

# Magic Blue - Modular denim wet-finishing concepts developed by Goller Textilmaschinen GmbH

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Garments made from Denim are probably the most long-lasting casual outfit trend in the world; most retailers and garment shops worldwide have denim range and offer an endless variety of Denim finishes. One must not forget that on one hand the production for this kind of apparel has basically not changed much, since the first denim woven in 18<sup>th</sup> century. What started to be a simple workers' apparel and then casual wear, it is still today is one of the most popular fashion outfits since generations. In the last years in average annual 4 billion linear meters of Denim were produced, more than 50% in Asia with China, India, Turkey, Pakistan and Bangladesh leading in that order. The global competitive pressure on that magic blue piece of Twill, Drill or Canvas has dramatically increased within the past several years forcing the manufacturers to look into more efficient and flexible production methods.

Until today most of the Denim manufactured is so called "blue Denim" which is still dyed with the traditional synthetic Indigo dyestuff by dip-and-sky in Slasher or Rope dyeing. Subsequent to dyeing and drying, the warp is prepared directly and the continuous processing is applied with size in beam-to-beam method before going to weaving.

Various finishes like icewash, stonewash, sandblasting and many other applications, are mostly done in garment washing plants and have unique and individual design features, the importance of so called continuous "millfinish" is minute. Nevertheless on the processing side of the woven fabric, it is of utmost importance to keep consistency of fabric shade, weight and dimension stability to achieve the treatment effect. However, nowadays, this is not enough as enormous competition amongst other fabric finisher, makes it imperative for a manufacturer to be innovative and unique and on the other hand to run the operation efficiently in order to be more competitive.

## Goller modular denim

Today's Denim finisher have to follow requirements from retailers and trends of fashion quickly. This challenge is enormous and requires, apart from reliable technology, also a high degree of versatility in terms of layout of production and equipment.

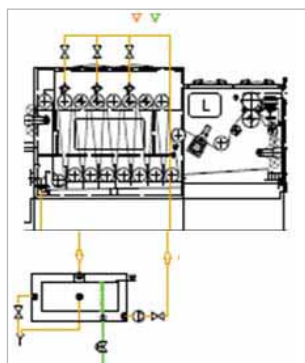


Fig. 2 GOLLER EFFECTA with POERSPRAY pressure washer and VAUSET vacuum technology.

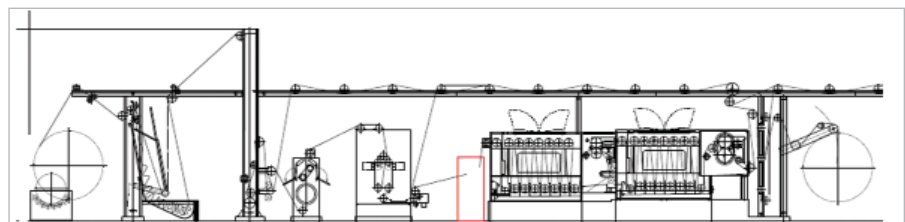


Fig. 1 GOLLER DESIZA/EFFECTA single desize range for dry-on-wet desizing.

GOLLER Textilmaschinen has long been successful in developing modular concepts together with their clients worldwide to fulfill all their needs in terms of cost and production efficiency.

As a textile machinery manufacturer, Goller is always striving to be innovative and offering a wide range of equipment, which can be individually combined to help the customers save operational costs and natural resources and obtain flexibility to meet the ever changing demands of end-users.

## Desizing

Looking into the treatment process of Denim after weaving, first step for all processing is the singeing and desizing of the indigo dyed woven raw material. The size applied for weaving, mostly based on starch in combination with synthetic sizing agents and wax, interfere with the subsequent finishing processing steps. As most garments are enzyme-treated anyhow in discontinuous processing in garment washing plants, the 100%

complete desizing is in that sense not essential, but a proper pre cleaning of the fabric is required. In common textile processing most desizing is done by the cold pad batch method.

In those dye-houses with low profit margin on production, for instance denim finish, the interruption of continuous flow of fabric in the production for cold pad and washoff procedures increases processing cost and therefore this should be avoided if possible. As a matter of fact the application amounts of sizing on the fabric is not always 100% consistent, as such, the consistency in onward processing becomes essential.

GOLLER TEXTILMASCHINEN for this purpose is offering non-stop solutions for single-desize based on the DESIZA module.

After a singeing passage, the raw denim is passed through a double set of GOLLER-EFFECTA high efficiency washers for one step singe - wash - partial desize. In order to achieve a maximum consistency, the DESIZA line as a standard already holds a smart water management system, with fabric weight proportional feeding control system for operational chemicals and water, based on the field proven Multidata operational system. Large dimensioned guide rollers and special flow design guarantee highest efficiency even at production speed above 100 m/min. Additionally, the range is equipped with individual top roller drives, therefore processing of elastic denim can be achieved with highest efficiency at the lowest possible risk for both direction crease marks.

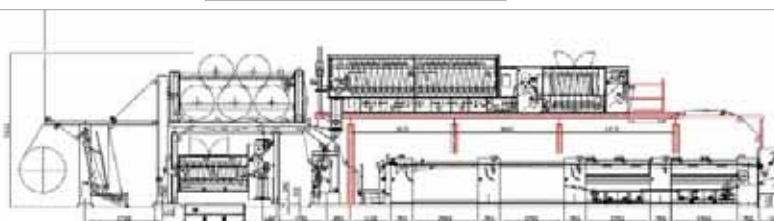


Fig. 3. GOLLER PERFECTA / COLORA mercerizing / overdyer range.

Depending on further additional equipment like POWERSPRAY/ THERMOFLUSH pressure washers, dosing system and VACUSET vacuum-technology, even high degrees of desizing may be reached in one single dry-on-wet passage.

Such kind of setup can be equipped additionally with the GOLLER DRYMENZA cylinder dryers before batching up to avoid unwanted Indigo migration while waiting for the next processing step.

### Mercerize and overdy

In many cases the Denim fabric requires an alkaline treatment in order to increase the depth of shade, for instance for "old blue navy" finishes, extremely dark color or reduced Indigo washdown in garment treatment; and to simply mercerize the fabric for better luster and shrinkage or a softer hand. A mercerizing or caustification range for such kind of fabric is supposed to be a necessary hardware for every denim finisher.

Besides, in many cases the indigo dyed and desized fabric requires an over dyeing with vat, reactive or sulphur dyes to follow the fashion trend. In early days, several manufacturers had a separate over dyeing range at their dye houses, which in downtime or in case of stagnation of incoming orders, would still incur costs in terms of maintenance and upkeep. To offset the costs of having two machines, which are not running at full capacity is to use the tailor-made GOLLER DENIM OVERDYE RANGES.

The example shows a setup of mercerizing and over dyeing which can be run in a huge number of process variations. Therefore, equipped with this kind of machinery setup by Goller, the finisher is no longer forced to bear the cost for holding mercerizing and over dye-range in operation, regardless of the fact that the finisher is working to capacity or not.

#### Processing options are:

- ❖ Cold mercerizing.
- ❖ Caustification.
- ❖ Pad steam denim sulphur over dye.
- ❖ Caustification – wet-on-wet over dye



Figure 4: GOLLER PERFECTA.

The setup is a combination of holding classic chainfield-mercerizing based on GOLLER PERFECTA (Figure 4) and equipped with lye chiller for cold mercerizing or caustification, saturator impregnation with lye, a cold cylinder-skying passage and sub-sequential chainfield for width and dimension control in mercerizing and stabilizing.

Additionally equipped with GOLLER ECONOMICA S-roller dyepadder for chemical and dyes-application and put up on scaffold COLORA airtight dyeing steamer, it is also possible to run over dyeing with selected pre-vatted sulphur dyes, while the mercerizing section is off operation. To avoid unwanted side reactions in the chemical and dyestuff tanks, components may be separately dosed and mixed only on demand with GOLLER 4:1 dosing technology directly via premixer into the ECONOMICA dyepadder trough.

Most vats and sulphur dyes should not be exposed too early to air oxygen after steaming to avoid quick oxidation and as a result of poor fastness levels, it is recommended to link the COLORA steamer by hermetically closed passage directly to an EFFECTA high efficiency washer to remove excessive dye and reactive chemistry from the fabric.

In addition, in other various processing methods, this flexible GOLLER Denim-concept also provides the opportunity to first dip the fabric with pre-defined amount of alkali / caustic for pre-swelling the fabric and then in one shot over dye pad steam bypassing the chainfield. A deeper dye penetration and alkaline treatment may also be done in one go.

It is also feasible to fit in other GOLLER MODULES for alkaline treatment; such as

roller mercerizer OPTIMA or a second one ECONOMICA dyepadder plus tight strand skying passage for pad-sky-pad-steam or pad-pad steam applications for instance for the application of vat dyes.

The line of sub-sequential EFFECTA washers may vary from one application to another application as well as with different capacities. In case of space limitation, GOLLER also provides a wide variety of innovative features with high efficiency for the EFFECTA washers, such as the earlier mentioned POWERSPRAY pressure washers, VACUSET vacuum technology.

### Payback period and operational cost

The concept to round up on the setup all GOLLER equipment is to meet modern economical and ecological requirements.

The flat bottom construction of the EFFECTA high efficiency washers allows the finisher to run the machines on lower bath contents at higher bath exchange rates. The specially designed flow scenario and optimized mechanic washing aspects of Goller range maximizes the washing effects at lowest possible water and energy consumption. These features also reduce downtime for cleaning and maintenance, thus increasing the efficiency of the GOLLER lines, as well as lowering down the production costs as well.

Inbuilt heat recovery, not only ensures a very short pay-back period of the capital investment and but also help save natural resources and reduces operational cost dramatically. The smart dosing of processing chemicals also helps to save the money of at finisher' manufacturing plants.

GOLLER DRYMENZA contact drier technology with Teflon coated drying cylinders guarantees a frictionless production to run on nonstop basis from roll to roll in one shot for a large number of variations

### Outlook

In summary, GOLLER TEXTILMASCHINEN is offering innovative technical solutions, which can be tailor made to all requirements in the field of woven Denim continuous wet processing. Besides, with its operationally efficient and environmentally friendly features, the GOLLER MODULAR DENIM offers highest achievable production safety, sound reliability and flexibility and constant premium quality. To keep pace with increasingly stringent demands in the Denim market, GOLLER MODULAR DENIM should be the first choice in woven Denim continuous wet processing which improves the production efficiency and the quality of the final products at the dye-houses. ♦

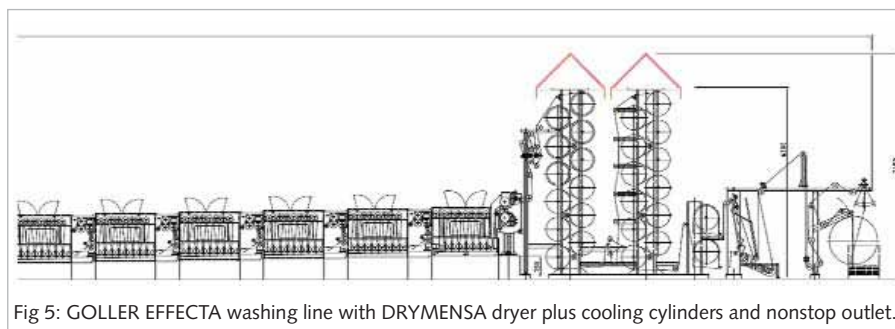


Fig 5: GOLLER EFFECTA washing line with DRYMENZA dryer plus cooling cylinders and nonstop outlet.