

2022/2023

ctrlX
AUTOMATION
MAGAZINE



FEEL FREE

TO CHANGE THE GAME

rexroth
A Bosch Company

X—plore

Next Level Automation: Openness and freedom through an industrial operating system, a planar system with 6 degrees of freedom and sustainable services.

X—cite

From practice for practice: Whether warehouse logistics, automotive, battery production, fitness equipment or traffic guidance – ctrlX AUTOMATION offers endless possibilities.

X—change

Celebrating success together: awarding top performances, the ctrlX developR Challenge at XCON 2022, technology and campaign awards.



**WE
IMAGINED
WE COULD
CHANGE
THE WORLD.**



LET'S CHANGE THE GAME TOGETHER

We imagined we could change the world. To make it more open. More free. More flexible. This resulted in ctrlX AUTOMATION. And with it a completely new world of automation, which represents a turning point in time. The system breaks down all previous boundaries. It connects people, technologies and machines. In the process it reaches even greater heights all the time. We're ready for the next level. Join us in our new universe.



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CEO, Business Unit Automation

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FREE. OPEN. SHAPING THE FUTURE.
The world of products at a glance



Development and manufacturing times are becoming shorter and shorter. Added to this are technological and demographic shortages of skilled workers and labor, as well as a scarcity of resources. Industrial automation is taking on an increasingly important key role in the changing times and is definitely software-driven. With ctrlX OS, ctrlX AUTOMATION is now expanding the solution space across all levels of the automation pyramid and vendor boundaries, thus promoting even more co-creation and enabling independence.

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A NEW ERA

The growing challenges in industry and other sectors require more software and data-oriented automation solutions. There is a broad distribution of these solutions across the entire automation pyramid – with maximum networking of information at the same time. High standards apply with regard to security, uniform tools and communication interfaces. A modern, industrial operating system such as ctrlX OS can support the implementation of these high requirements. It makes it easy to merge IT and OT applications and to develop new functions in line with Industry 4.0.

SOFTWARE-OPERATED FUTURE

Software development is therefore becoming the driving force behind industrial automation solutions. It is thus important to ensure that functions can be developed and operated even more easily. The aims here include significantly reduced engi-

neering work, less lock-in and, above all, optimized solutions that safeguard a company's own competitiveness.

Low code/no code platforms are becoming increasingly important. “Configuring instead of programming” is the principle here, a principle whose aim is to come up with solutions even more easily and quickly. As a result, people with little or no programming knowledge can generate software. The development of simple applications is thus many times faster and also delivers error-free code.

STRONGER TOGETHER

The unlimited freedom in automation results in significant competitive advantages for users. The new methods and solutions put in place everything that is needed for the software-driven factory and allow modern practices such as DevOps. This way, the increasing challenges of the various industries can be met with an even shorter

time to market, high plant availability and flexibility in production.

And another key trend is becoming established: The best innovations come about with bundled domain knowledge and joint creative power. The automation solution of the future will therefore allow co-creation between all players. Directly involving the target group and taking into account their individual needs is the key for solutions which offer genuine added value rather than simply being an end in themselves.

The ideal automation solution thus functions like ctrlX AUTOMATION as an ecosystem which contains all hardware and software components. It also provides apps which allow users to solve their tasks individually or even develop their own apps. The automation toolkit, which is open in all directions, thus achieves independence from individual providers.

In the interest of users and third-party providers, ctrlX AUTOMATION is continuously

FREEDOM THROUGH OPEN- NESS

being opened up and expanded. The partner network ctrlX World is growing steadily. It expands the ctrlX AUTOMATION ecosystem with hardware and, in particular, more and more apps which can be downloaded from the ctrlX Store. This creates an automation world that is open to all and knows almost no boundaries.



Steffen Winkler
CSO, Business Unit
Automation

THE UNIVERSE IS ALL

According to the Big Bang theory, the entire universe was no bigger than a pinhead 14 billion years ago. In a huge explosion, everything was blown apart. Since then, space has been expanding in all directions. ctrlX AUTOMATION follows this principle with its ctrlX World partner world: It is a universe in which space and time are transcended, encompassing numerous galaxies and growing larger all the time. In the meantime, numerous bright shining stars are forming in the sky.

Nowadays, more than 600 customers around the world use ctrlX AUTOMATION and more than 60 third-party providers have joined the partner world. And the numbers look set to grow significantly.

The partner network expands the universe with hardware and, in particular, more and more new apps which can be down-loaded from the ctrlX Store.



"With the help of IO-Link, a number of process values can be transferred cyclically with just one sensor cable. This increases the effectiveness of the system and helps to reduce costs. The IO-Link communication with the sensors also provides excellent diagnostic options from a central point. Via the ctrlX World, we can provide all of these benefits for users."

Benno Kathan, CTO, ifm electronic



"Thanks to the direct link between our simulation platform and ctrlX AUTOMATION, users save a lot of time because they can test the machine or system virtually in the model prior to its completion. The digital twin of the machine comes first, before the machine is set up by the manufacturer. Errors can thus be recognized and eliminated in advance. Processes optimized by the machine can thus be recognized ahead of time, and much more. The joint solution allows virtual commissioning and lays the foundation for AI-based solutions, for example in the field of predictive maintenance."



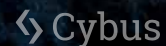
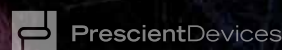
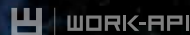
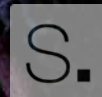
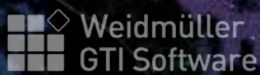
Norbert Ulshöfer, Manager Application Engineering, MathWorks

"In the ctrlX World, we and Bosch Rexroth offer users the freedom they need for individual, adaptable solutions. As a result, they can react flexibly to the needs of their sector."



Marco Henkel, Vice President Technology Management, WAGO Group

More about ctrlX World



COM PLETE LY



Freedom and openness are the key factors in automation nowadays. ctrlX AUTOMATION knows no boundaries. With the real-time-capable, Linux-based ctrlX OS operating system, a new stage of evolution has been reached and the prerequisites for the software-driven factory are now in place.

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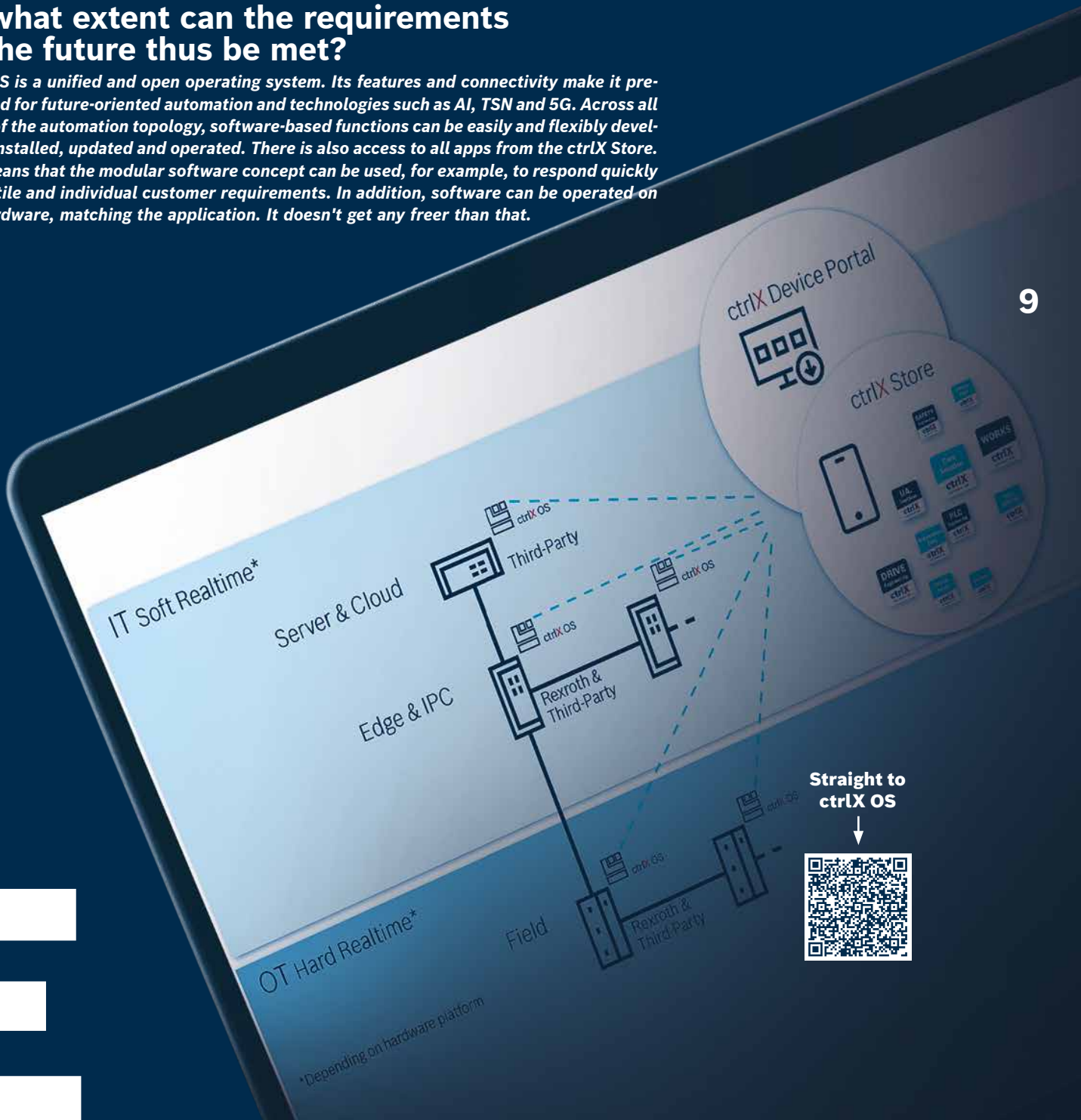


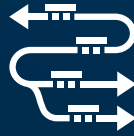
What makes ctrlX OS so special?

The Linux-based operating system was designed especially for real-time use in industrial environments. It is completely hardware-independent and seamlessly connects even more automation components to the entire ctrlX AUTOMATION portfolio, including ctrlX World partner solutions. ctrlX OS means automation on all levels, from the field level to the cloud. Moreover, IT and OT applications can easily be merged for Industry 4.0 purposes. The operating system supports app technology, web-based engineering and secure user management and makes automation incredibly easy. Data are exchanged efficiently via the high-performance ctrlX Data Layer which connects all devices in the network.

To what extent can the requirements of the future thus be met?

ctrlX OS is a unified and open operating system. Its features and connectivity make it predestined for future-oriented automation and technologies such as AI, TSN and 5G. Across all levels of the automation topology, software-based functions can be easily and flexibly developed, installed, updated and operated. There is also access to all apps from the ctrlX Store. This means that the modular software concept can be used, for example, to respond quickly to volatile and individual customer requirements. In addition, software can be operated on any hardware, matching the application. It doesn't get any freer than that.





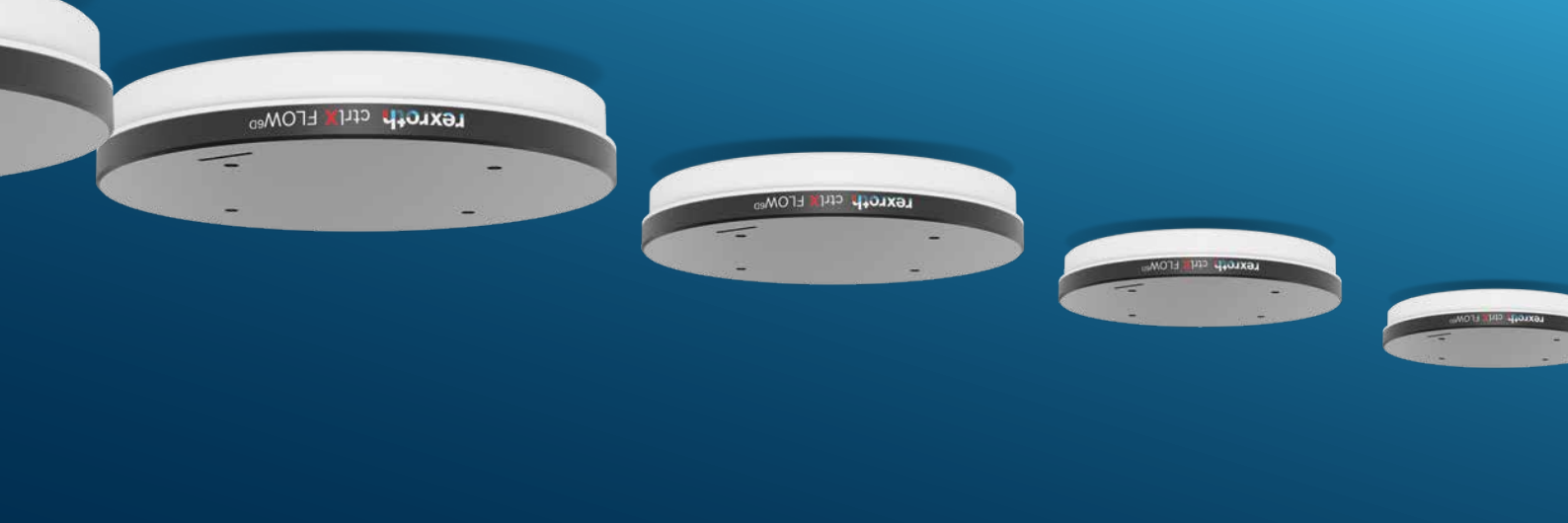
The floating ctrlX FLOW^{6D} transfer system raises contactless, high-performance transport and positioning to the next level. It forms the backbone of a flexible and efficient production facility.

0 1



Experience
ctrlX FLOW^{6D}





Freedom is increasingly important in intralogistics too. How does ctrlX FLOW^{6D} stand out against other systems?

Automating and optimizing intralogistics processes is a key factor for the success of the Factory of the Future. With the ctrlX FLOW product family, we offer easy-to-integrate solutions for highly efficient material and goods flows. The ctrlX FLOW^{6D} planar system allows greater freedom of movement with maximum precision. The free-floating transport platforms, so-called movers, are moved on a horizontal, vertical or overhead working surface. Each mover acts in 6 degrees of freedom at high speed and with great precision. There is no friction or pollution. ctrlX FLOW^{6D} allows the efficient, safe and coordinated transport, positioning and handling of numerous loads.

How can ctrlX FLOW^{6D} make full use of the potential offered by industrial levitation?

Integration of the planar system into ctrlX AUTOMATION leads to an overall solution with a compact control system and apps to increase the range of functions. The result is an integrated, agile system. It offers enormous potential for a variety of industry segments. Given the modular, easily adaptable system structure, it can be used in numerous industrial sectors, for example in the semiconductor industry, the food sector, the pharmaceuticals industry or in assembly systems. Wherever ctrlX FLOW^{6D} is used, it supports flexible and efficient production.

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FEATURES

- Free and simultaneous movement in 6 degrees of freedom
- Extended movement range
- Power and data communication wireless on the mover
- Working level horizontal, vertical, overhead
- Low power consumption, independent of the payload
- Safe landing and parking in case of power failure
- No heating of the tile surface
- Easy handling, no risk of injury

NOTHING WORKS WITHOUT SERVICE



In many production companies, key areas of value creation are shifting. Companies that once did nothing but manufacture products are now becoming service providers too. Actual production is increasingly being supplemented by service offerings. These are often provided via service platforms. After all, service scales and generates business. And even the best product is worth only half as much without service. Products which offer outstanding technical performance are only worthwhile if they are easy to commission as well as reliable and efficient. It is therefore important to maintain, care for and manage them. Automation needs its own service world.

Customized solutions and a high degree of automation are shaping mechanical engineering and other sectors. Increasingly, digital services are in demand that can be implemented quickly, individually, scalably and in a customer-centric manner. Using automation solutions as an example, this means that users are ideally supported over the entire life cycle. This begins with the individual configuration of automation solutions. Users then have the option of developing software themselves – for example by means of a virtual control environment – and enjoy support through services in the form of apps and communities for ongoing operations.

Services should be provided via a company's own platforms or – as is increasingly the case – via ecosystems which are set up around automation platforms. In this environment, automation companies and third-party providers offer for example functions in the form of apps. These can be standard applications or software which is required on an individual basis. For third-party companies, it is a way of promoting their own services and generating additional business.

SERVICES ORIENTED TO BENEFITS AND PROFIT

Users should enjoy end-to-end support during their work processes – support which is available wherever they happen to be. This also means support which is available on all channels. After all, the changing world of work is characterized by mobility and flexibility. Digital and efficient support can provide quick help in the event of machine breakdowns for example. It is therefore important to offer digital services here too.

New business models – for example in the area of maintenance – should always be measured in terms of the added value that they offer customers and their transparency (including costs). For example, subscription-based models help with the flexible testing of new services and applications because costs are incurred on a time basis according to actual use. However, they need to be transparent so that the costs are predictable. Providers on the other hand, benefit from more predictable sales, which leads to higher profitability for all parties involved.

LONG AVAILABILITY BRINGS SUSTAINABLE ADVANTAGES

Machine builders, machine operators and component manufacturers profit from the long-term service availability of the components used, remanufactured products and other measures that enable machines to be used for a significantly longer period of time. Operators benefit because a service availability extension is effectively a machine runtime extension guarantee. In many cases, this is more economical than a new acquisition – especially if a service availability extension is combined with a modernization measure. For machine builders and component manufacturers, this is beneficial if the necessary stockpiling of expertise, processes and materials is bundled together economically. With suitable offerings, profitable service guarantees of over 25 years can be easily achieved for all parties.

Given that sustainability is becoming increasingly important, new sustainably oriented services and service products

– for example the return and resale of refurbished used products – should also be available. Used products can save a large part of the resources needed and the price is lower than for new spare parts even though the remanufactured products are as good as new.

COMPETITIVE ADVANTAGES AND FUTURE-PROOFING

Modern services thus mean value creation for everyone involved. The modular and scalable ctrlX AUTOMATION toolbox encourages this. Its service portfolio comprises classic and digital services as well as various other services for the entire product life cycle. This includes conventional services for machines and systems which are designed to ensure a long service life. At the same time, the ctrlX Store enables individual software to be downloaded. The ctrlX Device Portal allows the straightforward, central management of control systems and the ctrlX AUTOMATION Community provides opportunities for discussions, support and the transfer of know-how. This means a reduction in the burden on all users and future-proofing when they use their automation solutions.

Download
whitepaper



NEW MINDSET BRINGS TOGETHER ECONOMY AND SUSTAIN- ABILITY

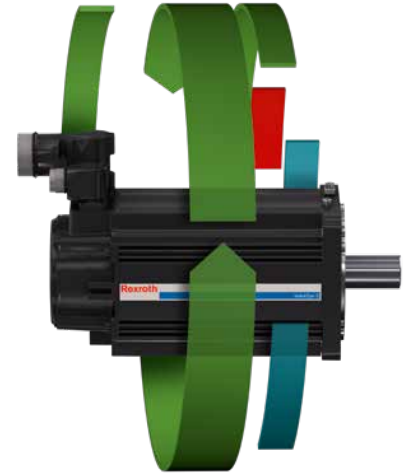
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When it comes to service, there is one factor that is taking on an increasingly important role: Sustainability. In the consumer sector, it is already an established concept. Remanufacturing and selling used products is a booming business. There is increasing demand for refurbished smartphones for example. The world of production is also opening up more and more to sustainability and discovering this important value creation factor. After all, there is no way around it now.



← Get to know the
repair service

The remanufacturing concept is already widespread in the automotive world for example. This can be seen in remanufactured components such as motors and turbochargers. In the field of e-mobility, a market is also opening up for remanufactured machines and systems. And there is great value creation potential in the automation sector too. That is why we are using remanufacturing in more and more suitable areas. For us, being sustainable means taking on responsibility.”



Remanufacturing, e.g., gives a used engine the quality standard of a new product.

We spoke to Jürgen Beeger, Director of the Repairs and Spare Parts within Bosch Rexroth's Automation Business Unit:

“Remanufacturing in particular is now recognized as an ideal service concept in the context of sustainability. Through refabrication, a used control unit for example is restored to the same quality standard as a new unit. All components and modules are thoroughly checked. In most cases, this involves fully dismantling the unit. At the end of the process, the remanufactured product offers a quality standard equivalent to that of a new product. The product is also fully updated from a technical perspective and then has the same warranty as a new product.

Remanufactured products offer numerous benefits. They cost less than new products because fewer resources are required. Remanufacturing saves energy and materials. At the same time, fewer greenhouse gas emissions and less waste are produced. A remanufactured product thus conserves valuable primary resources and reduces the CO₂ footprint. There are also cost benefits for customers – with the same product quality. The availability of spare parts is increased at the same time and downtimes in factories can be reduced – significantly in some cases.



Jürgen Beeger
Director Repairs & Spare
Parts, Business Unit
Automation

THE ctrlX CORE F APPLI

ctrlX CORE can provide a solution in virtually any situation where control systems are needed. But what makes it such an all-rounder? Its end-to-end, open and flexible architecture allows the control system to adapt to any requirements. The Linux-based multi-core technology breaks down the boundaries between platforms, the embedded system and drive-based technology. ctrlX CORE is also app-based and has a modular structure. It is available in various versions with different performance levels.





It is known in industrial automation as the ultra-compact and high-performance control system: the ctrlX CORE. The solution is the heart of the ctrlX AUTOMATION platform and the nucleus for industrial control systems of the future. But it is capable of much more. If ctrlX CORE is driving a high-tech fitness machine, controlling an automated barrier system or supporting a quick charging solution for driverless transport systems, it can do so just as well as in numerous other areas of use.

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More about
ctrlX CORE



BRINGS MOVEMENT TO NUMEROUS AREAS OF APPLICATION

The properties of the control system allow it to be used in areas ranging from dedicated PLC applications on the machine market and motion applications for simple handling tasks to highly dynamic machines. There are also numerous use cases outside conventional automation solutions, e.g. in building automation, traffic management or entertainment.

The control system offers high performance in a cutting-edge fitness machine for example. The device works with isokinetic biofeedback technology for optimum muscle loading and allows brief but effective training sessions with measurable results. ctrlX CORE controls the axes in the control cabinet which moves the wooden boards that provide training. The control cabinet contains not only the control system but also the drive controller (IndraDrive), motors and ball screw assemblies from Bosch Rexroth. The app-based software ctrlX MOTION and the EtherCAT Master which provides numerous connection options are used on the control system. Integrated safety functions are also present in order to protect users' data. It is therefore more than just a control system – it is a complete solution for demanding tasks in futuristic applications.



Compact control for opening and closing of a barrier system

GREAT VERSATILITY: APPS FOR AN UNLIMITED RANGE OF APPLICATIONS

ctrlX CORE scores particularly well with its app technology, which allows an extended range of functions and gives the controller almost unlimited capabilities. Developers can draw from the full range: They can simply select the functions they need or use any open source software. Bosch Rexroth is expanding the ctrlX AUTOMATION platform all the time, adding its own and third-party apps. Users can also operate software that they developed themselves on the open platform and turn their expert knowledge in the form of functions in all common programming languages into apps. These can be operated on ctrlX CORE and easily assigned and updated. The various applications can be sourced from the ctrlX Store.

ctrlX CORE thus grows with your requirements. It is gradually gaining ground in more and more areas of application.

AN ALL-ROUNDER IN BUILDING AUTOMATION

Especially in building automation very compact solutions are in demand. The ctrlX CORE is therefore ideal for use in this segment and has numerous application options. The high-performance control system relieves the burden on people in many areas where automation is needed. It is increasingly taking over laborious and repetitive manual tasks such as counting the number of people in buildings. It supports not only automated and thus more efficient processes – it also ensures great reliability and precision. In the following use case, for example, it integrates perfectly with the Aviotec camera from Bosch.

Here is how it works: The camera system detects and counts people crossing a virtual line. This information / counter readings are read by ctrlX CORE and compared with the maximum and minimum values. If the maximum number of people is reached, the doors are closed. Once the number of people falls, the doors open again. The information can be passed on to the control center as a visualization so that security staff have an overview of the situation at all times.

ctrlX CORE can also control a barrier system in a truck parking area of a factory for example. With its small size, the system fits perfectly into the system. Here too, it is used in conjunction with the Bosch camera. Virtual fields can be set up within the camera. With this function, the camera can see whether an object has left

The ctrlX CORE brings movement to a modern fitness machine

the field or another object has entered or moved across it. ctrlX CORE records the results from the camera so that they can then trigger an action. The control system receives and converts this information into an action, i.e. the command to open and close the barrier. The necessary approvals can be defined within ctrlX CORE.

These use cases are indicative of the many possible applications in building automation. Given its openness, the control system can easily be combined with existing and future systems. This results in an overall solution which is very attractive from an economic point of view and easy to implement.

FULL POWER DURING PITSTOPS FOR AGVS

ctrlX CORE is gaining ground in e-mobility for industry too. It is proving its worth in AGVs (Automated Guided Vehicles) for example. Modern driverless transfer systems are ideal as a way of speeding up material flows within companies. However, they need to be supplied with energy as quickly and conveniently as possible in order for them to perform at their best and always stay in the flow.

With automated logistics processes which take place without human intervention, the energy supply too must be independent. The charging system must also be able to adapt to the existing infrastructure and environment given the great flexibility of AGV processes.

An automated charging device helps to make full use of the potential of industrial e-mobility. With solutions like these, vehicles which require high performance can be charged extremely quickly without human assistance. In conjunction with the ctrlX CORE control system, significant advantages such as a high-power transfer in the shortest possible time result during charging.

Special plug-in connectors are designed to meet the requirements of fully electric mobility. For example, they enable high power to be transmitted within a short time, as a result of which the energy storage system can be recharged quickly. This allows, for example, the quiet and emission-free transport of goods by AGV without integrating an uneconomical, large and heavy battery. Thanks to the rapid charging process, the amount of energy to be stored can be reduced. An integrated self-cleaning effect during each mating process eliminates the need for time-consuming cleaning and maintenance work, so that high currents can be transmitted permanently.

The automatic charging system communicates not only with the vehicle – it also communicates with the higher-level software for controlling and monitoring the charging process. Thanks to the turnkey automation solution from Bosch Rexroth, the vehicle is connected to the charging station. The ctrlX CORE control system is used here in combination with the IndraDrive Cs compact inverter.

With the integration of ctrlX CORE, the fast-charging solution can check that the components are connected securely, manage the safety aspects relating to the supply of high power and compensate for any movement of a vehicle. Because the control system is designed to be open and app-based,

new functions can be added to the current solution at any time. This ensures modularity and scalability for all requirements.

ULTRA-COMPACT AND YET REALLY BIG

Whether it be at the gym, at the barrier or charging e-mobiles – wherever the compact ctrlX CORE is used, it proves just what it is capable of. The control system can be used in numerous other sectors and applications and is highly adaptive too. As a result, it can be tailored to all individual needs. ctrlX CORE consolidates the advantages of previous stand-alone solutions into one system, makes them easy to use and thus points the way for controlling a new era.

Control system supports automated loading of AGV



COMPACTNESS AND PERFORMANCE IN HIGH-BAY WAREHOUSES

Intralogistics is changing. In many areas, mobile and flexible assistants are replacing rigid transport units or manual processes. The company DAMBACH Lagersysteme is bringing the benefits of automation to the pallet warehouse. The DAMBACH COMPACT SHUTTLE allows pallets in high-bay warehouses to be stored and retrieved even more efficiently. The shuttle is controlled by the space-saving, high-performance ctrlX CORE system and can thus play to its strengths in an ideal manner.

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It takes less than two seconds to pick up or put down a load. Up to 1,500 kilograms can be picked up and transported reliably and quickly. This is what the DAMBACH COMPACT SHUTTLE is capable of, making it ideal for storing and retrieving large load carriers, e.g. Euro pallets, in high-bay warehouse channels. Together with storage and retrieval machines or a transport vehicle, pallets can be stored in a particularly compact manner with multi-depth storage.

“Our previous solution was in use for over 10 years but was reaching its limits due to problems with keeping spare parts and increased performance and flexibility requirements. We therefore decided to upgrade the existing shuttle or develop a new one. This resulted in the new DAMBACH COMPACT SHUTTLE 2.0,” explained Thorsten Veit, Head of Control Technology at DAMBACH Lagersysteme GmbH & Co. KG.



ANCE



THE AIM: IMPROVED DYNAMICS AND EFFICIENCY IN HIGH-BAY WAREHOUSES

A key requirement when developing the new shuttle system was that it could achieve an even higher packing density on the shelves – with optimized energy requirements. The channel depth and thus the number of storage places should be increased as a result. “Short storage and retrieval times are also important in order to make a warehouse as efficient as possible. In order to achieve these aims, we need a compact design with a high-power density. We therefore decided to integrate ctrlX CORE into our shuttle as the control system,” said Thorsten Veit.

In addition to the control system, the DAMBACH shuttle uses servo drives controlled by ctrlX CORE for the axis movements “running and lifting”. Among other things, DAMBACH used the motor-integrated IndraDrive Mi servo drive from Bosch Rexroth. The shuttle runs completely independently with its own power supply. This is provided via PowerCaps for energy storage purposes. As a result the

DAMBACH
LAGERSYSTEME

system can run independently of the storage and retrieval machine in the warehouse channels and store and retrieve goods. The Power Caps can be recharged in just a few seconds on the storage and retrieval machine or transport vehicle, which means that the system can operate 24/7 without interruptions.

“We decided to use components from Bosch Rexroth because of their compact, high-performance design. This is a key advantage compared to other rival solutions. It saves even more space in the shuttle, and we can use the freed-up space to store our shuttle caps. The performance of the DAMBACH COMPACT SHUTTLE 2.0 was improved further – with an increased operating time,”, explained Thorsten Veit.



BROWNFIELD TEST PASSED²₁

He describes the development of the joint solution with Bosch Rexroth: *“The actual development time was about half a year and included electrical planning and software creation. One of our customers agreed to test the new shuttle system. As a result, we could see how it performed when operating in an existing warehouse.”*

The exterior dimensions were a key technical requirement as the shuttle had to fit in existing set-ups too. Space in the shuttle was saved by reducing its height. This can be in existing warehouses by using appropriate adapter plates. As a result, the DAMBACH COMPACT SHUTTLE is 100 percent compatible with the old system. Communication with the higher-level control system is possible via Profinet/IO and Ethernet/IP.

GREATER MOVEMENT AND FREEDOM THANKS TO USEFUL EXPANSIONS

Thorsten Veit summarizes the benefits: *“The ctrlX CORE is light, small and open. These properties made it extremely easy to integrate. The engineering and operation are equally straightforward. Programming the system requires no specialist knowledge. And the solution grows along with your requirements. It can easily be expanded with apps such as NodeRed for IoT applications. Thanks to the open platform design, new functions can be added to the shuttle at any time, thus ensuring that it remains future-proof and always on the move.”*

X HIGH-SPEED MILLING FOR THE AUTO- MOTIVE SECTOR

2
2

What do dental implants and vehicle body parts have in common? Both product groups have to meet the highest demands in terms of precision and economic efficiency. The mechanical engineering companies Akurate and CIMT therefore came up with a very special transformation: They turned a high-speed milling machine for dental products into a high-performance automatic machining system for the automotive industry. An integrated package of solutions from Bosch Rexroth made this possible.



As sister companies, Akurate und CIMT develop and build measuring and high-speed milling machines. They are used in the medical and dental sectors as well as in the automotive and aviation industry. Given their expertise within these sectors, both companies were able to rise to the challenge of converting a dental machine to mass-produce vehicle body parts.

The idea for this unusual project came from an automotive supplier who was looking for a robust, fully automatic high-speed milling machine in order to machine tubes made from high-strength steel and aluminum. ***“As a basis, we chose a high-performance machine from the dental sector and then thought about how we could further develop it for use in the automotive sector,”*** recalled Andreas Kirsch, Managing Director of CIMT and Akurate. ***“It quickly became clear that our project would only succeed with an integrated approach. In view of this, we decided to involve our long-standing partner Bosch Rexroth. They were able to provide the relevant application know-how along with the necessary best-in-class components – all from a single source.”***



FROM DENTAL IMPLANTS TO VEHICLE BODY PARTS

The application specialists at Bosch Rexroth were immediately impressed by the plan. Account Development Manager Nina Heckt said: ***“During this project, we were able to make full use of our strengths as an integrated automation specialist. Our highly integrative standard modules allowed us to create a futuristic generation of machines which meets all requirements as regards quality, performance and connectivity.”***

Instead of small blanks for dental implants, the Akurate Pi5 Tube, implemented with the help of Bosch Rexroth, now processes tubes up to seven meters long, which are automatically loaded and unloaded by three collaborative robots. A linear feed axis moves the work pieces into the milling machine where they are cut into 70 cm sections. The pieces are then milled and drilled as required. The rapid five-axis machining process is simulated in real time and shown on a display so that the process is transparent and understandable at all times. Operating staff can intervene immediately if necessary.

For the substructure of the machine, Bosch Rexroth supplied a complete range of assembly systems including the subframe for the feed axis, the control cabinet and the base for the front. The complete mechanical systems including the ball screw assembly and roller rail systems come from the linear motion technology portfolio. The overall package contains not only the spindle motor but also the drive and control systems including controllers and converters. The Pi5 Tube is controlled by a high-performance IndraMotion MTX advanced system. The industrial PC and the operating terminal are also from Bosch Rexroth. The experts added a range of automatic functions to the HMI software for the dental machine.

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Directly to
the video



SMART WITH ctrlX AUTOMATION

With the new high-speed milling machine, Akurate also opens the door to the Smart Factory. After all, the machine manufacturer already uses the ctrlX AUTOMATION toolbox in certain areas. The modules used in the first development stage cover a range of areas including cyber security: Special software with a fire-wall runs on the ctrlX CORE control hardware in order to protect against hacker attacks and unauthorized access. Akurate is also planning predictive maintenance applications based on the automation solution and OPC UA. ***“We want to take full advantage of ctrlX AUTOMATION on a step-by-step basis while still using other apps”***, said Andreas Kirsch.

QUICKER AND MUCH MORE COMPACT THAN LASER CUTTING MACHINES

With this further development, Akurate has launched a type of machine which achieves a remarkable throughput thanks to its high degree of automation. With a cycle time of around 20 seconds, it beats even benchmark laser cutting machines. Unlike with these rival machines, even extruded sections made of aluminum can be machined precisely, with no burrs and without the use of fluids. As Kirsch pointed out, the new system can take up as little as one tenth of the space normally required.

“Together with our partner Bosch Rexroth, we have come up with a genuine innovation in the field of automotive engineering and vehicle body construction”, said Kirsch. ***“I am sure that the competition will cut their teeth on this machine.”***



BATTERY PRODUCTION BREAKS RECORDS

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4

Whether driven by electric vehicles, smartphones or other devices, batteries are experiencing a real surge in demand. It is therefore important to quickly put in place new production capacities. DWFritz Automation is leading the way here.

It has provided a North American battery manufacturer with a new, flexible and fully automated battery production line with high throughput – and in record time. As a strategic partner, Bosch Rexroth contributed various skills that speeded up the development process and project work.

“At DWFritz, micrometers and milliseconds matter. The manufacturing challenges our customers present us with can only be met with high speeds, advanced material handling, process automation and extremely high precision”, said Chris Povich, CSO at DWFritz Automation.

Watch the
video



The North American battery manufacturer placed the same requirements on its new, fully automated assembly line. Today's batteries are becoming smaller and smaller and offer ever higher energy densities. However, battery manufacturing, regardless of size and shape, is a multi-stage process in which dissimilar materials are brought together to form the battery's cathode and anode. Together with the conductor, this creates a finished end product. Production must therefore be geared exactly to the specific needs.

DWFRITZ[®]
PRECISION AUTOMATION



HIGH PERFORMANCE HAND IN HAND

Given the complexity of the project and the short development time, a strategic partner with experience in a number of technological areas and the ability to work in a simultaneous engineering environment was needed. The company therefore opted for Bosch Rexroth.

According to Povich, several key development and operational requirements were key in the decision: ***“The manufacturing line had to operate at very high speeds. The limited space was also a challenge. The production line is more than 30 meters long, but it had to fit into a very small space. At the same time, the motion platform must give very robust motion control commands. One system has over 50 movement axes.”***

The biggest challenge was the short time. In the past, DWFritz worked with a number of suppliers. But it would have taken at least 10 to 15 weeks to get these various suppliers working together. For this project, only 12 weeks were available for planning and construction and another eight weeks for procurement. We therefore needed to work with a partner like Bosch Rexroth that could provide both the technology and the engineering support.

ctrlX AUTOMATION CRUCIAL FOR THE SUCCESS OF THE PROJECT

Bosch Rexroth provided a wide range of technologies and systems in order to set up a complex multi-technology product line for battery production. These include:

- Several conveyor systems for transporting batteries within and between the production cells
- Linear precision modules for gantry-style handling systems
- Aluminum structured profiles
- A complete solution with advanced motion control and drive systems, some of them from the new ctrlX AUTOMATION toolbox.

DWFritz President Mukesh Dulani said: ***“One of our main goals was to put in place an open machine control architecture so that our customer's servers can query real-time data straight from the machine. The ctrlX AUTOMATION system and the associated ctrlX CORE control platform were not only responsible for the success of the project, they also allow our customer to build future production lines using the same software and hardware platform.”***

Thanks to web-based system configuration, the platform can be launched quickly, easily and without having to install additional software. In the completely virtual development environment, the team was

able to create a "digital twin" of the communication platform between the MES and the automation controllers, which saved a great deal of time.

Dave Hull, Regional Vice President of Bosch Rexroth, explained: ***“Thanks to a digital twin, the engineers at DWFritz had access to a software platform that they could use straight away. Months before they received the hardware, they were already testing all the systems for functionality and for their ability to interface with the battery manufacturer's MES system. This gave us a huge head start.”***



X — CHANGE

ctrlX | developR
AUTOMATION | challenge



Jasmin Heim
Director Marketing,
Business Unit
Automation

DEVELOPING THE FUTURE

Developing future-viable new solutions from ideas – that was one of the goals of the ctrlX developR Challenge. The international competition motivated developers from all over the world to strive for excellence and exceeded all expectations. It revealed unexpected business opportunities offered by ctrlX AUTOMATION, led to new connections, was a media driving force and was above all one thing: great fun!

The ctrlX developR Challenge brought together the most talented developers with the automation system from Bosch Rexroth. On the basis of ctrlX AUTOMATION and the ctrlX CORE control platform, the 25 participants selected from 68 applications from all over the world broke completely new ground in automation. There were lots of valuable lessons.

“It was really exciting to see what tasks beyond classic factory automation can be performed with ctrlX CORE. Thanks to the open control architecture, a range of new

applications was possible. We had not even thought about some of these ourselves. The participants gave us valuable food for thought regarding future business fields and challenged us when it comes to implementing modern technologies such as machine learning. The challenge provided some very interesting input for further developing ctrlX AUTOMATION”, said Jasmin Heim, Director of Marketing within Bosch Rexroth’s Automation Business Unit.

AND THE WINNERS ARE ...

On July 13th, 2022, all the sleepless nights, excitement and passion finally paid off. At the two-day ctrlX developR Conference at the TechPark in Ulm, Germany the finalists presented their results during the pitch event. The winners are:



Andreas Schiffler (DE):
"Anomaly detection using Isolation Forest"



Phillip Stanley-Marbell (GB):
"Estimating uncertainties in empirical sensor data for faster and more reliable AI applications"



Matthias Dittrich (DE):
"IoT solution for wireless sensor systems based on MQTT"

The special prize for students went to:
Sabari Kannan Muthalagu (DE):
"Automation system for controlling smoke extraction for soldering stations in laboratories"



Cesare Bornaghi (IT):
"Connecting industrial cameras with ctrlX AUTOMATION and adding AI algorithms"

They all impressed the jury with their innovative technological approaches, the clever way in which they put their ideas into practice and their great enthusiasm.

Jasmin Heim summed up: *"The competition has shown that ctrlX AUTOMATION offers countless possibilities and is easy to use. In addition, we have promoted exchange. All participants and mentors are now part of our community. Some have networked with each other to deepen common topics. This precisely supports our co-creation approach: the best solutions are created in collaboration - ideally from now on regularly in a ctrlX developR Challenge. We are therefore planning further competitions in the respective regions."*



More about the
ctrlX developR
Challenge





WE LOVE SOFTWARE

XCON 2022 got software fans' pulses racing. The first ctrlX developR Conference was a platform for developers and sector experts who met at the TechPark of the Bosch Rexroth Customer and Innovation Center in Ulm, Germany on July 13 and 14, 2022. 2 days, 11 keynotes and 13 breakout sessions focusing on the topic "Automation is software development" inspired the 220 participants.

ctrlX developR
XCON2022



LIVES LONG
AND PROSPER
THANKS TO
LIGHTSPEED
SERVICE

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Event Video

rexroth
Bosch Company

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GAMM WINNERS

„With ctrlX AUTOMATION we changed the game. In the process we gained a lot. From experience, networking with interesting people and companies to a lot of motivation for the future. The numerous awards for innovation, idea, marketing strategy and technology are the confirmation from the market that our joint creativity moves great things.”



Jasmin Heim
Director Marketing,
Business Unit
Automation

X CHANGE

03/2020

RED DOT AWARD
ctrlX CORE

05/2020

GERMAN INNOVATION AWARD

10/2020

PALMARÈS
TECHNOLOGIQUES
– MESURES

01/2021

ROBERT BOSCH
INNOVATION AWARD

04/2021

PRODUCTS OF THE YEAR:
“CONTROLLING AND
REGULATING”

04/2021

PLANT ENGINEERING
PRODUCT OF THE YEAR:
GOLD & SILVER
ctrlX AUTOMATION & ctrlX DRIVE

06/2021

DER DEUTSCHE
INNOVATIONSPREIS

07/2021

GERMAN AWARD FOR
ONLINE COMMUNICATION

02/2022

ENGINEERS’ CHOICE AWARDS

06/2022

HERMES AWARD:
NOMINATION FOR ctrlX CORE

06/2022

RED DOT AWARD
ctrlX SAFETY

06/2022

BCM AWARD: SHORTLIST

FREE. OPEN. SHAPING THE FUTURE.

Solve classic control tasks today, get robots moving tomorrow and make the leap into the Industry 4.0 world the day after tomorrow. It can be so simple. With ctrlX AUTOMATION.

The automation platform reduces components and engineering effort by 30 to 50% with the Linux real-time operating system, open standards, app programming technology, web-based engineering and a comprehensive IoT connection.

3
2



ctrlX CORE
Control platform



ctrlX OS
Linux operating system



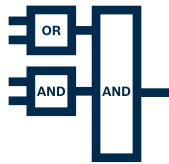
ctrlX WORKS
Engineering software toolbox



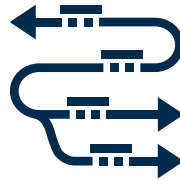
ctrlX IOT
IOT solutions



ctrlX MOTION
Motion, robotics & CNC software



ctrlX PLC
PLC solutions



ctrlX FLOW
Transfer systems



ctrlX I/O
I/O systems



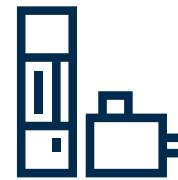
ctrlX IPC
Industrial PC



ctrlX HMI
HMI solutions



ctrlX SAFETY
Safety solutions



ctrlX DRIVE
Drives & motors

IMPRINT

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TWO STEPS AHEAD

ctrlX
AUTOMATION

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