

NEXT.assembly

Final assembly on the NEXT.level

One-Stop-Shop solutions from Dürr

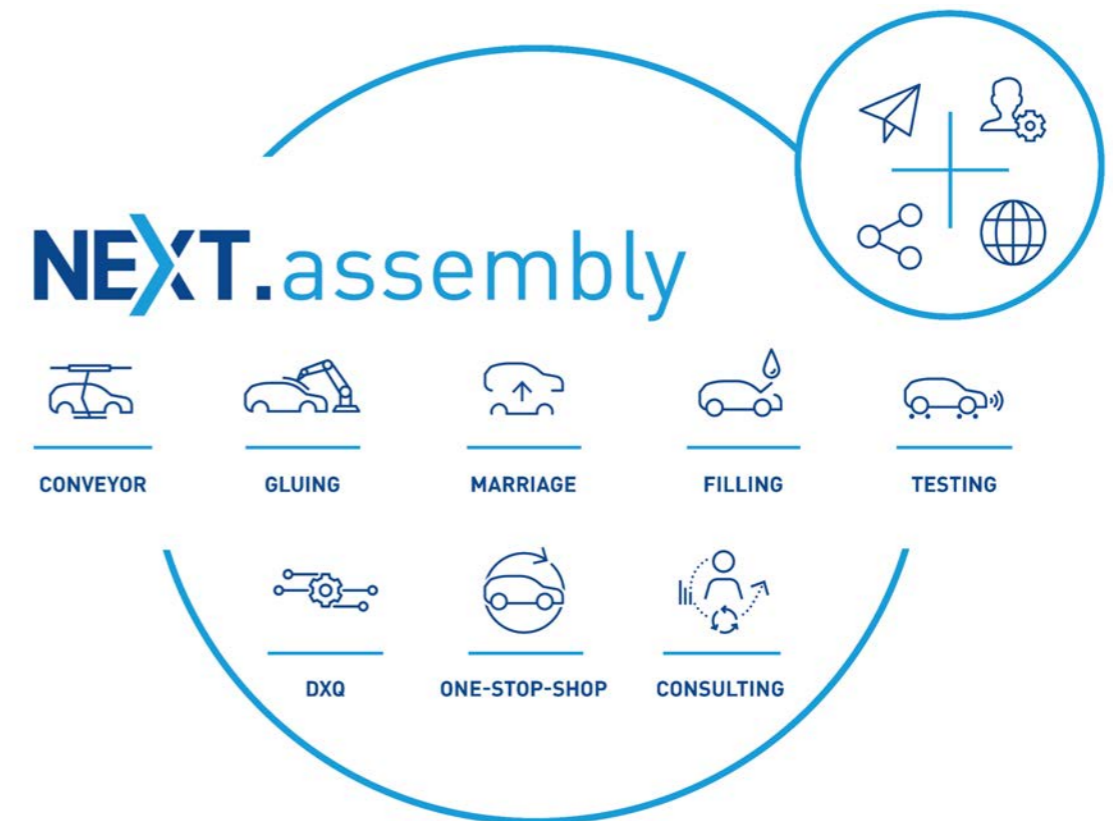
NEXT.assembly



Driving your efficiency in final assembly

Final assembly of the future

Technical expertise and synergies on all levels



Dürr is setting new standards of efficiency in final assembly with NEXT.assembly. We focus on the entire final assembly line and look beyond the individual components. This end-to-end approach is our response to the challenges of the future.

NEXT.assembly incorporates our entire range of technology and consulting products and services to make the vehicle assembly process as efficient as possible. The modules comprise our conveyor, gluing, marriage, filling and testing systems, together with digital solutions for the intelligent management of the entire production process. This includes comprehensive consulting for the advance planning of greenfield and brownfield assembly lines. Dürr's portfolio consists of a modular system with individual components or a complete solution (One-Stop-Shop). This creates synergies for customers on all levels: simple communication, expert knowledge, fewer interfaces and a global presence.

PREPARED FOR THE FUTURE



The final assembly of the future will not be a one-size-fits-all solution. Instead it will be designed to meet each OEM's requirements:

[Flexibility](#)

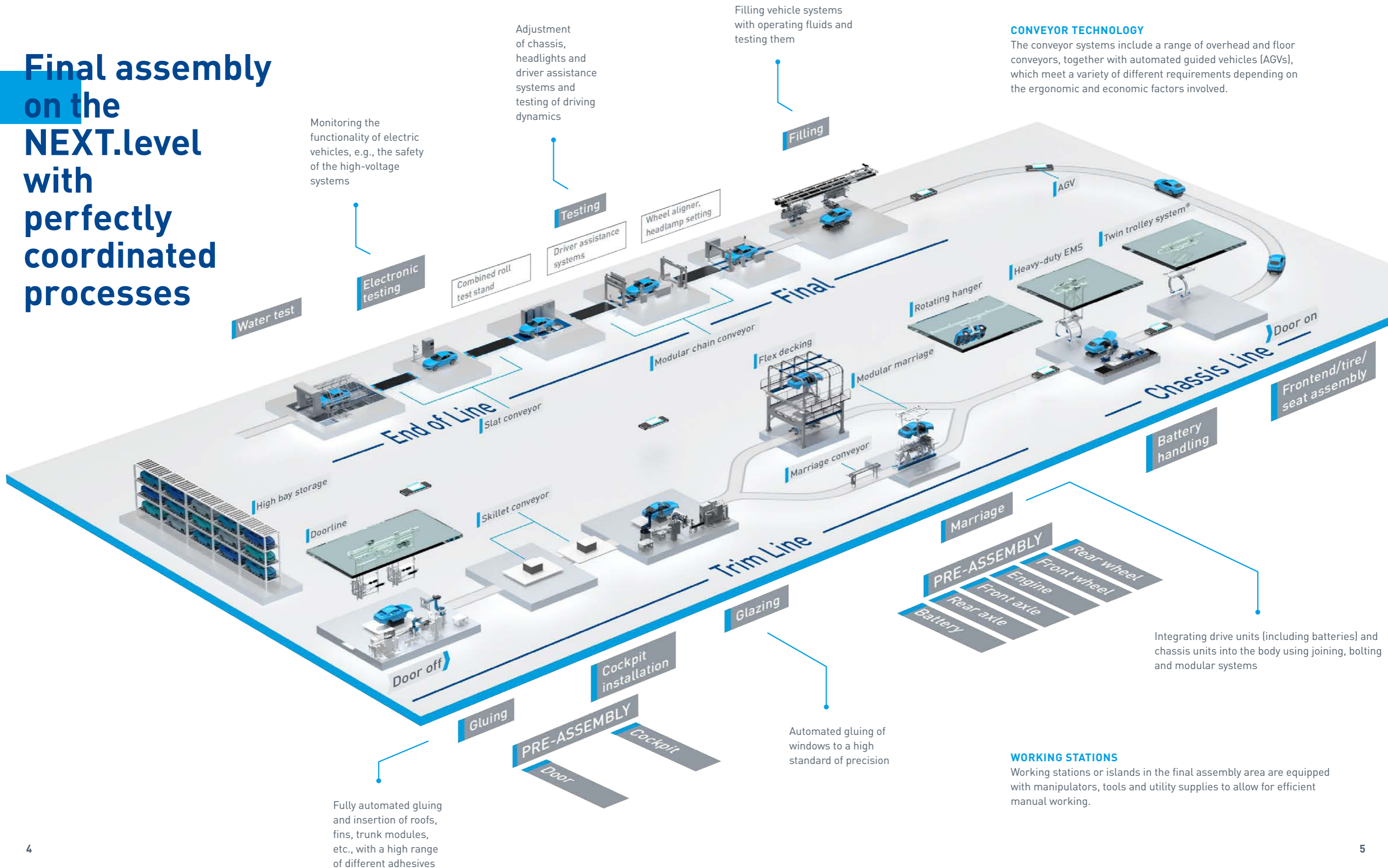
[Adaptability](#)

[Digitization](#)

[Connectivity](#)

[Sustainability](#)

Final assembly on the NEXT.level with perfectly coordinated processes



Monitoring the functionality of electric vehicles, e.g., the safety of the high-voltage systems

Adjustment of chassis, headlights and driver assistance systems and testing of driving dynamics

Filling vehicle systems with operating fluids and testing them

CONVEYOR TECHNOLOGY
The conveyor systems include a range of overhead and floor conveyors, together with automated guided vehicles (AGVs), which meet a variety of different requirements depending on the ergonomic and economic factors involved.

Water test

Electronic testing

Combined roll test stand

Testing
Driver assistance systems

Wheel aligner, headlamp setting

Filling

AGV

Twin trolley system[®]

Heavy-duty EMS

Rotating hanger

Chassis Line
Door on

Frontend/tire/seat assembly

Battery handling

High bay storage

Doorline

Skillet conveyor

Modular chain conveyor

Flex decking

Modular marriage

Marriage conveyor

Marriage

PRE-ASSEMBLY

Rear wheel
Front wheel
Engine
Front axle
Rear axle

Integrating drive units (including batteries) and chassis units into the body using joining, bolting and modular systems

Fully automated gluing and insertion of roofs, fins, trunk modules, etc., with a high range of different adhesives

Gluing

PRE-ASSEMBLY
Door

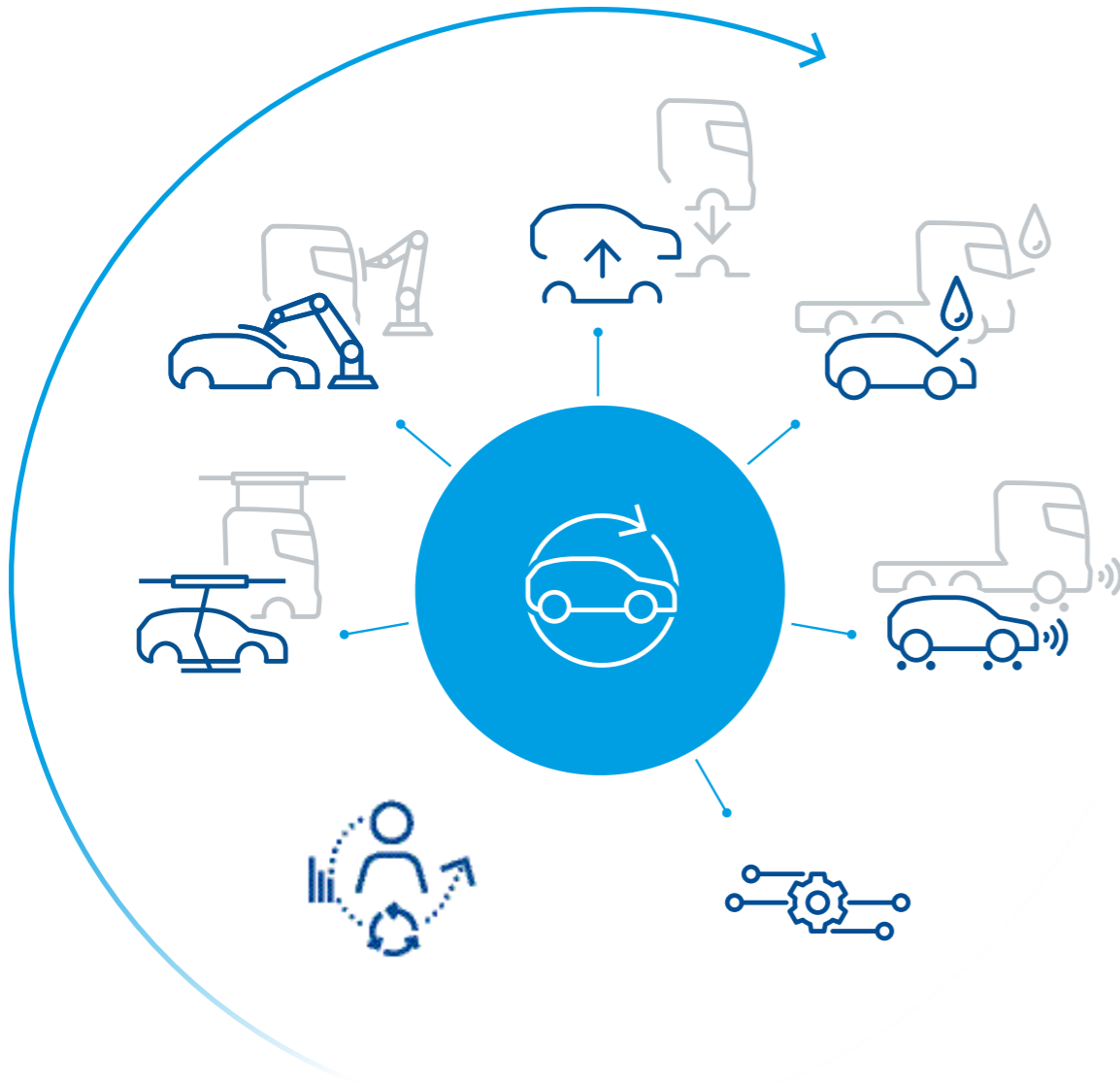
Cockpit installation

Cockpit

Glazing

Automated gluing of windows to a high standard of precision

WORKING STATIONS
Working stations or islands in the final assembly area are equipped with manipulators, tools and utility supplies to allow for efficient manual working.



One-Stop-Shop

Choose exactly what you need from the largest range available on the market.

Final assembly equipment from Dürr for:

- All types of vehicles – from cars and trucks to motorcycles
- All drive technologies – from combustion engines to batteries
- All production volumes – from large to small
- All quality and market requirements

Dürr Consulting

Individual consulting improves sustainability and efficiency and gives a greater competitive advantage

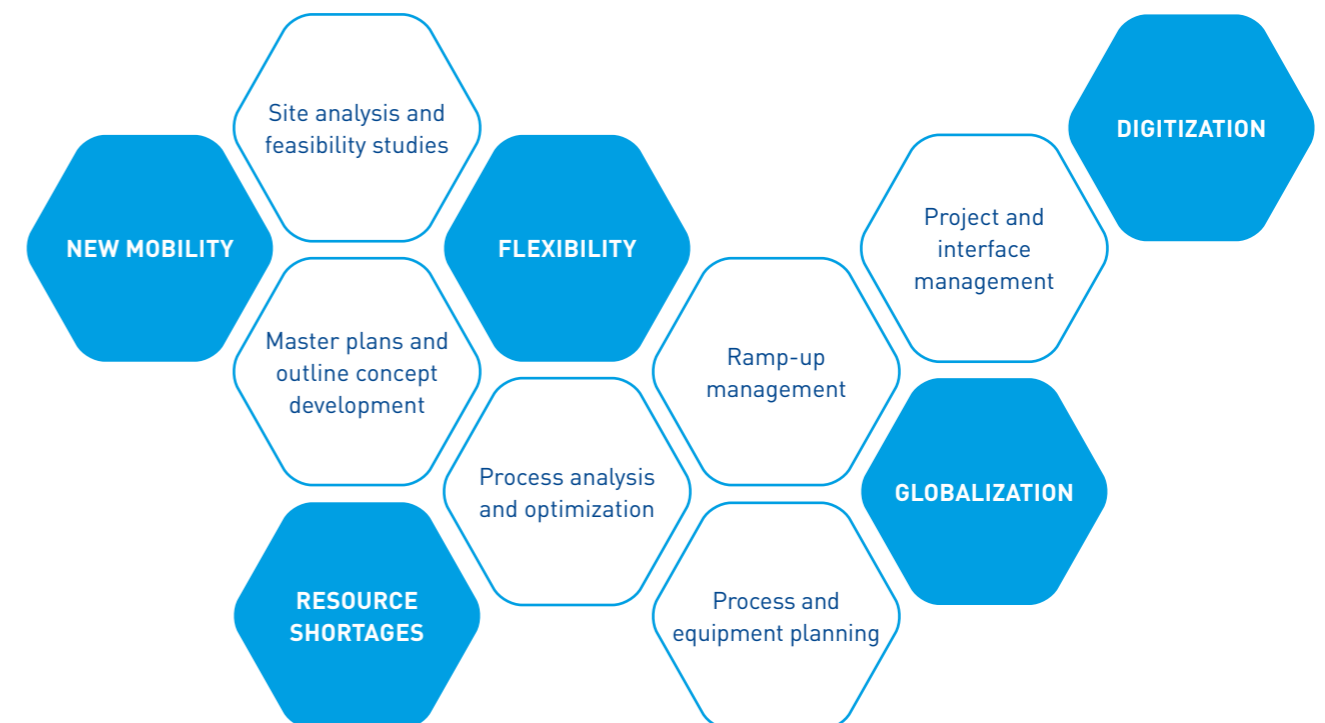
Dürr Consulting brings together more than 30 years of experience and expertise in advising decision-makers in a technical production environment. We provide consulting services to almost all the leading manufacturers and start-ups in the automotive, engineering and transport industries throughout the world. Dürr Consulting also advises tier 1 suppliers, machinery and plant construction firms and component manufacturers. We work with them to plan their future by making their production processes more competitive in the long term. Our success in this area is based on the efficient integration of technology, innovation and digitization, plus production system design and process optimization.

Our customers' main objective is to increase overall equipment effectiveness (OEE). Using sophisticated project management methods, an entrepreneurial approach and in-depth industry knowledge, our global team of consultants advises, plans and manages you worldwide.

YOUR ADDED VALUE



- Process and equipment expertise, together with innovative ability, from the Dürr Group
- Integrated planning, including master plans, logistics, processes, organization and IT
- Global experience with leading manufacturers and start-ups
- Project-specific solutions based on experience from more than 1000 projects in high-cost and low-cost countries



Conveyor

Suitable for all ergonomic and economic requirements

For final assembly, Dürr supplies a variety of overhead and floor conveyors, together with automated guided vehicles (AGVs), which meet a variety of different requirements, depending on the ergonomic and cost factors involved. The products in the portfolio are used for the pre-assembly of components and for unit assembly (marriage).

OVERHEAD CONVEYORS

Dürr's conveyor systems are characterized by their flexibility, customized working positions and high levels of accessibility. The height-adjustable load-bearing devices (hangers) with scissor lifts have a stroke of up to 4.5m and can be used in combination with electric monorail systems or the Twin Trolley System (T.T.S.®). The scissor lift stabilizes the hanger and allows for individual height adjustment in every work zone. Body carriers are available as C-, T- or four-arm hangers. The bodies are lifted by a polyurethane belt with integrated steel cables which is designed for a payload of up to 3 t. The scissor lifts and standard and rotating hangers mounted on the electric monorail systems or on the T.T.S.® meet the highest standards of ergonomics and power and enable employees to work at the ideal height.

FLOOR CONVEYORS

On the floor conveyors and skilnet platform systems with integrated lifting devices, employees can work on the bodies while they are being continuously transported together with the work platform at a low speed. The advantages of the skilnet platform system include its compact design (a height of 270 mm including the scissor lift table), operation without a pit and a stroke of up to 1.45 m. In addition, there are no specific requirements that the building must meet and the system is easily accessible.



Skilnet platform with integrated lift table (bottom right) and heavy-duty EMS with integrated scissor lift (top middle) in a production environment

ProFleet is the most flexible AGV for final assembly



360°
panoramic view with two laser scanners

350 mm
height for the most ergonomic work zone

AUTOMATED GUIDED VEHICLES

One of Dürr's latest developments is ProFleet – an innovative, driverless, non-contact transport system. This has been specially designed for use in final assembly and covers a wide variety of requirements, including transporting bodies, the marriage process and use as a working station. In addition, the vehicle that is being assembled is easily accessible on the ProFleet system, which also meets the highest safety standards and guarantees full protection for employees. The options available include battery power or inductive charging, adaptable payloads, mono-, bi- and omni-directional kinematics and a choice of steering systems.



DIGITAL SOLUTIONS

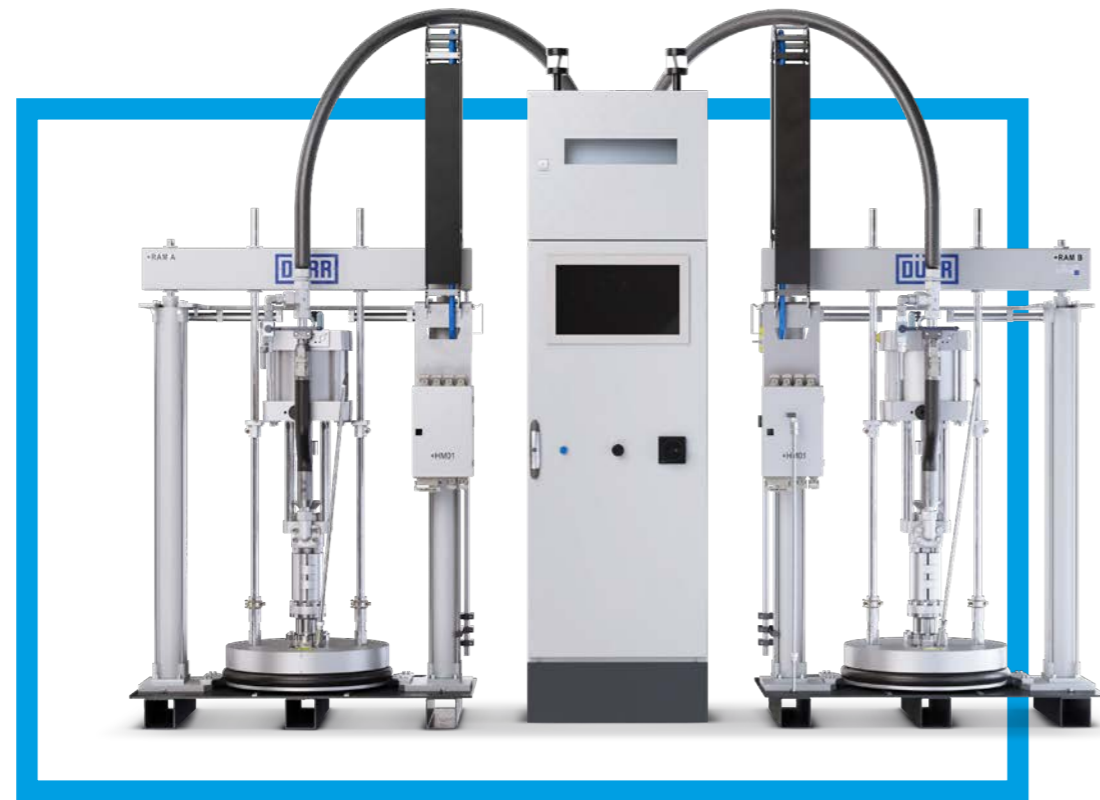
On the basis of years of experience of production systems, Dürr has developed DXQcontrol MES/SCADA as an MES software system with extensive functionality for the automotive industry. The system provides a comprehensive selection of tools specially designed for automotive applications which make it easy for operators to document and monitor the processes and the movements of vehicle bodies.

Gluing

Tailor-made to meet the highest standards of quality, cost-effectiveness and quantity

Glued joints fulfill a wide range of requirements in the automotive industry and these can vary significantly in terms of numbers, material costs, applications and quality. Dürr develops ready-to-use solutions which meet the demands of all of these different tasks. For every type of final assembly application a modular gluing system is available.

To be able to design the perfect automated and semi-automated solutions as well as robot-guided and stationary application systems at an early stage, Dürr runs process simulations which allow it to optimize the workflows and cycles and reduce the commissioning times (identifying the best concept).



The **EcoRAM** material supply system (barrel pump) is used for highly viscous glues

ALL FROM ONE SOURCE

Dürr has comprehensive process knowledge and provides a complete portfolio of products. From simple manual gluing stations through to complex, fully automated robot cells, the range covers the pre-treatment, gluing and assembly of

- Vehicle windows
- Roofs
- Roof reinforcements
- Trunk modules
- Fuel tanks
- Other plastic, CFRP and GFRP components

Dürr helps customers to design the layout of their plants and takes a flexible approach to specific requirements and local conditions. The modular structure of the solutions allows customers' requirements to be met to a high level of accuracy and innovative solutions to be found for even the smallest problems.



The **EcoShot Meter** electric dosing system, when combined with the **EcoGun** applicator, guarantees an interlocking connection from beginning to end of the application bead



Automated window insertion

YOUR ADDED VALUE



- Application, automation and robotics expertise
- Full concept planning for the customer's process
- Shorter start-up duration as a result of process simulation and robot programming
- Shorter cycles and a reduction in adhesive consumption because of the system's high precision



DIGITAL SOLUTIONS

The latest process for the fully automated gluing of windows, known as glazing in line tracking, allows windows to be installed automatically in vehicles on a moving production line. Dürr also provides an innovative HRC (human-robot collaboration) solution to improve the quality of the adhesive application, increase

flexibility, save time, reduce the number of safety devices needed and shorten working distances. The operator is optimally supported in automated gluing processes. In the future, additional intelligent solutions from Dürr (**DXQ**) will increase plant efficiency even further.

Marriage

Modular, scalable automated systems to meet all needs

Dürr combines a comprehensive knowledge of processes from axle assembly through to marriage with an innovative approach. It is constantly developing new solutions for customers to optimize production processes and bring about noticeable reductions in costs, time and resource use. More than 100 marriage systems have already been installed by Dürr for different manufacturers throughout the world.

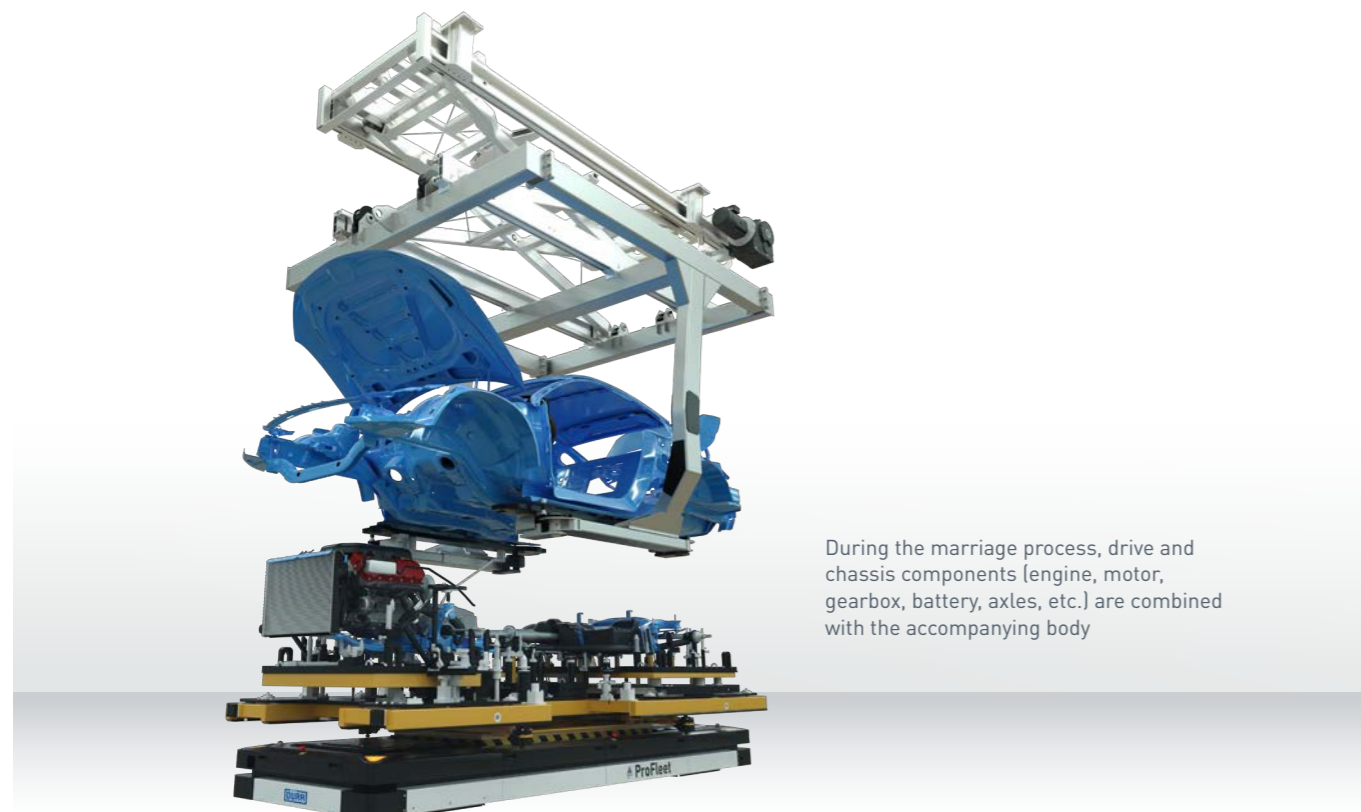
UNIT ASSEMBLY

Unit assembly, or marriage, is the central feature of the final assembly process. The product range includes systems for joining and bolting the drive and chassis units to the body, together with axle alignment stations. Using virtual engineering, the systems are tailored to fulfill customers' specifications so that processes can already be tested and analyzed during the planning phase.

The flexibility of the machines is of particular benefit in mixed production, where different model ranges are assembled on one production line. The automation level of the systems ranges from manual and semi-automatic to fully automated, depending on customers' requirements.

The Flex Decking marriage system covers three layers and provides the greatest possible flexibility and scalability to allow for a high production volume in a small space. Dürr also supplies a horizontal marriage system which is the ideal solution for low to moderate production volumes. The modular system has the same design but is restricted to one level.

Dürr's products for marriage and rear axle alignment in pre-assembly are characterized by innovative solutions and ensure that future generations of vehicles can be integrated cost-effectively into the production process, against the background of the short model lifetimes and faster start-up phases.



During the marriage process, drive and chassis components (engine, motor, gearbox, battery, axles, etc.) are combined with the accompanying body

M8 – M16

a broad variety of possible bolt sizes

1,3 MP

a 3D camera system ensures accurate bolt detection



x-elect takes automation in the marriage process to a new level

INNOVATION

A pioneering feature of the assembly process is the bolt picking system x-elect, an innovative automatic bolt loading system developed by Dürr for direct bolting. This involves a software-guided robot with a gripper picking up the bolts without the need for human intervention. x-elect can use a variety of different bolts, allows new bolts to be integrated into the process quickly and reduces the number of manual work phases in unit assembly. The commissioning process is simulated to enable the compact, space-saving system to be incorporated into existing plants and to prevent any potential risks from occurring. As the system has no pneumatic components, it operates almost silently and is also environmentally friendly.

BOLT SYSTEMS

The x-bolt and x-gun systems have been successfully in use for more than 10 years. x-bolt is a fully automated, modular, scalable bolting system. The x-gun multi-direct bolting system provides the highest possible level of automation because it can insert up to four bolts one after another using one nutrunner.



DIGITAL SOLUTIONS

Innovative equipment and systems in the field of marriage can also be equipped with intelligent software products (DXQ) to enable even more convenient handling, improved maintenance and real-time evaluations of collected machine and quality data. Unplanned downtimes are both reduced and shortened in this way.

Filling

High-performance, high-quality modular products

Filling vehicle systems with operating fluids (for example, ABS systems, engine oils, coolants and air conditioning systems) and testing them are essential features of the final assembly process. **Somac**® filling systems from Dürr are ideally suited to all levels of automation and to configurations and cycles in any vehicle assembly line (cars, trucks, motorcycles, buses, agricultural machines and special machinery). They set new standards of efficiency, ergonomics and quality.

Dürr filling systems are modular and can be adapted to meet customers' requirements with regard to different product models and additional filling and testing processes. All the systems comply with legal regulations concerning the prevention of explosions in pressure equipment and the handling of flammable or hazardous substances.

YOUR ADDED VALUE



Everything from compact machines and production-scale filling systems through to fully automated solutions

Efficient filling processes, a long service life and easy maintenance

Highly modular solutions allow for cost-effective application

Expertise in compliance with specific regulations



Combined filling of all media types with one ProLine filling machine



G4 Blue Adapter in operation

THE NEXT GENERATION OF MACHINES

The modular **Somac**® ProLine Cube guarantees an optimum flow of media and provides an increased vacuum output which can shorten process times by up to 15%. Other features of the compact system include visualization of valve status using LEDs, cluster calibration of sensors and a smaller number of pipes and bolted joints. The ProLine Cube increases overall equipment effectiveness (OEE) in final assembly as a result of its ease of maintenance, availability and process quality.

The accompanying **Somac**® G4 Blue Adapter sets new standards:

- Up to 20% faster
- On average 20% lighter
- New benchmark for ergonomics
- Encapsulated electronic modules
- Improved maintenance



DIGITAL SOLUTIONS

Somac® filling systems are supplied **DXQ**ready, which means that they can be equipped with intelligent software products (**DXQ**) at any time and without additional hardware or software upgrades. These smart solutions increase product quality and the productivity of the machines and

can be used at any time, in any location and on any device (smartphone, tablet, laptop/desktop). E-learning courses and tutorials help customers to solve complex problems or carry out servicing tasks on the machine by providing step-by-step instructions.

Testing

Highest level of process and production reliability at the end of line

Dürr designs and supplies process-oriented solutions for adjusting chassis, headlamps and driver assistance systems and for testing driving dynamics. The aim is always to set new standards of accuracy and reliability and to help the manufacturers of passenger and commercial vehicles to meet increasingly stringent legal regulations concerning safety and fuel consumption. Dürr is constantly developing and enhancing its products and services and introducing new technologies that guarantee the highest level of process and production reliability at the end of line.

PREPARED FOR AUTONOMOUS DRIVING

Dürr's pioneering solutions include automatic headlamps setting using collaborating robots, vehicle-in-the-loop applications for ADAS testing in x-road curve and modular calibration of driver assistance systems for autonomous driving in x-around.

As well as widely used static function tests, x-road curve also offers dynamic function tests and the option of testing driving characteristics in typical traffic situations. Vehicles can be tested at high speeds and the steering system can be included in the tests. This allows real driving situations to be reproduced more accurately than has been possible in the past on roll test stands. x-road curve can be integrated into all existing wheel alignment test stands.

x-around is an innovative, modular multi-sensor calibration test stand that is used to calibrate driver assistance systems for autonomous driving. The concept of the test stand allows calibration equipment to be positioned anywhere around the vehicle with monitors displaying the static and dynamic calibration patterns. This means that x-around is designed for the next generation of assistance systems, including autonomous driving functions.



The x-road curve simulates real driving situations on the screen

FORWARD-LOOKING CUTTING-EDGE TECHNOLOGIES

Innovations introduced by Dürr include the development and use of cutting-edge technologies such as stereophotogrammetry, which allows vehicle geometries to be accurately measured and calibrated with structured LED light by the innovative x-3Dsurface measurement system. The new sensor provides highly accurate measurements and meets additional requirements with regard to tire and body shapes of passenger and commercial vehicles.

5 MP

cameras ensure a high image resolution and precise measurements

10"

for toe / camber the sensor covers a measurement range of 13–23 inches



The x-3Dsurface measurement sensor can be used for cars and trucks



DIGITAL SOLUTIONS

As part of the process of digitalizing its machines, Dürr is constantly developing its **DXQ** software products to provide customers with tailor-made solutions that make operating, maintaining and analyzing the machines easier. Customers have access to powerful, user friendly solutions that improve

plant availability and vehicle quality and range from monitoring machine status from any location to real-time evaluation of processes. The test stands are **DXQ**ready, which means that they can be equipped with intelligent software products at any time without the need for additional hardware or software upgrades.

Let's assemble every vehicle in the world most efficiently

Service

Fast expert support from our service teams around the world

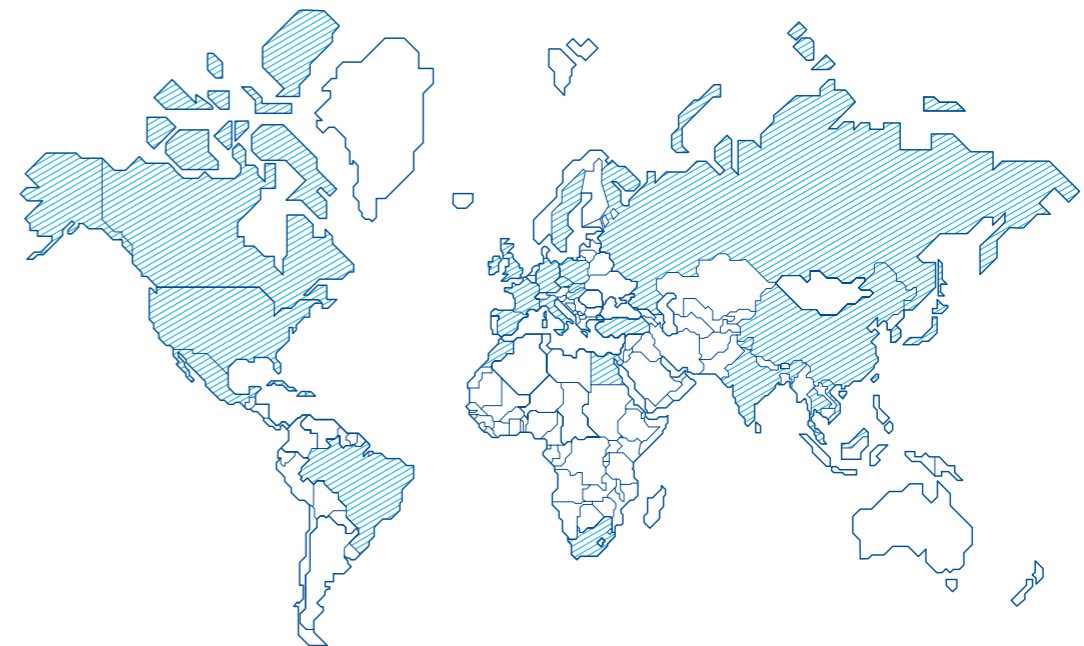
Our global network means that we are always close to our customers' sites. This allows our local specialists to investigate service queries directly and provide fast first-level support. Our customers can take advantage of the short distances and easy access to our teams to discuss specific issues with us. We are constantly working all over the world to develop new customer relationships and to improve existing relationships even further. At the same time, we are driving the digital transformation in the field of service in partnership with our customers.

GLOBAL PRESENCE - LOCAL ACTION



- [Integration of lines into existing final assembly buildings](#)
- [Spare parts, repairs and parts-related advice](#)
- [Product services \(maintenance, upgrades, etc.\)](#)
- [Advice on product optimization](#)
- [Hotline and emergency support](#)
- [Training courses and workshops](#)

DIRECT ACCESS TO OUR LOCAL SERVICE TEAMS



DIGITAL SOLUTIONS

Digital training and learning solutions for our plants and systems supplement face-to-face training and development measures. By providing video tutorials on typical maintenance

and repair tasks and interactive e-learning courses, we give active support to plant and maintenance staff with self-guided learning that is available from any location.

LEADING IN PRODUCTION EFFICIENCY



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