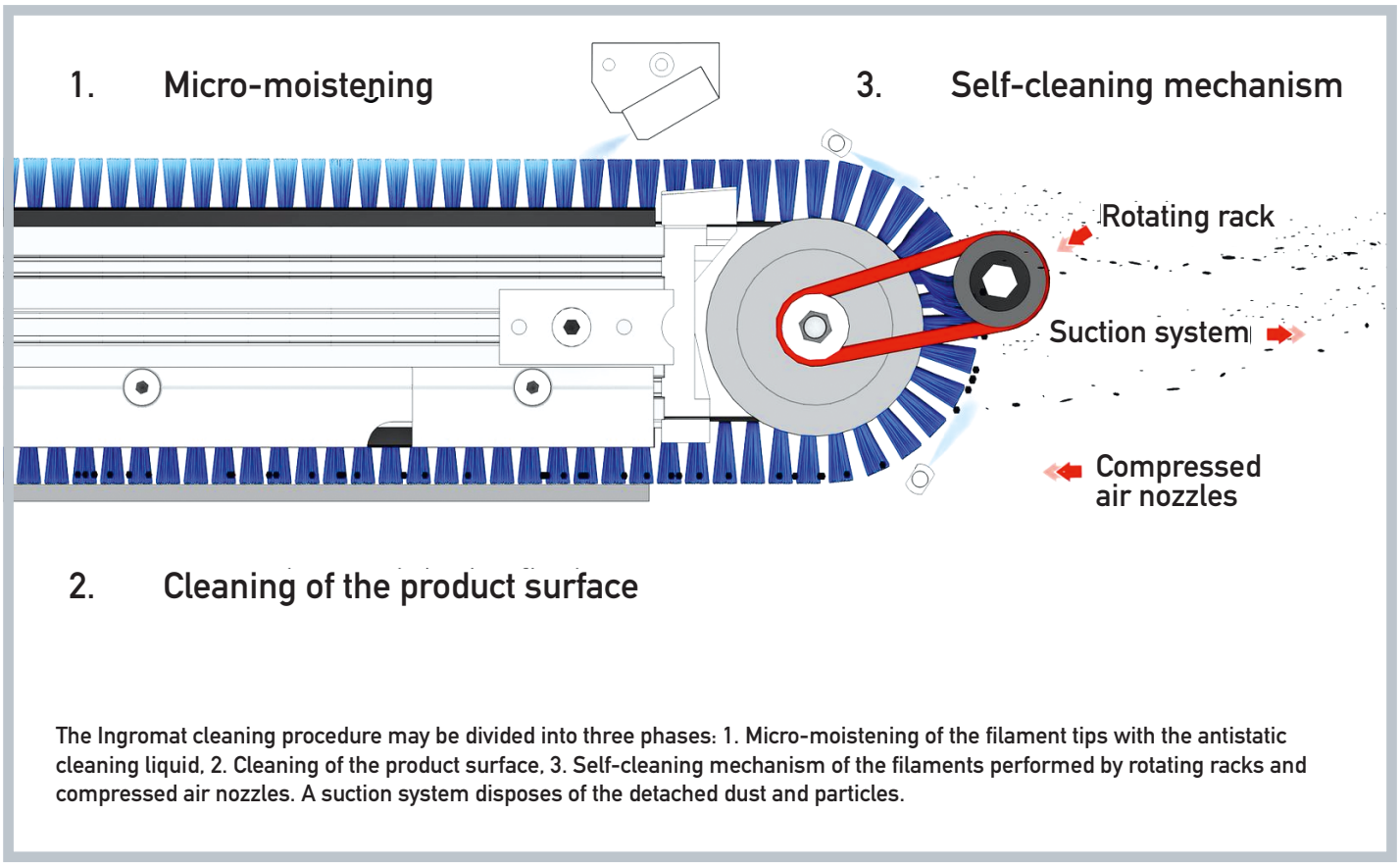

The Ingromat cleaning procedure may be divided into three phases: 1. Micro-moistening of the filament tips with the antistatic cleaning liquid, 2. Cleaning of the product surface, 3. Self-cleaning mechanism of the filaments performed by rotating racks and compressed air nozzles. A suction system disposes of the detached dust and particles.

Sword Brushes provide for particle-free electrical steel

Clean electrical steel

The stators and rotors of electric motors are constructed using laminations of electrical steel stacked together to avoid eddy current losses. Sword Brushes reliably remove contaminating particles from the steel strip before stamping thus preventing short circuits between laminations.

Electrical steel is a material used for the rotor and stator parts of electric motors. The steel sheets are stamped from a strip made of an iron-silicon alloy and then stacked together into bundles. Electrical steel sheets may be coated to provide insulating properties and improved bonding during punching. The thickness of the coating varies between 1µm and 4µm, depending on the function. Small metal particles remaining on the surface of the electrical sheet can penetrate the coating layer during stacking and lead to contact between the sheets and, in a worst-case scenario, cause an electrical short circuit. To prevent this happening, the metal strip needs to be cleaned before the levelling process and before cutting and stamping.
This is the task of the Sword Brushes from Wandres GmbH micro-cleaning. The Sword Brushes wipe transversally to the direction of transport of the steel sheet at a speed of about 1.5 m/s across the surface of the metal strip. Particles are bound to the filament tips and effectively removed from the surface of the strip.

Capillary adhesive forces are the key

To assist the adhesion of the particles to the brushes, a sprayer continuously applies a thin film of Ingromat cleaning liquid onto the filament tips. This liquid increases the capillary adhesive force between the filaments and the particles and provides for excellent cleaning results. The amount of Ingromat liquid applied can be adjusted according to specific requirements within a range of 0.2 - 0.8 litres per hour. The product surface remains dry during the procedure. Following the surface cleaning of the metal sheet, the particles absorbed are removed from the filaments by a self-cleaning mechanism consisting of a rotating

Combi Sword Brush before the levelling process.

(Figures: Wandres)

A Combi Sword Brush cleaning a steel strip from above and below.

rack and compressed air nozzles. This ensures that the brush, undergoing constant regeneration, is always at the ready with clean filaments. The industrial life of the filaments is approximately one year despite the contact with the sharp-edged metal strip and use in three shifts per day. Generally, the linear brushes can be replaced during annual maintenance work.

Speedy double Sword Brushes

The Combi Sword Brush Una XL deals effortlessly with cleaning the steel strip before entry to the high-speed press, even at transport speeds of 90 - 120 m/min. This cleaning system involves double Sword Brushes cleaning both from above and from below, each consisting of two parallel linear brushes. The cleaning module has a space-saving installation depth of merely 280 mm and can be retrofitted without any difficulty.

Adjusting to different sheet thicknesses and wavy surfaces

The steel strip is 500 mm wide and between 0.35 and 1mm thick. A flexibly bedded brush belt accommodates thickness variations of the steel sheet and compensates for wavy surfaces up to a difference of +2 mm. To this end, the brush belt is flexibly mounted on a pneumatically regulated pressure buffer. This compensating element adjusts the brush to the surface and provides for a constant wiping pressure thus guaranteeing reliable cleaning results.
The modular cleaning systems designed by Wandres GmbH are ideal for cleaning electrical steel and are at the same time both cost-effective and low maintenance. As an added plus, the cleaning of the metal strip also helps protect the levelling rollers from particle-related damage.

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