

Trends & Topics

2025

AI – now or never

Stäubli Robotics embraces advanced AI solutions

Mobile automation

A look at current trends and developments

Healthtech

Driving Quality and Growth with Robotics in Medical Device Manufacturing

Sustainability

Sustainability journey at Stäubli





Editorial

Dear readers,

The automation industry is advancing like never before. Artificial intelligence, the industrial metaverse, mobile robotics, and humanoid robots – technologies that until recently were seen only as pilot projects are rapidly achieving production readiness. This is not the time for a “wait and see” strategy; rather, “see and invest” appears to be the more promising approach.

In this edition of our Trends & Topics, we provide a brief insight into the exciting world of supercomputers and humanoids. And: You'll discover which innovations Stäubli is presenting now and in the near future, how Stäubli robots are demonstrating their effectiveness in growth markets such as healthcare, aerospace, and recycling, and how you can benefit from the latest technological developments.

Under the topic of “We make work easy and safe,” we are presenting innovations that not only make work easier but also significantly more efficient and profitable. This includes a demonstration of how Stäubli Robotics, in collaboration with our partner robominds, is opening a new chapter of

AI-supported robotics. The combination of Stäubli robots and robominds AI opens up entirely new possibilities and applications. You can learn more about this on the following spread.

Highlight number two: the expansion of our portfolio of mobile robotics solutions – an important step that makes us a comprehensive robotics provider. We are proud to present three different types of AGVs, including the world's first vehicle for use in aseptic environments and a special forklift. Detailed information starts on page 6.

With these and other proven innovations, Stäubli helps companies make their production simpler, more efficient, and sustainable. The two case studies in this edition demonstrate how well this works in practice. One describes a globally unique facility where a line of 18 four-axis robots handle the recycling of valuable non-ferrous metal scrap. The plant is a prime example of sustainability in action.

More exciting topics await.

Enjoy reading!

**Best wishes from the
Stäubli Robotics team**



We make work
easy and safe

Content

04

AI – now or never

Stäubli Robotics embraces advanced AI solution

06

The world's largest AI superbrain

07

The humanoids are coming

08

Quo vadis, mobile robotics? A look at current trends and developments

10

The best of both worlds

Stäubli Robotics and SAFELOG focus on synergistic effects in transport robotics

12

Stäubli group and sustainability

Sustainability journey at Stäubli

16

Innovation: 18 robots in a row perform vehicle recycling

Closing the loop on non-ferrous scrap

20

Driving Quality and Growth with Robotics in Medical Device Manufacturing

Stäubli Robotics meets the needs of medical device manufacturers in all areas of production

22

High-tech test procedures for aviation

AI – now or never

Stäubli Robotics embraces advanced AI solutions

Artificial intelligence (AI) is fundamentally transforming all areas of life. While Chat GPT, Grok, and DeepL simplify our everyday lives, industrial AI solutions are enabling enormous productivity gains. Here, a megatrend is gaining momentum that will reshape the competitiveness of businesses.

If the use of AI already has a decisive impact on the productivity of manufacturing companies today, it could make or break them in the future. For Europe and Germany, this means „wait and see“ is not a viable strategy. A December 2024 survey from Statista found that in the DACH region, only

about 20 percent of manufacturing companies use AI, compared to 46 percent in the USA and 94 percent in China.

World premiere: Stäubli presents AI robots
It's high time to act. The good news is that the range of AI solutions for production is

vast, and many practical solutions are coming from Europe, as showcased at automatica. Stäubli is opening a new chapter in AI-supported robotics at the Munich trade show in 2025.

To offer solutions quickly, Stäubli has part-



AI is the game-changer in robotics.



A SCARA robot handles new part variants - without any programming. AI makes it possible.

nered with AI experts from robominds. The goal of our collaboration is to provide users with plug-and-play AI robotic solutions that quickly, easily, and affordably unlock crucial competitive advantages.

The high-performance Stäubli four- and six-axis robots of the TS2 and TX2 series can now be equipped with the robobrain® of robominds, qualifying them to take on entirely new areas of application. These intelligent robots are ideal for new applications, particularly those involving small batch sizes and a high degree of variation.

Traditional programming is a thing of the past

The big advantage: AI robots can independently recognize, grasp, and organize various items. There is no need for constant programming and teaching new variants. Taking on completely new tasks is quick and easy. Simply put, all you need to do is select the appropriate AI skill from the robominds library — and you're done.

The use of artificial intelligence also makes robotics more accessible to small and medium-sized enterprises that have little

or no prior experience with advanced automation. AI streamlines robot integration and eliminates programming effort at the user level. As a result, SMEs can get started with robotic automation much more easily and significantly increase their competitiveness. AI can thus become a productivity booster for the European economy.

Text: Ralf Högel, IKH - Industrie Kommunikation Högel
Image: robominds, Stäubli



Bringing AI to Stäubli robots: the robobrain® from robominds. Image: robominds



A look inside the AI supercomputer Colossus.

The world's largest AI superbrain

In Memphis, USA, xAI built the world's largest supercomputer for AI applications last year in just 122 days. Its name: Colossus. Associations with the Colossus of Rhodes, one of the seven wonders of the world, are not entirely coincidental. The supercomputer occupies an area of 73,000 square meters, making it significantly larger than the total exhibition area (66,000 m²) of the automata trade fair in Munich.

Colossus now boasts an astonishing 200,000 NVIDIA GPUs and over one exabyte (one billion gigabytes) of storage capacity. In its final development stage, Colossus is expected to have an unimaginable com-

puting power of one million GPUs. Such performance comes at a cost: 150 MW of electricity – enough for a city like Heidelberg, Germany – and five million liters of water daily for cooling.

Colossus represents a monumental advancement in the endeavor to unlock the full potential of artificial intelligence.

How far the Americans have come can easily be discovered: Just try out xAI's AI chatbot Grok.

Text: Ralf Högel, IKH - Industrie Kommunikation Högel
Image: ServeTheHome

The humanoid robots are coming

Human-like bipedal robots are set to fundamentally change the world in the coming years. They are already working in large logistics centers operated by Amazon and GXO, and going through pilot deployments in the plants of leading automotive manufacturers. Soon, they will make their way into private households.



The humanoid robot Optimus features a highly advanced hand with 22 degrees of freedom.

Impressive leaps in development have occurred recently in the field of humanoid robotics. Significant advancements, particularly in artificial intelligence, but also in battery development and mechatronics, are taking humanoids to performance levels previously unimaginable. In China, up to five percent of all jobs are expected to be filled by humanoids in the coming years. That's 35 million units.

Humanoid robots are already proving themselves in logistics

The capabilities of humanoid robots are evident in the logistics centers of Amazon and GXO Logistics, where Digit, the humanoid from Agility Robotics, is a valued team member. Standing 1.75 meters tall and weighing 64 kg, it can lift loads of up to 16 kg. Thanks to advanced sensor technology,

Digit navigates a human-centered environment with ease.

Many other highly developed humanoids come from the USA. The most well-known include Atlas, Figure, Apollo, and Optimus, which are already working in pilot deployments at automotive plants. Optimus, with its five-finger hand boasting 22 degrees of freedom, closely emulates the model of the human hand.

A future market is emerging

Elon Musk envisions Optimus, also known as the "Tesla bot," soon taking on household tasks, which it is rapidly learning, in addition to industrial ones. The tech billionaire sees a huge market for humanoids: „Eventually, there will be more humanoids on Earth than humans.“ A bit more realistically, the U.S. investment bank Goldman

Sachs forecasts that the global market for humanoid robots will reach 38 billion USD by 2035. Both views point to a massive market emerging.

One thing is clear: The time has come for the industrial application of humanoids. In the near future, they will be able to substitute for humans in the performance of numerous tasks. This development will also impact conventional robotics. Humanoids are highly flexible, easy to program, and relatively inexpensive. This means that they will not be a real competitor to industrial robots in all areas, but certainly in some. Consider simple handling tasks, assembly applications, and loading and unloading machine tools — with these capabilities, humanoids are already well-established in warehouses.

Text: Ralf Högel, IKH - Industrie Kommunikation Högel
Image: Tesla

Quo vadis, mobile robotics? A look at current trends and developments

Jan Louwen, Global Head of AGV Robotics & Member of Global Robotics Management, Stäubli

It is an exciting time for mobile robotics. Global events, technological advancements, and changing market conditions are increasingly influencing our industry. The growing labor shortage on the customer side further drives the topic of automation, and thus mobile robotics. Established market players in particular are facing new challenges and are confronted with strategic questions. How do they want to position themselves? Which partnerships make sense? Which market segments can be tapped into? Are there promising niches that can be penetrated? These are not new considerations, but they have rarely been as prevalent as they are now. There are reasons for this.

Market dynamics: a broad playing field

The market for mobile robots is extremely dynamic and growing rapidly. This attracts investors and leads to many new players entering the market. On one side, there are providers with mobile transport robots for new, innovative concepts. On the other side, more and more manufacturers are entering the field with cost-effective solutions, putting significant pressure on the industry. China stands out in particular. Numerous Chinese companies are investing in mobile robotics and are increasingly celebrating successes in Europe and the USA. The competition in the industry is invigorated. This can and must be seen as an opportunity.

New technologies, new opportunities

It's not just the new market players that influence the dynamics, but also the rapid technological developments. Advances like 5G connectivity and GPS for outdoor navigation open up new possibilities and further drive the efficiency of solutions. New navigation methods, more powerful computers, and above all, the integration of artificial intelligence (AI) are helping mobile robotics increase availability. The boundaries of what is possible are regularly being pushed. This also impacts customer desires.

Standardization and modularity: the path to mass production

Historically, customized solutions dominated the market. They met the diverse customer needs and special applications. To increase the reliability of mobile robot solutions in the future, the development and production of serial products will become more important. For broad market penetration, manufacturers of customized solutions must think more in terms of modular products. This can sometimes be a rocky road, especially if the company does not already have the competencies around serial business in-house. Nevertheless, this rethinking is important. Stäubli benefits here from its internal know-how in mass production and pursues this path with its 3-ton platform PF3 and, in the near future, with the counterbalance forklift FL1500. Equally import-

ant is close collaboration with customers. Despite AI and other customization options, it is often worth asking what the mobile robot really needs to be capable of. The interaction between integrator and manufacturer can also be a crucial step towards market penetration with standard products.

The core as part of the system: the software

Software is playing an increasingly important role in mobile robotics, from navigation





“New navigation methods, more powerful computers, and above all, the integration of artificial intelligence (AI) are helping mobile robotics increase availability.”

Jan Louwen,
Global Head of AGV

software to fleet management and analysis tools. This goes hand in hand with rapid technological advancements. Software is undoubtedly gaining in importance. What often unjustifiably takes a back seat is mechatronics. In mobile robotics, it is at least equally important. To reliably and efficiently operate a mobile transport robot, the interplay of both areas is crucial. One must always view the whole as an integrated system. This will not change in the future.

More flexibility for mobile robots: new business models as opportunities

There is a visible trend within the industry: traditional sales models are being supplemented by new flexible business models. In addition to the now almost established temporary rental of mobile transport robots, leasing is also coming to the fore. These payment models with monthly fees are well-known in industry and logistics from manual forklifts. This provides customers with a significantly easier financial entry into automation, as capital costs are converted into operational costs. This principle will continue to permeate the industry in the future.

How Stäubli is responding to trends in mobile robotics

As modern production concepts often rely on a combination of conventional and mobile robots, and more and more customers demand solutions from a single source, Stäubli Robotics is repositioning itself in the mobile robotics segment. What remains firmly in place is our production site in Sulzbach-Rosenberg. Under the direction of Jan Louwen, our entire range of vehicles is still developed there, from small AGVs to driverless forklifts and mobile platforms with load capacities of up to 450 tons.

What is changing is our sales strategy, which will be divided into production vehicles and customer-specific solutions. While the consulting-intensive business for customized solutions continues to operate from Sulzbach-Rosenberg, the distribution of standard production vehicles will be handled by Stäubli Robotics worldwide sales force from now on. Yann Stragiotti, Global Business Head of General Industry Robotics, explains: “Our offering is no longer limited to classic industrial robotics but also includes standard mobile solutions. Thus, we will become a comprehensive full-service provider with a very wide portfolio of solutions.”

Among the standard mobile robots complementing our range of conventional industrial robots are the PF3 mobile platform, the FL1500 counterbalance forklift, and Sterimove, the world’s first mobile robot for the pharmaceutical industry. From the outset, Sterimove was developed with a clear focus on meeting the pharmaceutical industry’s cleanroom requirements. In this regard, attributes such as modular, easy to clean, and collaborative were critical.



The best of both worlds

SAFELOG and Stäubli Robotics focus on synergistic effects in transport robotics

Interview Mathias Behounek, Managing Director of SAFELOG and Jan Louwen, Global Head of AGV Robotics, Images: SAFELOG, Stäubli

SAFELOG and Stäubli Robotics have formed a distribution partnership to combine their expertise in mobile robotics, strengthen their market positions in Europe, and compete with China, a robotics powerhouse. Stäubli contributes its specialized know-how in mechatronics while SAFELOG contributes its expertise in software development. In this interview, SAFELOG Managing Director Mathias Behounek and Jan Louwen, Global Head of AGV at Stäubli, explain why the two companies complement one another so effectively.

Your companies are competitors. Isn't this an unconventional basis for a partnership?

Jan Louwen: It only looks that way at first glance. Although we both build mobile robots, we are positioned differently in terms of applications. Stäubli is traditionally at home in the heavy-duty sector. Our range starts with platform vehicles with a payload of 3 tons and goes up to 450 tons.

Mathias Behounek: SAFELOG is far removed from that domain. Our mobile robots can move a maximum of 1.5 tons, just approaching the lower end of Stäubli's range. As different as the payloads are, so are the applications. There is no intersection and therefore no competition between us.

The collaboration involves the FL1500 counterbalance forklift and the PF3 transport robot from Stäubli. Both models are being integrated into SAFELOG's system landscape as partner products and will be distributed by both partners. How exactly does this work?

Mathias Behounek: We are expanding our robot portfolio with the FL1500 counterbalance forklift and the PF3 transport robot from Stäubli. Both models will be equipped with our agent-based fleet management system. This combination will enable us to

offer solutions in the future that cannot be realized with our own robot models.

Jan Louwen: Our strength is mechatronics. You can see this in our vehicles, which can transport up to 450 tons. Such loads place extreme demands on the mechanics, and we have mastered this technology. Since we are not a traditional software company, we rely on strategic partnerships and an open architecture. This partnership will enable Stäubli to expand its sales channel and provide SAFELOG with sophisticated hardware. The SAFELOG software will be embedded via a defined interface.



Mathias Behounek, Managing Director at SAFELOG

Why a partnership? What is behind it?

Mathias Behounek:

It is better for both companies if we combine our core competencies. This will increase our sales opportunities, make us more competitive in Europe, and strengthen our positions against international market leaders.

By 'international market leaders,' you surely mean China. According to the latest report by the International Federation of Robotics, the country is investing heavily in robotics. Eight years ago, they ranked 23rd in the world with a below-average robot density. They have since moved up to third place¹.

Jan Louwen: China has come a long way, but Germany is still one of the most automated economies in the world. Nevertheless, this is a situation that we need to manage. This includes pooling our resources and positioning ourselves in the overall market with more customer-oriented solutions. I am convinced that we are on the right track together with SAFELOG.

Mathias Behounek: I think our approach is a model for the future. By combining our core competencies, we are bringing together the best of both worlds, so to speak.

¹ <https://ifr.org/ifr-press-releases/news/global-robot-density-in-factories-doubled-in-seven-years>



SAFELOG and Stäubli have combined their expertise in mobile robots to strengthen their market positions in Europe

This is the right way to assert ourselves on the European market and compete with China.

What do you expect from the partnership?

Mathias Behounek: Our collaboration with Stäubli is more than just a partnership for us. I see this as a fusion of strengths and an important milestone in SAFELOG's growth strategy. By merging the two companies, we can offer our customers tailor-made solutions for special requirements that we were previously unable to meet. Our solution expertise is being expanded to include additional fields of application.

Jan Louwen: Through this collaboration, we aim to create synergies that will enable both companies to grow faster and work more efficiently. We want to benefit from economies of scale and gain further market share. Our new FL1500 model will be key to this.

In what way?

Jan Louwen:

The FL1500 model is a counterbalance forklift, which therefore does not require a stabilizing structure when lifting a pallet or pallet container. Support legs would limit the flexibility of the application. On the other hand, we had to pack a lot of mass into the

rear of the vehicle, namely 3.2 tons in order to carry a total payload of 1.5 tons.

Has the model become larger as a result?

Jan Louwen:

That is exactly what we wanted to avoid so that we could continue to operate in confined spaces without restrictions. The FL1500 is currently the most compact counterbalance forklift on the market in this weight class.

Mathias Behounek: This is also a decisive argument for SAFELOG and makes integration easier for us. Space is a valuable commodity in production and intralogistics environments. The aisles are narrow. This is where vehicles like the FL1500 are needed.

Not every customer has to lift 1.5 tons. What do you say to those who only need half the payload?

Jan Louwen: An important point. In this case, we can remove the counterweight from the forklift. If, for example, the user only needs to maneuver one ton, we would reduce the counterweight in the robot accordingly. Excess mass would only put unnecessary strain on the battery.

Mathias Behounek: We benefit from Stäubli's strengths in hardware development and this is another important aspect of the

partnership for us. If we were to develop a forklift like the FL1500, we would have a time-to-market problem. The lead time would simply be too long. By the time we could offer such a product, the market would be gone. That's why we prefer to concentrate on our strength, and that is software.

Service-friendliness is more important today than ever before. Do the two partner products meet the customer's expectations in this respect?

Jan Louwen:

Yes. And it's true that a new product stands or falls with its service-friendliness. After all, the vehicles should offer customers high availability, with as little downtime as possible. And if repairs are necessary, the time required should be minimal. That's why the side modules on the PF3 can be removed without tools, allowing you to quickly access all important components such as the control unit or battery compartment. The bottom line is that the components can be replaced in just a few minutes. This quick and easy service is also available with the FL1500. This demonstrates our expertise in hardware development.

What about security?

Mathias Behounek: Safety is a particularly

important issue with forklifts. The FL1500 is equipped with several laser scanners for personal protection and an emergency stop system. In mixed traffic, employees and transported goods are always protected by the safety devices.

How does the customer benefit from the SAFELOG software installed on both partner products?

Mathias Behounek:

The customer does not need a higher-level control station for control purposes. Instead, we use a swarm-based fleet management approach. Like all mobile robots from SAFELOG, the two partner products are equipped with computing units, on which the autonomous process software runs. This allows the devices in the swarm

to exchange the information they need to perform the tasks at hand. The system also contributes to high availability because if one vehicle breaks down, the others continue to operate and take over its tasks. Thanks to the VDA5050 compatibility of our software, we also enable control via a central control station if the customer requires it.

When will the two partner products be launched on the market?

Jan Louwen:

The PF3 model is available now. The FL1500 is about to be integrated into the first pilot project at an Automotive OEM in summer and will be available for order in autumn 2025.

Thank you for the interview.



Stäubli contributes its specialized know-how in mechatronics while SAFELOG contributes its expertise in software development.

Stäubli group and sustainability

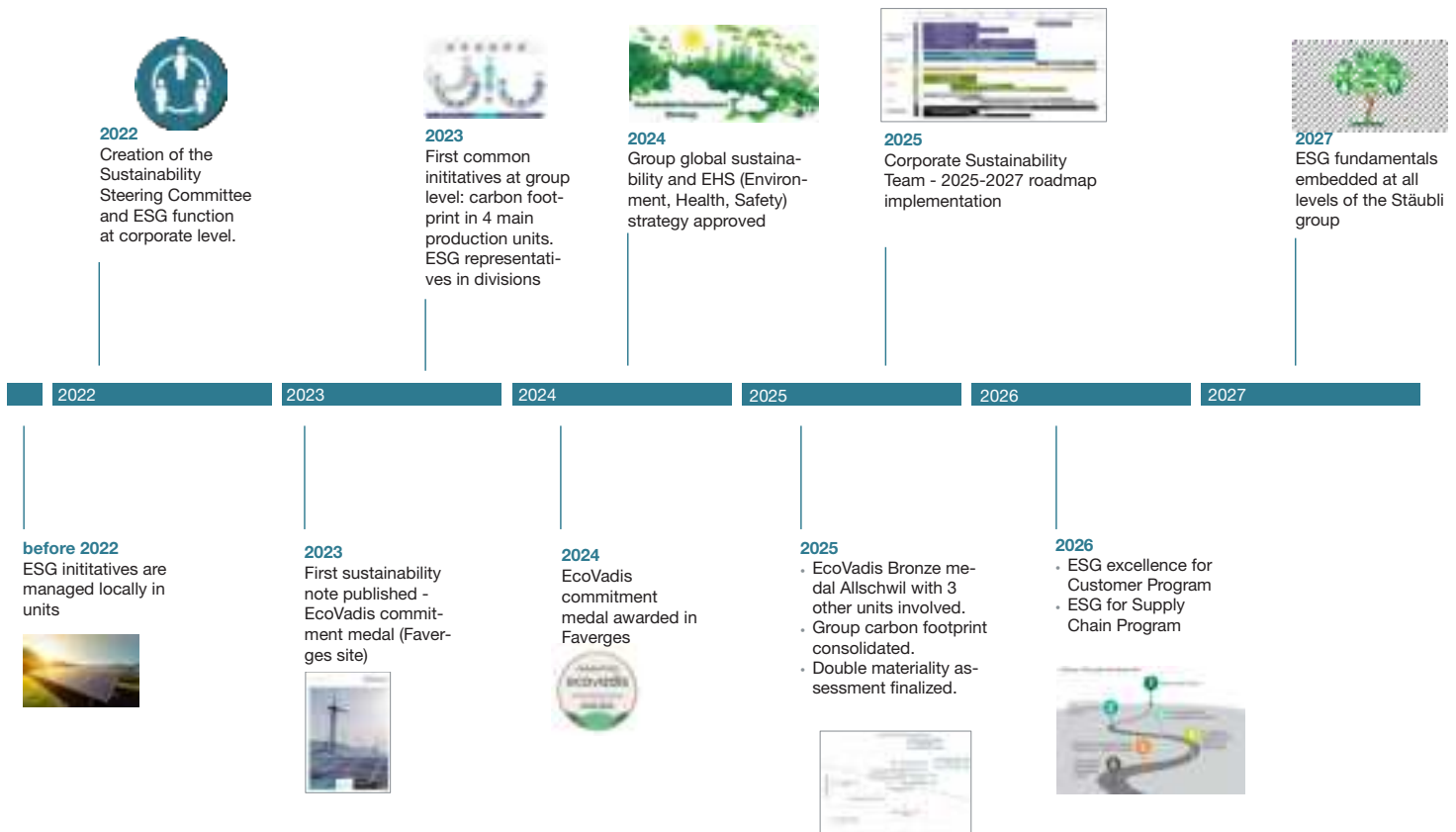
Sustainability journey at Stäubli

Sustainability is part of Stäubli's history since 1892. For more than 130 years, we have been delivering premium quality products and services for sustainable improvements in industry and society. Sustainability is also part of our vision and values. We are guided by our vision: We make work easy and safe. Our industrial and mechatronic solutions deliver unparalleled performance and generate value for our customers, organization, society and environment. The four values – People, Passion, Performance and Partnership – drive the actions we take and define our culture. With our commitment to these

shared values, we take social, economic and environmental responsibility for all our actions, and strive to create value for our stakeholders.

Embarking on a sustainability journey as a group is more than just a trend. It's a fundamental shift toward responsible business practices that benefit not only the planet but also your bottom line. In today's world, where environmental and social issues are at the forefront of global consciousness, integrating sustainability into our company's operations is not just an option – it's a necessity.

Sustainability journey – easier, faster, embedded



The sustainability journey is accelerating to support the strategy Horizon (effective until 2030). We progressively shift from isolated initiatives in Stäubli units to a full strategy set at corporate level (2024) and associated dedicated teams (2025). Working on common standards and frameworks will progressively drive ESG representatives in

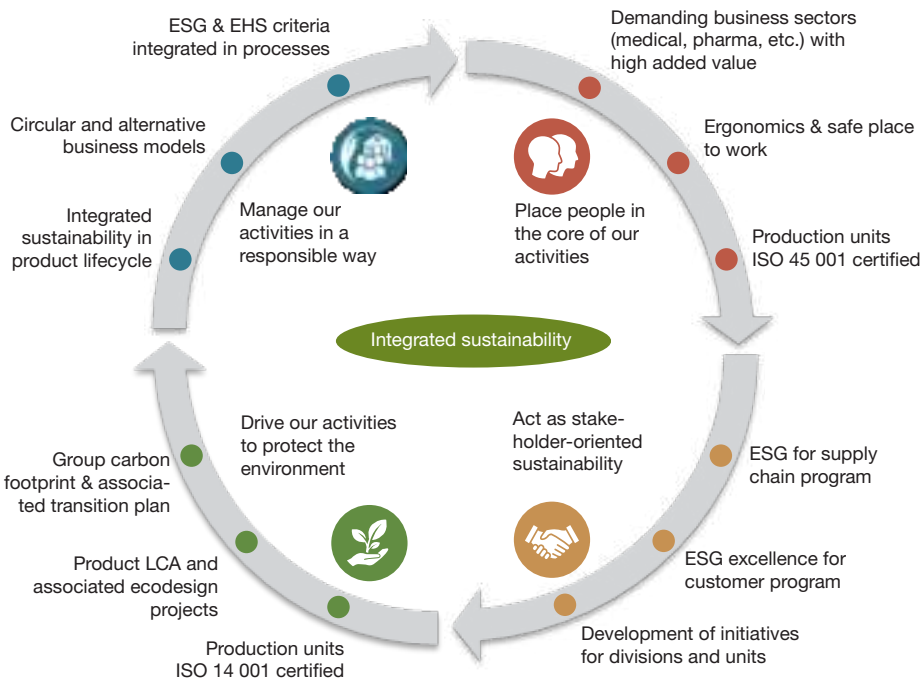
Stäubli divisions and the EHS/ESG specialists in Stäubli units to conduct worldwide projects and raise sustainability as a strategic topic.

Transform compliance requirements to business opportunities

Our sustainability strategy supports the

strategy Horizon. As a central function, sustainability and EHS play a key role in driving progress and enabling long-term value across the Stäubli group. By embedding sustainability and EHS topics in processes and products, we intend to shift from a reactive to a proactive approach. In an environment of evolving regulations and increasingly demanding customer expectations, our goal is to turn compliance requirements into opportunities for innovation and business growth.

Sustainability ambition and commitments



Sustainability framework at a glance



15 sustainability group projects by 2030



ESG excellence for Customer Program → 300 salespeople trained



ESG scoring systems (EcoVadis) implemented in 4 main production units, to be progressively extended to all units by 2028



Carbon Community at Stäubli → 101 active members, 45 units involved, and 7 Climate Fresk workshops conducted



ESG for Supply Chain Program → 4 divisions actively involved



100% of production units under the EHS common framework by 2026

Sustainability in Robotics division and associated units

Integrated sustainability in Robotics



- Product portfolio which answers to demanding sectors (medical, pharma, etc.) with high added value (robotics in surgery)
- Products which mitigate risks for users in hazardous environment (chemical, nuclear)
- Products which enhance ergonomics for workers
- Production units ISO 45 001 (already certified or in progress)
- Dedicated ESG representatives supporting the division



- ESG in Supply Chain Program → 5-year timeline to fully engage our suppliers in continuous sustainability improvement
- ESG excellence Program for our customers
→ empowering sales teams to best address ESG/EHS requirements and drive our businesses toward high-level standards
- Integrate ESG local initiatives or wider initiatives (e.g., responsible working group in sustainability for rail business)
- Good practice sharing between peers and create new partnerships



- LCA (Life Cycle Assessment) on TX2-60L robot and connected controller system
- Ecodesign projects integrated in the new portfolio + anticipation of ESG regulations
- Carbon footprint in Robotics production units and transition plan
- Production units ISO 14 001 (already certified or in progress)



- Integrate ESG criteria in processes, product guidelines including technical specifications
- Integration of ESG in all project phases and gates (e.g., chemicals substitutions, raw materials, etc.)
- Circular business models assessed (refurbishment, second-hand, leasing, etc.)
- Create circular partnerships (e.g., recycling permanent magnets partnership with local company)



Robotics division is contributing to several SDG goals

Faverges carbon footprint 2023



Dedicated programs on energy efficiency of our sold products and on supply chains



The result: precious non-ferrous parts, sorted and ready for reuse.

Innovation: 18 robots in a row perform vehicle recycling

Closing the loop on non-ferrous scrap

At the Obourg facility of Comet Traitement in Belgium, Europe's biggest automobile shredder, a 7,000-HP machine processes 300 tons of scrap cars each hour. That's heavy-duty metal handling at its best. In the direct vicinity, a completely different high-speed automation process takes place: The "Megapicker" line with 18 Stäubli SCARA robots sorts the precious non-ferrous metal fractions – 15,000 tons per year, with a cycle time of one second per robot. This is outstanding – worldwide.

Nobody would expect the highest-level robot-based industrial automation at a site where scrap cars are shredded. And indeed, this situation is unique: At the Comet Metalsambre site in Obourg near Mons, Belgium, heavy-duty metal handling is ta-

king place. In large numbers, end-of-life vehicles are dismantled and shredded. But in a new building, the highest precision is requested. It is the end of the process, as Grégory Lewis, R&D Officer at Comet, explains: "Here we are sorting the shredded

non-ferrous metal fractions and making them ready for re-use."

Closing the loop with "reverse metallurgy"

This is great progress in the value chain of metal recycling. Grégory Lewis: "Part of our



The line is able to sort 15,000 tons of scrap metal per year, with a cycle time of one second per robot.

car recycling process is the concentration of the remaining non-ferrous metals within a fraction called ZORBA, which means zinc, aluminum – this is the biggest part – copper, brass, stainless steel, and printed circuit boards. We were used to exporting this material to Asia, where it was sorted manually and fed back into smelting. From 2017 on, we started to think, ‘Could we secure this kind of material, valorize it and use it within Europe?’”

That was the starting point of the “reverse metallurgy” project, which has now been put into practice with the Megapicker. Comet approached the Liège-based automation expert Cilyx, which had experience in designing highly automated, robot-based processes, but not in metal recycling. Grégory Reichling, CEO of Cilyx: “At first, we had to find a technology to characterize the single metal fractions for small parts in high quantities.”

For this goal, Cilyx and Comet collaborated with the University of Liège, which developed an intelligent high-throughput sorting system that uses a combination of several

sensor technologies: XRT (X-ray transmission) for measuring the density of the material, 3D scanning to determine the shape parameters (including the center of gravity) of the crushed objects, LIBS laser systems, and hyperspectral color sensors to measure their reflectance spectrum. All this happens within a few seconds at the starting point of the line, and the sensor data of each part is combined to determine its way through the line.

Sorting 1,500 irregularly formed metal pieces per minute on one line

In parallel, the Cilyx engineer tackled a second task: How can you pick and sort 1,500 metal pieces per minute (that’s 90,000 parts per hour), considering that the parts are irregularly shaped, with weights from 20 g up to 1 kg and lengths that differ from 20 to 100 mm?

The answer, simply speaking: Take a 50-m long conveyor belt, drive it with a speed of 1 m/s, mount 18 four-axis Stäubli TS2-100 SCARA robots above the belt, and create a control mode of “division of labor” to ensure that each robot is fully busy all the time , in

Image up:
Plant manager Olivier Loire surveys the operational status of the line

Image down:
Left to right: Grégory Reichwein, Managing Director of Cilyx, Plant Manager Olivier Loire, and Grégory Lewis, R&D Officer at Comet.



24/7 mode – and that a minimum of material remains unsorted and unpicked at the end of the belt. Apart from this, economics had to be considered, too. Grégory Lewis, R&D Officer at Comet: “We have to be competitive compared to the manual sorting business in Asia, which is very low-cost.”

Challenges: Design of the gripper, concept of the control system

What is easy to describe in words took years to put into practice. Grégory Reichling: “We began with a lab-sized test machine which we improved and tested in many loops before scaling the process up and designing the full-size line.”

How did the engineering process start? “We started with the gripper, which was a real challenge. Each part is different. The gripper has to grab the part at the center of gravity; it must grip the parts firmly, but without touching the belt. Otherwise, the lifetimes of the belt and the gripper would be limited.”

High data and information density

Another challenge was the control of the line, i.e., ensuring that each part is gripped by one of the 18 robots in a cycle time of one second per robot. Obviously, the information rate is very high: Combined sensor data of 1,500 individual parts have to be converted into commands for the robots.

This requires, for example, intense communication between the robots and the overlaying, Siemens-based control system of the Megapicker. For facilitating the installation, Cilyx decided to create modules of four robots. When one module is installed and qualified, the others can be copied.

Seeing 18 robots work with extreme speed, gripping scrap parts from a fast-moving belt and sorting them in one of five (soft) containers is impressive – even more so because the robots themselves do not use cameras or sensors. Grégory Reichling: “The robots are directed and controlled by the central control only. We just send x/y/z and angle data for the exact position to each robot. There is only one ‘smart sensor’ at the end of the line, which tracks the shredded non-identified and non-sorted items.”

Precise and robust: The SCARA robots

In such an application – very fast picking of single parts from a belt – delta pickers might be the first choice. This is what Cilyx did for the lab version of the line, but soon opted for SCARA robots for the “real” Megapicker for several reasons. The first: As the gripper is quite heavy and the shredded parts weigh up to 1 kg, delta robots are not strong enough. The second: With their robust design, Stäubli SCARA robots are able to work with high precision in a heavy-duty environment.

The third reason concerns not only the type of robot but also its manufacturer, as Grégory Reichling explains: “We had a lot of support from Stäubli during the development. For us, this was a new application with many challenges. We solved them together, as we did in other applications. In our view, Stäubli delivers excellent development support.”

Always improving: AI constantly increases the detection rate

As artificial intelligence is included, the detection rate is constantly increasing. Grégory Lewis: “Undetected material is brought into re-circulation a second time and we continuously feed the control with new data. This self-learning loop gets better with time. Currently, we have arrived at a sorting rate of 96% and there is still room for improvement.”

Other features are also being improved. Grégory Reichwein: “Since the Megapicker went into operation, we have been optimizing. We have, for instance, improved the workload of each robot to make sure they all work together perfectly.”

Further development: Integrating new sensor technology

Apart from these improvements, there are other, more groundbreaking developments going on. Grégory Lewis: “At the moment,



Especially valuable: The last (car) scrap

An old car consists largely of various metals, mainly steel, which can easily be reintroduced into the recycling loop as shredded scrap on site—a well-established process. Steel mills use this scrap as a secondary raw material. In Germany alone, approximately 15 million tons of steel were given a “second life” this way in 2023 (not only through car recycling). This approach is cost-effective, efficient, and sustainable: Each ton of steel scrap saves 1.5 tons of newly mined iron ore and 0.5 tons of fuel, significantly reducing CO2 emissions.

The recycling process differs for the non-ferrous fraction of the shredder residue, which amounts to around 800,000 tons annually in Germany. Typically, this is exported from Europe to Asia, where it is manually sorted and remelted. However, with the “Megapicker” robotic sorting system developed by Comet and Cilyx, these valuable metal components can be cleanly reintegrated into the recycling process—with fully automated sorting and no need for long-distance transportation. Even precious metals from circuit boards can be recycled using the Megapicker, with Stäubli robots playing a significant role in the process.

Cilyx and Comet are investigating the addition of a new laser sensor, which will refine the sorting. We then would be able to separate different types of aluminum and, in consequence, deliver more added value to the customer.”

Although the Megapicker is under continuous improvement, the Comet experts are very satisfied with the existing system – on both the technical and commercial side. Grégory Lewis: “We expect an ROI within

five years.” Apart from this, sustainability is increased with the recycling rate, and precious metal material can be reused without ‘downcycling’ and within Europe. That’s a real win-win situation and a fine example of “reverse metallurgy.” Hopefully also for the other companies involved: The University of Liège has already started a new company concentrating on opening up new applications and customers for the sensing and characterization system for non-ferrous metal fractions.

Text: Ralf Högel, IKH - Industrie Kommunikation Högel
Images: Cilyx, Comet Traitement SA

Comet Group:

Innovating the recycling process

The Comet Group in Belgium covers the whole metal recycling chain from collection to shredding to valorization, making it ready for reuse. In this field, the company is not only a large player – with, for instance, Europe’s biggest car shredder at its Obourg facility – but also a very innovative one. The R&D department is rather busy. Comet not only employs the Megapicker described here but has also developed a process to separate the plastic fractions of shredded cars. And they recently also started a brand new hydrometallurgical-based process to recycle copper, mainly for wires, which also achieves a high recovery rate.



Watch video



Image left:

The single parts, with weights from 20 g up to 1 kg, are sorted into soft containers.

Image right:

All in a row: In the Megapicker line, 18 Stäubli robots are employed to sort precious non-ferrous shredded parts from car recycling.

Driving Quality and Growth with Robotics in Medical Device Manufacturing

Stäubli Robotics meets the needs of medical device manufacturers in all areas of production

The spectrum of medical device products ranges widely in value, complexity, and customization, from tongue depressors to CT scanners and prostheses, but all devices must comply with strict regulatory standards. At the same time, continuous innovation and industry trends such as connected and wearable devices require manufacturers to adapt to more complex processes and enhance traceability while scaling production.

Robotics offers practical solutions that take all regulatory requirements and industry dynamics into account. Medical device manufacturers can improve their throughput, product quality, and technological advancement by implementing robotic automation to automate repetitive tasks. This reduces human error, adds transparency with real-time data capture, and brings flexibility to the manufacturing process, which is essential to meeting the demand for personalized devices.

Strengthening process control when scaling production

Despite growing environmental concerns, the prevalence of single-use products continues to rise, increasing pressure for high-throughput manufacturing. At the same time, Western markets face increasing labor shortages. Robots bring high repeatability and precision to manufacturing processes, minimizing product variability and enabling manufacturers to scale production while ensuring compliance.

Automation is particularly critical for high-value single-use devices, where precision assembly and rigorous testing are central to production. Surgical instruments such as staplers and pacemakers, which often comprise numerous components, require carefully controlled assembly processes to meet the highest quality standards.

Robotic automation is no longer just an advantage; it's essential. While the initial investment can be substantial, the return on investment is both measurable and predictable, particularly for high-value medical devices. Beyond traditional automation, technologies such as mobile robotics, artificial intelligence, machine learning, and pre-



Seamweaver
Precise seam welding cell for helium tight implant welding under inert gas - CAM-guided, product flexible, fully automatic and MES-integrated.

dictive maintenance are poised to transform medical device manufacturing.

Stäubli Robotics is expanding automation in medical device manufacturing, offering solutions that go beyond conventional tasks such as transferring devices between stations. Collaborating with OEMs and system integrators, the company develops tailored automation solutions, with a particular focus on assembly and testing of high-value single-use medical devices to ensure consistent quality and optimize workflow efficiency.

Personalized medical devices and robotics integration

The medical device industry is increasingly shifting toward customization, requiring highly adaptable manufacturing processes for products like invisible brace aligners and smart drug delivery systems. Robotic automation plays a crucial role. For example, to help manufacturers meet demand for invisible brace aligners, Stäubli robots are integrated into laser cutting applications. The ability to rapidly adjust cutting trajectories ensures precise customization, allowing manufacturers to accommodate individual patient needs.

This customization process begins with an oral scan at the clinic, which generates a 3D model of the patient's teeth. The model is then transferred to the factory, where robotic automation initiates production. Once completed, the finished aligner is delivered either to the hospital or directly to the patient, demonstrating how robotics streamlines personalized medical device manufacturing from digital design to final delivery.

The future of robotics in medical device manufacturing

As medical device production evolves, manufacturers are increasingly leveraging data-driven automation to enhance traceability, efficiency, and compliance. Connected monitoring systems optimize performance

by enabling real-time analytics, supporting industry-wide shifts toward predictive and adaptive workflows.

Stäubli Robotics provides advanced automation solutions tailored for the medical device industry and broader life sciences sector. Its portfolio includes ESD-safe, cleanroom-compatible, and GMP- and FDA-compliant robots, designed for aseptic and harsh environments, ensuring manufacturers can meet regulatory requirements while maintaining operational efficiency. With its specialized expertise and adaptable solutions, Stäubli continues to set the standard, helping manufacturers improve scalability, process control, and technological innovation.

Text: Cindy L'Esperance
Image: Baumann Automation, MGS Automation



Two Stäubli TX2-60L six-axis robots handle the catheters after inspection with high precision and high hygienic standards.



**Find out more
on our website**



First choice for ultrasonic testing of fuselage components: a duet of Stäubli robots.

High-tech test procedures for aviation

When inspecting carbon composite components, mainly in aerospace applications, for irregularities, ultrasonic test machines are employed. Ultrasonic Sciences Ltd uses Stäubli robots when larger and complex (fuselage) parts have to be tested. They prove to be first choice of robot because of their accuracy in a testing machine where two robots with a total of 18 axes have to be co-ordinated and synchronised.

The observation of a robot system being put into operation in the plant of Ultrasonic Sciences Ltd, Aldershot UK, may leave the viewer fascinated but somewhat perplexed. Two Stäubli six-axis robots TX200L HE move in such a way that the two water jets which they emit via their tools meet exactly in the middle, creating a fountain in the form of an umbrella. In doing so, they perform complex and perfectly synchronous movements, including the swivel movement of the head and the seventh linear axis.

Testing fuselage components of aircrafts

This looks very impressive and demonstra-

tes, for sure, a high level of programming skill. But the purpose of the precise motion sequences is not initially apparent – unless the spectator knows that an ultrasonic testing process is executed which the system will later use to test carbon composite components of laminate as well as honeycomb construction.

These tests are necessary because they are performed on fibre-reinforced fuselage, structural and other flying surface components for aircraft which have to meet highest safety and integrity standards. Here, de-lamination from machining or drilling is

one of the most commonly found defects. Also voids (trapped air or gas) can occur that are cured into the laminate – porosity is an aggregation of micro-voids. De-bonds are separation of bonded surfaces. Inclusions are also fairly common – FOD (foreign object debris) or other contamination gets cured into the parts.

Ultrasonic testing with water as a carrier medium

So there are several reasons to test each component meticulously – in order to ensure safe flights everywhere at any time – and several types of faults which are detec-

ted. The testing is done with an ultrasonic signal. In this proven testing method, water is used as a „carrier medium“, i.e. as a couplant for the ultrasonic signals to travel through – either, for smaller parts, in an immersion tank or, for large and curved parts, as a water jet.

In this case, the water jet has to maintain contact with the surface of the part on both sides simultaneously and at the same angle. So there have to be two robots, on a seventh axis, which execute the same resp. the corresponding antagonistic movements, ensuring that they hit the surface on both sides at the same time in the same angle – which requires a control and co-ordination with highest precision. This is what Stäubli robots are known for.

Through-transmission of ultrasonic signals requires precise robot co-ordination

In the sophisticated testing machines „made by Ultrasonic Sciences“, two ultrasonic techniques are used simultaneously. Niko Bayer, Technical Sales Manager at USL: „We employ Pulse-echo technique (PE) where the same probe transmits and receives the signal. In this case, the water jets must be maintained perpendicular to the inspection surfaces. We also use Through-transmission (TT) where one side transmits and the other side receives the ultrasonic signal. Here, both machine sides must be perfectly aligned.“ All USL dual sided machines are capable of PE inspection from both sides and TT simultaneously, generating 3 C-Scan files from a single pass of the component. This simultaneous PE + TT inspection can be done at one or more inspection frequencies.

Niko describes the testing process : „The parts to be inspected are loaded into the machine. The inspection path is either manually programmed or imported from CAD. The machine then follows this path at the set increment and scan speed.“ The inspection time will depend on the size and complexity of the part. The maximum linear

speed is more than 2,000 mm/s, using a combination of linear and robotic axes. At this speed, a high level of accuracy must be achieved. The typical scan resolution is 1 mm x 1 mm, so the positioning accuracy over the entire scan area should be better than that. And, as mentioned, parallelism and perpendicularity have to be maintained during the testing process.

„Water umbrella“ signifies perfect parallelity and synchronicity

For the spectator, it is quite easy to see whether the paired robots in test mode are a „perfect match“. Where the water paths meet, they create an umbrella. This umbrella should be central between water jets and aligned vertically. If the umbrella is tipped, there is a misalignment between water jets which can occur due to mechanical inaccuracies or inconsistent water pressure.

„We also use algorithms to compensate for gravity when scanning at different heights. And we are always demonstrating our machines showing this umbrella rather than putting a reflector plate between water jets as it shows we have a perfect mechanical control and equivalent water system control“, says Niko.

Recently, USL has delivered two of those testing systems with two robots each – one for an Turkish aerospace company, one for a Malaysian manufacturer of composite structures who is listed as a tier-one supplier for leading aircraft manufacturer. Both of these systems use Stäubli six-axis robots TX200L HE. The „L“ stands for „long reach“ (up to 2609 mm) which means that the robots are equipped with a longer arm. This is necessary because of the dimensions of the, for example, fuselage components.

Niko: „We choose the TX200L HE robots specifically for their reach – and we choose Stäubli robots because of their precision and the rigidity of the axes.“ That is the critical point: Parallelism and perpendicularity of the two „paired“ robots are crucial for exerting these tests.

The „HE“ means that the robots are designed for working in „Humid Environment“

which is very true in this application: It cannot be avoided that the robots are exposed to water jets, and the complete environment of the machine is humid. USL uses Stäubli robots „off the shelf“, without modifying them: „They have perfect accuracy, are IP rated and by using them as they are we retain OEM warranty“, says Niko.

Sophisticated control functions: Paired robots with 18 or more synchronised axes

During the test of the composite components with the „paired“ robots, many axes and processes have to be controlled and co-ordinated. This requires an intense cooperation between the Stäubli robot controllers and the „master“ motion control, an Omron CK3E PMAC.

Niko: „We use the Stäubli CS8C controllers for the amplifiers and connections to the robots. The motion control is via OMRON CK3E PMAC which controls up to 32 axes simultaneously: 6 robot axes per side, one linear axis and an eighth axis for the dynamic motorized end effectors, plus the pump control, so total of 18 controlled axes per standard dual robot machine. This then feeds positional data back to the PC where it is synchronised with the collected ultrasonic data.“ And as complex as this is – the user is able to perform the programming of testing new component shapes on his own by using the USL scanner software.

In these two machines, as in many others, USL is using TX200L, Stäubli's biggest six-axis robots with the longest reach. In other applications, smaller robots of this range – TX2-160L and TX2-90L – are employed. Apart from this, USL also uses Stäubli's MPS robotic tool changing mechanisms on all of these machines. Asked for the reasons, the USL engineers name the quality of the robots, their industry leading accuracy, the availability – and the support and good relationship with Stäubli UK. This is why in the future, more Stäubli six-axis robots will make a large contribution to safety in aerospace industry and public air transport.

Text: Ralf Högel, IKH - Industrie Kommunikation Högel
Image: Ultrasonic Sciences Ltd

About Stäubli

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Stäubli is a global industrial and mechatronic solution provider with four Divisions: Electrical Connectors, Fluid Connectors, Robotics and Textile. We are enabling customers to increase their productivity in different industrial sectors.



Originally founded in 1892 as a small workshop in Horgen (Zurich), today Stäubli is an international Group headquartered in Pfäffikon, Switzerland, operating with over 6,000 employees in 28 countries on four continents.

Stäubli is focusing on differentiation and growing businesses with strong future potential. Operational excellence, focus as well as strategic investments enable Stäubli to grow and take a leading position in the defined businesses and markets.

Innovation and sustainability are part of Stäubli's DNA: high-quality industrial and

innovative mechatronic solutions as well as customer proximity will remain a success factor.

Passion and family spirit make Stäubli unique. Our people make the difference – therefore we continuously invest in the development of our employees.

Quality and reliability have been the driving force of Stäubli since 1892. Long-term business activities and independence are key factors in Stäubli's success.



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