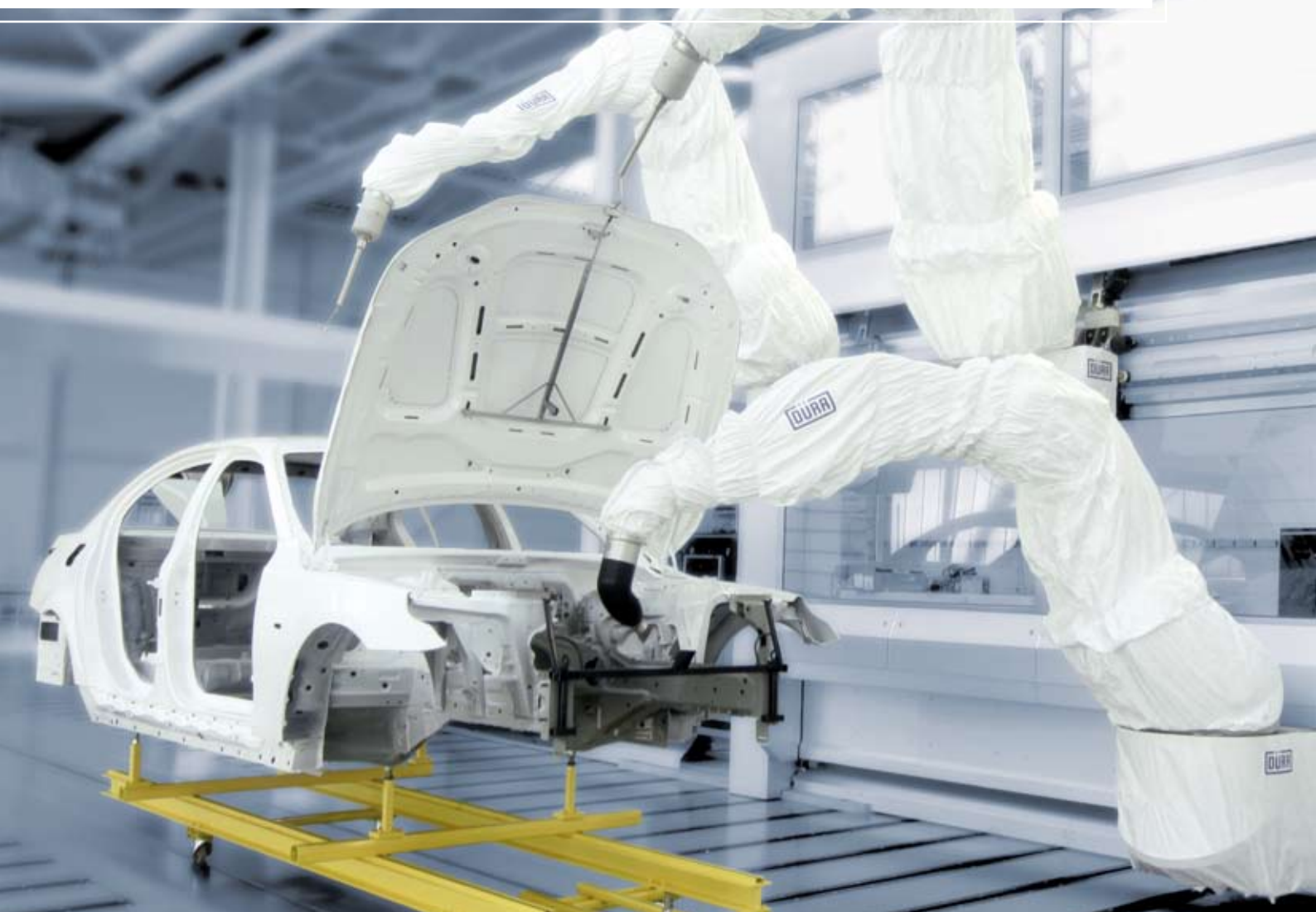


# ***Ecopaint* Robot Painting Station**



Newest Generation of *EcoRP* Painting Robots



Technologies · Systems · Solutions

# *Ecopaint* Robot Painting Station



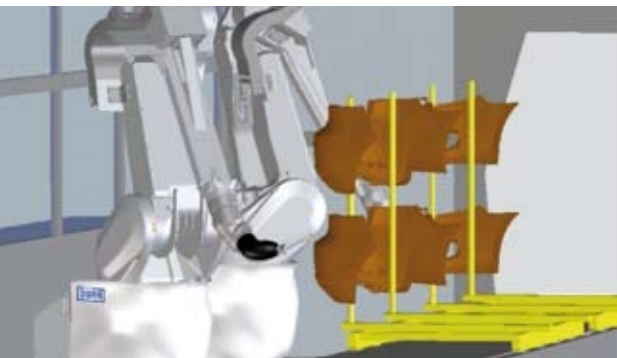
*Exterior painting*



*Interior painting station - doors*



*Interior painting station - hoods*



*Painting of add-ons*

## **The Basis for Shining Results**

*Ecopaint* Robot painting stations are optimized for automatic surface coating of automobile bodies including small parts and detail painting.

The robots coat the entire range of interior and exterior areas and are suitable for ESTA, AIR and Powder applications. They are usable with all paint materials, including solvent paints, water-borne paints and powder paints. The newest generation of paint and application robots improves flexibility and profitability in the *Ecopaint* Robot painting station, and guarantees the highest level of quality in the entire painting process.

- **Reduction of Booth Size**

Robots on elevated travelling axes increase accessibility to all exterior areas to be coated during painting and permit smaller booths (e.g. 4 - 4.5 m for typical cars) with accordingly lower operating costs. Where necessary for interior painting and / or degrade scenarios a dual rail configuration is possible. With this design the robots and openers are able to pass as necessary to achieve rail positions required for the painting process. As a result the booth length is reduced by up to 2 meters, investment and operating costs are decreased all while maximizing productive cycle time.

- **Less Paint and Solvent Loss**

*Ecopaint* Robot painting stations come out on top with their short color change times and minimum paint and solvent losses. This is due to two special features: First, the application equipment with up to two dosing pumps or a dosing canister is placed on the horizontal robotic arm; Second, the process and control technology is integrated into the robot. The result is a reduction in material and cycle time losses due to color change.

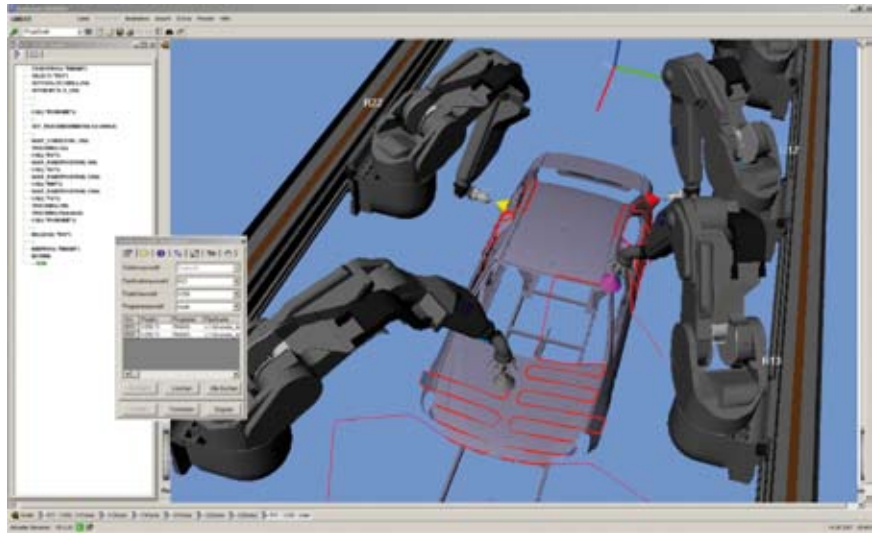
- **Designed for Fast Installation**

Fast installation of robotic paint systems into existing booths is possible via modular designs that facilitate pull ahead work. Final installation tasks can be accomplished over long weekends or brief model change conversions.

- **Designed for Easy Maintenance**

Painting robots and hood openers share a common kinematic design and identical controls. This concept provides reduced requirements for spare parts and maintenance training.

*EcoScreen 3D-OnSite  
Offline Simulation*



**Ecopaint Robot painting stations provide customer specific solutions derived from flexible modular designs:**

- Modular robot process arms allow for flexible integration of proven, efficient Dürr paint dosing and color change systems. A wide variety of designs are available including traditional dosing pumps, *EcoChargeD*, *EcoPurge ICC* and *EcoPurge MCC*.
- Robots can be installed in either pedestal or rail mounted (travelling axis) designs.
- Application robots for opening, holding and closing of doors and hoods.
- Dürr control concept to drive all robot variants, including integrated safety PLC, safety devices and HMI.

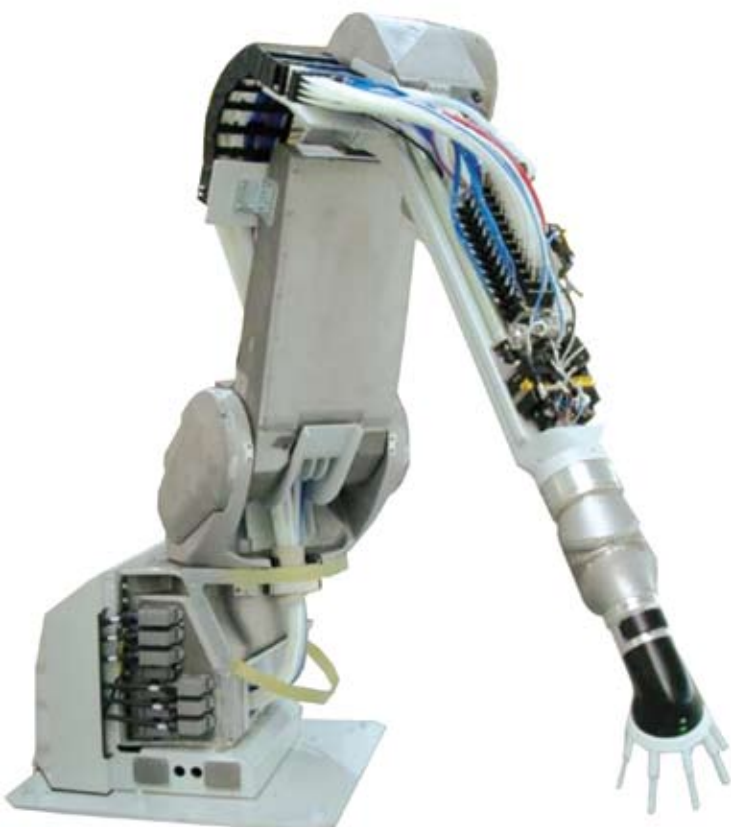
Comprehensive simulation capabilities are used to design the painting station including consideration for and optimization of process specific parameters such as conveyor type, spray booth characteristics and painting requirements.

With the aid of 3D-models of car bodies, the *EcoScreen 3D-OnSite* computer software designs the paint path and spray patterns for the painting station. 3D-OnSite provides support for offline path programming and operator initiated immediate download of offline modifications to production robots. Teaching the robot is only necessary when dealing with difficult parts or for “fine tuning”.

Controls, safety controls and power supplies for the robots are located in modular control panels next to the booth(s). The *EcoScreen* visualization and operator panel is located on the station control panel.

**Conveyor Configurations**

The *Ecopaint* Robot features support for both tracking and Stop-and-Go conveyors. In the stop-and-go configuration the car body is conveyed into the booth and is held stationary while painting. For tracking operations the car body is conveyed at a constant speed through the spray booth for painting. Stop-and-go robots typically move on rail or travelling axes; tracking robots can be either pedestal mounted (line tracking) or rail mounted (rail tracking).



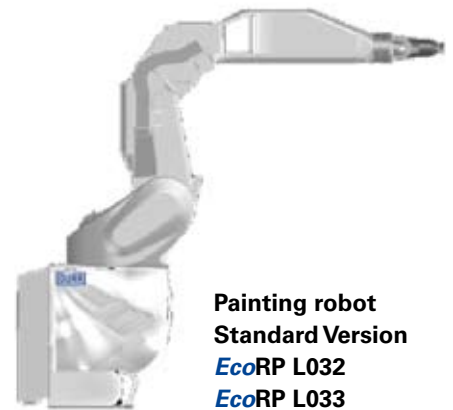
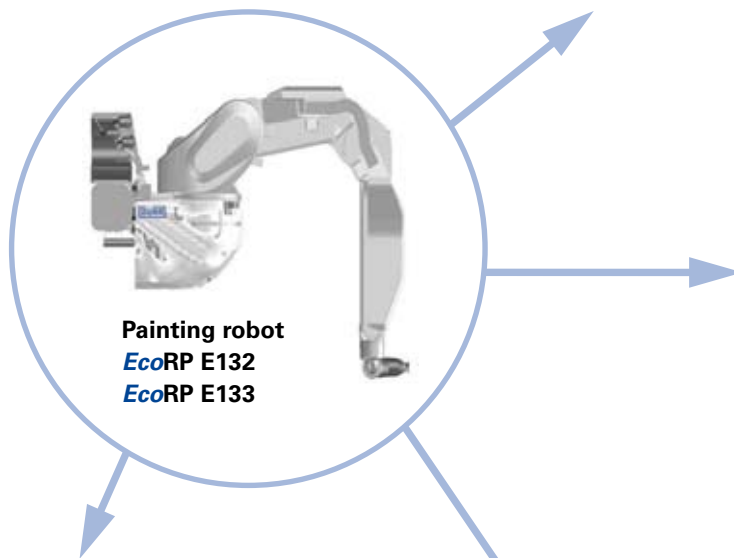
*Standard version of the robot with  
2 dosing pumps on the robot arm.*

# New Generation: *EcoRP* Painting Robots

## Flexible and Efficient Painting

Frequent model changes require the use of flexible paint automation to meet styling demands while providing world class paint quality.

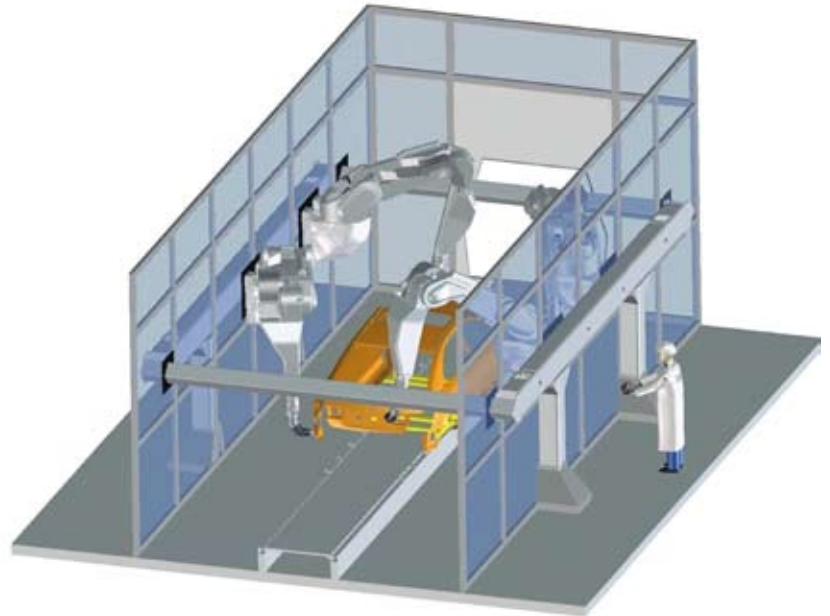
The task of the painting robot is to move the atomizer around the surface to be painted while maintaining a constant speed, distance and orientation from the surface. This technique ensures a homogenous paint film.



### EcoRP E133

- Number of hand axes
- Number of main axes
- Number of travelling axes  
(0 = none, 1 = one)
- Position of the robot  
(E = elevated, L = low)

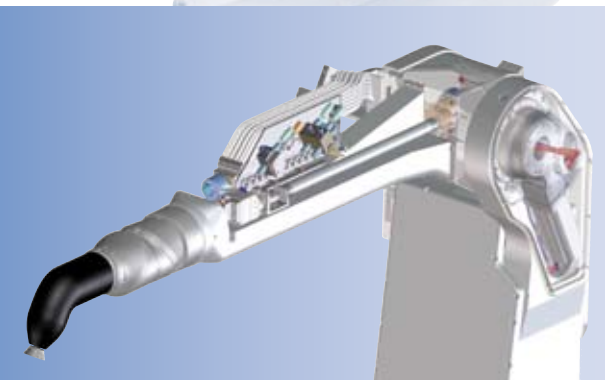
EcoR(obot)P(aint)



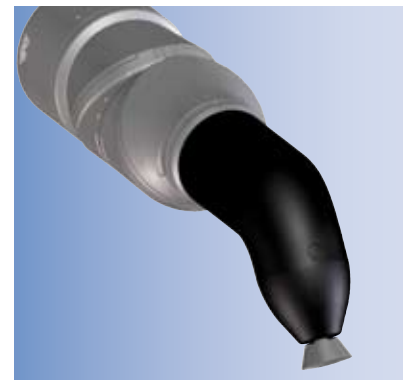
### Technical Data

Painting Robot	EcoRP E132, EcoRP L132, EcoRP E032, EcoRP L032		EcoRP E133, EcoRP L133, EcoRP E033, EcoRP L033	
	Application Area (x°)	Max. Speed (°/s)	Application Area (x°)	Max. Speed (°/s)
<b>Axis 1</b> Robot rotation	EcoRP E ... ± 95 EcoRP L ... ± 115	115	EcoRP E ... ± 95 EcoRP L ... ± 115	115
<b>Axis 2</b> Vertical arm swivelling	EcoRP E ... - 60 / + 110 EcoRP L ... + 65 / - 105	115	EcoRP E ... - 60 / + 110 EcoRP L ... + 65 / - 105	115
<b>Axis 3</b> Horizontal arm swivelling	+ 80 / - 75	115	+ 80 / - 75	115
<b>Axis 4</b> Hand axis rotation	(total x°) ± 360	400	(total x°) ± 540	540
<b>Axis 5</b> Hand axis		400		540
<b>Axis 6</b> Atomizer rotation		–		700
<b>Axis 7</b> Travelling axis	depending on travelling axis lenght	see travelling axis tabel	depending on travelling axis lenght	see travelling axis tabe
<b>Load bearing capacity at hand axis</b>	Plastic-hand axis: 7.5 kg		Double-jointed hand axis: 15 kg	
<b>Weight (kg)</b>	Robot	approx. 570	Robot	approx. 600
	Base	approx. 250	Base	approx. 250
	Carriage	approx. 140 (EcoRP E) 300 (EcoRP L)	Carriage	approx. 140 (EcoRP E) 300 (EcoRP L)
<b>Arm length (mm)</b>	Arm 1: 1.000, 1.250 Arm 2: 1.400, 1.500		Arm 1: 1.000, 1.250 Arm 2: 1.626, 1.726	
<b>Painting area (mm)</b>	distance: 3.052		distance: 3.278	
<b>Max. conveyor speed (mm/s)</b>	2.000			
<b>Max. acceleration (mm/s<sup>2</sup>)</b>	8.000			
<b>Explosion protection</b>	ATEX category 2, 3; FM class 1 div 1			
<b>Repeat accuracy</b>	± 0.1 mm			
<b>Load on arm 1 and arm 2</b>	each 15 - 30 kg			

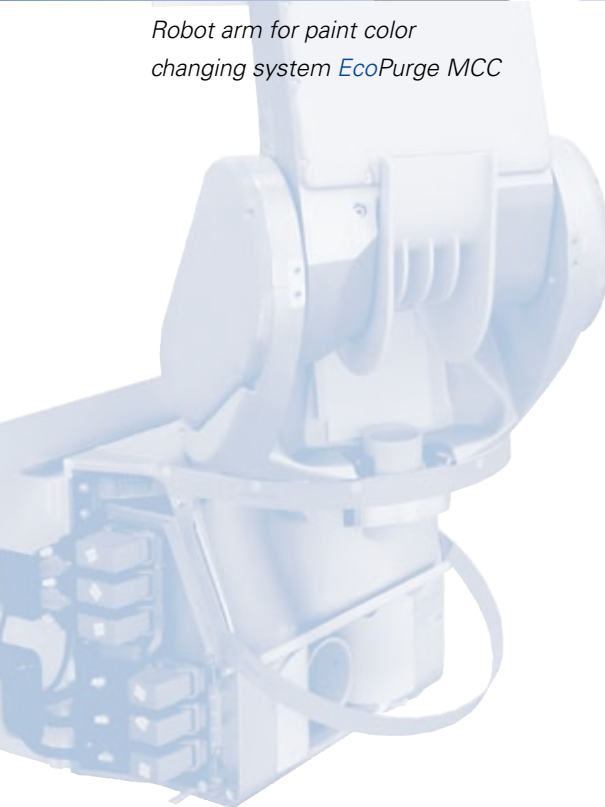
# Performance Scope of the *EcoRP* Painting Robot



Robot arm for paint color changing system *EcoPurge MCC*

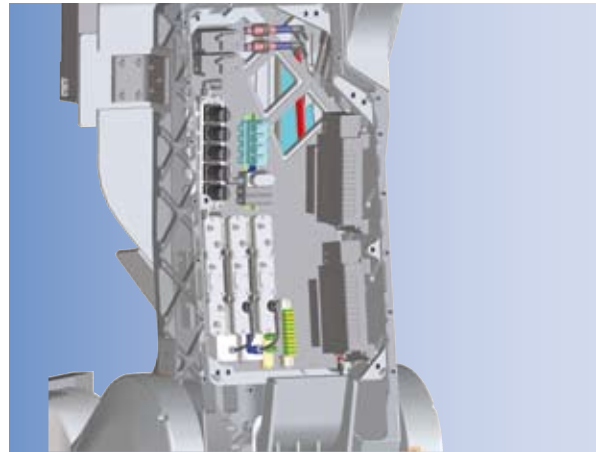


2-axis and 3-axis hand axes with 65 mm as well as 75 mm inside diameter for secure hose guidance to the atomizer nozzle



## The advanced painting robot concept provides:

- Painting robots for exterior and interior painting
- Pedestal or rail mounted configurations
- 5 - 7 paint axes
- Robot arms for dosing and paint color change systems *EcoCharge D*, *EcoPurge ICC*, *EcoPurge MCC*
- Different arm lengths for optimized work envelope for differing applications
- 2 and 3 axes wrists with 65 mm or 75 mm inner diameter for secure hose guidance to the atomizer.
- Integrated air and paint flow rate controls; integrated bell speed O/E converter and pneumatic valves

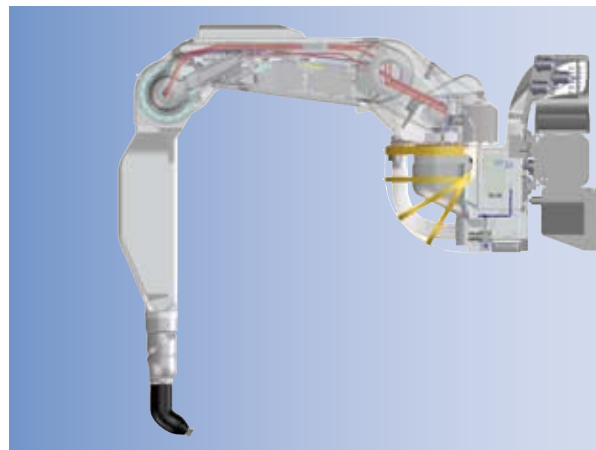


*Integrated air and paint quantity control, O/E converter and pneumatic valves*



*Hose guide through central seam of robot axis*

- Hose guide through central axis of robot to minimize torsional hose stresses and ensure maximum hose life
- Smooth surfaces for optimal cleaning
- Maintenance-free and high availability
- Integrated automatic mastering of axes 1, 2, 3 and travelling axes
- Explosion protection by means of air purged design, ATEX compliant / FM approval
- ATEX / FM / UL drive conformity
- Hollow gear boxes for minimized torsional stresses on cables
- Usage in other application areas, e.g. quality measurement, flaming of plastic parts and cleaning of auto bodies



*Gears with internal cabling*

# EcoRP Application Robot

## Opening, Holding and Closing during Interior Painting

Together with the EcoRP painting robots the EcoRP handling robots execute important tasks in the painting station: during the painting process, they open, hold and close hoods and doors.

In interior door painting applications, the Scara robots take care of necessary handling tasks. Openers for hoods and trunks are identical in construction to the painting robots with the exception of the end of arm tooling. The atomizer is replaced with tooling necessary to open the panel.



*EcoRP L030 (Scara) door opener with 3 axes*



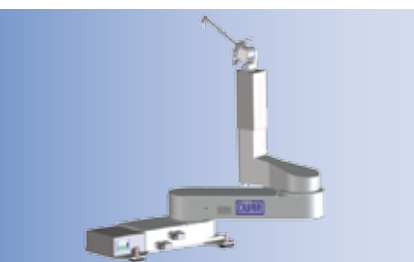
*EcoRP L130 (Scara) door opener with 4 axes*



**EcoRP as a hood opener with 5 - 7 axes**



**EcoRP L130 door opener with 4 axes**



**EcoRP L030 Scara door opener with 3 axes**

**Areas of application:** stop-and-go as well as tracking operation.

**Description:** This robot is used to open, hold and close engine hoods and trunk hoods with gripper tools. Depending on the application requirements a two or three axis wrist is used.

**Areas of application:** stop-and-go as well as tracking operation.

**Description:** This door opener is constructed following the Scara principle. Axes 1 and 2 are used for horizontal positioning, and the Z axis is used for the vertical positioning. The gripper tool on the Z axis is normally in the form of a hook. Safe, reliable performance is achieved through sensors that register the various operating statuses thereby avoiding handling errors and collisions. The door opener is placed on a travelling axis.

**Areas of application:** stop-and-go operation

**Description:** This door opener follows the Scara principle with 3 axis of motion. It is attached to the booth floor.

## Technical Data

Door opener	<i>EcoRP L030 and EcoRP L130</i>	
	Application Area (x°)	Max. Speed
<b>Axis 1</b> Horizontal arm 1 swivelling	± 90	(°/s) 130
<b>Axis 2</b> Horizontal arm 2 swivelling	± 155	(°/s) 130
<b>Axis Z</b> Vertical lifting axis	300 mm	250 mm/s
<b>Axis 7</b> Travelling axis (only <i>EcoRP L130</i> )	depending on travelling axis length	1.5 m/s
<b>Max. conveyor speed (°/s)</b>	130	
<b>Max. acceleration (°/s<sup>2</sup>)</b>	390	
<b>Load-bearing capacity (N)</b>	500 at opening tool	
<b>Explosion protection</b>	ATEX category 2, 3; FM class 1 div 1	
<b>Weight (kg)</b>	approx. 265	
<b>Installation</b>	<i>EcoRP L030</i> connected to grating <i>EcoRP L130</i> on <i>EcoRail C</i>	
Hood opener	<i>EcoRP E132 and EcoRP E133</i>	
	see painting robot	

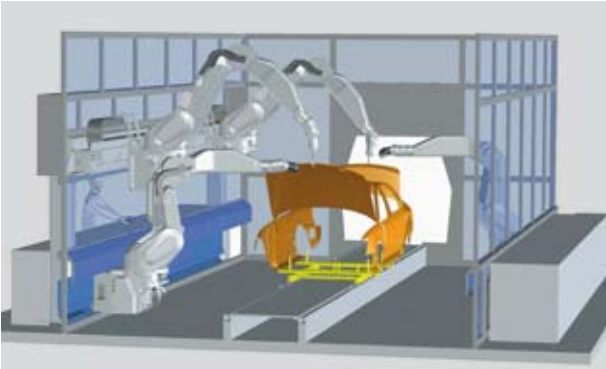
### Product Advantages:

- Modular construction for easy maintenance
- Streamlined, easy to clean, robust construction
- Special opening tools ensure that processes are adaptable, sleekly constructed to avoid contamination.
- Different arm lengths and spacers allow equipment to be adapted to customer specific painting processes
- Same drives and controllers are used for the door opener and painting robot
- Hood opener and painting robot identical in construction



*EcoRP E 133 as a hood opener*

# EcoRail Travelling Axes



## Mobility for Painting and Application Robots

Robots can be moved parallel to the conveying direction of the body in the painting booth using *EcoRail E* and *EcoRail C* travelling axes. The travelling axis is a freely programmable horizontal axis of motion for adding a seventh axis to the robot.

The travelling axis is designed to provide *Ecopaint* Robots with the motion necessary for painting and other application needs.

### *EcoRail E*

The possibility to install the *EcoRail E* travelling axis at different heights – according to the specific painting job – ensures that painting and application robots are mounted at the optimum height.

Advantages are:

- Accessibility to all areas to be painted
- Interference-free view inside the booth
- Reduction of booth widths

### *EcoRail C*

The *EcoRail C* travelling axis is installed low on the booth wall. Painting and handling robots on this rail are positioned relative to the height of the booth floor.

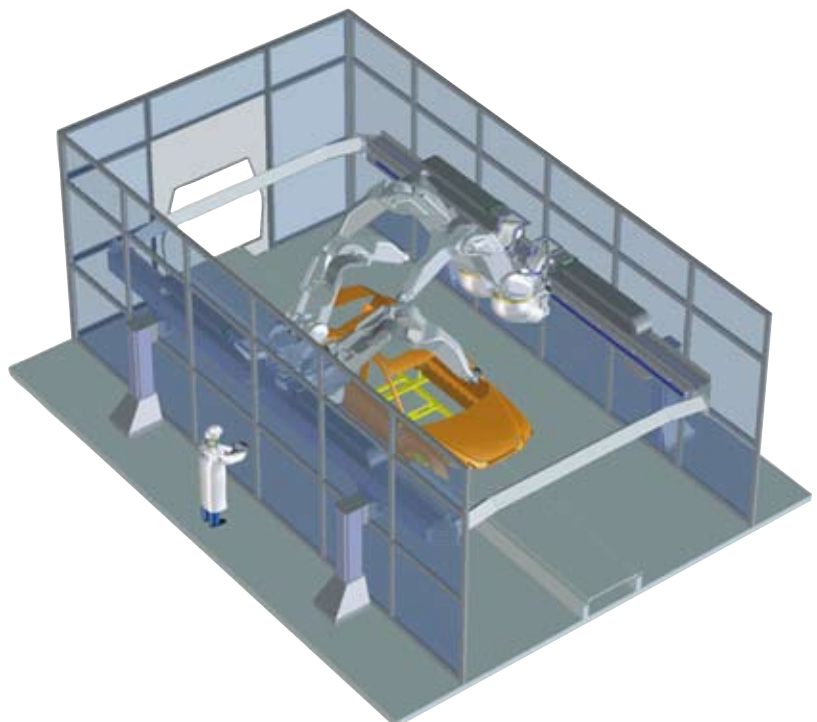
### Best Together

The combination of both travelling axes, one placed above the other, makes it possible for the painting and handling robots pass each other.

This way booth length and non-productive cycle time is minimized.

*EcoRail E* and *EcoRail C* are also available as clean-wall models.

Clean-wall designs protect the travelling axis from contamination from the painting process (overspray) and minimize cleaning requirements.



**Advantages:**

- High operational performance up to 150,000 km
- Fast and cost effective maintenance due to:
  - Exchangeable components
  - Central lubrication
  - Special fixtures to exchange the linear guide bearings without removal of the robot
- Complete corrosion protection for each axis even in aggressive environments
- Protection against corrosion and contamination of control components
- Very high level of smoothness and wear resistance due to the use of helically hardened and ground bevel gears and guides.

**Technical Data**

Travelling Axis	EcoRail C	EcoRail E
<b>Performance Data</b>		
Speed (m/s)	1.2	1.5
Acceleration (m/s <sup>2</sup> )	5.0	5.0
Weight of travelling axis (kg/m)	275	220
Weight of carriage with drive (kg)	300	140
Position accuracy in TCP (mm)	0.5	0.5
Maximum axis length (m)	50	50
Service life, guides (h)	20,000	20,000
Service life, drive elements (h)	20,000	20,000
Maximum number of robots/travelling axes	4	3
Maximum number openers/travelling axes	3	2
Maximum number of robots and openers/travelling axes	4	3
<b>Application Area</b>		
Painting robot <i>EcoRP E13x</i>	-	+
Painting robot <i>EcoRP L13x</i>	+	-
Hood opener <i>EcoRP E13x</i>	-	+
Hood opener <i>EcoRP L13x</i>	+	-
Door opener (Scara) <i>EcoRP L130</i>	+	-
Exterior painting	+	+
Interior painting	+	o
<b>Special Versions/Options</b>		
Cover band	o	-
Central lubrication	o	o
Personnel protection switch	o	o
+ = standard o = optional - = not possible		



Painting robot on *EcoRail C*



Painting robot on *EcoRail E*



Hood opener on *EcoRail E*  
Painting robot *EcoRail C*

# Ecopaint Robot Painting Station

The new generation of the *EcoRP* painting robots provide the highest levels of quality, flexibility and cost effectiveness:

- **Higher productivity**
- **Reduction of booth size**
- **Reduced paint and solvent loss**
- **Short assembly and installation times**
- **Easy maintenance**

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