We make ideas flow.
Our stories have flow

Because we listen

Success stories 1–6

On the same wavelength

Success Story 1: Infusion bags
Success Story 2: Car body

We regulate gas

Success Story 3: Respiratory support
Success Story 4: Flame cutting

Thinking big in the micro range

Success Story 5: Stem cells
Success Story 6: Sterile packaging

Process automation

Intelligent networking: EDIP

Where ideas flow

/ Our stories have flow / Each story has a beginning. For example, we could tell you how a tech pioneer with vision, Christian Bürkert, founded the company 70 years ago and how it is still 100% family-owned. We could tell you how we came to be what we are today: one of the world’s leading manufacturers of measurement and control systems for liquids and gases. But we’ll leave that for now.

Because our true success story starts with you. The special dynamics of Bürkert Fluid Control Systems are characterized by the fact that our company makes transitions fluid: Our solutions for application challenges flow independently of the respective sector to our knowledge pool, our clients’ success feeds us and vice versa. We interconnect solutions to create thrilling success stories.
Because we listen / We are experts when it comes to making things flow. But there is one exception to this: The story you tell us stays with us. We accept your fluid challenge. Regardless of whether you want to measure, control, mix, dose or filter gases and liquids. Starting out, we focus on the perfect fluid technology, regardless of your industry.

Our most creative minds come together to create the perfect solution for your needs. In fact, their minds work just like the individual components in your equipment should work: intelligently networked. With one another and with you. After all, we can best achieve your goals by working together. Combining our comprehensive experience with your industry-specific know-how will enable us to find paths that have never been taken.

This makes it possible for us to take yet another step forward. We do not just simply take your orders; we advance ideas. Our employees can point out areas in your applications that you had perhaps never thought about optimizing. That’s because Bürkert also pays attention to the nuances.

Because we know how things flow.
On the same wavelength / What you see is not a car body or an infusion bag. What you see is the way Bürkert handles the fluid challenges of our clients. We do not think in terms of industries, we think in terms of solutions.

Let’s take a client from the pharmaceutical industry and a client from the automotive industry. The fact that they produce completely different products is irrelevant. We know that it’s the volume that counts and we know how to measure it, regardless of whether it’s an infusion bag or a car body anti-corrosion solution. With the Surface Acoustic Wave Technology (SAW), we are on the same wavelength as the product that has to flow.

Find out how SAW can help clients optimize their production results. Their success stories are proof of this. Our experts are here to advise you on your individual solution.
Success Story ——— 1

“No more compromises with flow rates.”

Client Meeting ——— 1

The beginning of any solution is understanding the problem: One of our long-standing clients, a global market leader in the development and manufacture of infusion solutions, invested heavily in a new production plant.

He wants every 3000 millilitres of his high-quality pharmaceutical product to flow automatically into the infusion bags under cleanroom conditions. But this has been made more difficult due to conventional flow meters currently available. Added to this comes special product flexibility meaning the need to accommodate various product types, minimal installation space and high packing density of the complete system.
The plant runs at a high speed and fills 40 bags per minute. 57,600 litres of fluid is distributed into transparent bags within a period of eight hours.

The problem: To prevent rejects, the bags may not be underfilled. Our client cannot deliver underfilled bags to his end client and, instead, has to throw away the rejected goods. The bags filled with excess fluid can be sold, but then the client has to accept that with each of these overfilled bags, he is giving away his quality product. Too much overfilling can ruin the bag or make it impossible to further process and then transport them. This negatively affects the plant’s efficiency.
His expensive plant has thus created “litres” of trouble for our client because either he has to give away the expensive fluid or, if the bags are underfilled, throw it away as a reject good.

Because it is always better to give away than to waste, the client has adjusted the average filling volume at the plant to high levels in order to mitigate the risk of rejects as much as possible. This is the lesser of two evils, but not an ideal situation. But our client has no other option, at least for now.

Too much liquid in the bag

Add up to roughly 276 litres in 8 hours

This is the equivalent of 2 full bathtubs per shift
There are many technologies available on the market that can measure and control the flow rates. Three immediately come to mind. But none of them is the perfect solution for this particular scenario:

There are several reasons why Coriolis flow meters cannot be used:
1. The specifications regarding installation space and packing density cannot be complied with.
2. By constricting the Coriolis measuring space that the product flows through (depending on the measuring principle), the flow rate rises while the flow velocity remains the same compared to the plant’s fluid handling system directly upstream from the filling point. This means flow velocities up to 12.5 m/s can develop directly at the filling point, which makes precision filling impossible and can ruin the infusion bags.

Mechanical flow meters are not allowed in hygienic processing environments because moving parts in the product stream are not permitted. The risk that the product could become contaminated due to a sensor defect is too high.

The magnetic inductive flow meters have to be ruled out because not all media produced by our client have the necessary conductivity.
With the Bürkert solution, the client can leave out the time/pressure measurement and no longer has to give away volumes of his product. Thanks to the FLOWave flow meters now installed in the plant, the filling valves no longer close when a certain time has passed, rather they close after the desired product volume has flowed through it. These flow meters function according to the patented SAW process. To get a completely accurate measurement, it is not necessary for there to be contact between the sensors and the medium. Also, there is no need for an additional pump to prevent pressure drops and the medium’s conductivity is not a factor at all. The infusion bags are now consistently filled, regardless of influences and changes that once negatively impacted the process – just as our client wanted.

Bürkert Technology

The success of our technology can be measured: The Bürkert solution has drastically reduced filling level inconsistencies. Our client now gets much better results.

Fact: The FLOWave unit is made of stainless steel, weighs only 3.2 kg and can be installed and removed quickly by one person.

Thanks to the high-precision filling, all specifications are complied with and plant efficiency has increased. Our client can fill and sell more bags in the same time period.

Therefore, our client combines the time/pressure measurement with a high-precision weighing system. This means that the strict specifications can be adhered to by weighing each bag. In order to avoid underfilling, the flow rate is set very high as a preventive measure, but means a lot of product is given away. Our client is therefore faced with a major fluid challenge: they need high-level precision filling at maximum filling speed.

Our client must thus rely on time, or, more precisely, the time/pressure dosing: To fill the bag, a valve opens for a certain time period to allow the desired product volume to flow through it – according to the plan. However, the plant reacts very sensitively to external influences such as pressure and changes that are made in the production plant as a result of self-correcting processes in the production.
“No more detours to achieve optimal results.”
The solution consists primarily of water, pigments that are designed to protect car bodies from corrosion and a binding agent that bonds the pigments to the raw material. When the luxury car is lifted out of this solution, the water flows back into the basin.

To prevent sedimentation, in other words the pigments from collecting on the bottom of the solution, the anti-corrosion solution is constantly circulated through a circulation line.

The binding agent and pigment can bond to the car body. This is precisely the purpose of the immersion bath. However, over time, it is exactly this process that has affected the result – undesirable results for our client.
As production progresses and the water content remains almost the same, the concentration of pigments and the binding agent in the anti-corrosion solution gradually decreases. The result: The mixing ratio is no longer correct and at the end of a cycle, it is completely different than at the beginning.

Our client can no longer accept this. Therefore, the client measures at regular intervals the ratio of the three elements in the anti-corrosion solution and comes repeatedly to the same unsatisfactory result.
The industry’s only solution thus far is to take samples at routine intervals during ongoing production and have them analysed in the lab. The results are reported and the mixing ratio is then adjusted accordingly.

This process is extremely arduous and time-consuming. Consequently, the client keeps the intervals between the time-consuming measurements, which are average at best, as long as possible. The client must therefore make do with the fluctuations in the mixing ratio.
Our automobile manufacturer wanted to find a way to measure the mixing ratio of the anti-corrosion solution, preferably during ongoing production, without having to detour to the lab. This would allow the client to ensure that every car body comes out of the production cycle with the identical anti-corrosion pigmenting. This is where we come into the picture.

With the Bürkert technology, the mixing ratio is not only correct at the beginning of a production cycle, the result remains consistent throughout – always optimal.

Our solution allows for seamless control: We have equipped their system with the advanced SAW technology. Our FLOWave flow meter constantly reports to our client which elements are missing in the anti-corrosion solution and by how much without having to detour to the lab. Because it has now been incorporated into the process. It’s just a lot smaller.

Benefit The extremely time-consuming measurements at regular intervals are now a thing of the past.

No lab The time and effort to make a detour to the lab is no longer necessary because our SAW sensors have replaced it.
We regulate gas / Because we think beyond the industry’s horizon, we are repeatedly tapping into fascinating connections. And because we use them to come up with unconventional solutions, our clients have trusted us with very special requests.

However, we not only try to meet these requests, we also use them as our inspiration to think one step ahead and offer complete solutions from a single source.

Bringing a respiratory device for infants to mass-production within five months? Developing an automated gas control system for flame-cutting machines? Let these true stories demonstrate to you how Bürkert makes wishes come true ... and more.
Half a billion – that’s how many breaths a person takes by the time he or she reaches the age of 78. Each breath is precious – and none is as moving as the first. Sometimes small lungs need a little support.

Our client has taken on a meaningful job. He develops respiratory systems that help newborns when they need it.
Around one in ten babies are born before the end of the 37th week of a pregnancy. Because premature infant lungs are often not yet mature, these babies are particularly prone to breathing problems. In some cases, they do not instinctively respond to a lack of oxygen by taking rapid flat breaths. To a certain degree, their bodies forget to breathe.

Premature babies are therefore carefully monitored in intensive care units and often use a Continuous Positive Airway Pressure or CPAP machine. If needed, these devices are also accompanied by machines that support breathing at a frequency of up to 15 Hz. CPAP treatment is used for newborns who are, in principle, able to breathe, but need help to stabilize their airways. To this end, a mixture of air and oxygen is supplied to the machine.
CPAP and NCPAP devices are an important part of any intensive care unit's equipment worldwide. Devices that can adequately respond when a newborn cannot compensate for a lack of oxygen with high frequency breathing are, in contrast, unaffordable and also too complex for many intensive care units.

The use of a CPAP machine is often combined with intubating the patient. For adults or older children, this form of breathing is non-invasive and consists simply of a small hose that is inserted into the nose. This is what is called (nasal) CPAP.

**High-frequency breathing**

[Diagram of high-frequency breathing]

**NCPAP**

[Diagram of NCPAP setup]
Another issue is that most conventional respiratory devices cannot accommodate a baby’s nose. That’s why larger face masks are used, which are uncomfortable for babies and cause unnecessary stress. Our client has addressed this problem by launching a unique device on the market. We were able to support them in this project.

**Bürkert solution** Because technology should not be unnecessarily complex when a baby’s start in life is already difficult enough. In working with us, our client was able to develop a device that supports high-frequency breathing up to 20 Hz and also allows the use of an NCPAP device even for premature infants.

**System solution** Because Bürkert components are designed according to a modular principle, they can be easily incorporated into systems regardless of their specific use. This saves significantly on costs.

**Quiet technology** With Bürkert components, our client was able to reduce the noise normally produced during CPAP treatment. This spares patients unnecessary stress.

**Rigorously tested** Because Bürkert develops its systems according to standards, our client was able to go through the strict approval process for medical devices quickly and smoothly.

**Technology where it is needed** This innovative device will enable our clients to tap into markets that were previously closed.

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**Face mask**

**CPAP breathing**

**High-frequency breathing up to 15 Hz**

**NCPAP + high-frequency breathing up to 20 Hz**

**System solution**

**Mask for nasal breathing**
“We’re now always a cut above the rest.”

If you work with flame cutters, you will know the problem: The quality of the actual cut depends on many variables. The cutting speed, the distance of the torch nozzle to the workpiece as well as the size and design of the nozzle are crucial factors – and, last but not least, the type of gas supply.
If the gas supply of the flame cutter is controlled mechanically/manualy, the cutting quality is influenced significantly by the know-how of the respective operators. Incorrect adjustments cannot be excluded fully and can have some very undesired consequences. Here are just a few examples:

1. If the preheating flame is set too high, the upper cutting edge starts to melt and excess slag builds up at the lower edge.

2. An insufficient preheating flame creates deep grooves in the lower part of the cut surface.

3. A soiled nozzle has a negative impact on the oxygen jet, resulting in uneven, non-rectangular cuts.

In short: When controlled mechanically/manualy, the quality of the results varies greatly and gas consumption is often too high. Actual efficiency is something else. Furthermore, it involves extra effort as a result of the many individual components.
Gas can also be supplied using an automated solution consisting of individual components. Depending on the material applied, the material thickness and the torch configuration, the gas pressure levels are controlled proportionally and automatically using the set-point value default for the pressure controllers specified by the PLC. However, seeing as it consists of individual components, this type of gas supply demands a lot of space and a lot of wire. Furthermore, due to its actual size it can hardly be accommodated in the vicinity of the moving torch. Yet another disadvantage is the complex integration, usually via analogue signals.

**Bürkert solution** We have designed the gas supply as a compact integrated unit. It only has to be connected – and can now be positioned in the immediate vicinity of or even on the torch. The gas pressure levels and the controller parameters are set and defined automatically via a digital communication interface. Specific control functions are integrated directly in the gas supply. Individual components are not required for this solution, thus reducing the amount of material and effort considerably.

**Bürkert technology** The automated gas supply ensures the cut quality remains constant and only the exact amount of necessary gas is consumed.
Thinking big in the micro range

Our clients lead the way in their respective field. They know what they are doing – and they know what they want. But when it comes to fluids, we know what needs doing to achieve your goal.

We blend your specialist knowledge with our comprehensive know-how. This results in solutions that are perfect down to the very last detail and help to reduce complexity. That’s because we give your idea the respect and attention it deserves – irrespective of whether you work with stem cells or dose micro-litres.

Be inspired by the following real success stories and discover how we build on and increase the knowledge of our clients. Ensuring everything flows smoothly all of the time.
Success Story

“An important step in stem cell research.”

Client Meeting

Our client has taken on a major task: stem-cell research. This young start-up company from Italy has achieved a major breakthrough in this complex field.

Their innovation represents a decisive step forward in successful treatment of many serious diseases and injuries ranging from Parkinson’s disease to paraplegia. And we were happy to help them in the execution of their idea.
The young company has found a way of separating healthy stem cells from dead or defective ones, as well as from other cells such as blood or lymphatic cells, without damaging them in the process. Previously, no method had been found to sort the cells without inadvertently compromising the quality of the stem cells.

The technique that the start-up has developed is revolutionary: It causes the cells to form groups according to their physical characteristics, so the ones that are of interest become discernible. However, our client is faced with two fluid dynamics challenges.
Stem cells are extremely delicate. For the start-up’s innovative method to become practicable, we have to find a way of guiding the cells carefully through a duct. Our client’s technology can accurately identify and locate the cells in the duct. However the client has to be able to facilitate the cells’ capacity to flow while preventing them from adhering to the walls of the duct or sustaining any other kind of injury. In addition, it must be possible to extract the stem cells from the duct undamaged when the software signals that the sorting process has been completed successfully.
Bürkert is exactly the right partner for this kind of task. We have the experience needed to get things flowing – including very, very small things. And we know how to merge knowledge.

Our know-how complements that of our client; our technology makes the client’s method practicable. Together they give rise to the solution.

The solution at a glance

In order for them to be able to group themselves, the cells need to flow properly. To this end, two liquids are introduced into the duct with the cell sample: The first one ensures that the cells do not adhere to the surface, while the second one generates the environment the cells need in order to form groups.

A camera monitors the cells so the software can count them as they flow past. The software recognizes when the cells have formed groups and provides a graphic representation of the process.

The software passes on the graphic data to the Bürkert system which then extracts the respective cell groups extremely carefully, introducing them into test tubes waiting on a rotary stand.
The stem cells can be removed from the duct with the aid of our sophisticated technology without being influenced in any other way. Thus they retain their potential, which can be fully exploited in subsequent research activities.

**Bürkert’s solution**  A clear case of congeniality. We have supplemented our client’s innovative method with our extensive experience in the field of micro-fluids. As a result we have opened up new horizons for the stem cell research of the future.

**Solution**  Pooling the knowledge of the young company with our expertise produces an entirely new technique for handling delicate stem cells in an appropriate way. They remain fully intact and can therefore serve the advance of science without restriction.

**Bürkert’s technology**  Our client’s sophisticated software is impressive enough in itself. Combined with our expertise in fluid technology, it adds up to a workable concept that can form the basis for future developments.
Sterile packaging

The specialist field of our client is the development and production of machines that package sterile products. And the main focus is on the efficiency of these machines. They have to work flawlessly in clean room conditions.

Reliability, speed, minimum rejects and maximum compactness are demanded. Furthermore, the machines must be able to package minimum quantities. No easy feat for our client.
A dosing unit that can be integrated in a new system where it fills very small packages with 500 microlitres of sterile liquid is required. This liquid is intended to protect a delicate object that is added before sealing the package.

Our client developed the dosing system in-house, using various components from OEMs. The client is thus exclusively responsible for ensuring the assembled parts work together without any problems. This limits the number of simultaneously operating dosing units. There is the risk of the overall system design becoming overly complex and thus unmanageable.
Complexity of the dosing units increases with the number of packages that need to be filled simultaneously since each dosing head has to be provided separately with energy and signals by the central control cabinet. In addition, each dosing head needs its own product supply. Huge lengths of cables and hoses are the result; in addition to complexity, a key factor to consider with regard to production errors is also a definite lack of space.

Bürkert solution: We have made life simpler for our client. Thanks to our comprehensive solution the client has been able to overcome this obstacle and develop a dosing system that can fill a large number of small quantities very quickly and precisely. Since our communication platform reduces the complexity.

Bürkert technology: A single connection to the PLC is enough. Since each and every action no longer needs to be integrated, it is possible to increase the number of dosing heads.

Everything included: Our client no longer has to obtain individual components from various OEMs. Now we are responsible for ensuring everything flows smoothly.

Solution: The device platform enables us to now provide the dosing units with everything they need via a manifold, our büS. Discover more about this intelligent networking solution on page 24.
Professionals who work to strict hygienic standards during production processes or who have to meet other basic, industry-related conditions are quite familiar with the problem: huge lengths of cables and hoses make searching for an error similar to escaping a labyrinth. We show you how to escape – towards a success story.

Conventional system designs for hygienic or otherwise regulated processes are often restricted by the demands placed on material, space and time. The lines between the pilot control and the process valves are long – and the search for a source of error is accordingly difficult. The result: Delays in production instead of increases.

Bürkert offers three process automation solutions that help to reduce complexity and boost efficiency. In all three, the fieldbus Type ME43 acts as the gateway for the devices. It transfers their communication to all common industry standards. Our technology minimizes the planning and installation effort, use of material, air consumption and the risk of errors significantly. Switching times are easy to reproduce. With the local solution, the process functions are executed by the actual devices.

Extensive searching for the source of errors in the clutter of cables and lines is a thing of the past. Not simply because our solutions ensure clarity, but also because our technology is able to detect and communicate potential malfunctions. The valve islands used for the distributed and local variants are equipped with a display that makes fault diagnostics child’s play: It is possible to see at a glance whether a diaphragm needs to be changed or a cable checked. With the integrated solution, this process-optimised function is assumed by the software tool of our EDIP (Pg. 24). The control cabinets are greatly reduced in size – if they are not made obsolete by an integrated solution. This also releases lots of valuable space.

With the distributed and the local solution, the pilot control still guarantees the functions of the process valves. However, with the local variant it is already much closer to where the action takes place.

With the integrated solution, the pneumatics is housed in the valve actuators. A ring supplies the compressed air, while the PLC guarantees electrical activation. Pilot valves are no longer required – the control and diagnostics functionality is contained directly in the actuators.
/ Intelligent networking: EDIP / When we talk about networking, we are not simply referring to the fact that we allow our knowledge to flow across industries and in an interdisciplinary fashion. We also mean it in a practical sense. The best evidence of this is our Efficient Device Integration Platform. EDIP allows the integration of field devices down to the sensor and actuator level within an existing system. Our contribution to Industry 4.0 – but especially to optimising your process.

How does EDIP work? Our device platform simplifies the operation, communication and interfaces of process devices. Communication occurs via the Bürkert system bus (büS), which utilises the industry standard CANopen.

All the participants within the network are equal, a master is not required. The chips necessary for digital communication are reduced, which obviously helps to save costs. Besides simple configuration and parametrisation, the Bürkert Communicator software is also used for the graphical presentation of process values.

Therefore, you can see all the participants and can control processes during ongoing operation using an intuitive touch control. Intervention in the control system is no longer necessary, thus saving time and money. EDIP allows for the implementation of various hardware module kits and their combination according to your specific needs.

Success Story 6 demonstrates what EDIP means for practical application and how our clients benefit from it. EDIP reduces complexity, while increasing efficiency.

EDIP networks individual field devices into one intelligent system. Since this occurs via common industry standards such as PROFINET, PROFIBUS, EtherNet/IP and Modbus TCP, EDIP is compatible with the systems of other manufacturers. EDIP devices can be simply integrated in the existing process – from the electrically driven process valve and the valve island to the flow meter.

EDIP enhances the devices’ ability to communicate, while the administrative effort of the applied PLC is reduced. And our clients also see the amount of effort required reduced thanks to EDIP: Modules can be quickly added, parameters simply transferred, if necessary, by replacing the storage medium and new functions programmed at ease via the Communicator. EDIP makes your devices intelligent.

Success Story — 6
Where ideas flow / Ideas need space to develop. We have therefore created a location that offers the ideal conditions for this. To be exact: five locations. At our Systemhaus in Ingelfingen, Dresden, Dortmund, Charlotte (USA) and Suzhou (China), we take the shortest of routes to develop the best of solutions.

This is where our teams of experts dedicate themselves to your specific challenges and requirements across industries and in an interdisciplinary fashion. Project managers, engineers, industry specialists and sales consultants work in close partnership according to demand. And the main thing is: they are close to each other. This accelerates the process from the idea, initial development and tool-making all the way up to pre-production runs and approval – and saves you having to collaborate with various sub-suppliers.

Each Systemhaus can be considered as a competency centre. They enable us to use synergy effects to create added value. We bundle our knowledge within them, transfer it in a targeted manner and adapt it to your specific needs – for individual fluidic system solutions and amazingly short times-to-market. While not directly linked to our standard development, but still benefiting from a constant exchange of ideas and practices and being firmly rooted in the respective market, each Systemhaus is, first and foremost, a location where also your success story begins.