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Image: Wandres GmbH micro-cleaning

Keeping a clear perspective

Wandres cleaning technology prevents false positives at camera inspection

In modern short-cycle press lines, melamine-faced chipboard is cleaned from above and from below prior to camera inspection, using a breakthrough cleaning procedure. Combining brush cleaning technology with air technology makes perfect sense and provides for extremely efficient surface cleaning. The camera inspection that follows is guaranteed to have the lowest possible reject rate.

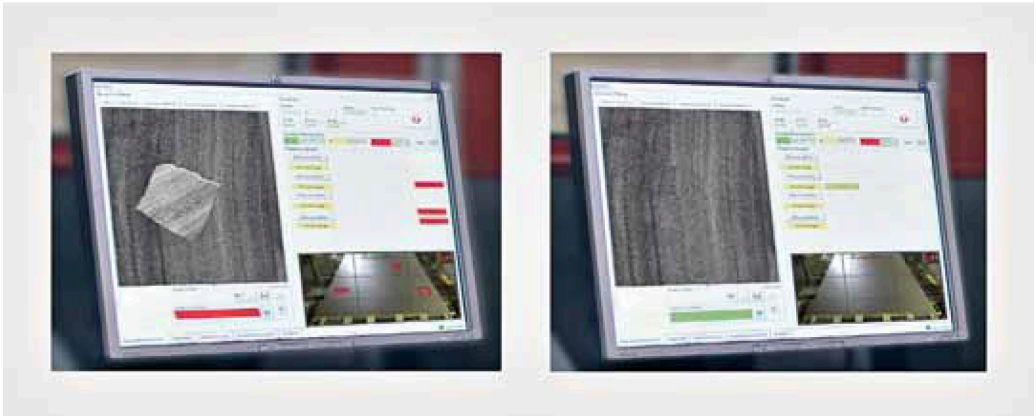
Effective surface cleaning is an essential prerequisite for the automated optical quality control of chipboard using a camera inspection system. Boards that have been cleaned optimally are no longer contaminated by particles which could potentially trigger false positives. This prevents chipboard from being mistakenly discarded as scrap. A reduced reject rate and higher productivity soon provide a return on the investment in an effective cleaning system. In addition, a clean production environment with an improved quality of ambient air, far less dust as well as fewer wood chippings on the floor, has a positive effect for employees on workplace health and safety standards. Edge-trimming of faced chipboard generates a tremendous amount of particles, chips, edge fragments and shavings, some of which are hurled onto the surface of the boards. During the subsequent optical quality control, these contaminants can cause disruption. They may lead to false positives at camera inspection and thus to an increased reject rate. This is why any strips from the melamine cover layer, edge fragments, chips and wood dust must be effectively removed from the faced chipboard. Due to the build up of thermal residual stress in the materials, melamine-

Cleaning chipboard after direct facing from above and from below prior to camera inspection (Graphic, photos: Wandres)

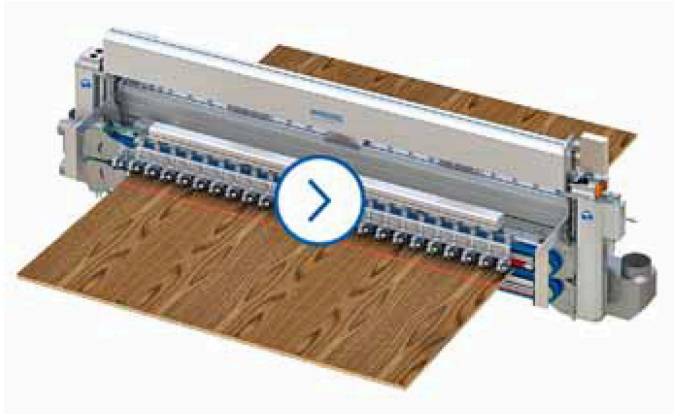
faced chipboard frequently displays wavy surfaces, blisters or blown areas near the edges of the boards after pressing. Wandres GmbH micro-cleaning in Stegen has therefore developed a sophisticated cleaning system that even cleans the wavy surfaces of large format chipboard with reliability. This cleaning installation is already operating in several short-cycle press lines in Europe and exceeding expectations there. The cleaning principle is based on a combination of brush cleaning technology and air technology.

Sword Brushes with tactile control elements adapt to surfaces

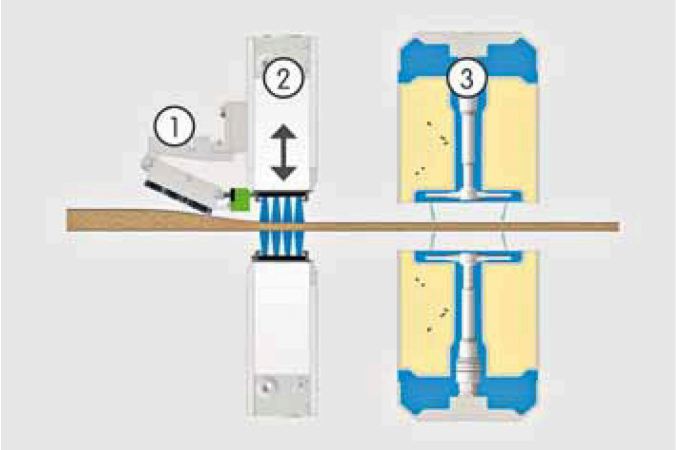
The initial cleaning phase involves Sword Brushes that are stationed at the infeed of the cleaning installation 'Una H-XFT 621'. They kick-start the cleaning process by removing coarse contaminating particles using brush cleaning technology. Particles are sometimes detached from the unprotected and raw edges of the chipboard and flung onto the surface of the boards. Subsequently, a contactless cleaning procedure removes these residual particles. During this stage, compressed air is emitted at several times the speed of sound from air jets rotating at high speed. Particles and dust are effectively removed from the surface.
The two-stage cleaning concept, combining brush cleaning technology and air technology, achieves consistently high quality cleaning results.
Boards with blown areas or warping at the edges can display quite considerable variations in height. Tactile control elements are installed at the infeed of the cleaning module to compensate for these uneven surfaces. They lift the linear brush of the upper cleaning unit slightly to allow for differences in thickness. This prevents any damage to the upper brush occurring.



Particles and fragments on the surface of boards trigger false positives at camera inspection. Effective surface cleaning upstream will prevent these false positives



3D animation of the cleaning procedure (view at: www.wandres.com/anwendung/spanplatten/)



Left: Cross section of the cleaning installation for large format chipboard:
1) touch control element,
2) upper Sword Brush with flexible buffer, lower Sword Brush with pressure buffer,
3) Tornado Channel above and below, each with rotating Tornado Nozzles
Right: Tornado Nozzles rotate at high speed and in absolute synchronicity at the heart of the Tornado Channel, removing particles from the entire surface of the board

The Sword Brushes wipe crosswise to the direction of travel, across the upper and lower surfaces of the boards, removing edge-trim and cover layer fragments. Very fine particles cling to the filaments and are transported by the circulating linear brush towards a suction system. At this point, the linear brush undergoes a self-cleaning process, performed by a rotating rack and compressed air nozzles. The upper and the lower Sword Brushes are both equipped with a pneumatically regulated flexible buffer or pressure buffer. Rather like a cushion of air, this ensures a constant wiping pressure on uneven surfaces and therefore optimal cleaning results. The flexibly bedded linear brushes are thus suitably equipped to adapt perfectly to wavy surfaces. The brushes of the linear brush belt have been developed specifically to meet the unique challenges that arise during the cleaning of chipboard. This includes a particular modification of the brush filaments for this cleaning application. All the linear brushes are manufactured according to the highest quality standards by Wandres Brush-Hitec GmbH in the Black Forest.

'Tornado Channels' with innovative air technology

Positioned at the outlet of the Sword Brushes, ready for the second cleaning phase, are two 'Tornado Channels' of Type TKR 405. These

Touch control elements 'TSE' at the infeed to the cleaning installation

'Tornado Channels' carry out contactless cleaning of the upper and lower surfaces of the boards using Tornado Nozzles that rotate at high speeds. The arms of the nozzles interlock during the process like cogs in a finely-tuned machine. The circular cleaning areas therefore overlap and the entire width of the board is cleaned seamlessly. Tornado Nozzles emit compressed air at several times the speed of sound. The jet of compressed air dislodges particles from the surface and drives them towards vacuum extraction. The rotating nozzles are electrically driven via a timing belt, synchronized and spinning at constant high velocity. To avoid the accumulation of particles in the channel and to reduce wear and tear on the timing belt, the 'Tornado Channel' is supplied with a protective stream of air produced by an external side channel blower. This protective air-flow creates over-pressure in the Tornado Channel and has a positive effect on its cleaning performance.

The compact cleaning installation can be quickly and easily integrated into production lines. Both the Sword Brushes and the 'Tornado Channel' are mounted on a shared adjustment unit. The entire cleaning system has an installation depth of a mere 650 mm approximately.

Only a very narrow space is therefore required for integration into an existing production line. The height of the upper and lower cleaning modules can be adjusted in parallel by means of the adjustment unit. In case of operational machine stoppage, the cleaning modules are instantly raised from the surface of the boards by a short-stroke pneumatic cylinder. Polishing effects on the product surface are thus avoided.

Should a client's laser light barrier detect upstream the risk of collision, for instance due to an extremely blown area on the surface of a board, the multi-position cylinder will lift the cleaning module into safe position with a pneumatic long-stroke.

After the new cleaning installation was commissioned, the production manager of the short-cycle press at one of the largest manufacturers of wood-based panels in Europe remarked,

'This is the best cleaning process I have ever seen. Thanks to the new cleaning system, our camera inspection can now assess boards correctly after edge-trimming'. In fact, the cleaning system has proved so successful since then that the identical Combi Sword Brush is now deployed in other short-cycle press lines in the same company.