

Since Sulzer's founding in 1834, the company has been at the forefront of technological advancement across a wide range of industries. In a year when Sulzer's Applicator Systems division was spun off to create medmix, a newly independent global leader in high-precision delivery devices, we take a look at some of Sulzer's achievements and historical milestones: how the company has incubated technologies and businesses as an innovative pioneer over almost 200 years.

One theme remains particularly constant throughout Sulzer's history: the company has never been afraid to reinvent itself. As times, industries and technologies change, so does Sulzer — constantly reshaping its business as new opportunities arise, and others mature, to meet the evolving needs of our society.

The first steam and diesel engines

In 1851, the visionary British engineer Charles Brown moved from the UK to Switzerland to join Sulzer, which had already established an international reputation for engineering. Brown worked for 20 years at Sulzer, during which time he carried out pioneering work developing early steam engines. In 1871, Brown co-founded the Swiss Locomotive and Machine Works, which was eventually taken over by Sulzer in 1961 to continue a legacy of over 100 years of railway engineering. In 1998, Sulzer sold its railway business in parts to Stadler Rail and Bombardier to focus on faster-growing core activities and provide a better fit for the further development of the businesses.

A similar chain of events has played out in other industries — Sulzer innovating to develop solutions to society's problems. This is how Sulzer's name came to be inseparably linked to some of the most important developments of the last two centuries. In 1898, Rudolf Diesel's work at Sulzer led to the invention of the first diesel engine and 100 years of diesel engineering for Sulzer, until the company once again recalibrated its core focus and sold the diesel business to Wärtsilä in 1997. Sulzer began

producing turbo compressors and turbines in the mid-twentieth century, and while the production parts of the business were variously sold to MAN and ABB, and later to Alstom and Siemens, the decades-long expertise with the machinery still forms a core part of Sulzer's Services division today.

From military planes to prosthetics

Sulzer's precision casting, used for example in the twentieth century for specialized parts in military planes, was the spark that ignited Sulzer's activities in a completely new field — orthopedic implants. Thanks to a great deal of research and innovation over the following decades, Sulzer Medica's portfolio included cardiac pacemakers, vascular prostheses and heart valves in addition to more than 400 different prosthesis variants by the time it was sold to Zimmer in 2003 — where it remains a very successful part of the business. These are but a few examples of how Sulzer's legacy endures across industries — and how the technologies it incubated are still central to today's products and machinery.

Sulzer's latest creation: medmix

Fast-forward to 2021, and Sulzer successfully completed the spin-off of its Applicator Systems division, renamed medmix. As part of the Sulzer family, medmix became a global leader in high-precision delivery devices for markets ranging from healthcare to adhesives and beauty. The division's roots trace back to 2006, when Sulzer acquired Mixpac, Werfo and Mold. These acquisitions, combined with the expertise of Sulzer's Chemtech division, allowed Sulzer to revolutionize the mixing, dispensing and application of multicomponent materials. Sulzer created the Applicator Systems division in 2017 to encompass this newest niche, and in 2021, the business was ready to stand on its own. With a valuation close to CHF 2 billion, profit margins of 25% and over 900 active patents, medmix's success and innovations touch billions of people's lives — from its contributions to healthcare devices to the glue that sticks the pieces of your car together, and even to your makeup.



Sustainable solutions to society's problems

The spin-off has allowed Sulzer to once again refocus and reinvent itself, as it has done so many times throughout its history. Sulzer is now a pure play flow-control company, using its expertise to improve lives and solve many of society's pressing problems.

Water is now the largest business in Sulzer's Flow Equipment division, and its comprehensive portfolio of water treatment solutions mean that it provides for every stage of the water life cycle. Our products ensure that fresh, clean water is brought to millions of people worldwide, for use in our homes, farms and industries, while protecting this most precious natural resource.

And as the world prioritizes the essential goal of decarbonization, Sulzer continues to lead the way. Our technologies are helping companies and industries worldwide to reduce emissions and waste through the circular economy, carbon capture and storage, renewable fuels and materials, recycling, and novel techniques for energy production. Discover in this report how Sulzer's technology is central to most production facilities for degradable polylactic acid (PLA) bioplastics worldwide, or how we are helping to create biogas from sludge during water treatment so that these electricity-intensive facilities can achieve energy neutrality. And almost 90 years on from Sulzer's development of weaving machines and the successful textile business that followed, the company has once again entered textiles, this time with core separation technology to recycle them.

In a world where the pace of change is only accelerating, nothing lasts forever. Times change, our society evolves and the problems to be solved mutate. Thanks to Sulzer's unparalleled ability to incubate new technologies and reinvent itself, the company has stayed relevant over 180 years and continues to develop highly innovative solutions to the world's problems. Sulzer's most exciting business is always the next one.



The ability of water utilities to support global demands ultimately depends on the infrastructures used and the technologies that these facilities leverage. For decades, Sulzer has been developing and expanding its business to create a comprehensive portfolio of water treatment solutions for all stages of the water life cycle. Our state-of-the-art solutions and services allow water to be collected, purified, transported, desalinated and more — protecting this precious natural resource and saving energy with innovative treatment techniques.

Life on Earth relies on an invaluable and indispensable resource — water. The water industry is therefore fundamental to our survival, from supplying safe drinking water to the world's population to providing irrigation on farms producing our food, all the way to wastewater treatment to close the loop. As a full-spectrum service provider of treatment solutions, Sulzer helps water utilities worldwide to ensure that these demands are met with the highest levels of reliability and efficiency.

Wastewater in particular has changed dramatically in recent years. It contains less water but more solids and fibrous materials, which places tough new demands on collection networks. Sulzer's innovative range of pumps, grinders, solids-handling hydraulics and smart controllers are specially designed to meet these challenges, ensuring that water is efficiently recovered with minimal disruption and waste at collection facilities across the globe. Our screens, grinders, pumps, mixers, compressors, aeration and filtration systems and other wastewater treatment solutions then ensure that the water is properly cleaned and ready to be reused in our homes and industries, or pumped safely back into natural environments.

We don't just go with the flow - we create it

Thanks to our unique combination of engineering expertise and experience in the water sector, we can provide bespoke, fully integrated technologies that address the specific requirements of our customers in some the most challenging circumstances.

In Saudi Arabia, our engineers delivered 289 high-efficiency desalination pumps in a tight 12-month window, helping to bring fresh water to millions of people within a desert territory. And in Egypt, our solutions are helping an award-winning water treatment facility to irrigate 70'000 acres of agricultural land, while simultaneously restoring the once-thriving ecology of the heavily polluted El Tamseh lake.

And in Sweden, Sulzer Nordic Water helped the Simrishamn wastewater plant to achieve the first fullscale expansion of its kind with the addition of advanced treatment steps designed to remove pharmaceutical residuals and micropollutants. This was a critical first step towards enabling water reusability in a region that suffers from seasonal water shortages and water pollution, and the newly commissioned plant achieved significant reduction rates for all the targeted substances — including a 99.8% reduction in microplastics using our Dynasand filters.

Groundbreaking power-generation strategies

The ebswien water treatment facility is one of the largest in Europe, serving the city of Vienna in Austria and processing up to 1'000 cubic meters of wastewater per minute. The facility uses groundbreaking technology to produce biogas from sludge during the water treatment process, which is then converted to electricity and used to help power the plant and reduce its footprint.



When ebswien wanted to expand its capabilities and circular energy production, the facility called upon Sulzer. At the center of the upgraded plant are six 30-meter-high digesters, each capable of generating biogas from 12'500 cubic meters of sludge. Sulzer delivered the mixer units for the digester tanks to keep the biogas production running optimally. In contrast to conventional equipment, Sulzer's solution required smaller motors, thus unlocking energy savings. In addition, Sulzer's highly efficient turbocompressors delivered further savings, cutting total power consumption by 400 kW, while reducing noise and offering very low maintenance costs.

Sulzer specialists were also able to install a number of digital solutions and provide key products that helped ebswien reduce its energy consumption and improve operations across the facility. The plant has now been transformed from a major energy consumer, accounting for more than 1% of the city of

Vienna's annual energy consumption, to an entirely self-sufficient net energy producer — thereby reducing Vienna's annual carbon emissions by 40'000 tonnes.

Capacity boost that supports carbon neutrality

An increasing number of businesses are committing to net-zero policies. One of these is the Netherland's Rivierenland Water Authority, which also produces biogas from sludge during water treatment to help minimize its footprint. When the utility wanted to improve the performance and sustainability of its Sleeuwijk wastewater operations, Sulzer offered the ideal technologies and services to create Energiefabriek West ("Energy Factory West").

In particular, we were able to develop a customized sludge-mixing approach that supports the implementation of an innovative technology to increase capacity and maximize biogas production. The enhanced capacity enables the plant to process additional sludge that is transported in from a number of smaller wastewater treatment plants in the region, thereby increasing biogas production by 20 to 30%.

With Sulzer's help, Energiefabriek West has been able to continue serving the 90'000 people in the Rivierenland region with new levels of efficiency and circularity. The authority is now well on track to achieve its goal of carbon neutrality by 2030.



Water represents one of the largest sources of renewable energy on our planet. For over 2'000 years, water has been harnessed to power machines, and more recently to generate electricity. Today, using the latest engineering techniques, we are able to achieve new levels of efficiency and reliability for hydropower stations, ensuring the future of this sustainable form of energy production. Sulzer helps hydropower stations to maximize output and extend their operational life by decades, thereby accelerating the world's transition to renewable energy.

From waterwheels and windmills to wind turbines and solar power, renewable energy sources have been utilized for centuries. In 1878, William Armstrong used water in lakes on his estate in Northumberland, UK, to power a turbine and create electricity to light his house — the first home in the world to use hydroelectricity. Soon after, in 1882, the world's first hydroelectric power plant began operating in Appleton, Wisconsin, USA.¹⁾

The hydropower landscape

Today, over 70% of the world's renewable electricity is generated using hydropower,²⁾ and all of these sites need to be carefully maintained to ensure optimum performance.

Sulzer has been a leader in the maintenance and repair of generators and pumps in hydroelectric power stations for decades. Our expertise, products and modern manufacturing and maintenance facilities enable us to deliver on the very high standards required by the hydroelectric industry. The testing criteria for key components are more stringent than in any other sector, primarily because of the remote locations of these sites and the need for superior durability and reliability.

Maximizing the efficiency of ageing equipment

A rewind gives our customers in hydropower and other power-generation industries the opportunity to renew their ageing equipment to maximize efficiency and sustainability. Rewinds and retrofits can significantly lower energy consumption, operating costs and waste, while improving the performance of the whole system — thanks to the world-class efficiency of Sulzer's products.

In many cases, when a generator needs to be rewound, the work has to be completed on-site because the size of the equipment makes it very difficult to remove and transport to a service center. It is therefore essential to have experienced and skilled field service teams that can be mobilized to complete a repair quickly and minimize downtime.



These skills were highlighted in a recent project that Sulzer completed for Statkraft, which operates several hydroelectric sites in the UK. In operation since 1965, the Dinas hydropower station utilizes a single 13.5 MW (18'100 hp) generator to produce 24 GWh of electricity each year, enough to power approximately 3'500 homes. Following a winding failure, Statkraft awarded an overhaul project to Sulzer for the complete repair and refurbishment of the generator.

Expert support from local teams

The team at Sulzer's Birmingham service center designed, manufactured and tested 220 new highvoltage coils destined for the generator. Four coils were tested to destruction to establish and prove the quality of the new coils, according to the demanding specifications for hydroelectric applications. We also assigned two teams of winders to the project to work around the clock and ensure the generator repair was completed as quickly as possible. The teams were drawn from Sulzer's network of service centers across the UK, including Falkirk, Ipswich and Middlesbrough. Moreover, our investment in the latest technologies saved six days on the rebuild time because three brazing stations could operate simultaneously, allowing the process to be completed quicker than with traditional methods. As a result, Statkraft was able to restart its generator with minimum downtime, knowing that it will provide years of reliable and optimized service to ensure uninterrupted renewable electricity for the people of Wales.

As the world increasingly moves towards sustainable practices, Sulzer's Services division will continue to meet the growing demand for repairs, retrofits and rewinds to help our customers accelerate the global energy transition and maximize the efficiency and sustainability of their operations.

National geographic: Hydropower, explained
National geographic: hydroelectric energy



While we have come to realize the environmental limitations of plastics, there is still a great future in such materials — especially if solutions based on the principles of renewability and circularity are adopted. One of the most remarkable examples is polylactic acid (PLA), a highly sustainable bioplastic that is now produced worldwide. PLA production is mostly based on Sulzer Chemtech's advanced technology, which is included in almost all PLA production plants currently in operation across the globe.

In just over 60 years, plastics have witnessed an extraordinary evolution as materials, fitting practically any application. From consumer goods to packaging, all the way to art and medicine, plastics are ubiquitous. Thanks to their adaptable properties and limited cost, no other alternative can effectively compete.

However, these tremendous advantages typically come with an environmental price tag that is impossible to overlook. Traditionally made from fossil fuel-based petrochemicals, they rely on non-renewable resources. In addition, they are generally not easily recyclable, and it can take anywhere from 20 to 500 years for them to decompose. In this time, the waste accumulates and can leach unwanted chemicals, with disastrous environmental consequences. At least 14 million tonnes of plastic end up in the oceans every year, and plastic makes up 80% of all marine debris found from surface waters to deep-sea sediments.

Sustainable solutions for the future of plastics

Thanks to recent pioneering developments, there are new solutions that can turn the tide. Innovative chemical recycling strategies, for example based on Sulzer's devolatilization technology, are providing new recycling opportunities for traditional plastics. Sulzer recently announced its collaboration with Tide Ocean SA and the Eastern Switzerland University of Applied Sciences on a groundbreaking solution to recycle ocean-bound plastic waste. Sulzer Chemtech developed a method to turn recycled

polyethylene terephthalate (PET) recovered from the ocean into high-quality foams that match the properties of virgin plastics. This is a key step towards forming premium raw materials that can be made into innovative circular products.

Moreover, new alternatives are offering more sustainable, yet highly performing, polymeric material without any compromise. The most widely adopted of such alternatives is PLA, a plastic obtained from sugars contained in crops and plants. It is renewable, biodegradable, compostable and recyclable — achieving circularity.

Increasingly used worldwide, PLA relies greatly on Sulzer Chemtech's leading purification processes. Sulzer proprietary technology is included in almost all PLA production plants currently in operation, from small- to large-scale facilities, including the largest globally.

One ring (-opening polymerization) to rule them all

What makes PLA unique is that the bioplastic is made using a non-traditional chemical reaction known as ring-opening polymerization. This process allows us to deliver more robust materials, whose properties can be easily adjusted to suit different applications and uses. For example, it is possible to adapt the compostability of PLA, making it exceptionally resistant if used in durable products with long-term performance or easily degradable for disposable applications.



This allows us to revolutionize the plastic life cycle, solving the problem that has marred the plastics industry for decades. We give our customers full control over the technical properties of their bioplastics, so that they can be used long-term, easily recycled, or degradable in natural environments depending on their intended use. Businesses choosing our state-of-the-art technology can therefore produce a wide range of competitive and fully circular products that serve different industries and enhance their role in the marketplace.

Driving sustainability practices worldwide

When Corbion, a market leader in biotechnology, wanted to establish a new production facility for PLA, Sulzer Chemtech offered the right services and technologies in record time. In just over a year, we provided a complete, fully customized technology and project-management solution that enables the bioplastic manufacturer to deliver approximately 75'000 tons of sustainable bioplastics every year.

Thanks to our expertise and capabilities, the flexible production line can supply different types of PLA to support various applications, including packaging, consumer goods, 3D printing, fibers and automotive products. At the end of their service life, these products can be mechanically or chemically recycled, or even industrially composted to fertilize soil, making them truly sustainable, circular products.

Supporting continuous growth

NatureWorks, the world's leading manufacturer of low-carbon PLA biomaterials, wanted to support the increasing global demand for bioplastics with a new production facility for PLA and its intermediates. Located in Nakhon Sawan Biocomplex, Thailand, this plant will have a capacity of approximately 75'000 tons of biopolymer annually.

To provide the key equipment for this facility, particularly for lactide and PLA production, NatureWorks selected its long-term partner, Sulzer Chemtech. A key reason was that our technology can purify lactide and its intermediates to reach extremely high levels, while the polymerization can support versatility in the types of plastics created. These elements will help NatureWorks maintain a competitive edge with a range of high-quality, sustainable products.