Paint Systems

Complete Paint Shops for the Automotive Industry and its Suppliers

Superlative surface finishing: efficient, flexible, environmentally responsible
Efficient painting is a combination of quality with economy and ecology.

Paint finishing: Thin films of immense importance

Paint application is one of the most demanding aspects of automobile manufacturing. Not only does the paint coating protect the body surface, it also enhances visual appeal by adding color and gloss – important selling points. The technology used must meet high expectations of quality and cost efficiency while remaining environmentally responsible.

The solution: The Dürr range of systems

Leading edge technologies in all key fields combined with our experience in integration enable us to provide turnkey systems of the highest quality and cost efficiency. In the role of General Contractor we accept responsibility for time scheduling, project costs, plant performance and the building and its services.

In addition, all of the products and services included in our full service programs are also available to you individually as items of equipment or service or for plant upgrades and modernization programs.

Prevention, recycling, disposal

Protection of the environment has become a vital aspect of the painting process. Where primary measures at the outset are unable to prevent emissions, secondary measures are necessary to reduce them. Statutory regulations also require the careful use of valuable resources such as water, power and paint raw materials.

Dürr atomizers ensure high precision paint application thus lowering paint consumption. Dürr supplies solutions for all paint systems that are both cost efficient and designed with the environment in mind.

Painted trim items must be perfectly color matched. Dürr supplies the turnkey paint plants to do the job – and the degree of automation can be selected to suit your needs.
The Dürr Ecopaint Test Center: At this location Dürr, working in partnership with the automotive, automotive supply and paint industries, develops and tests tailored system solutions.

**The optimum solution for your application**
You wish to paint particular vehicle models or parts. We use your targets with regard to quality, unit prices, quantities and schedules as the basis for our planning and design.

**Process knowledge**
The first task is to define the process best suited to your application needs. Dürr possesses a wealth of knowledge and experience of the paint finishing processes in use in all parts of the world. Test painting can be carried out at our Ecopaint Test Centers under conditions similar to those achieved during production. Using your test parts and paints, Dürr optimizes the process developed knowledge.

**Planning knowledge**
At the preliminary planning stage – which often employs virtual reality and material flow simulation methods – the path is laid for the optimum overall concept and layout.

**Order execution knowledge**
The project management team directs all activities and is the customer’s main point of contact. This reduces the number of interfaces from detail planning right through to commissioning. The supply of ready-for-installation and pre-set plant modules and the inclusion of pre-commissioning at our workshops allow delivery to site “just-in-time”. This in turn also reduces the overall time required for project completion and launch.

**Product knowledge**
The brand name Ecopaint symbolizes innovation and cost minimization when it comes to turning plans into reality. The modular concept of our Ecopaint product ranges enhances their flexibility of use. Product development is ongoing and focused on continued customer satisfaction.

**Service / Operator model knowledge**
The combination of our understanding of paint application and overall paint process requirements ensures superlative quality while minimizing costs. During the initial production period Dürr offers further support in the form of training, production assistance and even full operation of the plant.

Dürr Ecopaint Robot offer full flexibility in interior and exterior painting – as stand-alone solutions or in combination with automatic painting machines.
### Total solutions: The way to keep costs in line with market conditions

By the time each car body receives an “ok” from the final audit station and leaves the paint shop, it will have passed through approximately 20 process stages, each with a number of stations. The paint shop also has material handling equipment and other peripheral items such as material supply systems and air and water purification equipment.

Quantum leaps in terms of cost and quality can only be achieved with new processes. Dürr – together with customers and paint suppliers – has participated in pioneering projects to introduce new painting processes.

Examples of this are global débuts for water-based paints, waterborne primers, powder paints and integrated painting processes.

Process alternatives depend on:
- **Materials** used for body manufacture – steel, aluminium, plastic, pre-coated metal, etc.
- **Body design** and the range of models and colors
- **Functional and visual quality** standards and the build-up of layers forming the paint coat.
- **Paint systems** used – solvent paints, water-based paints, powder paints, powder slurry - and their polymerization characteristics.
- **Production aspects** – capacities required and degree of automation requested

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### Process expertise is the key to finding the best possible solutions

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<th>from the body shop</th>
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<th>pretreatment</th>
<th>electrocoat</th>
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<td>online painting of trim items</td>
<td>offline painting of trim items</td>
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The innovative **Ecopaint PT/EC RoDip** at our Technology Center for corrosion protection (PT/EC)
Using preliminary planning to optimize material handling and system solutions

It is often necessary to consider alternative plans in order to find the optimum design to meet individual needs in terms of
- investment cost
- space requirements
- process time for the bodies and/or parts
- operating costs, etc
as well as the peripheral conditions applicable in each case.

As a result of decades of experience we understand the process and benefits of preliminary planning and can provide you with the perfect pre-engineering studies – with speed and efficiency. The experience we have gained from process development and project execution forms an integral part of our planning exercises.

Simulation models and, where necessary, painting tests are used to ensure that even at this early stage space and cost saving solutions are found that incorporate optimum material flow and general layout concepts.
Corrosion protection: Essential for long-term value

Ecopaint Body Washer

During assembly in the body shop or prior to pretreatment, the exterior surfaces and the cavities of each body are washed thoroughly.

This has the advantage that, at the subsequent inspection station, basic assembly defects can be spotted and corrected, where appropriate.

It also prevents most dirt particles such as welding burrs from being carried over into the pretreatment plant.

Ecopaint PT Pretreatment

Pretreatment is the first of the many stages of the painting process. Here the body is cleaned and prepared for the subsequent coating processes – optimized for the material involved (steel, aluminium, magnesium, etc).

Degreasing is followed by the application of a phosphate coat, which serves as corrosion protection and provides a bonding layer for paint application.

Several rinse zones are interspersed around these and passivation and neutralization zones complete the pretreatment process.

Ecopaint EC Electrocoat

All internal and external body surfaces require an even coat to ensure high-grade corrosion protection. The fully automatic electrocoat dip (EC) unit employs electrophoresis to deposit paint solids on the body surface. As the body emerges from the EC tank loose particles are rinsed away using filtrate recovered from the paint.

To minimize waste water volumes this filtrate is contained within a closed loop system and cascades from the end of the rinse zone back to the dip tank.

Immersion in the EC dip tank using the Ecopaint RoDip method ensures that all cavities are thoroughly flooded.
Effective corrosion resistance: The systems

**Ecopaint RoDip**

Ecopaint RoDip, a rotational pretreatment and dip painting method, has clear advantages:
- optimum coverage of all body surfaces and cavities
- less deposits of dirt on the body surface so less repair work is necessary
- compact design
- ability to handle large volume requirements
- attractive operating and maintenance costs

**Ecopaint AirBiDip**

The tried-and-tested Ecopaint AirBiDip process – based on a horizontal pendulum conveyor – is particularly suitable for
- large capacities
- buildings with height restrictions
- high availability requirements
- heavy body shells

**Ecopaint Monorail**

This alternative, suitable for handling small capacities, is characterized by
- proven and accessible conveyor equipment
- compact design
- ease of maintenance
- combination of dip and spray treatment
- minimal carry over

**Ecopaint Water Treatment**

Cascades and closed loop water systems lengthen the life cycles of treatment tanks. Less fresh and demineralized water is required and waste water volumes are reduced – thus aiding environmental protection and lowering operating costs.

Ion exchange, an efficient water treatment process
High tech equipment for maximum first run rates: Primer and top-coat application

The visual image of the car relies on the successful application of primer and topcoat paint. So sophisticated technology is brought into play. The cost of painting is largely dependent on first run rates.

**Ecopaint paint lines – always provide the best total solution**

The flexibility of Dürr Ecopaint paint lines enables them to fulfill all automatic paint application needs for all paints in use by the automotive and automotive supply industries. The modular concept of the range combines standardized components:

- Automatic dusting machines Ecopaint Blow off, Ecopaint Clean or alternative washers (Power Wash)
- Automatic electrostatic painting systems Ecopaint ESTA robots or machines
- Pneumatic painting systems Ecopaint Air assisted robots or machines
- Interior and detail painting Ecopaint Robots
- Material logistics Ecopaint Supply
- Quality measurement Ecopaint Quality

**The established world leader: Dürr application equipment**

Dürr has been the leading international supplier of application equipment for many years. Dürr products are used in the painting of two thirds of all vehicles manufactured worldwide. Our ongoing development program for all key technologies ensures that our systems are best-in-class when it comes to:

- paint quality
- application efficiency
- minimal color change losses
- stability of application
- lowering of emission levels
- lifecycle costs

**Staying ahead of the field: Dürr powder coating technology**

We have also set standards in the development of the most environmentally-friendly painting process – powder coating. Our innovative systems are suitable for application of base and clear coats – including powder recovery processes – and for application of powder slurry.
Spray booth systems

**Ecopaint Booth for optimum application conditions**

The enclosed and separately ventilated cleanroom areas of the booths with their personnel entrance vestibules prevent the ingress of dirt particles into the painting process.

Dürr booths are constructed from aluminium, stainless or steel profiles with part or fully glass panels.

**EcoAir Supply**

Application, particularly of water-based paints, involves a tight process range with regard to humidity and temperature. Air supply systems made up of standardized modules clean and condition the air in the volumes and to the standard required for each spray booth.

**Environmental protection and cost efficiency - not a contradiction in terms**

The EcoEnvirojet system washes paint overspray out of the air extracted from the spray booth. It is highly effective while requiring a minimum of energy and causing little noise emission. Our tried-and-tested EcoESKA system deals with paint removal.

EcoHeat Recovery recovers heating energy from the exhaust air stream. This equipment reduces the amount of primary energy required so investment amortization is fast. In some cases the appropriate EcoPure air purification systems are added to deal with concentrated exhaust air from spray booths.

Our EcoPurge Reflow and EcoPurge Pushout products ensure full flexibility where frequent color changes are involved. These automatic systems also make it possible to apply special colors cost-effectively.

**Ecopaint Supply – material logistics**

Dürr offers complete material supply systems for paint materials. Here, too, we are one of the world’s leading suppliers.

Excellent color matching – the automotive supply industry paints trim items using the same technologies as are used to paint the bodies.
Improved working conditions and greater efficiency: Automatic application of viscous materials

An increasing number of automatic solutions are being developed for the application of viscous materials. The Ecopaint Sealing product range combined with the support of qualified specialists enables Dürr to provide reliable process solutions.

**Application of underbody sealer**
Underbody protection is usually applied prior to primer painting either on a continuous or on an indexed basis as required. Robots ensure the necessary model flexibility and precise application.

**Seam sealing**
Special PVC materials are used to seal body seams and flanges prior to painting. Seal lengths and their accessibility dictate the positions and numbers of robots required. Dürr uses a “check and adjust program” of early simulation tests, coating tests and pre-commissioning. This results in fast adjustments to optimize production.

**Cavity protection**
An unbroken wax film applied to body cavities protects them from corrosion. Dürr offers both injection spray and automatic hot wax flooding systems for this purpose.

**Other tasks**
Sound deadening mats, which require manual fitting, are being replaced with increasing frequency by materials which can be applied by robotic spraying machines. We also offer automated solutions for other tasks, as in the application of protective wax film prior to transportation or the masking of window frames.
Excellent high gloss surface finishing: Dürr oven systems

Ovens are required to dry and cure the surface finishing coats that have been applied. It is vital that the heating up and cooling down of all body sections is even, irrespective of body shape and material thickness. Conveyor systems that require little maintenance and are clean in operation are particularly important.

**Ecopaint Oven - a modular concept**

We have the system you need whether it is required for gelling, intercoat drying or curing at high temperatures. Each Ecopaint Oven is made up of standardized modules. This means full flexibility in their combination to suit the process parameters involved and allows us to deliver fully assembled modules to site.

The modular concept accelerates not only installation but also commissioning procedures while ensuring that quality is always of the same high standard.

**The methods**

Dürr supplies oven systems for all drying methods
- recirculation (EcoCure InPaint C)
- combination of radiation and recirculation (EcoCure InPaint-RFC)
- intercoat or preliminary dry-off methods with dehumidified air (EcoCure LOW X*)

- drying methods for other media, like water or PVC material (EcoCure OffPaint-C) and air purification units, selected to suit your needs from our Ecopure® range

We work closely with paint suppliers as part of our ongoing research program on new methods, as in UV curing to improve scratch resistance.

The Dürr inverted monorail system, installed within an air seal at the base of the oven, offers minimum maintenance requirements and a low level of dirt contamination.
Material handling solutions - fast and flexible

Efficient production relies on perfect interplay between process and conveyor equipment. Our conveyor equipment is designed to fulfil the requirements specific to paint shops yet to offer maximum compatibility too. That’s why Dürr conveyor and material handling systems are found from the body shop right through to final assembly.

Overhead conveyors provide easy access to underbody areas

In addition to the patented RoDip process conveyor we are also able to offer excellent solutions in overhead systems, the twin trolley system (TTS), and monorail conveyors. MOVITRANS, a touch-free power and data transfer system, demonstrates that flexibility and zero maintenance need not be contradictory requirements.

Compact design and high precision

Dürr skid conveyor systems, already in operation all over the world, are part of our ongoing optimization program. As alternatives we also offer inverted power and free and inverted monorail systems. Special conveyors are used in powder coating booths to allow powder recovery. Belt systems ensure that noise levels are kept low in work station areas.

Optimum parts logistics

Dürr provides the necessary expertise and appropriate products for more than just transport. Dürr also ensures the best possible ways of loading and positioning parts on hangers and carriers.

Simulation tests are used to optimize transport paths, to identify potential bottle-necks and to confirm the overall design.
The technology may be complex but our systems put you in control

Ecopaint Control:
A modular approach throughout provides tomorrow’s solutions today

Our highly qualified team, responsible for control and supervisory control systems, works closely with our customers to find the right solutions and then to implement them. Dürr control systems offer maximum customer benefit and set the global standard.

Web-based solutions permit access to all information from each and every terminal. Dürr control and supervisory control systems are basically made up of “building blocks”. All modules are aligned to standardized mechanical equipment function groups.

Solutions tailored to suit customers’ specific requirements result from individual configurations of these modules at

- Central factory / area level
- Supervisory level
- Control level
- Process level

The open-plan architecture of these systems and the use of the most modern development tools make it easy to extend or modify them to suit customers’ wishes.

Perfect logistics optimize material flow and cut costs

Bodies are identified by web-cams and barcode readers installed at selected points

Single source perfection for ease of operation and maintenance

Careful thought has been put into the design of our standard control panels and the programming and hardware architecture for all Dürr system components to ensure that - no matter how complex the technology - you are in control.

- EMOS-SM (System Management) supervisory control system for comprehensive monitoring, statistical and logistical functions
- EMOS/EcoScreen (Equipment Monitoring and Operating System) PC based operating and monitoring system
- EcoDBS (Dürr Basic Software) PLC/RC software for control and regulation of the process
- EcoDIM (Decentralized Intelligent Module Control System) decentralized control hardware
- Customer specific host systems like vehicle handling control systems

Dürr plans and installs control and automation systems for individual production stages through to supervisory manufacturing control systems.
Quality management ensures top quality and first run rates

**Reducing touch-up and repair work**

Despite an increasing level of automation, touch-up and repair work is still a necessary part of vehicle manufacture after most production stages/coating processes. We are now able, as part of our ongoing product development program, to eliminate the need for touch-up and repair work after some process stages, for example after pretreatment/EC (as a result of RoDip). Top coat painting is a particularly sensitive area but the combination of our process solutions and our Ecopaint Expert system ensure that touch-up and repair work is minimized.

**Quality measurement using Ecopaint Quality**

Inspection of paint coat quality is the final step in the painting process. This is where the standard of quality achieved in all the preceding process stages is put on display.

Bodies are visually assessed and random checks of quality parameters are made at inspection areas equipped with special lighting.

Dürr is developing sensory systems and solutions for obtaining measurements automatically. The measurement data is used to help identify developing trends quickly so that painting parameters can be adjusted online to ensure uniform quality standards.

**Total quality management**

Measurement data together with quality data, entered manually via hand held PCs, is made available for quality management to measure actual performance against vehicle-related and plant-and-equipment-related quality control targets.
**Single source supply: Dürr global turnkey management**

**Production start-up in record time**

Paint shops can be constructed quickly and economically if contracts are placed with single source suppliers. That’s why more and more customers are appointing Dürr as their General Contractor.

The qualification and monitoring of all sub-contractors is part of the job as is construction of the building itself – complete with infrastructure and auxiliary equipment.

Professional project management teams follow progress from preliminary planning through to operation of the plant, ensuring smooth execution of contracts and a focused approach to meeting targets.
Optimization - Training - Systems Service: The competence required to ensure enduring success

**Ecopaint Optimization reduces operating costs**

Throughout the period of project execution – and after – we strive to optimize paint plant and equipment to harness all performance potential. Our engineers “fine tune” the systems to ensure they operate in full harmony to produce superlative results.

The effort is worthwhile: Improving first run rates substantially lowers operating costs.

**Ecopaint Training: Correct plant operation as a factor for success**

Even though we have simplified plant handling considerably, efficiency and quality of paint finishing is still largely dependent on the qualifications and capabilities of paint shop personnel. Our training engineers instruct plant operators at an early stage in all they need to know about process technology, mechanical and electrical issues, operation and maintenance as well as environmental protection, health and safety matters.

**Ecopaint Service - Competent assistance to ensure high availability**

Our Systems Service provides you with the advantages of a fast and competent response program:

- fast and reliable fault resolution
- maximum availability

ISDN network helplines allow our control specialists to provide customers – online – with the fast response assistance they need to identify and resolve faults.

Production experience provides expertise that Dürr feeds back into its ongoing product development program.
Dürr the company with a “learning circle” approach:
knowledge pooling

As a company with a “learning circle” approach, the Group pools all its knowledge and experience within one intranet database. The information is available worldwide and makes an important and ongoing contribution to the development of our process concepts and products and to the competence of our staff. A number of awards and feedback received from our customers confirm the success of this policy.

From Assistance to PoP (Pay on Production)

Parallel to the extensive range of services described that are available from the Paint Systems business unit, our Services business unit is pleased to offer its individual services or complete service packages for requirements you may wish to contract out. Full responsibility for plant operation can be assumed on a PoP basis within BOT (build operate transfer) or similar operator model projects.

Over the years Dürr has received many awards for outstanding performance from its customers. They include GM’s “Supplier of the Year”, Ford’s “Customer Driven Quality Award” and “Q1 Award” and VW’s “The Leading Edge”.

Dürr carries out cleaning, service, maintenance and operation of paint shops, as your outsourcing partner.
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<th>PSI (Paint Systems Industrial)</th>
<th>APT (Paint Systems Application)</th>
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