

No excuse for distorted carpets

Those involved in the finishing of tufted or woven carpets are constantly confronted with rationalization problems, while quality standards must be maintained or, in most cases, even raised.

The globalization of markets and efficient logistics in the procurement of raw materials and the distribution of finished products - supported by the progressive dismantling of trade barriers - allow production capacities to flourish wherever price and/or quality requirements can best be met.

It is not least against this background that monitoring and control systems have become established in the field of carpet finishing, which are of fundamental importance for the optimization of the various processes and the reproducibility of their parameters.

How can skew and sheet distortion be corrected in carpet finishing, and especially in carpet coating? This question can be answered as follows:

The coating process begins with the arrival of the uncoated carpet, which is distorted to a greater or lesser degree. Due to the fact that most carpets (woven, tufted or rugs) are produced with geometric designs distortions can easily be recognized by any observer. This accounts for the domestic as well as for the contract sector of the carpet business. Thus, before stabilizing by back coating, the carpet must be straightened or aligned. For this purpose Mahlo provides the Automatic Weft Straightener ORTHOPAC. Hundreds of units of different generations are successfully used in the carpet industry since decades. The actual weft straightener generation is called ORTHOPAC, Type CRVMC-12. An updated version CRVMC-15, with quite a number of new features, will be launched later this year. The first prototypes are already successfully installed in the carpet industry.



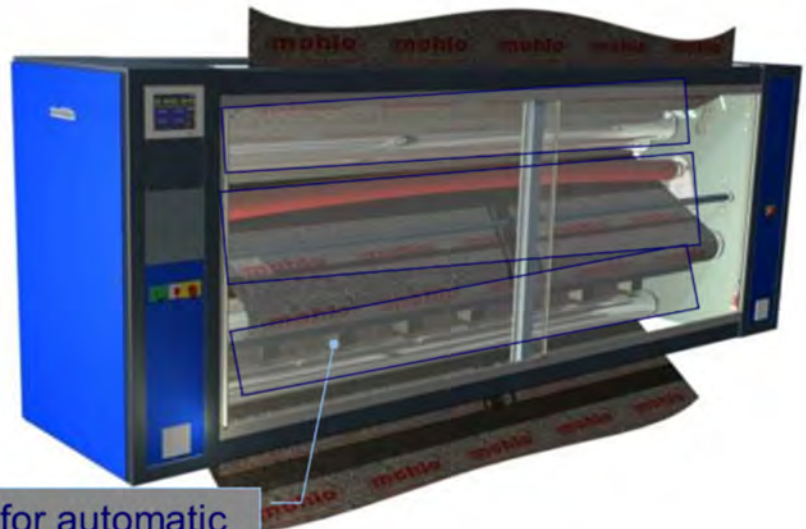
Fig. 1: Orthopac CRVMC-12

Detection System



Fig. 2: Scanner CTK-15

The core piece of the unit is the very sensitive distortion scanning system: The CTK-15 scanner is a sensor specially designed for carpet applications (woven or tufted). Carpets have a very low weft and warp density when thick yarn qualities are used. Conventional scanning systems are designed to scan higher thread densities. With its high resolution area of 9x9 cm, the CTK-15 offers a large scanning area to meet these special requirements. The CTK-15 is always exposed to reflected light. Light-emitting diodes in the infrared range are used to illuminate the lenses.



Cameras for automatic distortion detection

The camera focus is maintained by a predefined distance to the passing carpet back, which is a decisive factor for the evaluation. The carpet runs with the back side towards sensors. The CTK captures continuously high resolution images of the bypassing carpet. An intelligent algorithm of the software evaluates the captured image and summarises the generated pixel information in an FFT analysis. Repetitive information is matched to obtain a distortion signal of the weft yarn or tufted row.

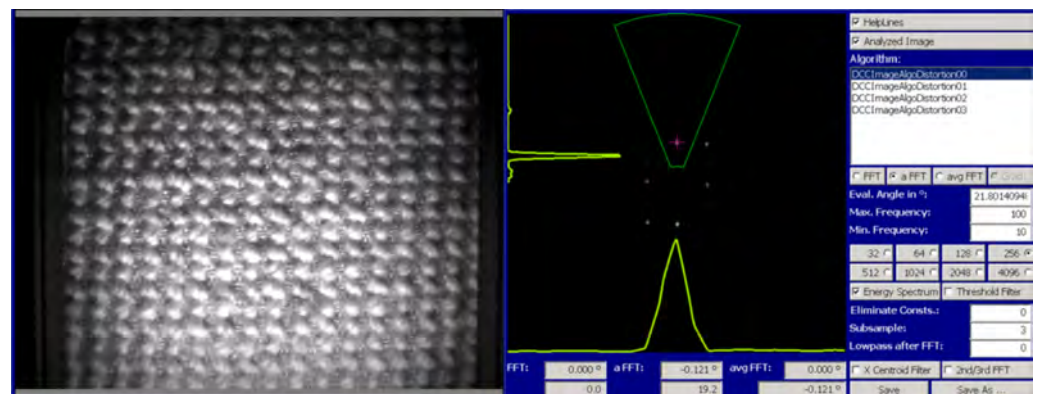


Fig. 3: Signal of CTK Scanners

A number of up to 8 CTK scanners are mounted in a motoric assembly at the exit end of the weft straightener. Selvage sensors detect the carpet edge and the drive system spaces them evenly in cross direction without any intervention of the operator. The typical setting parameters of a camera allow targeted scanning settings for the CTK scanner.

Intuitive user interface

The analysis electronics with powerful CPU, Ethernet interfaces and power link are integrated in the side panel of the straightening system. Modern network technology enables short installation times and allows for ease of upgrading.

The measured bow and skew distortions are then displayed on a robust, high-performance industrial 12", 15" or 19" TFT touch screen. All entries are made directly on the touchscreen using large, ergonomic buttons. Operation is simple and intuitive. All the key information is visible at a glance.

The current HMI and the associated evaluation and visualization software impress with new features:

- Individual signals from each scanner, to filter the signal digitally, allows much better detection results with better resolution.
- Visualisation and operation via intuitive TFT touch screen improves the overall user friendliness.
- Single signal display for each scanner individually simplifies online setting.
- Recipe management system for memory of machine settings.
- Remote diagnostic system for remote detection of malfunctions via modem or Internet.
- Internal and external Ethernet communications allows extremely fast data transfer.



Fig. 4: CRVMC Display

Mechanical straightener

During the development of the Orthopac CRVMC-12 straightening machine type, special consideration was given to the requirements for straightening heavy carpets. The result convinces with a completely revised straightening machine concept and a unique type of straightening roller arrangement. With the Orthopac CRVMC-12, separate straightening modules are used for the correction of skew and bow distortions. After the infeed roller, the carpet first runs over the skew straightening module, consisting of two skew straightening rollers.

Then the carpet passes to the bow straightening module equipped with two bow rollers. The angle of contact of the carpet on the bow roller is automatically optimized depending on the degree of distortion detected. The special arrangement of the bow rollers allows the rollers to always be positioned in such a way that the carpet lies completely on the bow rollers and the bow straightening effect is uniform over the entire width of the fabric. The achievable straightening results with nearly zero residual distortions convinced many customers and resulted in quite many repeat orders.



Since carpets, especially rugs, are a quite stiff products to be straightened and very often produced up to a width of 5400mm the whole design of this mechanical straightening device requires a very strong, reinforced design. The skew rollers with have a diameter of 219mm and the bow rollers convince with 190mm. The electrical roller positioning drives are laid out to work with up to 3000N web tension.

Application examples

In most applications, the straightener is installed between a pre-steamer and the coating head. At this point, the carpet reaches the straightening machine slightly damp, which makes the straightening process much easier.

When straightening carpet, special attention must be paid to the required fabric tension, as a defined straightening process is only possible with the appropriate, often high fabric tension. In many cases, therefore, driven pin rollers are used before and after the straightening machine, which are synchronised by means of a load cell on both sides. By specifying the required force, the fabric tension can be precisely adapted to the carpet quality to be straightened.

mInfo - Carpet Straightening with Orthopac CRVMC

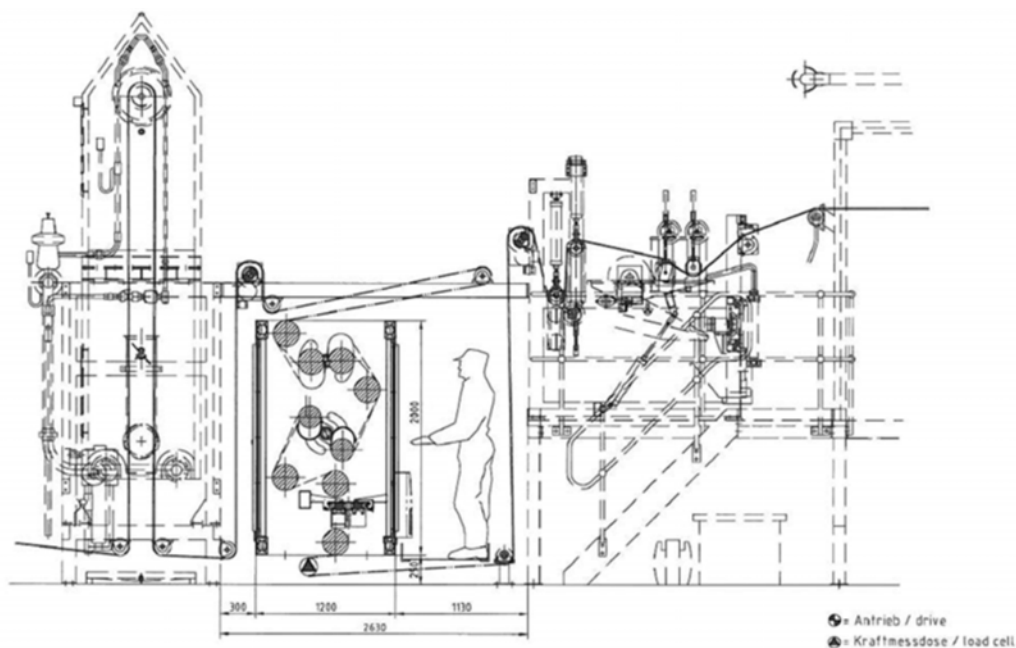
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Picture by courtesy of Kartal Carpets

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Picture by courtesy of Yasin Kaplan Carpet

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Summary

With the Orthopac CRVMC-12 and all the available options Mahlo offers the carpet manufacturer a reliable tool to help promote a quality product and economical use of resources (personnel, capital and energy) by optimising processing. In the final analysis, it contribute towards a spectacular reduction in cost and an increase in returns, and hence towards a long-term strengthening of the user's ability to compete in a global market.

As mentioned above: There is no excuse for distorted carpet anymore!

**Further questions?
Contact our experts!**



Fig. 5: Thomas Höpfl

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