Ekornes ASA is Scandinavia’s largest furniture manufacturer and is based in the Norwegian town of Ikornnes. Among other things, the company produces the world-famous Stressless furniture range. At its plant in Ikornnes, which is next to the Geirangerfjord, one of UNESCO’s natural world heritage sites, the company invested in a new state-of-the-art paint shop for wooden frames. The paint shop was planned, delivered and brought into production by Rippert.

On the previous paint line the frames had been automatically spray painted by robots for several years. As part of the modernisation process, Ekornes aimed to bring about significant improvements in terms of rationalisation, energy consumption and environmental impact.

The painting process consists of three stages: pickling, the first clear coat applied as a primer with subsequent sanding and the second clear coat as the top coat. All the paints and the pickling solution are waterborne for environmental reasons.

Two robots operate at the same time in each spray booth, which allows for a short cycle time of only 10 seconds per frame. The capacity is double that of the previous system. An overhead power & free chain conveyor ensures that the furniture frames are transported smoothly through the paint shop.

Three-stage overspray separation system
The new spray booths have automatically regenerating filters and a subsequent fine filter, which also has an automatic regeneration function. This allows the spray booths to operate largely with recirculated air, which means that they can function independently without being connected to the ambient air. This in turn significantly lowers the plant’s environmental impact, because it results in a major reduction in the amount of energy used for heating and keeps the residual dust content to a minimum.

The automatically regenerating filters in the spray booths are based on the Rippert system, which uses rotating brush rollers (RTS-Rotation).

The automated painting system has a high level of application efficiency, but
still produces a large amount of overspray, which is damp and tacky as it leaves the spray booth in the waste air flow. In order to prevent it from accumulating in the pipes or clogging the fine filter, prefilters are used at the point where the overspray is produced, which may be baffle plate, paper, fleece or fibreglass filters or a combination of any of these. The adhesive effect ensures that the paint particles stick to the contact surfaces of the filter, as a result of which a high level of separation is achieved.

However, all of these standard filter systems are storage filters, which means that the filters become increasingly clogged as the system continues to operate and cannot be regenerated. In addition, the resistance of the filter changes and, therefore, the quantity of waste air that passes through it is reduced, unless the system is adjusted automatically. In particular in the case of critical coatings, the consequence can be uneven spray patterns and variations in the thickness of the coating.

If the filter in the spray booth becomes so blocked that the amount of waste air emitted falls below the minimum limit, the filter has to be changed. In some circumstances, this can be very time-consuming and can also result in production being shut down. Another problem is that not only the paint residues which have been filtered out but also the filter materials themselves have to be disposed of.

Rotating brush rollers
For automatic, continuous and multicoat painting processes, such as those used by Ekornes, changeover times of this kind are not acceptable. Continuous procedures are needed, which means that the filters must be able to clean themselves automatically. However, in order to prevent the tacky overspray from affecting the regenerating filter systems, a prefiltering system is needed on some paint lines. The ideal solution is the RTS-Rotation system, which will ensure that maintenance of the prefilters does not lead to a production shutdown.

This system is based on a row of vertical brush rollers which rotate slowly while the waste air is sucked through them. The adhesive paint particles are trapped by the bristles and dry out. At specified intervals, the bristles are automatically cleaned by a pivoting comb or scraper mechanism behind the brush rollers. The paint particles fall into a discharge screw or a collecting tray and can be extracted and disposed of while the paint line is still operating.

Regenerating fine filters
However, this system alone does not comply with the environmental regulations concerning the residual dust content of waste air. A further level of filtering is therefore needed. As the paint particles which reach the next filter system are less likely to be moist and adhesive, special paint dust filters with high-quality filter tubes containing PTFE membranes are installed.

If required, a precoating agent (dust) can be used to reduce the adhesive properties of the particles and to ensure that the layer of dust on the filter elements remains permeable to air. The precoating material is injected into the air pipes using special dispensing systems. The filter tubes are cleaned by bursts of compressed air. The paint dust is removed using a discharge screw and transferred to the waste container, where it can be disposed of. This process can take place while the system is in operation.

Rippert has used the combination of prefiltering with brush rollers and regenerating filter systems in several paint shops, some with very large volumes of overspray, over a number of years. The plants in question have waste air capacities ranging from 5000 to 90,000 m³/h. As a result of Rippert’s 40 years of experience in air purification, several synergies have emerged. By working on the principle of supplying everything from under one roof and using its own products, the company has developed the expertise and the necessary flexibility to meet almost all requirements.

The new technology, which involves using precoating agents to bond with paint particles that remain adhesive for long periods and, therefore, allows for continuous operation, requires special planning expertise, but has already proved its value in individual areas. It also opens up new applications where previously only water-sprinkled separation systems could be used.

In order to ensure that the technology is suitable for the paint systems in question, individual tests should be carried out in advance in Rippert’s pilot plant, so that the correct solution can be found in each case. This approach produced successful results for Ekornes, where the system has been in full operation for several months without problems.

Thomas Schöning
Rippert Anlagentechnik GmbH & Co.KG,
Herenzbrock-Clarholz, Germany, Tel. +49 (0)5245 901 0,
info@rippert.de, www.rippert.de

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<thead>
<tr>
<th>Paint shop details</th>
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<tbody>
<tr>
<td>Cycle time</td>
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<tr>
<td>Conveyor feed rate</td>
</tr>
<tr>
<td>Pickling solution overspray</td>
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<tr>
<td>Clear coat overspray</td>
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