

## ENERGY-EFFICIENT POWDER COATINGS

# Increased productivity — an added bonus

The demands on energy-efficient powder coatings have changed as oil and gas prices continue to rise. The main objective is not only saving energy, but also increasing productivity, as the following example of a machinery manufacturer shows.



Machinery manufacturer Weidemann has reduced energy consumption levels with the use of energy-efficient powder coatings.

The German company Weidemann, a manufacturer of compact tractors, wheel loaders and telescopic loaders, has a policy of constant improvement with the regard to the technologies it uses and its employees and distributors. As a result of growing demand for its products, the company invested in a new plant in Korbach in 2007. In addition to the final assembly of the machines, the plant is also responsible for applying high-quality coatings to all the components, such as the chassis, bodywork, hydraulic cylinders and rear counter

weights, using a state-of-the-art paint shop which has been designed to allow the parts to be powder coated or painted, depending on the machinery manufacturer's requirements.

At the same time as the work on the new plant began, Weidemann's cooperation with the coating manufacturer Freilacke also started. A year after the plant came into operation, Weidemann decided to introduce further improvements to the

paint shop. Joint projects were set up covering areas such as high-solid paints, more UV-resistant gel coats and energy-efficient powder coatings. As a result of its need for powder coatings, paints and gel coats for the carbon-fibre-reinforced plastic engine covers of its vehicles, Weidemann chose one system supplier which could meet all the challenges involved in providing standardised coatings, with regard to both colour and gloss.

The company's requirement for an energy-efficient powder coating was aimed not only at saving energy, but also at increasing productivity during periods of over-capacity.

The new powder coating also had to offer a range of other properties:

- Compliance with in-house coating specifications
- Varied component shapes and different wall thicknesses, sometimes on one part
- Avoidance of overbaking during potential productivity increases with peak temperatures of 220°C
- Weld seam coverage
- No bloom



The aim of the new powder coating plant at Korbach was to provide a standardised coating solution and a more energy-efficient process. The new powder coatings are high quality polyester products for external use which increase the productivity of the paint shop.

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## REASONS FOR USING ENERGY-EFFICIENT POWDER COATINGS

1. Reducing the oven temperatures	This brings a direct saving in oil or gas consumption.
2. Increasing productivity within the coating shop	The oven often creates a bottleneck. Enlarging the oven is generally not feasible because of a lack of space. At the specified baking temperatures the conveyor speed can be increased and the oven throughput time reduced.
3. Broadening the range of parts	If the range of parts is very varied, for example components with very thin and very thick walls, the risk of yellowing can be significantly reduced with the use of powder coating systems which have lower baking temperatures, because of the lower peak temperature.
4. Opening up new applications	These could include wood (MDF) or plastic components. In addition, a variety of metal substrates which cannot be exposed to higher temperatures for functional reasons and assembled components which have a restricted peak temperature can also be processed.

In technological terms the agricultural and construction machinery industry presents one of the greatest challenges for coating manufacturers. Complex welds and solid steel parts which are centimetres thick and, in some cases, welded to 2 mm steel sheet can cause problems during the process of baking powder coatings. In this case three main colours are required: Weidemann red, yellow and grey. The two bright colours, red and yellow, need the highest standards of coverage, in particular when it comes to the weld seams. The yellow coating is very sensitive to overbaking.

#### Polyester grade for external use

Instead of a standard grade polyester coating, which cures in ten minutes at 180 °C, a more energy-efficient powder was needed. A new high-quality powder coating for external use that is baked at temperatures of 140 °C and above was produced in the coating manufacturer's development laboratory. In partnership with Weidemann, several test versions were evaluated, compared and developed further to provide the necessary levels of corrosion prevention, colour stability and overbake resistance. Only when all the parameters fell within the required range were the products tested in the technical centre and the first small quantities used by the customer in the paint shop. When all the results of these tests met the required standards, the

operational trials took place. Finally the new energy-efficient polyester coating was introduced into full production.

Using the energy calculator at [www.freilacke.de/service/energierechner](http://www.freilacke.de/service/energierechner), it is possible to run individual calculations of the energy and cost savings resulting from the use of energy-efficient powder

#### Qualitative comparison: Energy-efficient powder coating 20 min. and upwards / 140 °C (object) vs. standard powder coating 10 min. / 180 °C (object)

Baking temperature	+
Productivity	++
Flexibility in the coating process	++
Risk of yellowing during baking	++
Bloom	=
Gloss	=
Colour	=
Levelling	=
Runs	=
Thixotropic behaviour	=
Shrinkage	=
Mechanical properties	=
Chemical resistance	=
Corrosion prevention	=
UV resistance	+
ecoating with two-component PUR	+
++ significantly better	
+ better	
= comparable	

In comparison with standard powder coatings, energy-efficient coatings baked at lower temperatures are of equivalent or better quality.

coatings. The simplified calculation allows different powder coatings to be compared.

#### Baking limits

The example of machinery manufacturer Weidemann demonstrates the possibilities of using energy-efficient powder coatings. As the production process moves closer to the lower baking limits of the powder, it also reaches the boundaries of the coating properties. Energy-efficient powder coatings are less resistant to underbaking than powder coatings which are baked at standard temperatures of 180 °C or 200 °C. Underbaking has a disproportionate impact on the corrosion resistance and mechanical properties of the coatings. In this case, the conditions for the introduction of the new product were almost ideal. For example, the number of colours required was relatively small and only one grade of powder was needed. When introducing the new system, it was very important to ensure that the employees in the paint shop were made aware at an early stage of the potential and the risks of the new coating and given the necessary training.

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