

# Sustainable Pre-Treatment and Coating

The new multi-metal pre-treatment and powder coating plant at MWN meets high standards of sustainability and is far from being a conventional solution. With seven pre-treatment chambers, it can process a variety of different metals separately, while the enclosed powder application area guarantees very high-quality finishes.

The German powder coating company MWN has repeatedly demonstrated that business success and a responsible approach to the environment and the use of our natural resources are not mutually exclusive. One of the most important objectives of the company's latest project was to reconcile economic and environmental considerations.

MWN needed to take the strain off its 20-year-old coating plant from Noppel by installing a new flexible, multi-metal pre-treatment and powder coating plant, also from Noppel. As there was no space for the new plant in the company's existing factory, a new building covering an area of 1800 m<sup>2</sup> had to be constructed with a suitable layout and including all the necessary underground pits.

The loading and unloading areas show that the company also puts a great deal of emphasis on the well-being of its employees. The power-and-free conveyor that connects all the sections of the plant is equipped with lifting and lowering units for loading and unloading.

This means that the conveyor trolleys can be lowered to the required level to accommodate not only components of different sizes but also employees of different heights, which creates an ergonomic working environment.

The material flow within the plant is fully automated. Manual workstations have been installed in the unloading area where parts can be transported manually for greater flexibility.

## Multi-metal pre-treatment system: Space-saving and environmentally friendly

The pre-treatment process for the workpieces provides them with the necessary corrosion protection and ensures that the subsequent coating process will give high-quality results. As the pre-treatment phase varies significantly for different substrates, the plant has seven separate pre-treatment chambers installed in a line. The chambers for the selected pre-treatment process are automatically activated while those that are not needed remain inactive. This makes it possible to

prepare steel, galvanised steel, stainless steel, aluminium and other metals separately for the subsequent powder coating phase. As a result, MWN stands out significantly from its competitors, most of which focus on just a small number of materials.

All the machinery in the pre-treatment plant has been arranged to save space. Most of the machines are installed in a pit under the pre-treatment chambers. However, the dispensing and bath maintenance equipment is on platforms to make it easily accessible for supply and disposal purposes while the plant is in operation or is being cleaned.

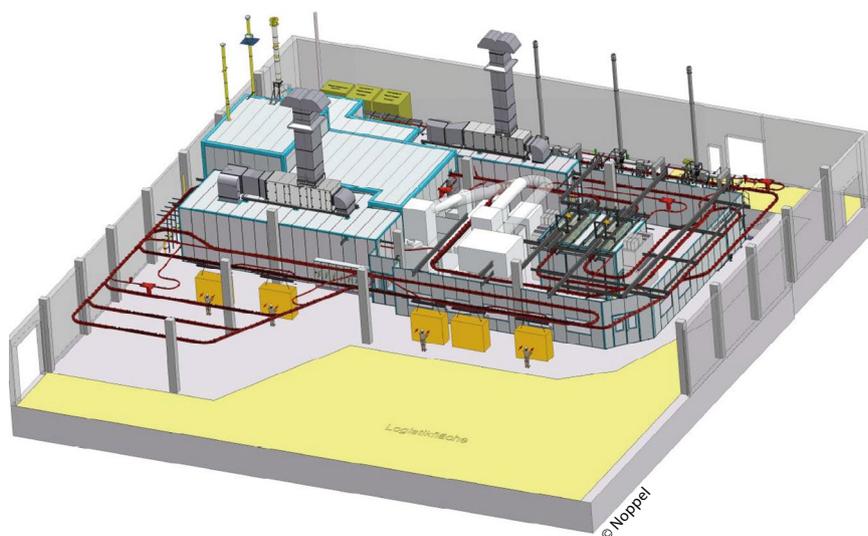


Figure 1 > Compact plant layout with spacious loading and unloading areas.



**Figure 2** > The entrance into the pre-treatment plant for the components.

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The fresh deionised water for rinsing purposes comes primarily from the rainwater that is collected on the roofs of the production buildings. On average around 30,000l of rainwater is captured every month. The entire pre-treatment plant produces no wastewater as a result of the recirculating deionisation and distillation units that have been carefully designed to meet the plant's requirements. Safety is an important consideration during the whole pre-treatment and water processing phase. Stainless steel collection tanks are fitted under the plant to capture any liquids that may be discharged in an emergency.

### Separate coating area in the centre of the building

After the dry-off oven has removed the moisture from the surface of the components, they pass into the enclosed cooling zone where filtered, temperature-controlled outdoor air from the inlet/exhaust/circulating air unit is used to cool them. Next they enter the powder coating booths. Depending on the type and size of the parts, they will pass either into the automated spray booth or into one of two manual booths, where they can be powder coated by hand.

The entire coating area is in the centre of the building and is surrounded by high walls. This protects the parts from air movements within the building and reduces the risk of them becoming contaminated by swirling dust, which further improves the coating quality. These measure also create the best possible working environment for the company's employees. A bypass section in the conveyor is responsible for a special feature of the plant. It allows any parts that need to be coated twice or that do not require pre-treatment for specific reasons to be transported directly into the powder coating area.



**Figure 3** > Lifting and lowering stations make parts handling easier.

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**Figure 4** > As the pre-treatment processes differ significantly depending on the material, the plant has seven separate pre-treatment chambers arranged in a row.

### Powder curing oven and dry-off oven in one unit

In the same way as in the old plant, the new plant combines the dry-off oven and the powder curing oven in one unit, which is positioned in the most appropriate location in the overall layout. This design saves space and, because of the smaller surface area of the outer housing, permanently reduces the plant's



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**Figure 5** > The automatic spray booth is equipped with a platform for manual coating.

energy consumption. Both ovens use recirculated air, which is the simplest and most flexible way of achieving the required component temperatures and dwell times and is ideal both for simple parts and for those with complex shapes. The drives on the insulated sliding doors at the entrance and exit of the oven unit are controlled directly by the conveyor system.

The last stage in the coating process involves cooling the workpieces. Another enclosed cooling zone with an inlet/exhaust/circulating air unit is used for this purpose. Here the parts are cooled with filtered, temperature-controlled outdoor air.

### Renewable energy

A photovoltaic system with a power output of 300kW on the roof of the building and the rainwater collection unit reduce the amount of electricity and water that MWN has to buy. In addition, a wood-chip heating system has been installed in line with the German Renewable Energy Sources Act (EEG). Environmentally friendly energy (electricity and heat) and rainwater are used wherever possible in the new powder coating plant.

The plant has been in operation for several months and has already demonstrated its efficiency in this short time. It is designed for components that are 2500×1000×2200mm in size and for a load of 400kg per trolley which not only covers the company's existing requirements but also possible future developments. With a throughput of 10 to 12 hangers per hour, it has also significantly increased the company's total pre-treatment and coating capacity. //



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**Figure 6** > The entrance to the powder curing oven, which is combined in one unit with the dry-off oven.

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