

Cleaning wood-based, composite and sandwich panels in the caravan industry

Clean Production



A wall panel with cut-outs for windows before cleaning (Image: Wandres)



The sandwich panel was cleaned perfectly within a few seconds. Small details on edges and in grooves have now become visible.

“Innovation through tradition” is the motto of Dethleffs, a market leader in the motorhome and caravan sector for the past 85 years (Image: company)

Thanks to an automated cleaning system developed by Wandres GmbH micro-cleaning in Stegen, Dethleffs, one of the leading manufacturers of recreational vehicles in Europe, has been able to optimise their production process. In addition, this innovation has succeeded in reducing the exposure of employees to wood and glass fibre dust in the production environment. Current trends within the industry towards the development of an increasingly lightweight construction for motorhomes and caravans are set to continue. Due to the use of modern composite materials and an innovative bionic design concept, the manufacturer Dethleffs GmbH & Co. KG has this year managed to put a spacious caravan on the market weighing in at a record of only 708 kilograms. Dethleffs, with over 1000 employees, has been

manufacturing high-end motorhomes and caravans for more than 85 years in Isny in the Allgäu and belongs to the Erwin Hymer Group which operates globally in this sector. To ensure the lightweight construction approach delivers a high degree of bending stiffness and tensile strength, the manufacturer uses MDF fibreboard for the interior elements. For the construction of the body shell GRP, aluminium, polyurethane foam and wood are used. These are lightweight and offer maximum stability and the best insulation values. The processing of the sandwich panels which are up to 9.5m long and 2.7m wide, is for the most part automated. Window openings and installation ducts for wiring are cut out of boards with a thickness of between 20 and 45 mm. This process generates large quantities of dirt and dust. The particles remain wedged in grooves in particular and cling

Micro-moistening of the brush filaments with the cleaning and anti-static "Ingromat®" liquid provides for the effective removal of even the tiniest particles

to the rough side edges of the cut-outs, adhering to the surfaces due to the electrostatic charge.

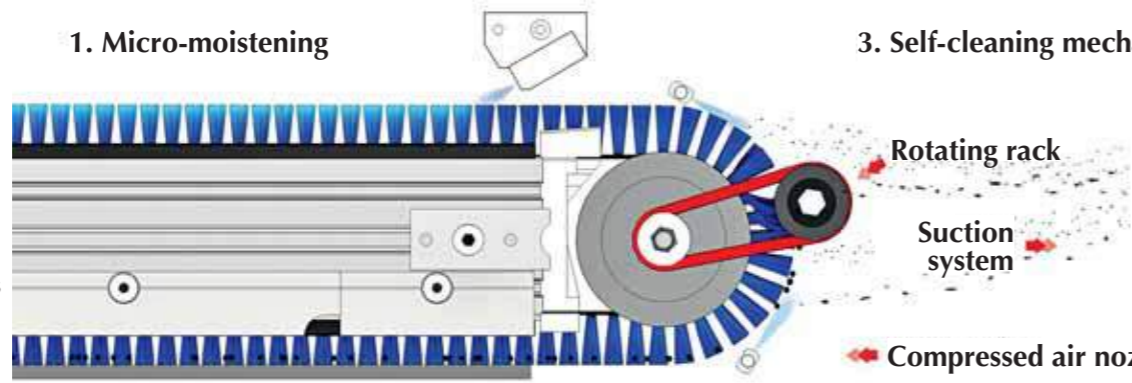
Cleaning at supersonic speed

Before the automated cleaning system was integrated into the production line, a seamless, uninterrupted flow of the subsequent manufacturing process could not be secured at this point. After cutting processes, boards had to be manually cleaned before assembly to remove the remaining contamination using compressed air, air lances, brushes or even by wiping with antistatic cloths. Manual cleaning was time consuming and only partly did the job. Specifically, blowing down the boards only sends the fine GRP dust up into the atmosphere, where it will settle back down on surfaces. Furthermore, fine

wood and glass fibre dust pollutes the entire production environment and is detrimental to the health of both staff and clients. The safe and effective removal of these micro particles had proved very challenging for the manufacturer up to this point. In 2011, however, Dethleffs decided to integrate a Wandres cleaning system into the production line for body shell components. The unit has a surprisingly space-saving installation depth of merely 460 mm and combines two different cleaning procedures: pre-cleaning with air technology at the infeed and a brush cleaning process at the outfeed of the machine. Both modules are mounted on an compact height adjustment unit which automatically adapts the height to accommodate the thickness of the component being cleaned exactly.

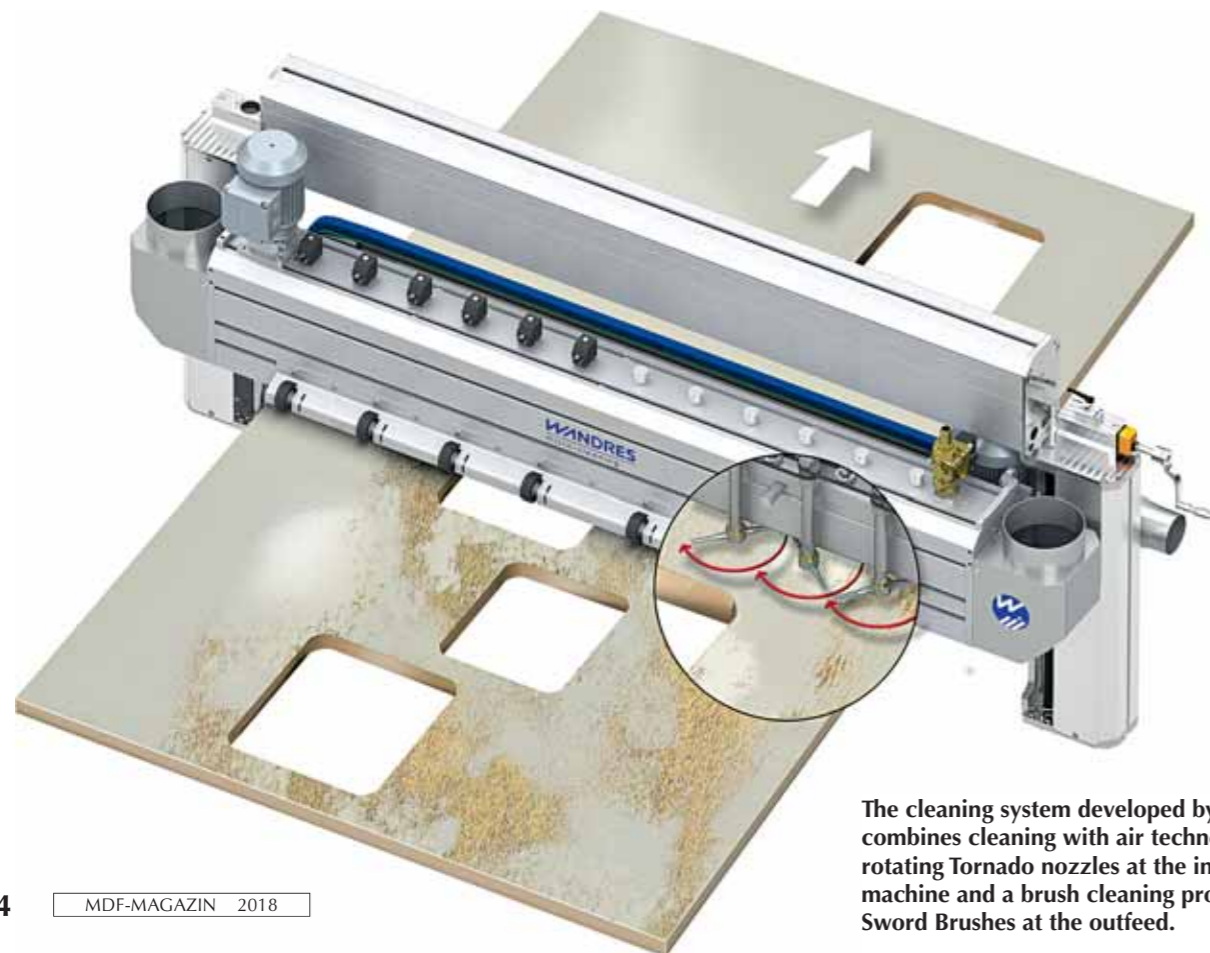
The air-assisted cleaning is performed by a "Tornado Channel" TKR 200. Swarf and dust are blasted out of recesses, propelled towards suction connections and rapidly expelled. The Tornado nozzles rotate at a consistently high rotational speed. They are synchronized electrically and driven via timing belts. The circular cleaning areas of the nozzles overlap thereby yielding a perfect cleaning result for the entire surface. Compressed air is expelled from the nozzles at several times the speed of sound and dislodges thereby tightly wedged particles from grooves and rough edges. Despite this, compressed air consumption is economical as the air jets are activated automatically but only when a panel is transported through the Tornado Channel. According to the cleaning requirements of the

1. Micro-moistening



2. Cleaning of the product surface

3. Self-cleaning mechanism



The cleaning system developed by Wandres combines cleaning with air technology using rotating Tornado nozzles at the infeed of the machine and a brush cleaning process with Sword Brushes at the outfeed.

panel and the width, specific nozzles can also be activated precisely as required.

Low running costs, better optical monitoring

A large part of the dirt which has been generated will have already been removed by the air assisted pre-cleaning process and disposed of via a suction system. Very fine dust particles remain, clinging tightly to the surface due to various capillary adhesive forces and can only be eliminated by a brush cleaning process. At the outfeed of the cleaning unit therefore, two aptly named Sword Brushes of type "BIX 51" are installed. The Sword Brush really has been named appropriately. The brush filaments made of polyamide are attached to a closed belt circulating around an elongated body with two deviation rollers. The form is somewhat reminiscent of a sword. The brush belt is flexibly bedded on a pressure buffer. The pressure buffer is regulated via com-

pressed air and provides for a constant wiping pressure onto even slightly uneven surfaces thus ensuring optimal cleaning results. The two Sword Brushes are arranged so that they wipe from above and from below, across the panel surface and transversally to the transport direction. Along a maximum cleaning width of 2900 mm, the filaments absorb dust and contaminating particles from the surface of the panels which are passing through the module and deliver them to a self-cleaning mechanism. Here a rotating rack and compressed air nozzles detach the particles from the brush and transport them towards a central suction system. The filaments of the Sword Brush are continuously micromoistened with the patented "Ingromat®" antistatic cleaning liquid by a pneumatically actuated nebulizer. The system utilizes capillary attraction to bind micro particles to the brush filaments. Only the use of this technology guarantees a reliable removal of even the most minute particles from the surface of the panel. After the automated cleaning system from Wandres had been integrated into the roller conveyor line of the manufacturer, production was able to recommence without delay. The new cleaning installation runs reliably and requires very little maintenance. In practice, operating costs, arising through the consumption of "Ingromat®" liquid and the replacement of the linear brushes, are very low. According to a

Dethleff employee, the brushes only had to be replaced once within a space of two years. In the opinion of the production manager in charge, the entire production process has seen immense improvement. The panels are cleaned immaculately and can immediately proceed to further processing. As a result Dethleffs promptly ordered two further cleaning systems from the manufacturer in Stegen. In retrospect, an additional benefit became apparent: the spotlessly clean surfaces are conducive to optical monitoring. Flaws on surfaces and edges are much more easily spotted by the employee responsible. The floor as well as the conveyor belts remain clean. Contaminating particles are no longer dragged along the line and the air quality in the production environment is noticeably cleaner and dust-free. Further caravan manufacturers have followed suit and, like Dethleffs, have installed modern cleaning systems reduced by Wandres in their facilities.