

## Technology highlights of the Goller mercerizing machine - Cadena

150 years ago the English chemist John Mercer laid the foundation stone for a textile technology later called "mercerisation" without recognizing the importance of his discovery. Later on the English man Lowe got the first patent for the commercial utilization of the mercerizing process.

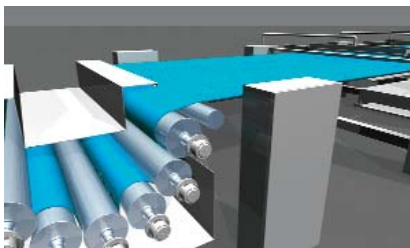
Over half a century Goller from Germany is involved in mercerisation. Through continuous innovations and constant development Goller, today a part of Fongs Group, sets the benchmark for the new mercerizing line, which is absolutely tailor-made for mercerizing knitted fabric and consists of a combination of chainless and chain mercerizing modules. This allows for adoption of the Goller mercerizing machine "Cadena" to the required properties of the structure of the knitted fabric regarding tension and stability. For the washing process after mercerizing the **Goller Sintensa** drum washing machine is used due to the perfect washing results on knitted fabric.

### The technology

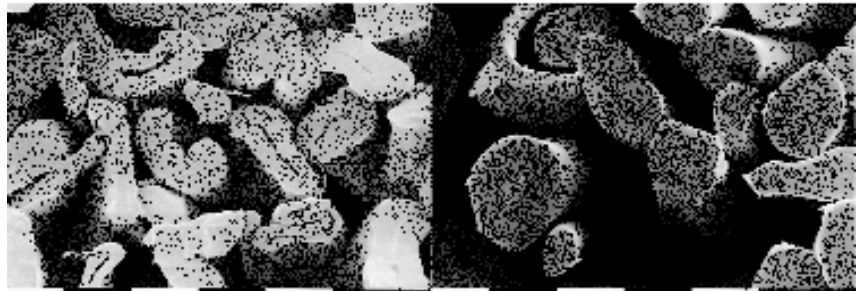
Independent of the layout of the range for hot or cold, chain or chainless mercerizing on cotton the following effects are achieved:

- ❖ Increasing of the gloss.
- ❖ Higher dyestuff pick-up.
- ❖ Covering of dead and unripe cotton.
- ❖ Improving of the dimension stability.
- ❖ Reducing of the residual shrinkage.
- ❖ Improving of the crease recovery angle.
- ❖ Increasing of the tensile strength of the single cotton thread.
- ❖ Clear mesh structure.

The physical and chemical basis of the mercerizing process can be described as follows. Water can dwell the non-crystalline zone of the cellulose fibre. The dwelling process is reversible for example through applying heat as during drying processes. Dwelling achieved through caustic soda, however, is not reversible.



Cadena - Mercerizing compartment



The picture shows the thread structure of the unmercerized and mercerized fabric respectively.

During a full mercerizing process the shape of the thread structure is almost completely equalized. This means the shape of the cross cut of the cellulosic fibre changes from originally kidney shape to almost perfect round shape. This explains the higher gloss that is caused by much lower light diffusion caused by the round fibre shape. The tension the fabric is exposed to during mercerizing results in a parallelism of the cellulosic chain and the equalization of the surface of the fibre.

The four most important parameter with influence on the mercerizing results are the temperature, the exposure time, the lye concentration and the fabric tension.

The temperature of the lye is of high importance for the dwelling. Therefore, it is differentiated between cold and hot mercerizing. The cold mercerizing results in best dwelling at temperatures between 18 and 22°C. The dwelling speed however, is reduced by the high viscosity of the caustic soda at these temperatures. The penetration into the fibre is aggravated, the process sets free heat energy which opposes the dwelling process. Therefore, a cooling is required to achieve the optimum dwelling results. Hot mercerizing starts at a temperature of 60°C. The lye easier can penetrate the fibre, the dwelling, however, is lower. Through the higher temperature, however, the mercerizing time is reduced.

The reaction time is defined by the glass point. This point is reached when the complete fabric appears transparent like glass and depends on the process.

- ❖ 25 to 35 seconds at 60°C (hot mercerizing).
- ❖ 45 to 60 seconds at 18 – 22°C (cold mercerizing).

The lye concentration is of high influence to the degree of dwelling of the cotton fibre. The optimum result is achieved at a concentration of 28 – 30° Bé. At this concentration the cork screw

twist shape is almost completely and perfectly converted into a cylindrical shape of the thread.

The fabric tension during mercerizing defines the gloss of the fabric. The orientation of the crystalline zones in direction of the fibre axis is increased and a higher amount of hydrogen bridges are formed.

To keep every single parameter constant is most important for an even and reproducible mercerizing effect. This is possible in a perfect way on the Goller – Cadena.

### Goller – Cadena

The Goller – Cadena mercerizing machine unites the best of both systems, the chain and the chainless mercerizing system and therefore can be used successfully for knitted fabric.

The range consists of the chainless mercerizing and stabilising modules both are linked through a horizontal pin chain. As an extra below the chain field supporting belts are positioned to prevent the sensible knitted fabric from hanging through within the chain field passage. In the mercerizing compartment the fabric is evenly impregnated with caustic lye over the whole width. Constant circulation of the lye (12 – 20 times per hour) the evenness of the concentration is guaranteed.

The intelligent drive control and the use of the state of the art control systems for the fabric tension the tension can be adjusted, stored and locked in the PC and can be recalled. At the end of the mercerizing compartment the fabric is running through a high efficiency squeezer down to 80% residual humidity. A special system of tight strand fabric guiding prevents the selvedge's from rolling in front of the pin chain. The automatic selvedge's detection system guarantees for minimal fabric waste at the needling onto the chain and a perfect fabric running on the chain.



Cadena chain compartment

In the state of running needled on the chain two objectives have to be achieved. First the cotton fabric which is in a plastic condition due to the lye application has to be stretched into the required final fabric width in a soft and tender way and secondly then has to be stabilised during it still is fixed on the pin chain.

Already on the chain the stabilization is started and the decreasing of the lye concentration is initiated. Special attention is paid during this process to the selvage region of the fabric. The stabilization is realized through defined rinsing of the washing liquor. The supporting belts below the fabric hanging through of the fabric especially at a bigger width is reliably avoided and a perfect stabilization is guaranteed. The length of the chain unit is

related to the required machine speed. Because only if the stabilization is sufficient in the chain passage a shrinking of the fabric in the following washing range can be avoided.

When the fabric is stabilised in the chain field the fabric is handed over to the chainless stabilising module without width shrinkage. In the stabilising module the fabric is guided in a tight strand way through rollers. The special counter-current flow of the wash liquor reduces the lye concentration down to 25 g/kg fabric. After this sufficient stabilization the fabric is washed on the following Goller – Sintensa washing range down to alkaline free.

The Goller – Sintensa open width drum washing range allows for tensionless,

crease free and fibre friendly fabric transport. The high washing performance is guaranteed through the pulsing wash process of the rotors, the spray unit on the upper washing drums, low liquor ratio, consequent counter-current flow of the washing liquor, bath temperatures of up to 98°C and last but not least through the bath separations by intermediate squeezers. Due to the unique system the full washing performance also is reached at low production speed and thus perfectly fits for the mercerizing processes (hot and cold).

After the fully automatic neutralization and clear rinsing (to avoid acetate forming on the fabric) the fabric is squeezed on a high performance squeezer at the last washing unit and then it is plaited.

### The result

On the Goller – Cadena mercerizing unit the highest quality fabric can be achieved. The results are dimension stability, silky and even gloss of the fabric. A constant density of the fabric and always the same number of stitches over length and width is guaranteed. The even washing process over the whole width and especially of selvage's guarantee for an even dyeing over the whole fabric width. During the dyeing a reduction of the required dyestuff of 20-30% can be expected. Furthermore the whole mercerizing process is optimized regarding lye, water and steam consumption for an altogether environment friendly and high economic performance of this unique mercerizing machine. ♦

## Jaume Anglada Vinas presents new tumbler

At ITMA Munich, a Spanish company Jaume Anglada Vinas s.a., had introduced the prototype of new version of its tumbler drier TURBANG VIBRO SEVEN, a seventh generation machine since 1984, when Anglada started making tumblers.

### Salient features of the machine are:

- ❖ Massive reduction in electricity consumption.
- ❖ Reduced fluff discharge, therefore the towel stays stronger.
- ❖ Reduced air consumption.
- ❖ Multiple widths and gsm can be simultaneously finished side by side, without any threads attachment.
- ❖ Relaxed fabric travel path.

According to Shahid Omar from Rehan Omair Corporation, (agent from Pakistan), "Anglada Vinas offers the most energy efficient machine with lowest per/kg drying/finishing cost with excellent tumbling effect." ♦



Jordi Anglada Sambeat, Jaume Anglada Vinas, S.A.