



**KARL MAYER**

# Warp Preparation

NEWS LETTER



**DENIM-Schichten mit KARL MAYER – ebene Wege in die Weberei**  
DENIM sizing with KARL MAYER – smooth roads to weaving

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# KARL MAYER's warp preparation machinery for cost-effective sizing in DENIM production

**D**irect beaming and sizing technology has a decisive influence on the economic aspects and efficiency of the weaving preparatory stage. User friendliness can be improved and output can be maximised if the same manufacturer is responsible for coordinating the machinery for the direct beaming, dyeing and sizing processes. The processes involved in weaving preparation must be coordinated with the weaving operations in order to optimise efficiency throughout the entire production chain. To ensure that all the processes are coordinated with each other, each processing stage must meet the requirements of the next processing stage.

For example, the sizing department must supply the weaving department with warp beams having the following characteristics:

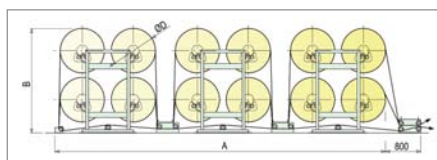
- the least number of yarn breakages, and preferably none at all
- uniform yarn sizing
- uniform and targeted sizing of the outer yarn
- constant residual yarn moisture content, without any stickiness
- no standing marks or marks caused by over-drying
- constant yarn tension/elongation
- high yarn residual elongation
- no crossed yarns
- low hairiness with no clinging
- perfectly wound edges

In turn, the sizing department needs warper beams with:

- the least number of yarn breakages, and preferably none at all
- no crossed yarns
- constant winding densities and beam diameters
- constant wound lengths
- constant yarn tension
- very little dust and fly, and preferably none at all

KARL MAYER's weaving preparation machines for use in processing DENIM can meet all these demands optimally and reliably. To this end, the company

Fig. 1: Diagram of the "BC-A" beam creel and "ABR" controller



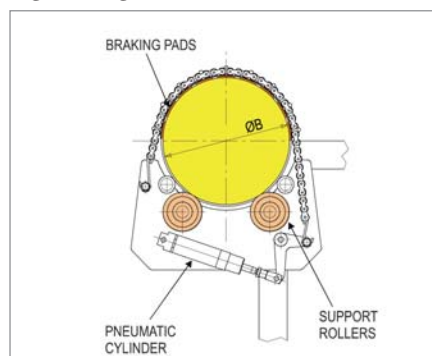
has constantly been developing its machines over many years and at every processing stage. Initially, the machines were mechanical, but then they were changed over to being electrical and then electronic, and now they are computer-controlled.

KARL MAYER's weaving preparatory machines are now all perfectly coordinated with each other. They enable the yarns to be transported accurately and uniformly, and thus ensure that the residual running lengths are extremely short and identical, right to the end of every batch. A high degree of reproducibility and machine availability is the prerequisite for the high performance levels that these high-tech machines have already achieved in practice in the textile industry.

Equipping the machines with KAMCOS® has contributed to the exceptional efficiency of the warp preparation machines produced by the KARL MAYER Group. This well-thought-out, standard platform for machine control consolidates all the computer operations, provides the framework for intelligent networking concepts within the textile chain, and last but not least, creates the right conditions for carrying out modern, transparent production operations.

The KAMCOS® control technology, together with the latest, patented conceptual solutions, such as regulating the "diameter and pressure structure", of a warper beam guarantee that all the beams have the same diameter, batch length and yarn density. Warper beams having identical characteristics are a prerequisite for carrying out high-quality, consistent dyeing and sizing.

Fig. 2: Diagram of the Band brake



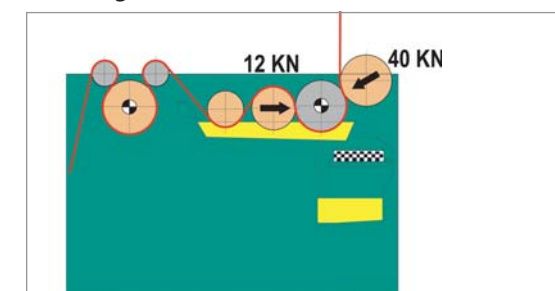
## "SMR" sizing technology for the DENIM sector

Modern dyeing and sizing technology, which is developed with the emphasis on the economic aspects of the process, greatly increases efficiency in both the weaving and weaving preparatory processes, and also guarantees that energy and the sizing agents are used efficiently. High-tech sizing operations produce high-quality, perfectly uniform, reproducible warp beams, which are needed to fully exploit the high weft insertion speeds of modern, high-speed air-jet, rapier and shuttle looms.

## "BC-A" beam creel and "ABR" controller

The yarn tension must be kept constant at all times during unwinding of the heavy warper beams, which may have flange diameters of up to 1,400 mm. During machine downtimes, emergency stops, periods of acceleration, and also once the production speed has been reached, it is essential to avoid high tension peaks during the stoppages, together with the associated risk of overstretching of the yarns at the warper beam. KARL MAYER's machinery (Fig. 1) fitted with the KAMCOS® system, together with the associated data collecting system and an efficient braking system, guarantee that this does not happen. A calculating system incorporated in the KAMCOS® system continuously supplies values on the required pneumatic braking and stopping pressure for the diameter of the beam currently being processed. Correspondingly, the yarn tension measuring rollers (load cells) in the ABR control system operate at a high resolution and with a high degree of precision. Flexible band brakes equalise any fluctuations between the actual and target

Fig. 3: Diagram of the CSB sizing system, simple system on the left, "wet-on-wet" on the right



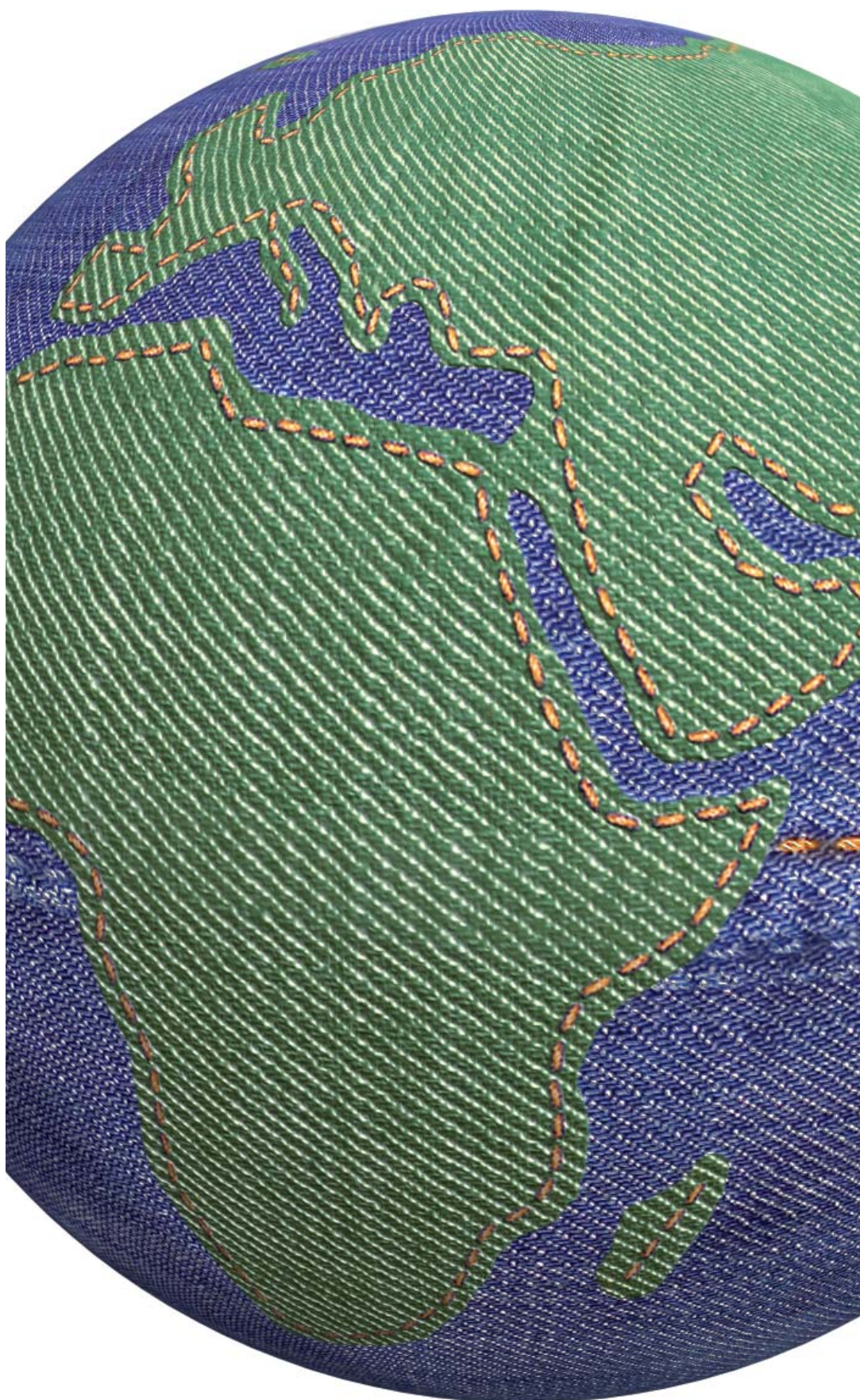
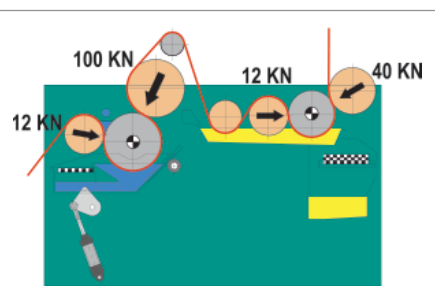
values quickly and reliably (Fig. 2). The band brakes are controlled by specially manufactured, low-friction roll diaphragm cylinders; they equalise out both resonance and beam irregularities and thus guarantee smooth machine running. This results in the shortest possible stopping times and distances, which avoids any further yarn breakages and yarn spirals.

#### “CSB/CSB-PW” sizing technology

The SMR sizing machine is PC-controlled and operates with the latest “TRIPLE DIP & DOUBLE NIP” sizing technology in the shape of the CSB application technology (Fig. 3). The combination of the dipping/nipping technique, with highly turbulent application technology, creates an integrated application system for the DENIM sector which, above all, conserves resources.

At one time, two sizing systems had to be used when the yarn loading density was higher than about 70/80 %, whereas now just one CSB application system is enough to size the textile material constantly and uniformly at yarn loading volumes of up to 110 % without any problems. Application baths having a low liquor volume and constant-pressure rollers operating at up to 40 kN are used for sizing in this case. The CSB technology, which is constantly being improved and revamped to meet the changing technological, ergonomic and economic requirements of the market, was developed by KARL MAYER. The latest machine features include:

- an ergonomic design for easy access, maintenance and cleaning
- a size bath having a liquor volume that is up to 60 % lower than in conventional techniques
- advantages as a result of using high-quality, corrosion-resistant materials
- bound textile transport during wet application



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- coordinated rubber-coated rollers for avoiding differences in circumferential speed and resulting yarn displacement
- optimised squeezing and wetting technology for achieving higher yarn loading volumes (of up to 110 %) in the single-bath process
- a reduction in energy consumption by using special smooth-running rollers and bearings
- a modular system, both for “conventional” and “wet-on-wet” sizing with the option to retrofit existing machines

#### CSB-PW “wet-on-wet” sizing technology

The “wet-on-wet” technique (Fig. 4) involves the additive application of sizes onto warp material that has been prewetted with water.

To do this, the warp yarns run through a separate, special prewetting section with an integrated, high-pressure squeezing arrangement and thus absorb up to 40 % warm or hot water. The water, which is mainly bound by capillary action, prevents the size from penetrating into the interior of the yarn. The advantage of this exterior yarn sizing technique is that the sizing agents and dyes can be subsequently washed out more easily, and up to 20 % of the size can be saved.

The wet-on-wet sizing technology also features an integrated system for measuring the liquor consumption, which can be combined with an optional on-line microwave monitoring and control system, which avoids over-sizing and thus saves costs (Fig. 5). Depending on the level, i.e. degree, of sizing measured, the nip pressure is adjusted during the next processing stage within a specific range to guarantee that the size adheres to the yarn as required. The fibres and yarns are squashed together in the nip, which has a negative influence during the drying stage. The yarn warp is fed to a wet section (Fig. 6) to facilitate opening of the yarn layer by improving the dissolvability and reducing yarn hairiness. It is important for at least two split rods to be used here - for moving and slowly rotating the size.

During prewetting, the wash or wetting liquor containing the washed-out components builds up to saturation point. The liquor can be discharged at preset intervals or rinsed with fresh, hot water to remove the contaminants.

#### Cylinder drying technique with overhead dryer

There have been very few drying machines or drying systems that have been so successful that there has been virtually no need to change their basic design. But cylinder drying is one of these technologies. This efficient drying system was first introduced approx. 160 years ago, and will lose none of its importance or dominance of the market in the future. The reason for its past success was that it was extremely economical. The yarn is also transported in an assembled form and it has positive effects on the yarn quality, especially during sizing.

The dryers in use nowadays (Fig. 7) also avoid yarn abrasion and fibre and yarn hairiness during warp dividing, which occur as the warp yarns rub against each other and during opening of the warp yarns that are clinging together. Using Teflon-coated cylinders also assists the pressing effect to reduce yarn hairiness and clinging.

Additional technical features of the modern cylinder drying technology are an adjustable, PC-controlled temperature profile (Fig. 8) between the pre- and main drying sections to ensure that a high-quality, elastic film is produced around the yarns. This excellent system for use in sizing is complemented by an integrated, controlled cooling/discharge zone and a sensitive sizing control system. The residual moisture of the material at the exit of the dryer is determined using three, highly sensitive measuring rollers (> 3 % moisture) in order to monitor the drying process. The actual moisture level is then compared with the target value and, if necessary, a correction is made by automatically adjusting the production speed.

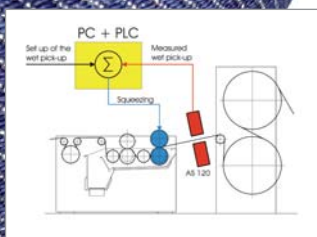


Fig. 4: The CSB-PW “wet-on-wet” sizing technique

Fig. 5: Diagram of a CSB box with integrated Pleva measuring technology

Fig. 6: CSB box with wet section

### Warp beam production

Warp yarn storage devices are used in the drying zone when producing the warp beams, which enable the sizing machine to continue running even when the beam is being changed. The compensators are designed for handling warp lengths of up to 144 m. They give rise to better and constant sizing values, without over-drying or standing marks, and supply the BM beaming machine. The design of the beaming machine makes it extremely user friendly. For example, the comb is arranged so as to permit easy access and, as well as facilitating yarn leasing, also makes it easier to deal with any yarn breakages (Fig. 9).

KARL MAYER's technology enables beam diameters of up to 1,250 mm to be wound without any problems. A linear comb traversing facility permits the warp or weaving beams to be wound uniformly right up to the edges. The mechanical, high-speed reversal point of the comb traversing mechanism prevents the formation of wavy edges during winding.

A sensitive, freely parameterisable winding tension characteristic (e.g. degressive winding) and a high-speed 3- or 4-roller control device guarantee an optimum beam winding pattern and the desired winding length. A freely programmable beam length pre-switching device and a system for reducing the temperature when changes occur in the running conditions complement the high-tech processing operations.

### KAMCOS® drive and control technology

High-quality weaving warps are characterised by having consistently low, yarn elongation loss values. To achieve this,

the yarn distortion must be precisely monitored and controlled as it runs through the sizing machine – a requirement that conventional sizing machine drives based on a mechanical longitudinal shaft have not been able to meet for some time now. On the other hand, modern sizing machines are equipped with frequency controlled multi-motor or individual motor drive technology, and can set the yarn elongation accurately zone by zone.

The yarn distortion forces and associated yarn sizing level can only be monitored and kept constant by using this yarn distortion control system. Variations in sizing, especially in the 2-bath process, can be equalised and eliminated by the KAMCOS's own zone elongation control system.

The KAMCOS® technology also provides the operators with extremely accurate information on the tension and elongation values throughout the process and during different running conditions. Subsequent fault analyses can also be carried out by producing protocols and data reports.

KAMCOS® is therefore the ideal tool for customer-oriented process monitoring, and for regulating the yarn tension and controlling the sizing parameters that are needed to produce the perfect product for the market.

The KAMCOS® system is supplied with information by yarn tension measuring rollers, which operate extremely accurately. The textile material is transported accurately, reliably and in a constantly assembled form throughout the entire machine with the aid of specially integrated smooth-running guide rollers. At the same time, this results in a uniform working width and associated, homoge-

neous yarn loading volumes – which opens up a new dimension in terms of product quality and reduced material waste (rejects, seconds).

The question as to whether a conventional or individually driven sizing machine is more economical can be answered by looking at some practical examples, where it has been possible to reduce the overall yarn distortion values by as much as 0.6 % using the modern KAMCOS® control technology, and also to increase the production speed.

### Conclusion

KARL MAYER is continuing to develop market-driven products and processes for improving the warp running characteristics in weaving and weaving preparation within its key areas of expertise, "denim" and "sizing". This well-known textile machinery specialist is happy to discuss the special requirements of the textile market individually with its customers world-wide, and its aim is to develop efficient solutions by introducing innovative products.

Well-targeted product development, combined with forward-looking, innovative processes, are the guiding principles of KARL MAYER's company philosophy.

Fig. 7: Overhead cylinder dryer



Fig. 8: PC record for setting the temperature

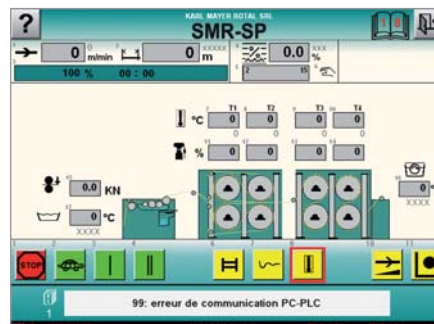


Fig. 9: Drawing-in roller and main drive of the beaming machine



## Germany

KARL MAYER Textilmaschinenfabrik GmbH  
Brühlstraße 25  
63179 Obertshausen  
Phone +49 6104 4020  
Fax +49 6104 402600  
E-mail: info@karlmayer.de

KARL MAYER MALIMO  
Textilmaschinenfabrik GmbH  
Mauersbergerstraße 2, 09117 Chemnitz  
PF 713, 09007 Chemnitz  
Phone +49 371 81430  
Fax +49 371 8143110  
E-mail: info@karlmayer.de

## Switzerland

KARL MAYER Textilmaschinen AG  
Fabrikstrasse  
CH-9240 Uzwil  
Phone +41 71 9558400  
Fax +41 71 9558487  
E-mail: info@karlmayer.ch

## Japan

NIPPON MAYER LTD.  
No. 27-33 1-chome, Kamikitano  
Fukui-City, 918-8522  
Phone +81 776 545500  
Fax +81 776 273400  
E-mail: info@nipponmayer.co.jp

## P. R. China

KARL MAYER (China) LTD.  
518 # South Changwu Road  
Wujin District, Changzhou City  
Jiangsu Province, Zip code: 213166  
Phone +86 519 86198888  
Fax +86 519 86190000  
E-mail: info@karlmayer.com.cn

KARL MAYER (H.K.) LTD.  
3507, 35/F., Metroplaza Tower 2  
223 Hing Fong Road, Kwai Chung  
N.T., Hong Kong  
Phone +8 52 27239262  
Fax +8 52 27398730  
E-mail: info@karlmayer.com.hk

## Italy

KARL MAYER ROTAL S.r.L.  
Via Trento N° 117  
38017 Mezzolombardo (TN)  
Phone +39 0461 608611  
Fax +39 0461 601790  
E-mail: info@karlmayerrotal.it

## UK

KARL MAYER Textile Machinery LTD.  
Kings Road, Shepshed  
Leic. LE 12 9HT  
Phone +44 1509 502056  
Fax +44 1509 508065  
E-mail: info@karlmayer.co.uk

## USA

KARL MAYER North America  
Mayer Textile Machine Corp.  
310 North Chimney Rock Road  
Greensboro, North Carolina 27409  
Phone +1336 294 1572  
Fax +1336 8540251  
E-mail: info@karlmayerusa.com

[www.karlmayer.de](http://www.karlmayer.de)



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