

ABSTRACT

In today's industrial landscape, companies increasingly demand integrated solutions that cover the entire production cycle to enhance efficiency, reduce processing times, and cut costs. Buffoli Industries and BlueTechHub, a technological ecosystem comprised of companies specializing in areas from multi-spindle equipment supply to robotic automation, additive manufacturing, and AI integration, meet these needs with turnkey solutions tailored to each client's specific requirements. With a global presence and a strong drive toward innovation, the group stands out for its ability to deliver customized and integrated systems, automated quality control systems, and high-performance proprietary numerical controls. Continued expansion into emerging sectors like additive manufacturing and collaborative robotics positions Buffoli Industries as a leader in Industry 4.0 and 5.0, with ambitious growth goals set for 2027.

Today, manufacturing companies no longer settle for standalone machine tools; they require integrated solutions that encompass every phase of the production process. The complexity of modern production lines demands continuous evolution: it's no longer enough to offer individual machines but necessary to propose integrated, interconnected solutions that guarantee efficiency, flexibility, and cost reduction. This transformation is achieved through a single approach: providing turnkey systems that include integrated automation at both the upstream and downstream stages of the production process. This enables the processing of large families of parts with a single setup, and ensures quick, even automated, retooling. Quality control based on artificial intelligence (AI), along with advanced handling and palletizing capabilities, are complemented by the vital ability to link machinery with client company information systems, enabling a smoothly running, real-time monitored production.

This is the vision of Francesco Buffoli, who, along with his brother Edoardo, serves as CEO of Buffoli Industries. A historic group based in Brescia, specializing in the production of precision machine tools and advanced automation systems, offering cutting-edge solutions for Industry 4.0 and 5.0. Founded 72 years ago, the group now employs approximately 180 people worldwide and generates revenue of around 40 million euros. Its growth and success are based on a diversified, highly specialized offering.

The group's most prominent company is Buffoli Transfer, a global leader in the transfer machine sector. Alongside Buffoli Transfer, which is dedicated to producing high-performance integrated systems for the flexible processing of metal parts from bar stock, castings, or forgings, the BIMU 2024 stand features Advanced Robotics, specializing in advanced robotics and AI integration, and Weaream, a center of expertise in additive manufacturing. These companies, along with complementary entities such as Electro Engineering (a Siemens Solution Provider), which also presented innovative digital solutions at the Siemens stand, and Buffoli Meccanismi, form a technology ecosystem dedicated to innovation. Startups such as CloudBits, focused on AI-AR-VR application software, InterMach Service, which provides maintenance, including preventive, for machine tools, and 3D Evolve, specialized in precision 3D printers, play a crucial role in the group's ongoing evolution. Thanks to this network of expertise and technologies, Buffoli Industries positions itself as a global player with a strong presence in international markets. The group is primarily export-oriented, with subsidiaries and strategic joint ventures in North America, Germany, Switzerland, Northern Europe, China, Japan, India, and Vietnam, expanding its reach into some of the most advanced and rapidly growing markets.

Why does the market demand integrated solutions?

The answer lies in several factors. First, integrated solutions optimize efficiency and reduce production and setup times, allowing costs to be cut without sacrificing quality. Operational flexibility is equally important: modular and customizable solutions are essential for quickly adapting to market changes. Additionally, adopting advanced Industry 4.0 technologies, such as AI and predictive maintenance, is a crucial step toward a more automated, efficient, and intelligent industry. This approach centralizes technical support and maintenance, making business processes simpler and more reliable.

Strategy and Solutions Presented at the Trade Show

To address these new challenges, Buffoli Industries has outlined an ambitious, well-defined strategy focused on innovation and synergy among the group's various entities. Among the most innovative solutions presented at the BIMU 2024 trade

show is OmniVance-AI, developed by Advanced Robotics. This solution combines collaborative robotics (cobots), supplied by the multinational ABB, with Advanced Robotics' artificial vision and artificial intelligence to automate processes like palletizing and quality control. OmniVance-AI allows multiple production stages to be managed simultaneously, reducing time, costs, and complexity and, thanks to AI, detects defects in real time, improving quality and minimizing human intervention. Its flexibility makes it easily adaptable to any production line.

The Crucial Role of Artificial Intelligence

AI plays an increasingly central role in the demand for production process integration. It allows companies to optimize every phase of the production cycle, making operation management more efficient and secure. With AI, quality control systems developed by Buffoli Industries can be fully automated. Artificial vision systems detect defects in real time, ensuring higher quality standards and drastically reducing the margin for human error. Additionally, AI-based predictive maintenance analyzes machine operational data to foresee potential breakdowns and prevent unscheduled production downtimes, resulting in greater operational continuity and reliability.

Buffoli Transfer's Flagship Product

One of the main innovations brought to BIMU concerns the evolution of turning processes with the adoption of our Trans-Bar systems. While we couldn't bring a machine, we presented over 20 documented real-life cases in which the Trans-Bar provided essential competitive advantages, with return on investment calculations from clients even under a year. The Trans-Bar represents the technological alternative to CNC multi-spindle lathes, offering a wide range of advantages we can demonstrate in real cases at over a hundred customers worldwide. Born in 1981 and constantly evolving with different solutions and sizes, Trans-Bar is recognized as the global reference for horizontal-axis transfer bars. This system enables machining without rotating the bar itself, improving machining precision and allowing for the processing of complex materials, such as lead-free brass, stainless steel, aluminum, and bronze. A crucial advantage of Trans-Bar is its ability to operate at high speeds without generating vibrations, reducing issues related to chip breakage and evacuation. Additionally, it allows complex machining from multiple directions more efficiently and precisely than traditional lathes.

Q&A Highlights:

An Overview of Buffoli Group, Innovations, and International Strategy

Francesco Buffoli, co-CEO, answers:

Q: Can you provide an overview of Buffoli Group?

A: First and foremost, the heart of our group is Buffoli Transfer, the "historical" company founded by my father in 1952 as a design studio, which quickly evolved into a manufacturer of automation systems and multi-spindle machinery with multiple stations. Buffoli Transfer today specializes in the design and production of precision machine tools, specifically high-performance transfer systems equipped with up to 60 spindles, all capable of operating on three axes. Buffoli Transfer's real strength is its ability to provide customized machines tailored to each client's needs, rather than standardized solutions. Supporting Buffoli Transfer are several companies housed within our BlueTechHub, a technological center dedicated to innovation for Industry 4.0 and 5.0. Among these is Buffoli Meccanismi, which focuses on non-robotic automation. Here, we produce bar feeders, palletizers, and conveyors, essential accessories for optimizing our machines and those of our customers.

Q: What other companies are part of the hub?

A: Advanced Robotics is our joint venture that embodies our commitment to advanced robotics and artificial intelligence. With Advanced Robotics, we offer systems that integrate industrial robots, cobots (collaborative robots), and artificial vision systems to automate quality control and autonomously manage production lines. Another key area for us is additive manufacturing. Through companies like Weaream and 3D Evolve, we're active in 3D printing for both metals and traditional and high-performance polymers. This technology is integral to our innovation strategy. Weaream operates within both our BlueTechHub and the AQM industrial service center in Provaglio d'Iseo, focusing on advanced research, new materials, and prototyping, including an atomizer for flexible production. Meanwhile, 3D Evolve handles polymer 3D printing, collaborating with national and international entities to develop cutting-edge additive manufacturing technologies.

Q: Which other companies within the group are based in the hub?

A: Another essential component is CloudBits Solutions, our software company specializing in Virtual and Augmented Reality and Artificial Intelligence systems. CloudBits enhances the integration between our machines and clients' enterprise information systems, developing software solutions that boost productivity and operational efficiency through seamless hardware-software synergy. Lastly, training is a top priority for us with the BlueTechAcademy project and our new mechatronics ITS designed in collaboration with the ITS Academy Machina Lonati and international partners like Siemens, ABB, Bosch-Rexroth, and Zeiss. Rounding out the group is InterMach Service, which supports our customers with maintenance for CN machinery and systems, even those not manufactured by Buffoli.

Q: What about outside the hub?

A: For digital integration, we ensured complete control by acquiring Electro Engineering in Mazzano, near Brescia, which has been developing high-performance numerical control systems for machine and special equipment manufacturers for over forty years. This allows us to design machines with an exceptionally high level of precision and automation using proprietary technologies that enhance diagnostics, maintenance, efficiency, longevity, and human-machine interaction. Our international presence is strengthened by subsidiaries in North America, Germany, and Asia, with Buffoli North America, Buffoli Deutschland, and Buffoli Intelligence Technology, respectively.

Q: Given all this, how would you define Buffoli Group?

A: Buffoli Group is not just an industrial entity; it's a genuine technological ecosystem where each company operates in synergy with the others, sharing expertise, resources, and innovations. This collaborative approach allows us to offer comprehensive and integrated solutions, from producing highly specialized machine tools to robotic automation, 3D printing, software development, and specialized training. Our international presence enables us not only to remain competitive on a global scale but also to maintain a constant focus on innovation and quality, elements that set us apart in a demanding and fast-evolving market.

Q: What are the primary industrial sectors in which you operate?

A: Buffoli Transfer has a global presence and operates in numerous industrial sectors. Our main focus areas include valves, automotive, pneumatics, hydraulics, the gas industry, locks, electrical, electronics, household appliances, general mechanics, and turning shops, addressing the growing demand for sustainable solutions. These markets, though varied, share the need for industrial solutions characterized by high precision, productivity, and reliability. Our machine tools are designed to meet these needs, ensuring great operational flexibility and high performance in terms of productivity and precision.

Q: Regarding automotive, its downturn is one reason for the slowdown in automation; what are your strategies to overcome this challenging period?

A: Yes, the industrial automation market is going through a challenging phase, especially in traditionally strong sectors like automotive, which is experiencing a longer, more complex transition than expected. However, this slowdown didn't catch us unprepared. We've already secured orders that will allow us to grow in 2024 compared to 2023 and in 2025 compared to 2024. Strategically, one of the most significant aspects of Buffoli Group is the decision-making and operational autonomy of each affiliated company. Nonetheless, five common pillars guide us: technological innovation, internal synergies, flexibility, internationalization, and training. On one hand, we focus on adopting cutting-edge technologies and expanding into new market sectors; on the other, we work to maximize internal collaborations among the various companies within the group, which makes us more flexible and responsive to market demands.

Q: Let's talk about technological innovation. What initiatives do you have in this area?

A: Technological innovation has always been at the heart of our growth strategy. We have invested heavily in advanced applications, especially in areas like collaborative robotics, artificial intelligence, and additive manufacturing. Although the traditional automation market has slowed down, we see enormous opportunities in applications that integrate these new technologies. We're convinced that the synergy between advanced robotics and artificial intelligence represents not only the future of industrial production but also a means to redefine operational standards in terms of precision, efficiency, and flexibility.

Q: What specific applications do you have for AI?

A: The most widespread use of AI within our group is for automated quality control. In many of our production lines, especially those integrated with Advanced Robotics, we use artificial vision systems enhanced by artificial intelligence to conduct real-time quality checks. These systems can identify visual defects, such as scratches, dents, or surface irregularities, that might escape human inspection. AI allows us to ensure standardized, reliable, and consistent quality checks over time, eliminating the variability typical of manual processes. The effectiveness and flexibility of these systems are also reflected in our OmniVance-AI solution.

Q: What is OmniVance-AI?

A: OmniVance-AI is an advanced automation system developed in collaboration between Advanced Robotics and ABB, combining collaborative robotics (cobots), artificial vision, and artificial intelligence to optimize industrial processes such as palletizing and quality control. The ABB cobot handles piece movement safely alongside operators, while the integrated artificial vision powered by AI performs real-time quality control, detecting defects like dents or scratches. One of OmniVance-AI's features is its flexibility: it can be integrated with Buffoli machines as well as third-party equipment, making it a standalone solution easily adaptable to any production line. This system not only reduces operational costs and improves efficiency but also automates complex processes, eliminating human errors and speeding up production. In addition to industrial applications, we're exploring new AI applications, such as company chatbots developed by CloudBits, which leverage generative AI to enhance customer interaction.

Q: What other key uses of AI have you implemented?

A: Another AI application within our group is in predictive maintenance. Using advanced software and continuous analysis of machine operating data, artificial intelligence monitors equipment operation and predicts when issues or failures might occur. This proactive approach enables us to intervene before unplanned production downtimes happen, thus reducing downtime and improving overall efficiency. AI-based predictive maintenance provides a competitive advantage by not only reducing costs associated with repairs and production stoppages but also extending machine lifespan, ensuring optimal, continuous operation.

Q: How is AI used in preventive maintenance?

A: AI-driven preventive maintenance represents a shift toward more efficient, proactive plant management. Through advanced software and continuous analysis of data collected from machines, AI can monitor equipment operation in real-time and predict with great accuracy when problems or breakdowns might occur. This approach allows us to take proactive measures, avoiding sudden production interruptions, reducing downtime, and improving overall efficiency. The competitive value of predictive maintenance is significant: it not only cuts repair costs and unscheduled stoppages but also extends machine life, ensuring continuous, optimal operation for customers. Finally, we are also using AI to enhance integration between robotics and 3D printing, with an innovative project we will showcase at Formnext 2024.

Q: How does AI enhance the integration between robotics and 3D printing?

A: AI has opened new horizons in managing complex production processes. Thanks to AI, we can orchestrate advanced production systems where cobots (collaborative robots) work in synergy with multiple 3D printers to optimize the entire production cycle without human supervision. AI enables cobots to autonomously make decisions on workload distribution across printers and manage the production flow intelligently. This minimizes downtime and improves operational flexibility, allowing companies to respond quickly to changes in demand. This approach is particularly useful in sectors that require high variability production, such as rapid prototyping or small batch processing. The solutions we are developing with 3D Evolve and Weaream represent a significant evolution in robotics and 3D printing integration.

Q: What innovative solutions have you developed in this area?

A: We have developed a range of solutions that combine 3D printing of metals and polymers with cobots to create a flexible production system, similar to an FMS (Flexible Manufacturing System). These systems can operate autonomously, managing all stages, from loading to unloading parts from the printers, without human intervention. A concrete example is a project where a collaborative robot manages multiple 3D printers, optimizing resource use and ensuring continuous, seamless production. This technology allows companies to efficiently transition from prototyping to mass production, reducing costs and enhancing product quality.

Q: Let's move on to internal synergies within the Group.

A: Internal synergies are a fundamental pillar of our strategy. We've worked extensively to foster collaboration among the various companies within our BlueTechHub, a hub dedicated to 4.0 and 5.0 innovation. A significant example is the partnership between Advanced Robotics and Weaream. Through such synergies, we're able to expand into new markets, like additive manufacturing, where there is a growing demand for customized and flexible solutions. Our solutions in metal additive manufacturing were very well received at the trade show, demonstrating the value of the technological innovations we are pursuing.

Q: Another crucial element of your growth strategy is solution flexibility. Could you elaborate?

A: Today's market demands not only machine tools but complete, integrated solutions that span the entire production cycle, from raw materials to finished, palletized products ready for distribution. In this context, our solutions encompass a wide range of patented international machinery, automation, robotics, quality control, and seamless integration with our clients' IT systems. Our strength lies in creativity and adaptability: each solution is designed to meet the specific needs of our clients, enabling us to address diverse markets and respond to highly varied operational requirements.

Q: Let's discuss internationalization. You're already present in several countries, but which areas are currently performing best?

A: At the moment, one of the slower markets is actually Italy, which represents about 20-25% of our revenue. In recent years, Italy has played a significant role thanks to Industry 4.0 projects, but Buffoli Industries is strongly export-oriented. We consider it favorable when the Italian market covers 30% of our revenue, but currently, we don't even reach this threshold and are unlikely to hit 20% next year despite the PNRR-driven technological transformation investments underway with our clients extending into 2025. North America is currently the leading market, followed by Northern Europe, Germany, France, and Spain, which are investing heavily and have filled our production capacity through 2025. Despite the economic challenges, foreign investments are often driven by product innovation and technological trends, such as compliance with new environmental regulations. We've observed that international companies have been preparing for years to meet the transition to lead-free brass, a crucial issue for the future of the hydraulic valve and fitting industry. Surprisingly, many Italian companies have yet to prepare for this change. Internationally, large industrial groups have already made the necessary investments to be ready, while I fear that many Italian companies risk arriving very late, relying on extensions to regulations.

Q: The last pillar of your strategy is skill development. What initiatives have you implemented in this regard?

A: Training and human capital development are central to our growth strategy. With BlueTechAcademy, we've created a training pathway for both our employees and our clients, aiming to maintain a high level of technical expertise in an ever-evolving industrial world. We firmly believe that technological innovation must go hand in hand with the development of human skills. Companies that succeed in innovating both in technologies and in the capabilities of their personnel are best positioned to face and overcome market challenges.

Q: What are your growth targets?

A: We aim to reach a total revenue of 50 million euros by 2027. We're confident that, thanks to our strategy and a range of innovative, unique products with highly positive references, we may even achieve this by 2026.

Q: Are there any acquisitions planned to support growth?

A: We aren't primarily focused on traditional acquisitions to grow. Rather, we prefer developing strategic partnerships and launching new projects through joint initiatives or innovative startups. Recently, we acquired 100% of Electro Engineering, recognized as a leading Siemens Solution Partner, a strategic move that allows us to offer high-performance solutions with hundreds of controlled axes and to maximize production process efficiency.

Conclusions

Buffoli Industries stands at the forefront of global industrial transformation, thanks to a unique combination of innovative technologies and strategies focused on sustainability. The integration of high-speed cutting processes, artificial intelligence, collaborative robotics, and additive manufacturing has enabled the group to offer highly customized solutions that enhance production efficiency and reduce environmental impact. This is made possible through advanced practices such as dry machining and the use of eco-friendly materials like lead-free brass. Beyond technological innovation, Buffoli stands out for its strong investment in skills development through BlueTechAcademy and training projects with prestigious international partners. This dual focus on technology and people, combined with the ability to respond swiftly to changes in the global market, positions Buffoli Industries as a leading figure in the fields of automation and Industry 4.0 and 5.0. With an ambitious growth strategy and a continued commitment to sustainability, the group is prepared to consolidate its leadership in the industrial sector, aiming for a revenue target of 50 million euros by 2027, supported by continuous innovation and strategic global partnerships.