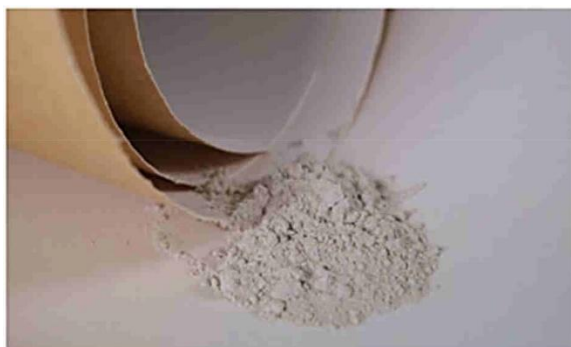
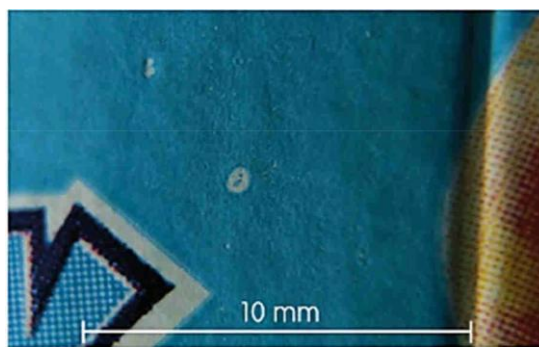


No surface cleaning without boundary layer activation

A groundbreaking process developed by Wandres GmbH, based in Stegen near Freiburg im Breisgau, tackles the challenges facing the paper processing industry with an innovative cleaning concept. Is the company thereby reinventing surface cleaning?



Suitable cleaning machines remove enormous amounts of dust from paper webs.



Paper dust can cause print defects and rejects as well as serious production problems.

When processing paper substrates, dust and tiny particles can significantly disrupt production processes. Paper dust that settles on ink-transferring machine components in the printing unit causes printing errors and requires increased cleaning interventions. Surface contamination is a fundamental problem in many paper processing companies, as paper substrates do not usually have a microscopically closed and deposit-free surface. Weakly bound fibres or filler particles can detach from the surface, especially due to bending, e.g., during transport over deflection rollers, and due to friction caused by speed gradients on rollers or by overlapping sheets. Heavy contamination also occurs during the finishing of webs and sheets, both during longitudinal and cross cutting, as dust formation is unavoidable at the unglued cut edge.

Unsharp or imprecisely aligned knives increase this effect and, in addition to fine dust, also leave coarser fibres in the edge area.



Tristan Kämper, Senior Manager Technical Sales, is the contact person for the paper and converting industry at Wandres GmbH.

In addition, recycled papers are more susceptible to dry dusting than papers based on fresh fibres. Contamination from paper dust can sometimes lead to serious production dry difficulties such as printing errors and frequent machine downtime.

Target: Avoid misprints

During flexographic printing, paper dust accumulates on the printing plates and causes printing errors. A common corrective measure is to shorten the cleaning intervals. However, this creates production backlogs and the frequent cleaning interventions bind capacity.

Downtime can add up to several weeks per year, driving up production costs. From an economic perspective, shortened cleaning intervals are not a satisfactory solution.



Wandres cleaning systems clean paper webs at high processing speeds and ensure optimal printing results.

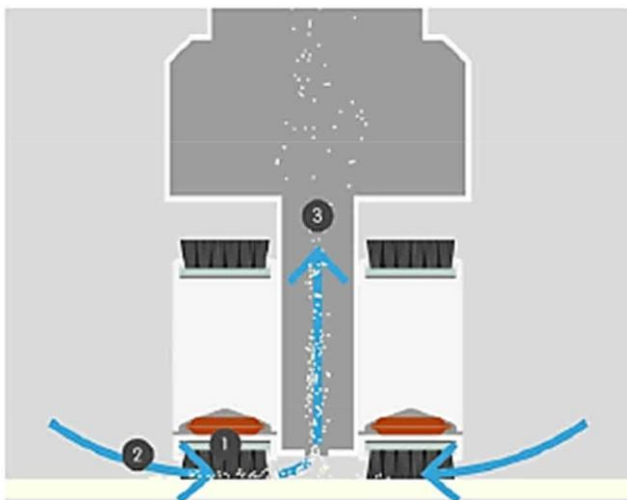
In addition, the printing defects lead to a high reject rate and can result in complaints from end customers. To solve the problem before it arises, paper dust must be efficiently removed from the web immediately before printing. However, simply vacuuming the dust from the web is not enough, as large quantities of fine dust particles remain on the surface. Dust particles in the air settle on machine parts and cause increased wear. In the worst case, the particles are present in concentrations that represent a health risk to people working in this environment. To ensure better working conditions in paper production with lower dust exposure for employees and to perfect web cleaning, the Wandres company has developed a process that led to the industrial testing of a new type of machine in 2025.

Solution: The boundary layer activation method (BLAM)

Fine dust particles adhere to substrate surfaces due to capillary forces, Van der Waals forces, and electrostatic forces, to name a few. If the substrate is subjected to a significantly higher speed than the ambient air, a boundary layer forms on the surface, which moves at the same speed as the substrate itself. »



The Fox® Cleaner uses the boundary layer activation process (BLAM) to clean fast-running and heavily dust-contaminated webs very efficiently.



Boundary layer activation method (BLAM)

1. The filaments penetrate the laminar boundary layer and remove particles from the surface.
2. Open filament zones allow air to flow through the digital brushes in a targeted manner.
3. The central extraction system effectively removes the dislodged particles.

Removing adhering fine particles from this boundary layer poses literally unsolvable problems for conventional, contactless cleaning systems. This results in inadequate cleaning results. The newly developed boundary layer activation method (BLAM for short) uses fine brush filaments to activate the laminar boundary layer on the substrate surface. The mechanical contact of the filaments on the surface loosens the particles from the web. The cross-wiping linear brushes perform a dual function in the boundary layer activation process: on the one hand, they transport adhering particles to the self-cleaning unit, and on the other hand, open filament zones allow air to flow through the digital brushes to the centrally integrated extraction system, which removes most of the particles loosened from the boundary layer. The combination of air-flowing digital brushes and compact central extraction ensures optimum cleaning performance – even at high web speeds and with heavy contamination.

Unlike the proven Informat process, the BLAM does not involve the moistening of the microfilaments. This simplifies particle extraction and improves the self-cleaning function. By eliminating the need for auxiliary cleaning equipment, the system has been significantly simplified, and operating costs have been sustainably reduced. "We listened to our customers and made our machines simpler and more robust," summarizes Tristan Kämper from the technical sales department at Wandres.

Intensive industrial testing

Following thorough development, intensive industrial testing of the boundary layer activation method was carried out at a well-known, globally leading manufacturer of cardboard-based liquid packaging. The existing web cleaning system was located immediately after the unwinding and directly before the first printing stage of the flexographic printing machine. This web cleaning system was retrofitted and intensively tested and optimized over a period of several months. A test matrix of different configurations for machine equipment, extraction capacity, and design features was systematically tested and analysed. Key quality indicators were closely monitored throughout the entire testing phase. The extracted dust quantities were evaluated at regular intervals using an isolated extraction system. In close consultation with the customer, the results were consistently positive, including in terms of the cleanliness of the immediate machine environment and the simplified operability of the system. The effort required for machine maintenance was significantly reduced.

"Every single gram of paper dust that we remove from the web significantly reduces printing errors and downtime. The boundary layer activation method has proven its superiority in the paper processing industry thanks to its dry process and is defining a new generation of machines called Fox®," summarizes Stephan Leu, technical director at Wandres.

The outcome: the Fox Cleaner

The implementation of the BLAM is consistently completed with the Fox Cleaner. It is additionally equipped with proven systems: the top and bottom of the web are cleaned by two Sword Brushes each with offset engagement points and opposite wiping directions. This arrangement also allows the sensitive edge area to be cleaned safely. Between the brushes, a centrally located suction system ensures air flow through the brushes and the removal of particles. When starting up or changing the web, the brushes are quickly lifted off the surface with the aid of a pneumatic cylinder. Parallel guidance and pressure buffers ensure uniform, vertical pressure on the filaments. "With the Fox Cleaner, we can offer a machine that cleans fast-moving and heavily dust-contaminated substrates with exceptional efficiency. This is promising in paper production for improving working conditions and is highly relevant in further processing and, above all, before printing," emphasizes Tristan Kämper, Technical Sales.



Stephan Leu, technical director at Wandres, evaluated the extracted dust quantity at regular intervals. The test setup was able to remove enormous amounts of paper dust from the web.