAGING ROBOTS

cama GROUP

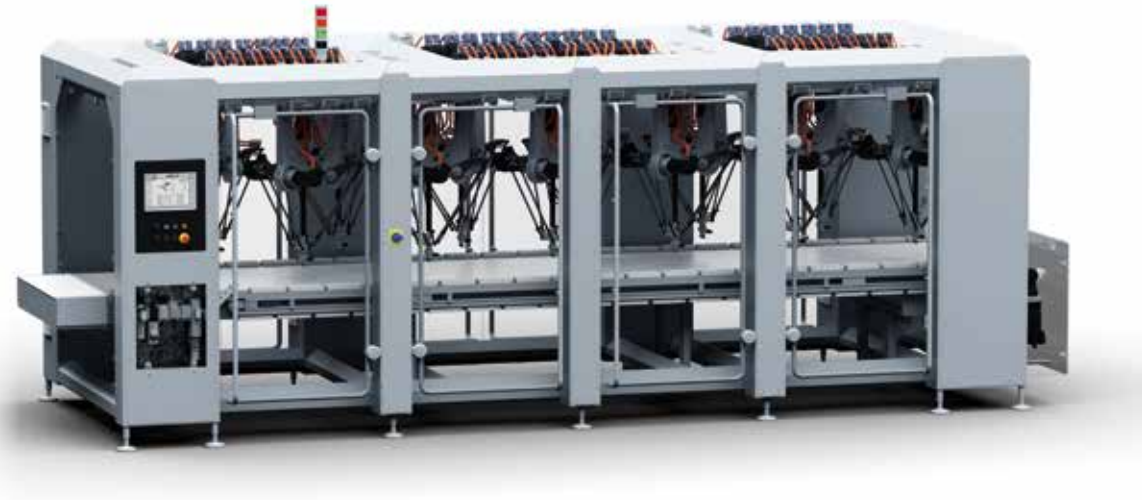
CAMA Group is one of the most prominent manufacturers of packaging solutions, with lines and machines delivered worldwide and for virtually every production sector. For years, it has also been developing all the integrated robotic systems in-house: two-axis arms, Delta robots, gripping, and vision systems. Thus the company has built up unique skills and technologies. Thanks to this know-how, CAMA can flexibly and creatively respond to its customers' requests with no comparison in the market.

The genius and creativity of Italian companies are recognized and appreciated all over the world, not only in the most celebrated sectors of Made in Italy, such as fashion and furniture, but also in those that contribute most to the country's economy, such as mechanics, mechatronics, and automation. A galaxy of high-tech companies arose in such sectors, with some internationally renowned "champions" among them. One of these is CAMA Group, a reference name worldwide for paper and cardboard packaging.
The company is based in Brianza, north of Milan, one of Europe's most industrialized areas. In such a context, it does not limit itself to designing and manufacturing

The interior of a CAMA Group packaging machine equipped with two-axis robots internally designed and developed by the Italian company.

The CAMA's robot timeline

1986	1992	1995	1999	2001
RB504, first 2-axis robot	Development of the RB504 robot	RB501, the evolution of the 2-axis robot	The 2000s 2-axis robot	RB570 4-axis robot



A CAMA guided loading unit equipped with 12 Triaflex Delta robots. Aided by a "smart" vision system, the robots can sort and pick loose products on a production line and position them into a container or conveyor in a pre-set pattern.

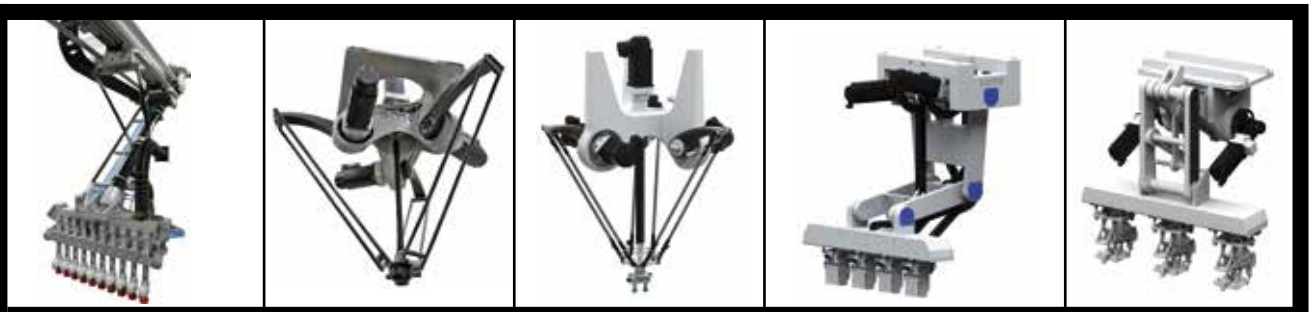
machinery and solutions for every kind of product, food and non-food, but also provides personalized advice to its customers that can explain their needs and participate actively in the creation of tailor-made solutions. Variables considered are the products to be packaged, the materials used, and the final consumer's use of the content and packaging.

LOOKING FOR THE PERFECT INTEGRATION

Thanks to its listening skills, CAMA Group has often been able to translate the customer's needs into genuine process innovations. Such creative ability is made possible by the competencies developed in robot technology, which is apparently auxiliary to machines but is increasingly the protagonist in packaging today. "Our goal," explains Alessandro Rocca, Sales Director of CAMA Group, "is not to compete with the big manufacturers but to create robotic solutions perfectly integrated with our machines and perfectly designed for the tasks required by packaging operations. Our robots don't have to be the best performing, fastest, or most powerful on the market. Instead, they must ensure 100% efficiency when used on our machines, and share the same software for easier programming. They must follow the correct trajectories and have all the useful devices facilitating management and maintenance by human operators. Furthermore, our robots have a specific design that fits both functionally and aesthetically into our production lines."

A MODEL PLANT

CAMA Group developed two robotic solutions: two-axis arms of various types and for different functions and Delta Triaflex robots, essentially for pick & place. We can see them with our own eyes by visiting the brand new production plant in Molteno, in the province of Lecco. The site is already active. Here the company is transferring all its activities from the historic and nearby headquarters in Garbagnate Monastero. The vast environment has sufficient room to allow the simultaneous processing of many machines or packaging lines, which can be assembled in their entire footprint by the company's technicians to check the operation of all the parts, create the wiring and assemblies, and integrate and program the robots.



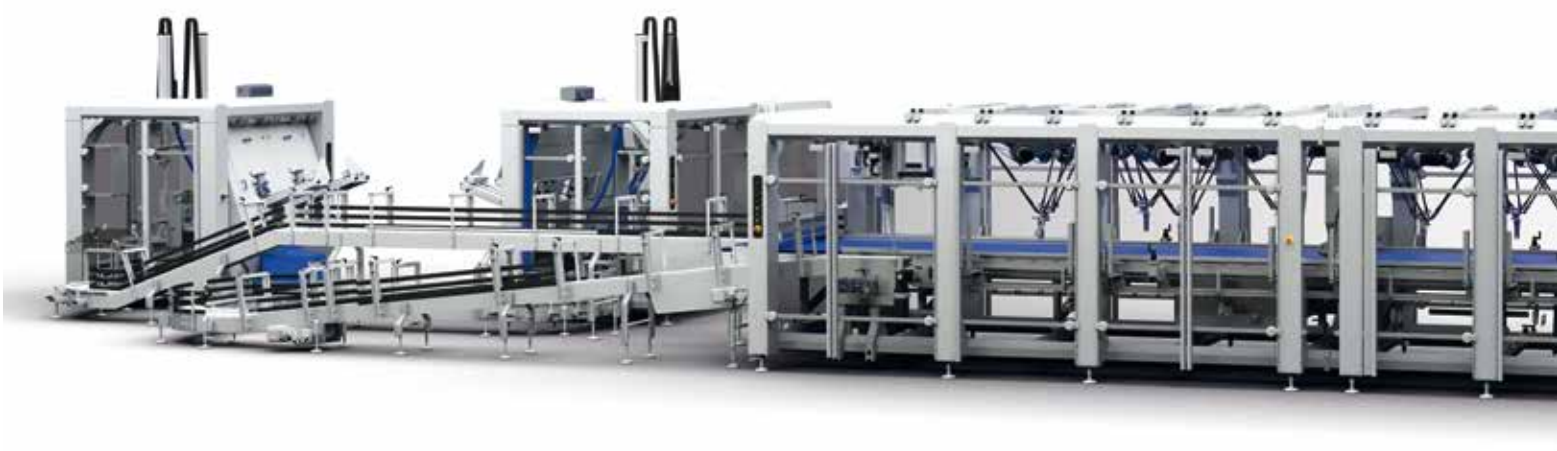
2004	2007	2014	2016	2022
MN530, first Y shape robot	RB590, first Triaflex robot	RB588 compact Triaflex robot	The RB001 robot	RB002 2 axis robot

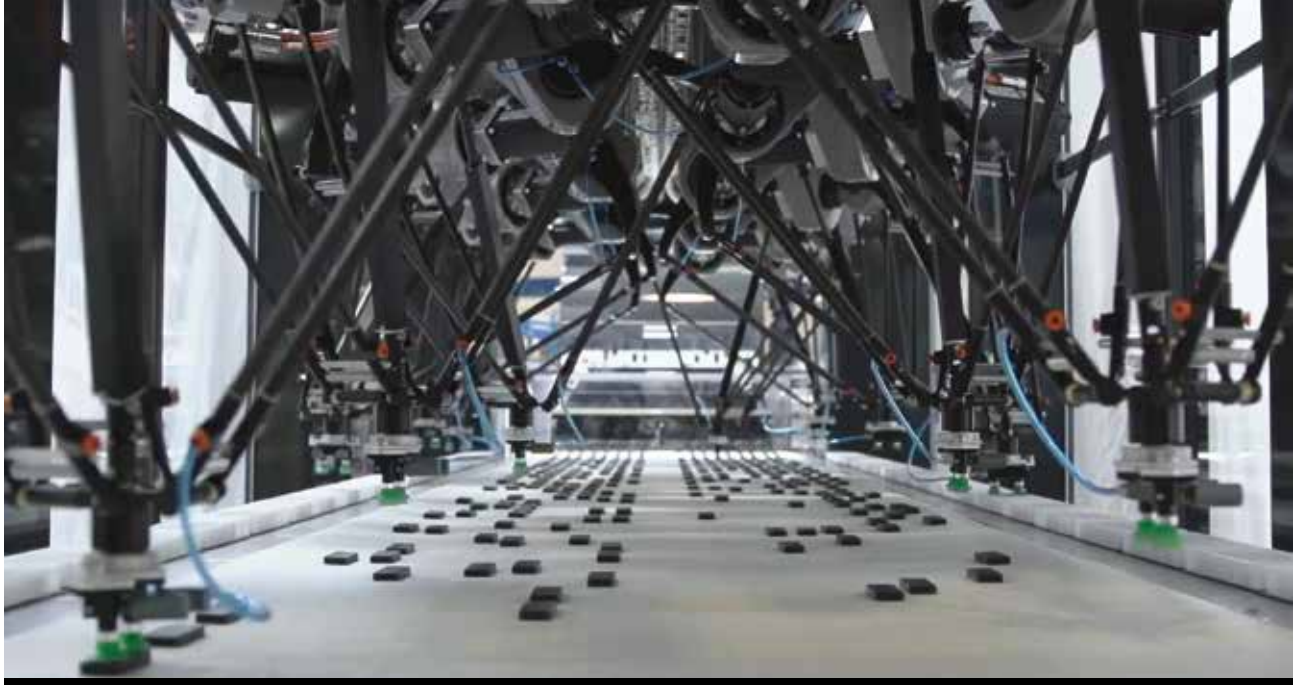
Delta robots, in detail, inside a CAMA packaging machinery.

All CAMA Group solutions are developed, inspected, and tested here before being disassembled and sent to customers for the final installation and implementation. Among the machines in production, we see, for example, a packaging line with a cell made up of 12 Delta Triaflex robots, which can package up to 1,000 pieces per minute. The solution, recently presented by the Italian company, is equipped with an anti-collision system that allows a particularly dense and space-saving integration of the robots. The line also features an advanced vision system and a digital twin, reproducing it virtually in every detail. An augmented reality package integrates the solution to facilitate maintenance and the installation of spare parts.

UNIQUE LINES AND MACHINES

Robotized machines like this one are an example of the philosophy followed by CAMA in robotic development and integration. According to Massimo Monguzzi, the company's R&D Manager: "Integrating such kind of robots on packaging machines means being able to control all their movements and the resulting vibrations, which could be transmitted to the machine itself and the nearby machinery, influencing production accuracy. A deep structural study of the whole packaging lines and their rigidity is thus needed. We can perform it thanks to our simulation software, preventing any stability and repeatability problems. One of our patents, for example, allows us to incorporate the electrical cabinets inside the machine support uprights, obtaining a strength and structural rigidity unachieved by other products on the market. This solution is designed to save space, increasingly precious in packaging companies, and to allow highly efficient use of robots." The Italian company didn't get at once to this evolutive stage, which allows the creation of truly cutting-edge, highly technological, and efficient robots. Instead, it followed a long development process that began as early as the 1980s.





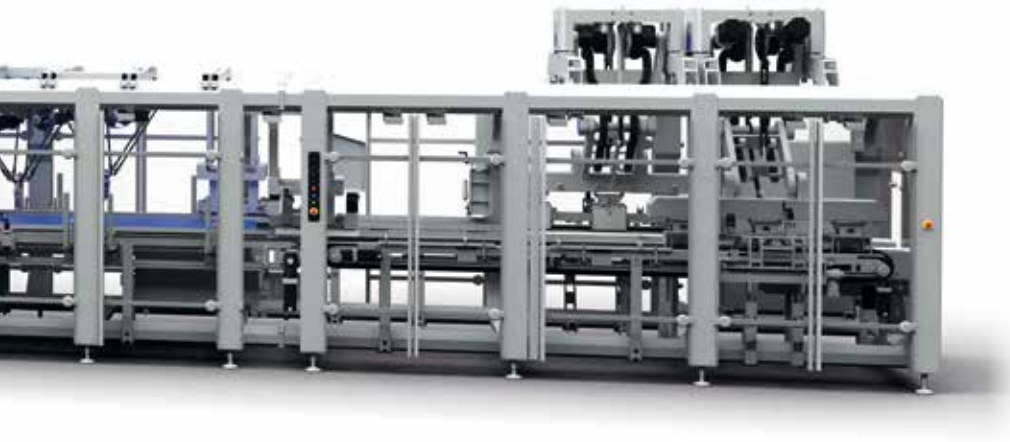
CAMA's Delta robots execute pick & place operations of naked products. Their carbon fiber arms are ideal for fast and smart product handling. Such vision-guided loading units represent a technological step forward to cater to customer needs.

THE CONSTRUCTION OF KNOW-HOW

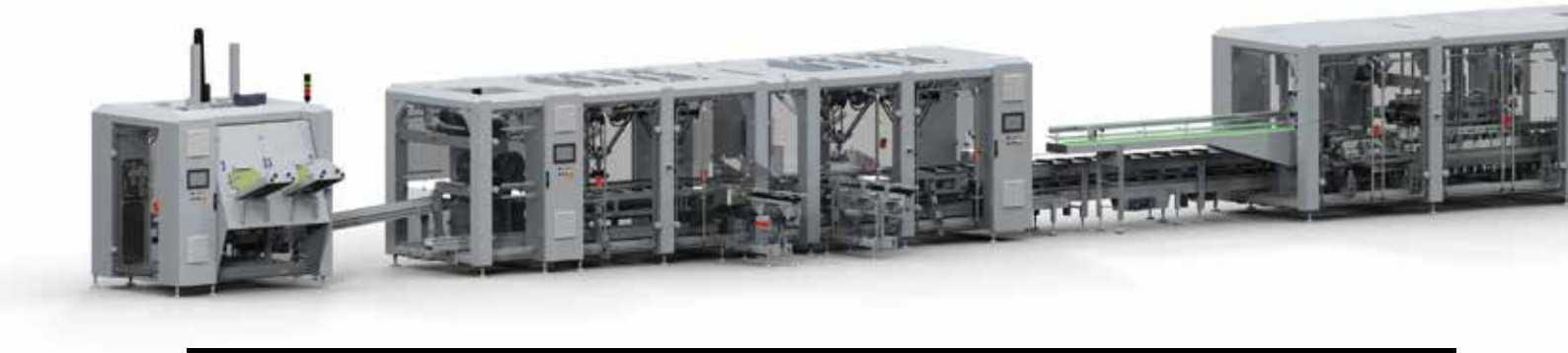
"During those years," Monguzzi recalls, "we began to develop our first pick & place applications based on two-axis robotic arms, replacing traditional handling solutions. We also activated relationships and collaborations with several universities and research centers, building a solid scientific and technical background for our subsequent achievements. Despite the external contributions from the academic world, all this know-how has always been developed internally and owned by our company".
One further step was made in 2007 when CAMA Group created its first Delta robot, called Triaflex. "Today, Delta robots are common," explains Rocca, "but about fifteen years ago, the situation was different: there was a huge need for knowledge, technologies, and the ability to develop better and more suitable solutions for packaging than the few available on the market. In 2010 we started our internal robotics division, aiming to follow all our machines' applications and integrations. The requests for installations were constantly increasing and led us to extensively invest in the development of accessory technologies, including vision and gripping systems."
Another strong point for CAMA is that its robots and machines share the same software. "There is no 'black box' problem," Rocca states. "I mean, with our solutions, we overcome the obscure areas that traditional integrators cannot resolve, generated by the difficult harmonization of components from various manufacturers, which often follow different philosophies. Anyone who buys our solutions has only CAMA as a point of reference. Nevertheless, we have established tight collaborations with automation hardware and software suppliers, leading us to develop patents and new products. Our points of reference are groups like Rockwell, Bosch-Rexroth, and Siemens. Working with them, we have developed three machine platforms, each based on the products of these three big partners and with perfect integration of our robotics."

SPECIALIST SKILLS

CAMA Group relies on a technical office with about twenty designers. The daily task of these



A packaging line for chocolate tea cakes designed by CAMA Group for the plant of a big snack company in Peru. The perfect machine/robot synergy, empowered by an advanced vision system, allowed the fully automating of all the secondary packaging operations.



A complete packaging line developed by CAMA group for a major food company. The intensive use of robotic solutions enables the operations of several substations.

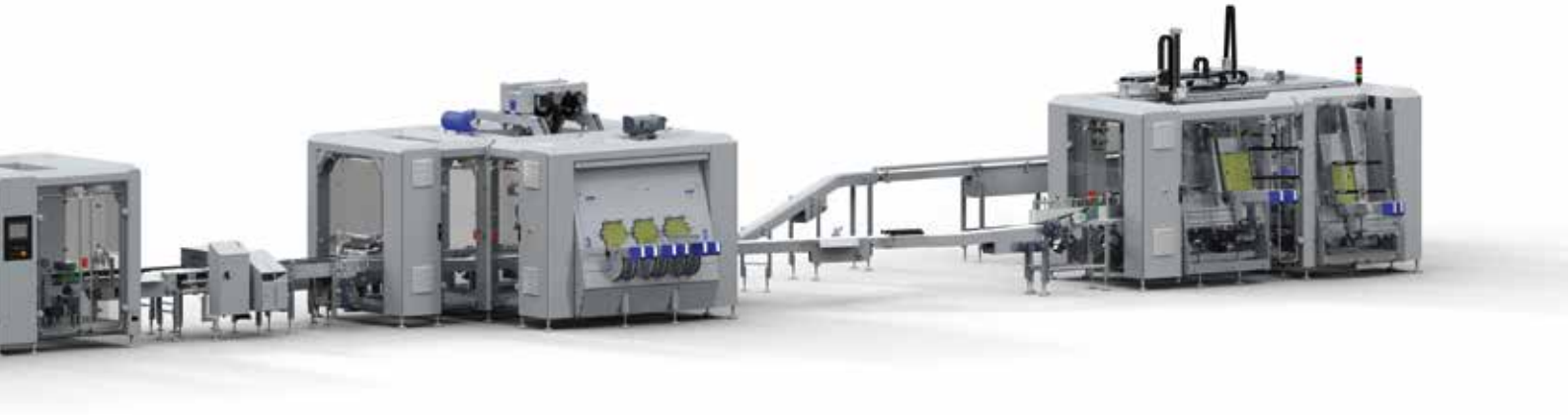
specialized professionals is the development of tailor-made machines expressly conceived upon the customer's needs because, Monguzzi continues, "robotic machines by definition are not a standard, but respond to specific production requirements that are never the same.
The robots' integration takes place during the project, with the support of other company offices working in parallel. These include the System Engineering department, which simulates and envisages the best solution for each specific application, and the Research & Development department, which constantly improves the technologies we are already used to or introduces new ones."
At Interpack 2023, the Düsseldorf's fair on processing and packaging (4-10 May), visitors can admire one of the solutions developed by CAMA's technical office: a new modular two-axis manipulator usable in different production areas. Depending on the machines and applications, the same robot can perform pick & place operations or box shaping and closing functions. According to Alessandro Rocca: "This product did not exist before for the packaging sector, at least not with such flexibility and multi-functionality. We believe it will represent the state of the art of the sector for at least the next decade."

SIMULATION AND VIRTUALIZATION

Since 2015, CAMA Group has been using simulation tools to study the behavior of integrated machines and robots during the design stage. "A technological leap forward," Monguzzi recalls, "developed in collaboration with researchers of the Politecnico di Milano. It was our first simulator for the production isles equipped with Delta robots. Over the years, we have increasingly refined our simulation technology until we reached, in 2018, a system that enables us to carry out the virtual commissioning of our machines with total autonomy. Such a tool is also useful for designing and operationally testing the software installed on PLC connected to the mechatronic simulator." Many are the advantages, that translate into a much shorter time for product development and machine start-up on the production site. "For example," Monguzzi says, "last year, we simulated all the operating logic and software of a pick & place machine with eight robots for the US market, thus overcoming the temporary shortage of electronic components caused by the supply chain crisis and without interrupting the development of the project."

MODULARITY AND CUSTOMIZATION

CAMA's robotics integrated into machines is no longer an option for the customer but a standard. This strong point distinguishes the Italian company from its competitors and has led it to become wholly autonomous in developing and producing its robots. "All the robotics in our production cells is standardized and constitutes our solid reference base," explains Alessandro Rocca. "But we can also create tailor-made customizations for all the specific packaging needs, which may concern, for example, robotic heads or format changeovers for each product or manufacturing sector."
Robots are not stand-alone machines but systems including gripping and handling solutions



or vision and safety devices. CAMA is equipped to develop them internally. “We have the advantage,” Monguzzi says, “of a modular approach to the robot, with many well-tested and established solutions, which allow our technical office to concentrate on the auxiliary parts of the robotic system, most importantly on the grippers, a key feature in packaging, that can deeply vary according to product typology. We have many solutions based on vacuum, suction cups, or mechanical manipulators. We have also developed the technical skills to produce these parts, such as by 3D printing, which we commission to carefully selected external suppliers, always working on our design. Thus, we can create gripping systems capable of adapting to any type of object, carrying out particular movements to form boxes and envelopes, or manipulating and inserting the products into the packages.”

A MASSIVE KNOW-HOW

This activity has not only led CAMA Group to file a large number of patents. Still, it has allowed the company to free itself from dependence on suppliers, whose solutions are not always tailored to the specific needs of the packaging sector. “We have evolved,” concludes the group’s R&D manager, “to the point of creating ultra-light, ultra-compact gripping heads, adaptable to format changes and with integrated vision or electronic recognition systems. All of this goes in the direction of increasingly intelligent machines, able to really solve operational problems and with added value for the customer that is widely recognized by the market.” For the future, among other things, the company is considering implementing machine learning and data analysis solutions to learn from the operation of its own robotic machines, both in predictive maintenance and continuous product improvement.

Packaging machinery by CAMA Group using two-axis robotic arms. Adopting big and fast robots requires structural rigidity obtained by steady support uprights incorporating the electrical cabinets. An example of the many unique and patented solutions developed by the Italian company.

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