Ecopaint RoDip4
Rotation for that decisive advantage

The process with the perfect turn!

RoDip4 is the next step in systematic further development of our established RoDip3 technology. With RoDip4 we present to you a new generation of plants for the rotational dip process.

This technology has already been successfully introduced on global markets and is equally suited to pretreatment (PT), cathodic electrocoating (EC) and body washing. RoDip can be used in the automotive and automotive supplier industry as well as in general industry.

Rotation of the complete body optimizes the process of immersion, flooding and draining. RoDip plants are shorter, therefore saving valuable building space. RoDip process technology is compelling because of the excellence of the corrosion protection and surface coating quality it provides and because operating costs are so attractive.

RoDip unites the benefits of top quality and high profitability
**Ecopaint RoDip4**

**Two model variants to meet your individual solutions**

**RoDip4 M chain drive**

The main characteristic of the RoDip4 M variant is the chain drive, on one side only, which pulls the rotation carrier through the process line. Rotation is initiated by a roller positioned on a lever connected to the carrier together with its v-shaped cams on the side of the tank.

**RoDip4 E electrical drive**

The RoDip4 E variant is characterized by its electrically driven transport unit on one side. The unit has a conveying drive and a separate drive for rotation. The transport unit is positioned via a path measuring system. A WLAN signal is used to communicate with the controls.

**Selecting the right RoDip model**

Both variants can handle plant capacities of up to 80 units per hour. RoDip4 E is recommended for capacities of 3 to 40 uph as it is more economical for such applications. RoDip4 M is recommended for capacities of more than 40 uph. Both variants can be used across the whole capacity range.
**Ecopaint RoDip4**

Modular build for flexible integration

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**RoDip4 – what’s new?**

- Drive chain on one side adjacent to tank
- Only two turn sprockets per plant
- Foldaway carrier shaft for space saving return lines
- Variable counterweight to reduce chain forces
- Simple and robust steel chain eliminates the need for lubrication
- Only two drives required per electric transport unit
- Existing PT/EC plants can be modified without making process changes

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**RoDip4 – stands for quality and space savings**

In comparison with continuous conveyor plants using conventional technologies, the dip tank for RoDip is considerably shorter as there is no need for inclined sections at its entrance and exit. With the rotational dip process, objects such as car bodies make a 360º turn as they pass through the dip tank.

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*Space saved with RoDip*
RoDip4 – compact build

Return lines for the RoDip3 generation ran beneath the plant. With RoDip4 considerable space is saved, especially in height, as return lines and rotation carrier drive equipment are arranged on one side of the plant only.

RoDip4 – stands for more flexibility

The compact build plus the modular concept of RoDip4 offer more variety in layout options. This means a high degree of flexibility in adapting to existing building conditions.

Existing PT/EC plants can be modified to RoDip4 without changing the process – a less expensive way for our customers to change to RoDip technology.

Ecopaint RoDip4 – for top quality and high profitability
Corrosion protection – essential for value retention

**Ecopaint Body washer**

The exterior surfaces and cavities of each vehicle body are thoroughly washed and rinsed in the Body Shop or prior to actual pretreatment. This has the advantage of largely preventing carry over of dirt and dust into the pretreatment plant.

**Ecopaint PT pretreatment**

Pretreatment is the first of many stages in the painting process. Here, as is appropriate for the material involved (steel, aluminium, magnesium, etc), each body is cleaned and prepared for the coatings that will subsequently be applied. After degreasing, the body is phosphated both as corrosion protection and to provide a suitable base for paint to adhere to. In between the body passes through several rinse zones. At the end of pretreatment it is passivated and neutralized.

**Ecopaint EC electrocoating**

All interior and exterior body surfaces need an even coat to attain high quality corrosion protection. During fully automatic cathodic electro dip coating the solids in the paint material are deposited on the body surface by electrophoresis. When the body leaves the EC tank loosely adhering material is rinsed off with filtrate recycled from the paint. Paint loss and waste water are minimized by returning this filtrate to the dip tank via a closed loop system and a cascade at the end of the rinse zone.
RoDip – PT/EC process advantages

- The cleaning process is more effective. Rotation ensures that dirt particles are flushed out of cavities.
- Sedimentation on horizontal surfaces is avoided.
- Uniform coating - including in cavities.
- Improved coating quality, as there are fewer runs and sags.
- Savings potential for paint material and chemicals. Less carry over due to rotation and tilting of bodies.
- Conveyor equipment does not contaminate baths as it is installed outside the process area.
- Smaller bath volumes (first filling, energy costs), less waste water is produced, less chemicals and less energy required.

Cavity coating example

Film thicknesses EC + zinc

7µm are deducted for the zinc film giving the following results:

- Average film thickness = 22.8 - 7 = 15.8µ
- Minimum film thickness = 20.0 - 7 = 13.0µ
- Maximum film thickness = 26.0 - 7 = 19µ

- for top quality and high profitability
RoDip4 – innovation in all details

In addition to the process, quality and plant design advantages already described, RoDip4 also offers customers the benefits mentioned below:

RoDip4 M
RoDip4 E

Modular build
– accelerated project realization times

- Entrance and exit modules independent of body width
- Standard components: shaft lifting mechanisms, conveyor tracks and transport units
- Counterweight adjustment units as well as entrance and exit modules are the same for all plants
- Entrance and exit modules are not fixed to the tank bringing installation and commissioning advantages ➔ reduction in tank stability requirements
- Plant can easily be adjusted to given heights

Conveyor equipment
– located on one side only, adjacent to the plant

- Maintenance walkways on one side only
- Rotation carrier shaft seal on one side only
- Tunnel area reduced ➔ less heat loss
**Single sided return line for rotation carrier with foldaway shaft**

- Reduction in plant height
- Minimization of space required for carrier return
- Better access to process equipment groups
- Reduction in number of chain sprockets required

**Use of steel chain**

- No separate chain guide (chain track) is required
- Chain requires little maintenance – no lubrication needed
- Easier replacement of chain – or of segments only
- Simple chain sprocket design

**Variable, independently adjustable counterweight**

- Reduction of active torques in rotation carrier guide track
- Reduction of tension and shearing forces ➔ less wear

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– for top quality and high profitability
RoDip global references ...

DC Ludwigsfelde Germany
First RoDip3+ plant for commercial vehicles
- PT+EC RoDip3+
- Capacity: 12 uph
- Model: NCV3 FH / VW-L T3
- SOP: November 2005

DC Wörth Germany
First RoDip3 Classic application for truck cabs
- PT+EC RoDip3 Classic
- Capacity: 28 uph
- Model: truck cabs (Actros, Atego)
- SOP: December 2005

Karmann Osnabrück Germany
First RoDip plant for different car makes and models
- PT+EC RoDip3 Classic
- Capacity: 30 uph
- Model: DC Crossfire, DC convertible, Audi convertible
- SOP: July 2005

Ferrari Maranello Italy
RoDip3+ used for low capacity plant
- PT+EC RoDip3+
- Capacity: 5 uph
- Model: Ferrari and Maserati
- SOP: 2004
### RoDip3 installations

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Location</th>
<th>Vehicle</th>
<th>Capacity</th>
<th>Conveyor Speed</th>
<th>SOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMG</td>
<td>South Bend, IN, USA</td>
<td>Hummer H2</td>
<td>21</td>
<td>2.38</td>
<td>2001</td>
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<tr>
<td>BMW</td>
<td>Dingolfing, Germany</td>
<td>BMW 5,7,RR</td>
<td>2x 46.5</td>
<td>4.96</td>
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<td>BMW</td>
<td>Munich, Germany</td>
<td>BMW 3</td>
<td>55</td>
<td>6.6</td>
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<tr>
<td>VW</td>
<td>Wolfsburg, Germany</td>
<td>Touran</td>
<td>65</td>
<td>6.5</td>
<td>2002</td>
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<tr>
<td>SVW</td>
<td>Shanghai, China</td>
<td>Polo</td>
<td>28.6</td>
<td>2.96</td>
<td>2003</td>
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<tr>
<td>Audi</td>
<td>Ingolstadt, Germany</td>
<td>A3, A4, TT</td>
<td>2x 50.2</td>
<td>5.35</td>
<td>2003</td>
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<tr>
<td>SAIC Chery</td>
<td>Wuhu, China</td>
<td>4 different cars</td>
<td>36.5</td>
<td>3.7</td>
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<tr>
<td>Hyundai</td>
<td>Montgomery, AL, USA</td>
<td>Sonata</td>
<td>73</td>
<td>7.3</td>
<td>2005</td>
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<tr>
<td>Ferrari</td>
<td>Maranello, Italy</td>
<td>Ferrari, Maserati</td>
<td>5</td>
<td>12 min. cycle</td>
<td>2004</td>
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<tr>
<td>Karmann</td>
<td>Osnabrück, Germany</td>
<td>various cars</td>
<td>30</td>
<td>3</td>
<td>2006</td>
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<tr>
<td>DC</td>
<td>Würth, Germany</td>
<td>truck cabs</td>
<td>26</td>
<td>2.64</td>
<td>2006</td>
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<tr>
<td>DC</td>
<td>Ludwigsfelde, Germany</td>
<td>NCV3, VVLT.3 (large vans)</td>
<td>12</td>
<td>5 min. cycle</td>
<td>2006</td>
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<tr>
<td>KIA</td>
<td>Zilina, Slovakia</td>
<td>various cars</td>
<td>64</td>
<td>6.4</td>
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<tr>
<td>JAC</td>
<td>Hefei, China</td>
<td>various cars</td>
<td>36.5</td>
<td>3.65</td>
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<td>PIDF</td>
<td>Iran</td>
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<td>11.5</td>
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<tr>
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<td>Pemsa</td>
<td>Saltillo, Mexico</td>
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### RoDip2 installations

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Location</th>
<th>Vehicle</th>
<th>Capacity</th>
<th>Conveyor Speed</th>
<th>SOP</th>
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<tbody>
<tr>
<td>Volvo</td>
<td>Dublin, Virginia, USA</td>
<td>trucks</td>
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<td>5 min. cycle</td>
<td>1995</td>
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<tr>
<td>GM</td>
<td>Bogota, Columbia</td>
<td>cars, trucks</td>
<td>12</td>
<td>5 min. cycle</td>
<td>1996</td>
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<td>Volvo</td>
<td>Curitiba, Brazil</td>
<td>trucks</td>
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<td>5 min. cycle</td>
<td>1997</td>
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<tr>
<td>Volvo</td>
<td>Umea, Sweden</td>
<td>trucks</td>
<td>24</td>
<td>5 min. cycle</td>
<td>1997</td>
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<tr>
<td>Navistar</td>
<td>Monterey, Mexico</td>
<td>trucks</td>
<td>13</td>
<td>5 min. cycle</td>
<td>1998</td>
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<tr>
<td>Renault</td>
<td>Blainville, France</td>
<td>trucks</td>
<td>19</td>
<td>5 min. cycle</td>
<td>2004</td>
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</tbody>
</table>
Ecopaint RoDip4

- Taking the proven RoDip technology one step further
- Mechanical and electrical versions available
- Simple, flexible and robust
- More than 9 million vehicle bodies already “RoDipped”