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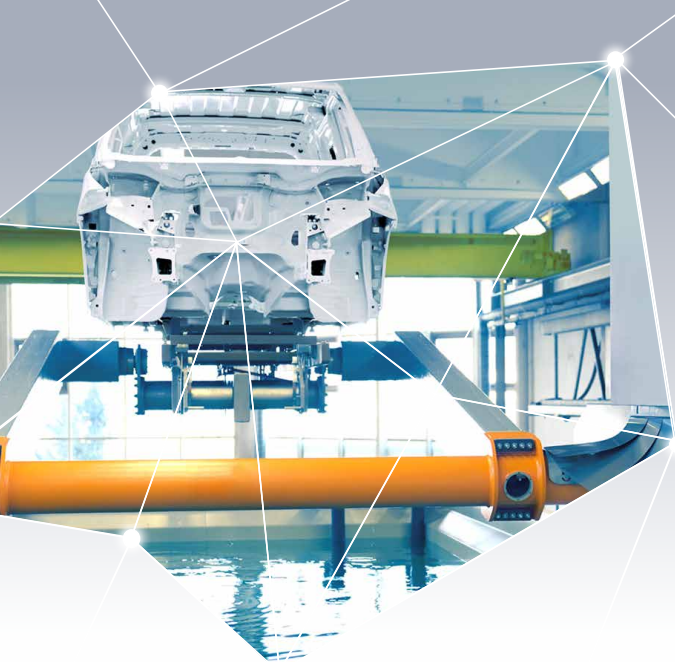
FLEXIBLE, SMART, INDIVIDUAL

E-SHUTTLES

**E-Shuttle conveyor systems for dip coating
as the basis for excellent surface quality.**



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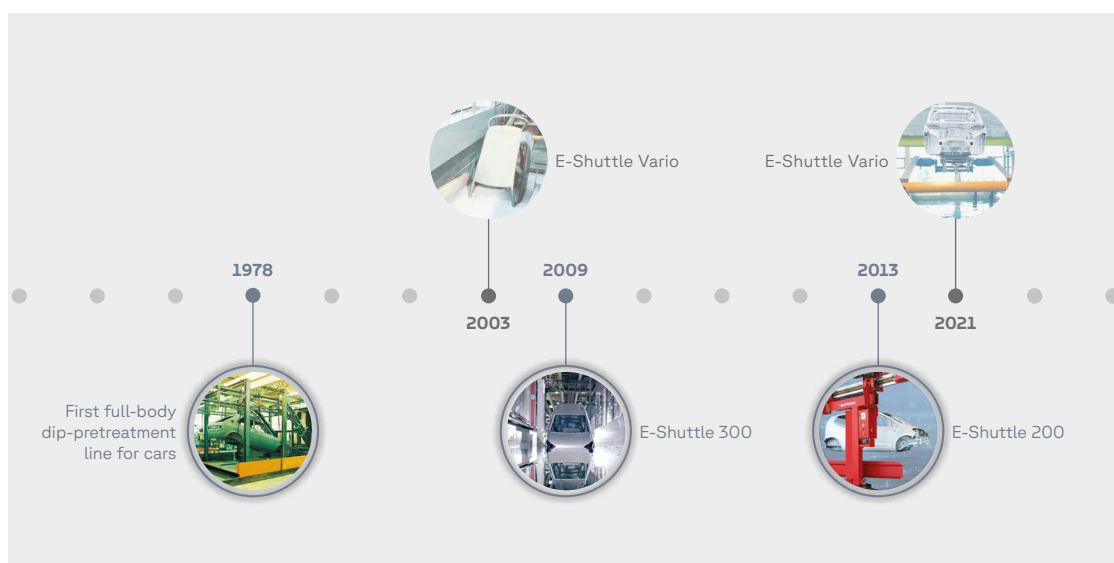


E-Shuttle systems

Intelligent solutions for customized process times,
immersion curves and weight classes.

Pretreatment and electrocoating are essential steps in any sophisticated automotive painting process. Seemingly small differences can have a significant impact on production efficiency and surface quality. This calls for purpose-designed, intelligent conveyor technology tailored to the specific requirements and characteristics of vehicle bodies and the corresponding manufacturing process.






In 1978, Eisenmann unveiled a world first: the first full-body dip pretreatment system for passenger cars. This became, and remains to this day, the standard pretreatment and electrocoating method for all auto makers. There have been a number of major development milestones since its inception. Eisenmann has paid close attention to the evolving real-world challenges of its customers, responding with the introduction of a number of innovative dip coating technologies. And from the very outset of full-body systems in the 1970s, a key focus has been flexibility.



A broad portfolio

Eisenmann is the only company worldwide to have a truly comprehensive portfolio of conveyor systems for automotive pretreatment and electrocoating. The plant engineering specialist is therefore uniquely equipped to offer each customer a coating solution geared to their specific imperatives.

The offering comprises five conveyor types. The flexible E-Shuttle 200, E-Shuttle 300 and E-Shuttle Vario systems, plus simple pendulum conveyors and an electrified monorail system (EMS). All three shuttle types allow vehicle bodies to be rotated during dipping. Each body can be moved through the electrodeposition (ED) tank at any angle by the individual shuttle. Additionally, each shuttle has its own on-board control unit. Process times and dip curves can be custom-programmed for each body type and ED tank. The E-Shuttle systems are suitable for bodies of various weight classes. The pendulum conveyors and electrified monorail system cannot be rotated, and are therefore better suited to simpler tasks.

E-Conveyor Pendulum	E-Shuttle 200	E-Shuttle 300	E-Shuttle Vario	E-Conveyor EMS
Simple and robust	Compact design	Maximum flexibility	Heavy Duty-version (for heavy bodies)	Ideal for low throughput
				
Large bodies up to 2,400 kg	Standard bodies up to 1,500 kg	Standard bodies up to 1,000 kg	Standard bodies up to 2,000 kg	Large bodies up to 2,400 kg
Continuous mode	Continuous or synchronized mode			Synchronized mode
Roof up	Roof down	Roof up/Roof down		Roof up

Jörg Robbin, Head of Research & Development, Eisenmann GmbH

Our extensive range of proven conveyor systems allows us to develop made-to-measure solutions for diverse vehicle body types – no matter how heavy, light or challenging. Our portfolio enables us to respond flexibly to the specific local customer scenario.



E-SHUTTLE 200 – FOR COMPACT COATING LINES

E-SHUTTLE 200

The compact, space-saving E-Shuttle 200 is ideal for high throughput. It has two freely programmable axes: one horizontal, one rotational. A frame is attached to the rotational axis, and connected to the skid and vehicle body at each end by means of a driveless pendulum. As there is no need for a vertical axis, this frame enables an extremely flat, compact conveyor system. In fact, this design permits one of the smallest total coating-line cross-sections in the world. E-Shuttle 200 is therefore especially suitable as a retrofit solution.



Diverse vehicle body types on a single production line

The smart E-Shuttle 200 allows one and the same production line to process a variety of vehicle models. It ensures excellent coating quality and reduces maintenance downtime as faults can be detected better and therefore earlier. The intelligent shuttle control unit is connected via bus with the PLC and the production control system, and enables autonomous shuttle response to varying types of process and vehicle body. This is the essential basis for deployment in smart paint shop scenarios. In addition, it is possible to capture data on the exact position of each body at any time. This gives the customer complete visibility, and allows subsequent analysis as the basis for process optimization and greater process flexibility. This improves paint quality and first-run rate.



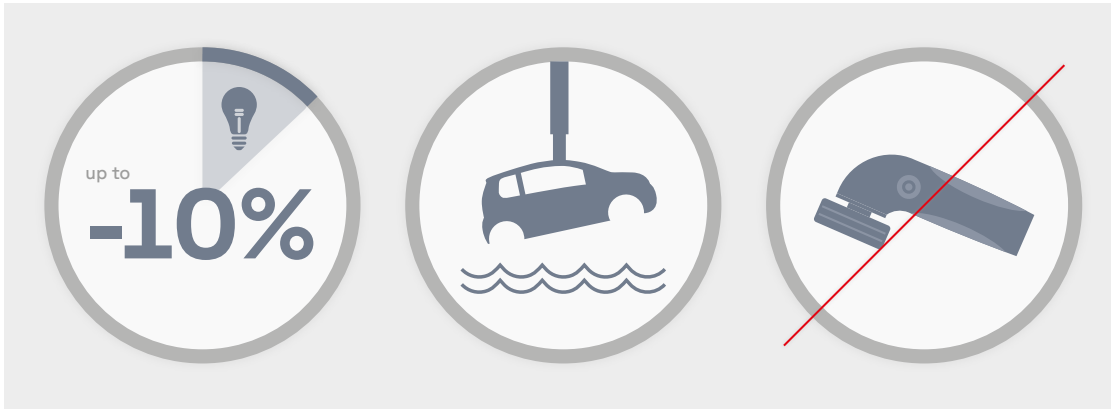
Very low operating costs

E-Shuttle 200 technology cuts operating costs in a number of ways. The pendulum makes it easy to rotate vehicle bodies, allowing them to be “twisted” either backward or forward into the ED tank in a space-saving way. As a result, it is possible to install far shorter and slimmer ED tanks. This reduces water and chemical consumption, and lowers the amount of energy needed for the corresponding heating and agitation of tank contents. Moreover, certain process tanks can be omitted entirely. This cuts total energy consumption up to 10% in comparison with conventional systems. In addition, a special body protection program means less scrappage. In the event of a fault, this emergency function ensures the bodies are removed (again by a twisting motion) from the process liquid, and production can continue immediately after restart.



The excellent quality of the coating generates further savings. Each body can be moved through the tank and flooded in line with its specific dimensions and shape, minimizing carry-over and promoting effective cleaning of the vehicle bodies. The e-coat power rail also helps safeguard process liquid cleanliness as it is no longer routed through the tank interior. All in all, this leads to excellent coating quality, and it may not be necessary to sand the e-coat.





Low operating costs.

- Energy savings up to 10%
- Process is extremely reliable
- No sanding of the e-coat is necessary

Lower capital expenditure

E-Shuttle 200 eliminates the need for e-coat skids. An additional vehicle body storage facility is also no longer required – as the shuttles' return path can be used as a buffer. As described above, the pendulums ensure a highly compact, space-saving system, as the tanks can be kept comparatively small and slender. This means less capital expenditure for equipment, land, and buildings. This is also helped by the design of the shop with a single loop, as there is no need for a transfer station between pretreatment and electrocoating. Overall, capital expenditure can be reduced by up to 11%.



HIGHLY FLEXIBLE 3-AXIS CONVEYOR SYSTEMS E-SHUTTLE 300 AND E-SHUTTLE VARIO

E-Shuttle 300 and E-Shuttle Vario has a third freely programmable axis, in the vertical, i.e. one more than E-Shuttle 200. This allows almost any vehicle body orientation, such as roof up, roof down, or any position in-between. All shuttle series enables dip curves to be tailored to the individual body. It also shares other features with the E-Shuttle 200, such as the space-saving twisting movement upon tank entry, in-process position monitoring, and the autonomous on-board control unit. Customers again benefit from shorter tanks, and lower chemical volume in comparison to traditional technologies. Moreover, both models create additional efficiency in the production process.

E-SHUTTLE 300



Lower operating costs

The combined driving, lifting and rotating movements means vehicle bodies can be rapidly flooded, and then completely emptied while still above the tank. This saves space, as smaller tanks can be employed, leading to lower water and chemical consumption. The volume of process liquid requiring agitation is correspondingly reduced, with a positive effect on operating costs. With an E-Shuttle 300 or E-Shuttle Vario system, there is no need for a dedicated zone for emptying vehicle bodies, as this is performed directly above the process tank. As a result, the lines can be shorter. Compared with conventional pretreatment and e-coating equipment, energy savings of up to 10% are achievable. The integrated body protection program, and the ability to perform maintenance during ongoing operation, drive down costs further. Moreover, outstanding coating quality means there is no need to sand the e-coat. And when an E-Shuttle 300 is employed, the final process step in the body shop – the body washer – can be omitted when using a 3-axis system.



Outstanding coating process flexibility

Through the twisting movement, the bodies „dive head forwards“ into the tanks. They can be rotated while immersed. If required by the body-specific dip curve, they can be positioned fully vertical. The highly flexible dip-coating system allows sensitive lightweight vehicle bodies to be immersed in the tank very gently, and innovative body designs to be coated without difficulty. In addition, the force exerted on bonded surfaces is so low that adhesive curing ovens may not be required in the body shop. Irrespective of the vehicle model and body geometry being treated, the process liquid can easily reach difficult-to-access surfaces, such as cavities and indentations. Moreover, the body-specific movements ensure an even coating. Furthermore, it is possible to modify the production process quickly and easily to accommodate new vehicle models.

E-Shuttle systems as a part of a smart paint shop

Eisenmann believes the paint shop of the future will feature an ideal combination of flexible hardware, intelligent software, and digital services. This combination of elements will maximize customer benefits. E-Shuttle systems can also be employed as part of a complete, seamlessly integrated solution in a smart paint shop. Just like, for example, the skidless conveyor system E-Loc Vario, the automated guided vehicle E-Mover, the resource-saving separation system E-Cube and the E-Oven Smart.



More information about E-Shuttle systems?

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