Paper dust and flaws in the print image easily avoided

Even microscopic particles can become a huge problem during the processing of paper and cartonboard webs. The build-up of paper dust results in flaws in the print image, disrupts the production process and can pose an occupational health risk. A cleaning process that utilises brush cleaning technology keeps these issues to a minimum. Andrea Rutz from Wandres GmbH micro-cleaning (Stegen, Germany) explains the technology in detail.

High-end paper and cartonboard webs should ideally feature a perfectly smooth and clean surface. To achieve this, a solution of starch is applied to the surface in the size press during the manufacturing process. All the same, abrasive contact with deflection rollers in the nip of a web transport system may still cause weakly bonded paper fibres or filler particles to detach from the surface during downstream processing. In addition, during slitting and cross-cutting of the web, large quantities of contaminating particles frequently occur. Avoiding the formation of dust on unbound edges is simply impossible. Sharp, well-set knives minimise the risk of debris generation and prevent even larger fibres from being deposited at the edges in addition to fine dust.

Fig. 1: Large quantities of dust are created during transport and cutting processes

Flaws in the print image and lengthy machine downtime

Contaminants can cause serious production problems during downstream processing. Loose particles settle on rollers or adhere to printing blankets and result in the formation of flaws in the print. This type of error is usually corrected by shortening the intervals between washes and replacing the printing blankets. From an economic point of view, this is a far from satisfactory solution. The downtime involved mounts up to several weeks a year and inflates production costs. Flaws in the print image increase the reject rate and, in addition, tons of material are scrapped during print acceleration and deceleration phases. Some manufacturers attempt to tackle the problem by cleaning the web using vacuum air flow. However, this still leaves large quantities of fine dust particles clinging to the surface. Wiping the cut edges with a mixture of water and glycerine as recommended by some paper suppliers can cause even further problems by dampening the surface of the web and so delaying the production process.

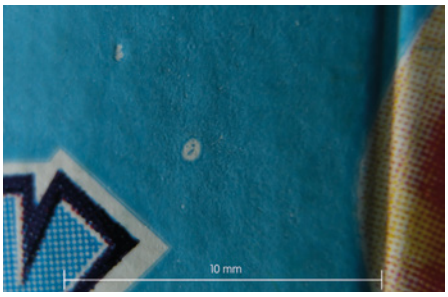

Fig. 2: A typical flaw in the print image caused by paper dust

Web cleaning using the Ingromat system

An alternative cleaning procedure has been developed by Wandres GmbH micro-cleaning. Sword Brushes feature a linear brush that circulates around a sword-shaped guiding element. The contact area of the linear brush is flexibly bedded on a pressure buffer to ensure the wiping pressure remains constant. Fine brush filaments made of polyamide wipe crosswise to the direction of transport across the surface of the web. A sprayer module moistens the filament tips evenly with a thin film of a special cleaning fluid. The surface of the web remains completely dry during the process and can proceed immediately to downstream processing. Due to increased adhesive forces, fine dust clings tightly to the micro-moistened filaments. The particles that have been absorbed are detached from the filaments in the turnaround area of the brush with the aid of two air jets and a rack and propelled towards the suction system.

The continuous self-cleaning feature of the linear brush delivers a high-performance cleaning process and reproducible results. Cleaning with Sword Brushes is an extremely reliable and economically viable solution, in particular for continuous processes in industrial production.

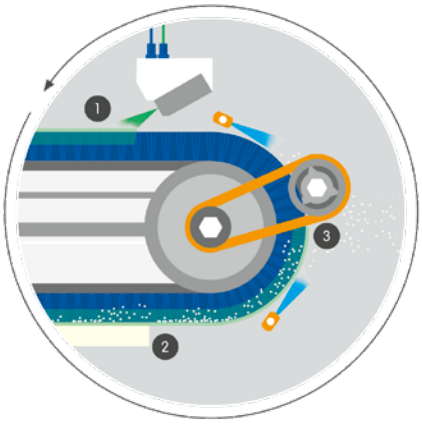

Fig. 3: The Ingromat system consists of three steps:
1. **Micro-moistening of the filaments**
2. **Web cleaning and binding of the dust to the filaments**
3. **Self-cleaning of the linear brush and disposal of dust particles by vacuum extraction**

Applications in the packaging industry

The Web Sword Brush was developed as a standard solution for cleaning webs with a width of up to 3 m and speeds of

up to 600m/min. The upper and lower surfaces of the web are each cleaned by two linear brushes wiping in opposite directions and with offset positioning. This configuration ensures that even problematic areas at the edge of the material can be cleaned effectively.

The Web Sword Brush can be easily integrated into existing installations. During run-up or when changing the web, the brushes can be swiftly removed from the surface with the aid of a pneumatic cylinder. If, for instance, a particularly large quantity of dust or fibre remnants has been generated by a prior cutting or slitting process, an additional vacuum extraction module can be installed at the infeed.

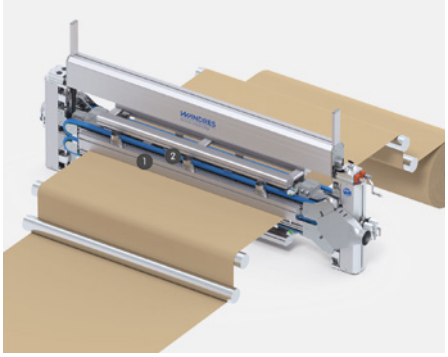

Fig. 4: The compact vacuum extraction module, the Trans-Vac Unit (1), removes large amounts of particles at the infeed to the Web Sword Brush (2) before the web is cleaned on both sides using brush cleaning technology.

Return on Investment in less than 6 months

A well-known packaging manufacturer ordered a Web Sword Brush from the Wandres Corporation (USA) and a significant improvement was visible immediately after commissioning. With the help of the web cleaner, repeatable and consistent results in the print image were guaranteed for the very first time. Without the cleaning system from Wandres, a much more frequent wash-up of the printing unit was required per cycle. The losses caused by machine stoppage and scrapped webs were reduced by an average of 75% so that the investment was recouped within less than six months. In the meantime, the manufacturer in North America is running several cleaning systems developed by Wandres and is already planning the integration of additional machines.

A kilogramme of dust in 24 hours

In a production line for SUS webs, the extraction filters were examined after the first three shifts. The production manager was astonished by the result as around a kilogramme of dust had been removed from the surface of the webs in this space of time alone. The cleaning procedure which had been in use previously had collected less than a hundred grammes. Justin Elsley, Vice-President of the Wandres Corporation (USA) explains: "The cleaning methods used previously were adapted to the width of industrial webs but quickly reached their limits when confronted with the fast-moving installations of the modern packaging industry. Our systems have been developed specifically for the cleaning of extremely wide webs and heavily soiled webs running at the highest possible speeds." With the help of the Ingromat System, manufacturers are in a position to achieve repeatable results when printing, gluing and coating and to deliver the perfect packaging.

Cleaning of rollers avoids particles being dragged along the line

Sword Brushes are ideal when it comes to cleaning web-guiding and deflector rollers. They prevent the transfer of any particles that are left clinging to the rollers onto the surface of the product. In addition, deploying Sword Brushes prevents repeated damage to the surface caused by a build-up of hard particulate on the rollers. The continuous cleaning process performed by Sword Brushes delivers a simple and cost- effective solution that has already frequently proved highly effective in continuous operations in industrial production. ■

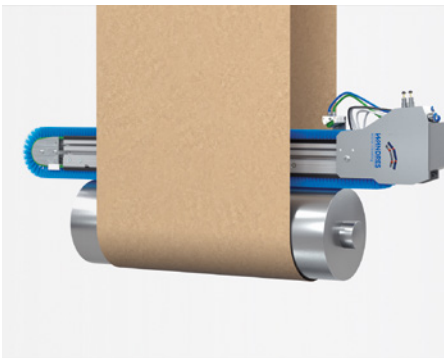

Fig. 5: The rollers are cleaned non-stop to avoid particles being transferred onto the surface of the product.

Image sources:
Wandres GmbH micro-cleaning