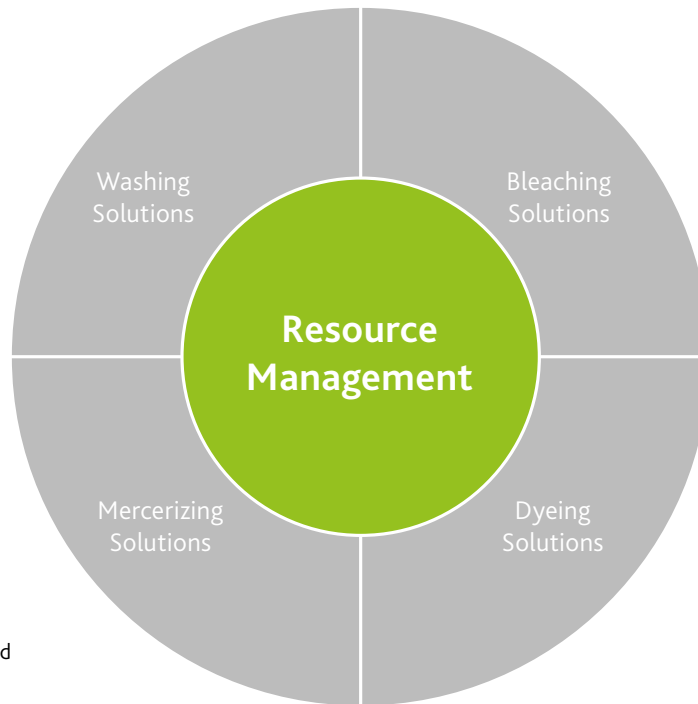




BENNINGER

Resource
Management

Leader in wet textile finishing



BEN-ECO

Environmental protection and cost savings by recovering energy and resources

- Caustic recovery systems
- Heat recovery
- Waste water recycling and zero-discharge solutions
- Energy-efficient drive technology
- CO₂ reductions by the use of the latest technologies



BEN-BLEACH

Continuous desizing and bleaching in one process

- High productivity
- Best pre-treatment results
- 30 % lower production costs



BEN-COLOR

The complete program for continuous and CPB dyeing

- High reproducibility
- Even dyeing results
- Low energy and water consumption
- High fastness properties
- No salt



BEN-DIMENSA

Highest quality mercerizing and causticizing for the best luster, dimensional stability and dye yield

- Improved dimensional stability
- Higher dye yield
- High luster level
- For woven fabric and knitwear
- Silky, soft feel



BEN-WASH

The complete range for all washing processes

- Excellent washing performance
- Minimum water consumption
- High energy efficiency
- Up to 50% water and steam savings in comparison to the exhaust process

Customized textile solutions

Mission

Customized

Benninger supplies tailored process solutions with innovative and reliable products as well as comprehensive know-how in textile process engineering, always based on close collaboration and communication with our clients.

Textile

Our concepts are fully geared to the textile applications of our customers. With its many years of experience and comprehensive textile competence, Benninger creates long-term added value for its customers. Benninger is backed by a large number of reference installations for each of the individual applications.

Solutions

Benninger is an integral solution provider. We plan and implement technologically optimized and individual process and system solutions. We are a trustworthy and reliable partner throughout the entire life cycle of the plant.

Sustainability

For Benninger, assuming responsibility is a matter of course. We are committed to sustainability – for example by investing in the development of high-quality products as well as ecologically efficient processes. We actively save water, energy, chemicals and we also focus on recycling waste water, exhaust heat and valuable materials. Integral consideration of the relevant factors is equally as important to us as the balance between ecological and economic concerns.

With regard to sustainability, Benninger has central obligations. Wherever possible we work with maximum environmental awareness and conserve resources. We are aware of our social responsibility towards communities, consumers and our employees. We continuously improve our economic performance and support the sustainability aims of our customers.

Customer benefits

Our clients do not need products, they need solutions. At Benninger, customer benefits and needs are the central focus of all activities. High quality, process know-how, many years of specialist competence, unique application know-how, local availability and flexibility make us a reliable solution provider for the textile industry.

Our range of goods and services is continuously optimized and supplemented. We have tremendous innovative power, a high level of specialist and process expertise and have installed a large number of systems. New findings are continuously included into the development of solutions – always with the aim of enhancing the success of our customers. We improve the entire value-added chain of our customers by observing the process life cycles, and with quality products and a comprehensive range of services guarantee efficient and reliable plant operation.

Tradition

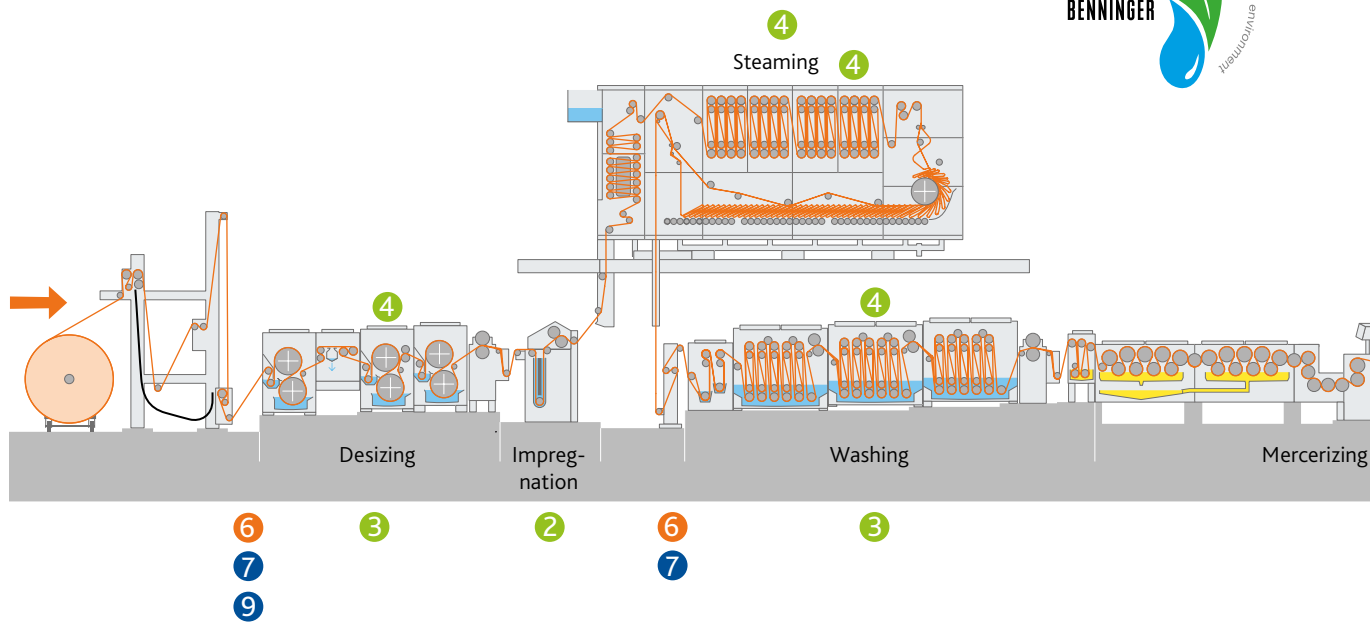
The future is rooted in the past. There is hardly anything more important than one's own history, as the innovations and business relationships of today and tomorrow are founded on the experience and know-how gained in the past. Benninger has been a global benchmark for competence and outstanding performance in wet textile finishing for more than 150 years. We always feel bound to our cultivated tradition of continually improving our services, products and processes so that the Benninger brand will continue to stand for quality, reliability and vision in the future.

As a company with international operations we are proud to support our customers on a basis of partnership and carry Swiss values such as high quality, reliability and trustworthiness out into the world.

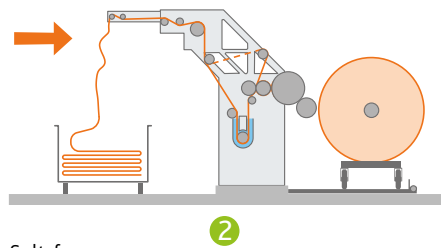


Sustainable use of resources with optimum system solutions

System example

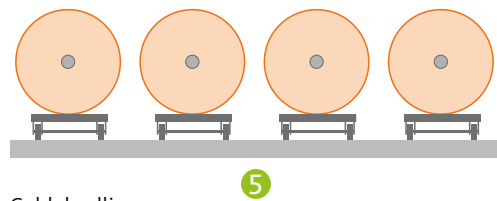


CPB dyeing station



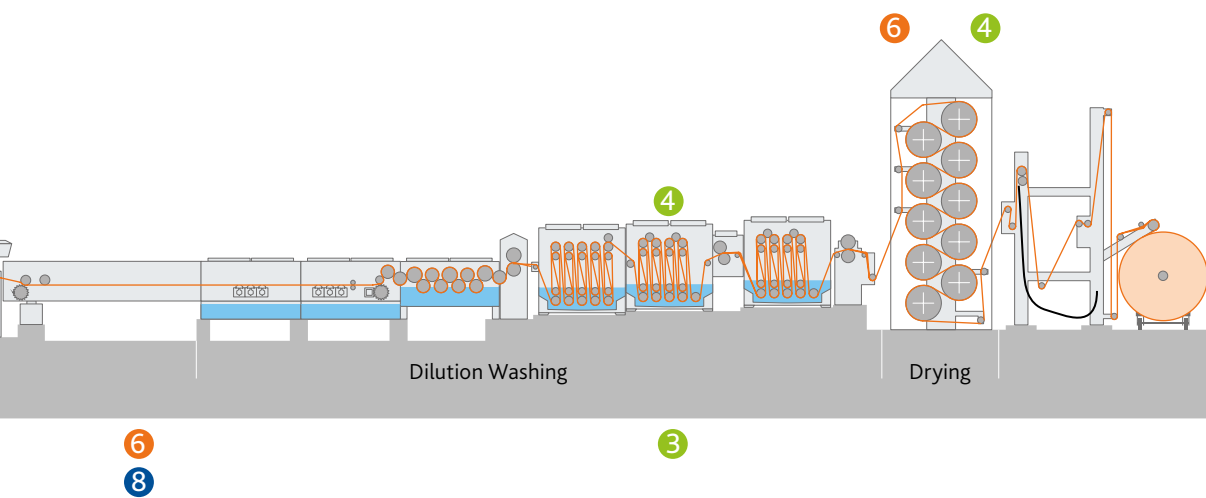
Salt-free
Liquor ratio < 1:1

CPB dwelling stations



Cold dwelling
at ambient temperature

As a Swiss company with a 150 year tradition, Benninger has always handled valuable resources with care and anchored this principle in its designs. Intelligent process water and chemical feeding already lowers water and therefore energy consumption tremendously right from the start.



System control



The Benninger master system control interconnects all hotspots of resource management and permits central technical energy system optimization in a clearly organized and simple manner.

KEY

Prevention

- 1 Energy-efficient drives
- 2 Controlled chemical application
- 3 High-efficiency, water-saving washing technology
- 4 Insulation
- 5 Cold dwelling fixation

Energy recovery

- 6 Heat recovery

Material recovery

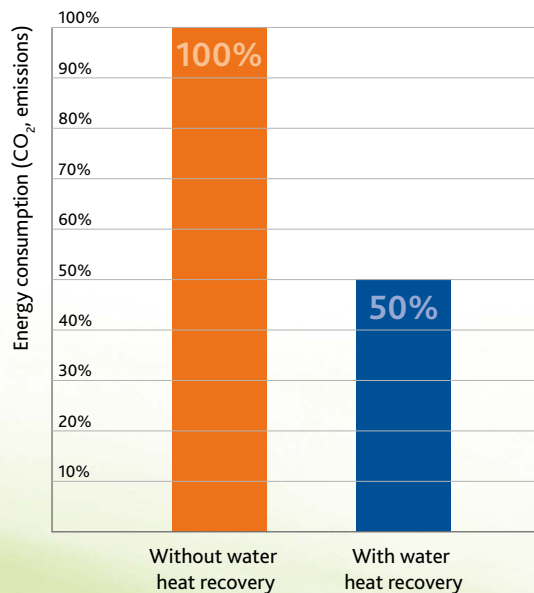
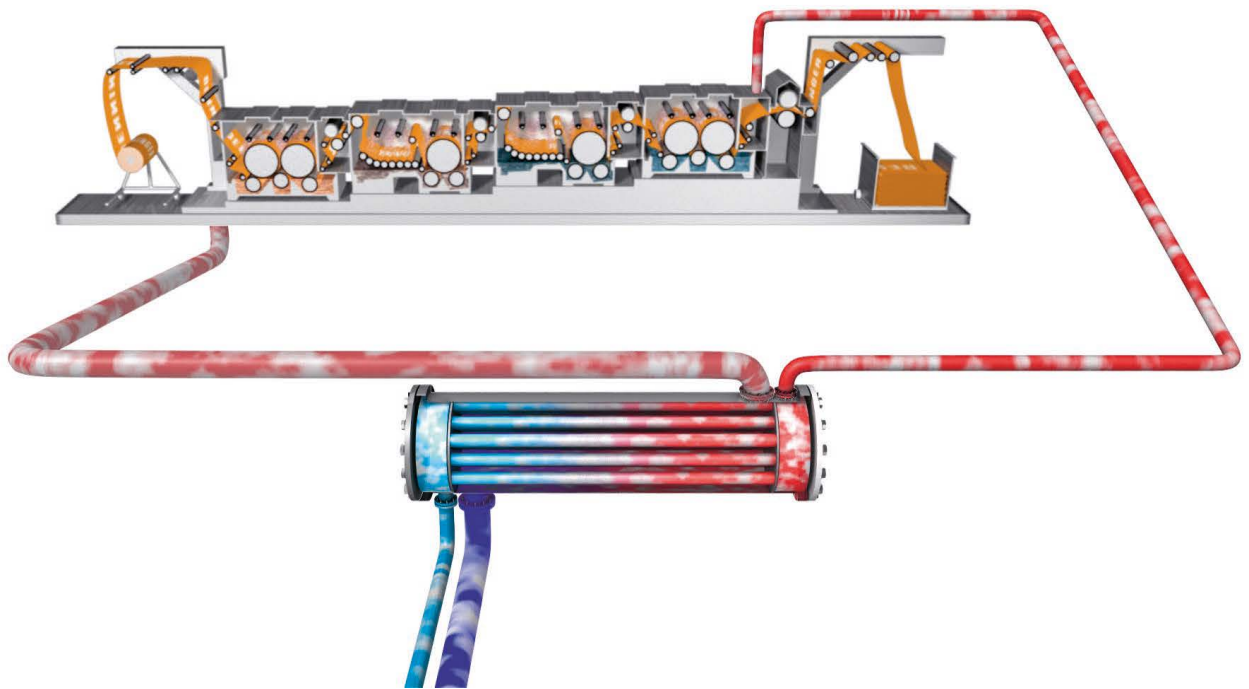
- 7 Waste water recovery
- 8 Lye recovery
- 9 Size recovery

WASTE WATER HEAT RECOVERY

Payback < 6 months

High energy savings with heat exchangers

Water-water heat exchanger
Completely maintenance-free



FACTS

- Approx. 50 percent heat recovery
- Approx. 50 percent less energy consumption
- Compliance with the permissible disposal temperature of waste water
- More effective washing efficiency with pre-heated water
- "Just in time" operation
- Low investment with fast payback

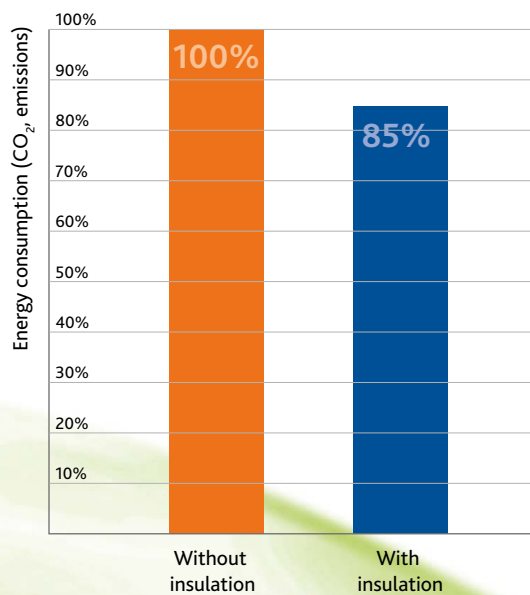
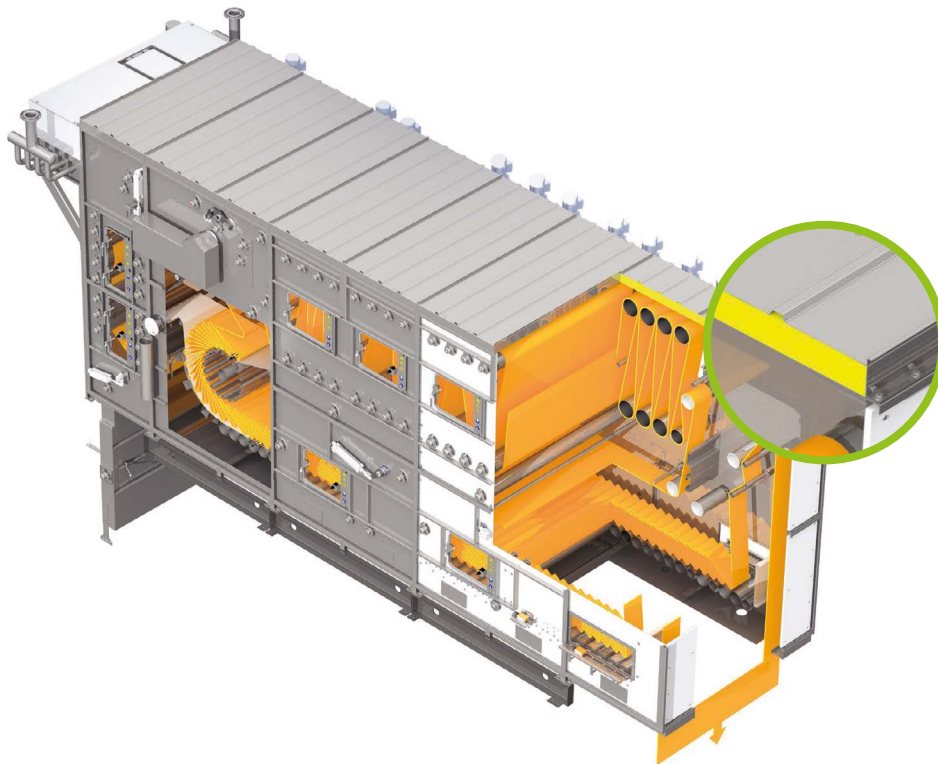
INSULATION

Payback < 6 months

Efficient reduction of heat radiation

REACTA

Effective insulation lowers surface temperature



FACTS

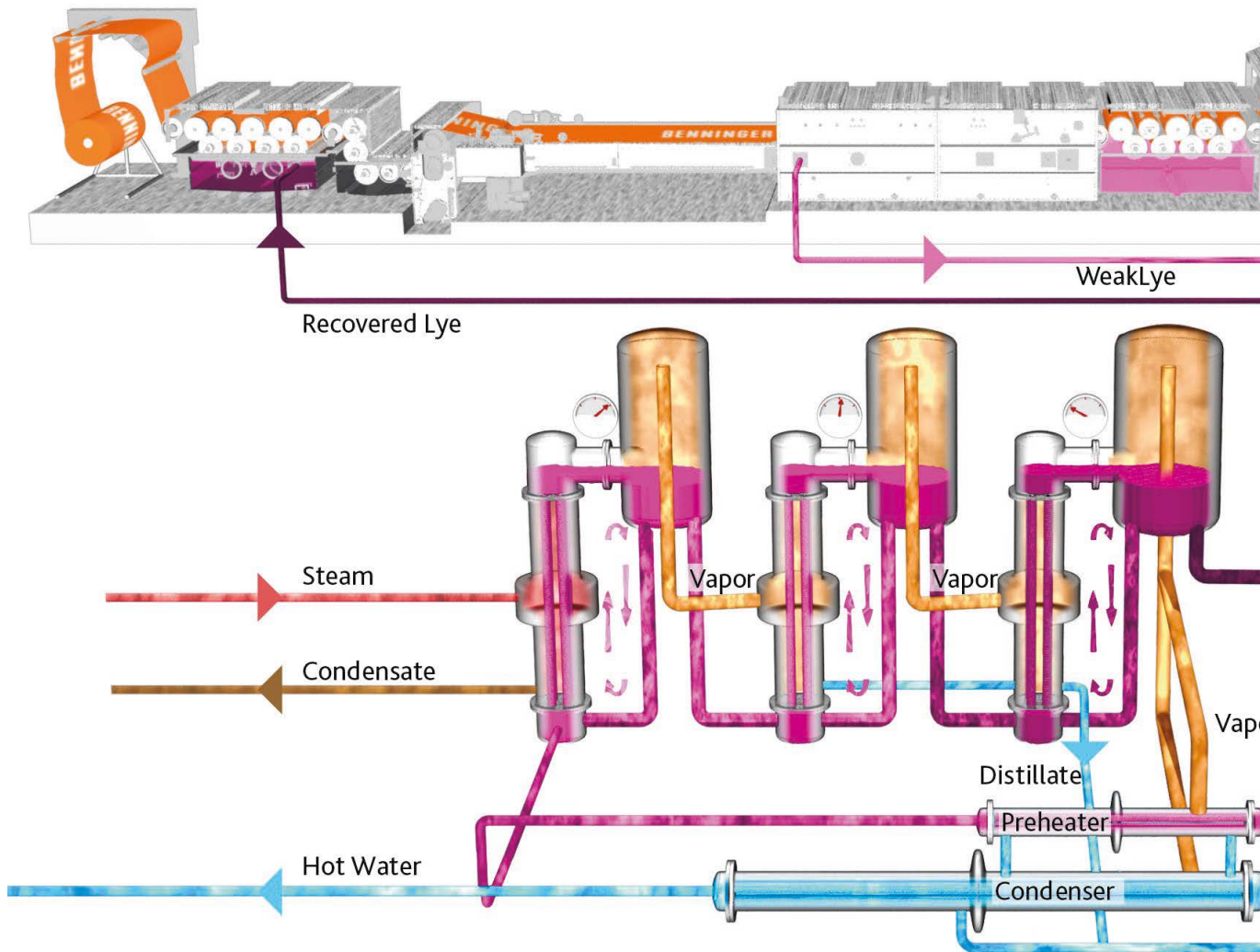
- 10–15 percent steam savings
- Improved surrounding temperature due to lower radiation
- Lower costs for building air conditioning
- Lower air humidity ensures positive indoor climate

BENNINGER KASAG LYE RECOVERY (LR)

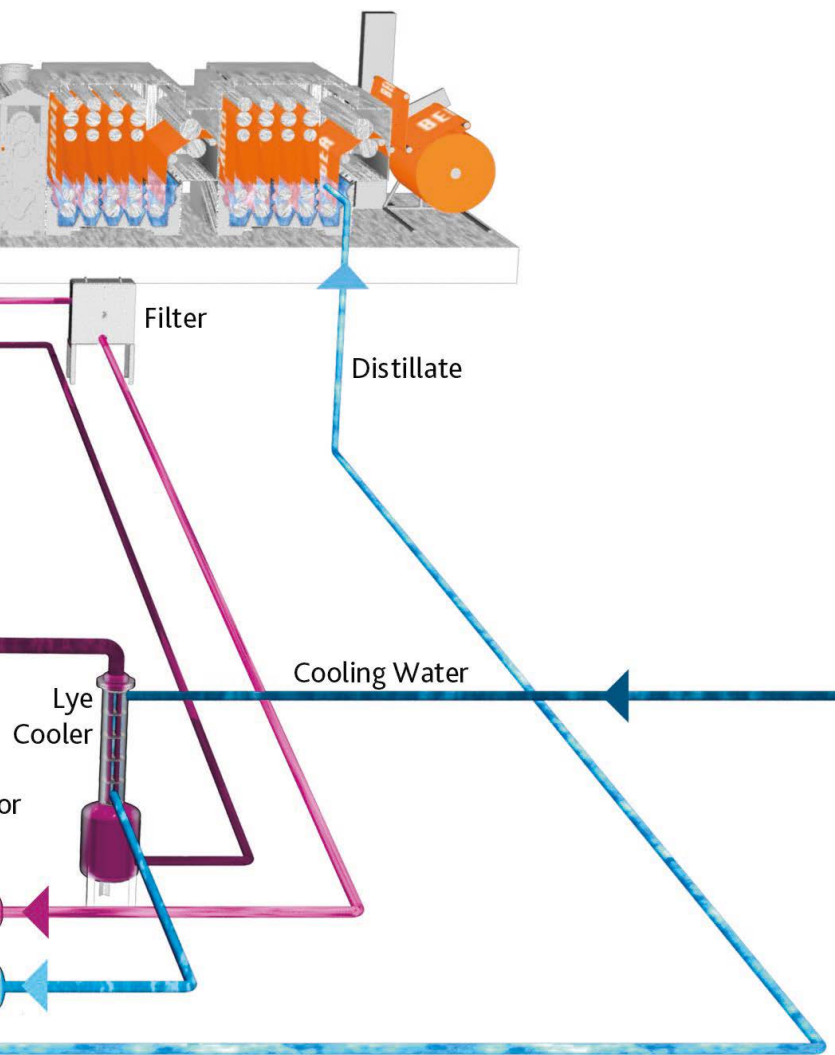
Payback 6 – 12 months

Cost minimization due to lye recovery

Diagram
Significant lye saving options



Heat recovery	Lye recovery	Water	Acid
Up to 80 percent of the supplied steam energy is transferred to the cooling and washing water.	The high weak lye concentration of the Ben-Dimensa of approx. 8° Bé shows the excellent efficiency of the Benninger washing compartments. This is achieved with only 4–5 liters of washing water per kg of fabric and is the reason for the very high lye recovery rate.	With the support of the lye recovery system, almost all the washing water can be recycled. This means annual water savings of 30–100 million liters!	It is no longer necessary to neutralize up to 100 million liters of weak lye (approx. 8° Bé) every year. The corresponding drainage costs can therefore also be saved.



Steam

As a lye recovery system provides condensate, hot water and washing water, the net steam requirements are therefore only 20–25 percent of the specified connection requirements.



Lye purification system (LPS)

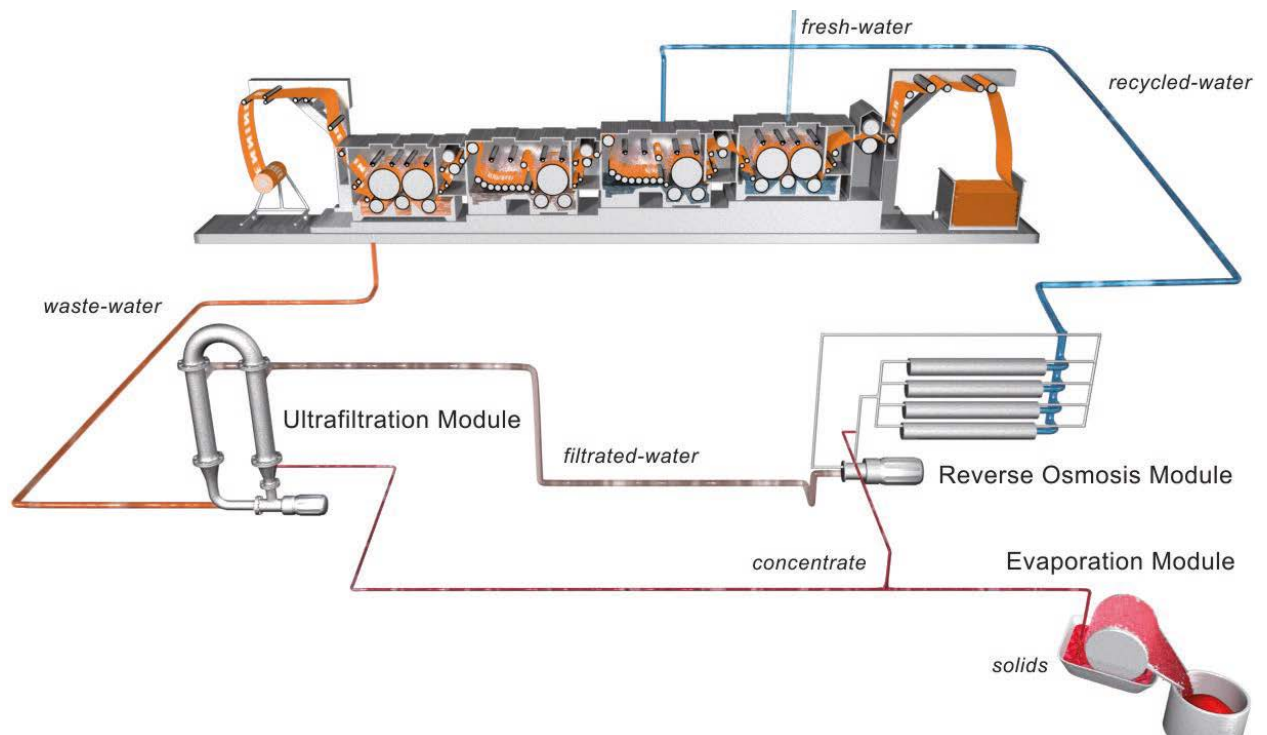
FACTS

- Lye recovery potential of up to 85 percent of the originally used quantity
- Annual washing water consumption reduction of 30–100 million liters
- Reduction in waste water quantity of 30–100 liters / year
- Reduction of the acid consumption for neutralization of waste water by up to 90 percent
- Recovery of the used steam energy in the form of hot washing water and hot water by up to 85 percent
- Drastic reduction in waste water costs
- Particularly suitable for wet-in-wet mercerizing

ZERO DISCHARGE

Payback after 24 months

The ideal solution for textile facilities
with waste water levels of 2 m³/h to 20 m³/h



Water and resource recovery circuit

Ultrafiltration (UF)

The hot waste water from the textile process is cleaned of coarse contaminants by means of mechanical pre-filtration and collected in an intermediate tank. With the aid of an ultrafiltration stage, particles are then filtered out down to a size of 0.01 µm or a molecular mass of 20 kD, in special applications even down as far as to a molecular mass of 0.25 kD. This allows decolorization of high molecular dyes up to 98%.

Reverse osmosis (RO)

The salty filtrate of the ultrafiltration is normally fed into a reverse osmosis stage, which is the finest filtration level possible. It can be used down to ion level. Whereas the water can still pass the membrane, salts and other small molecules are held back. Waste water from textile processes is desalinated and decolorized through the reverse osmosis. As a result, there is no reason why the water cannot be recycled in all textile finishing process.

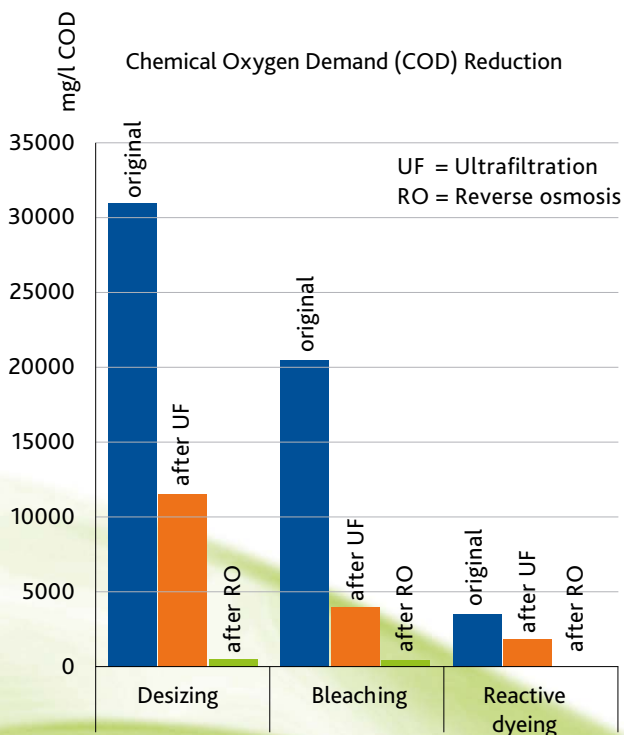


Bulk results

The results show a clear picture:
 left: washing liquor from CPB dyeing
 right: after filtration



Ceramic membrane



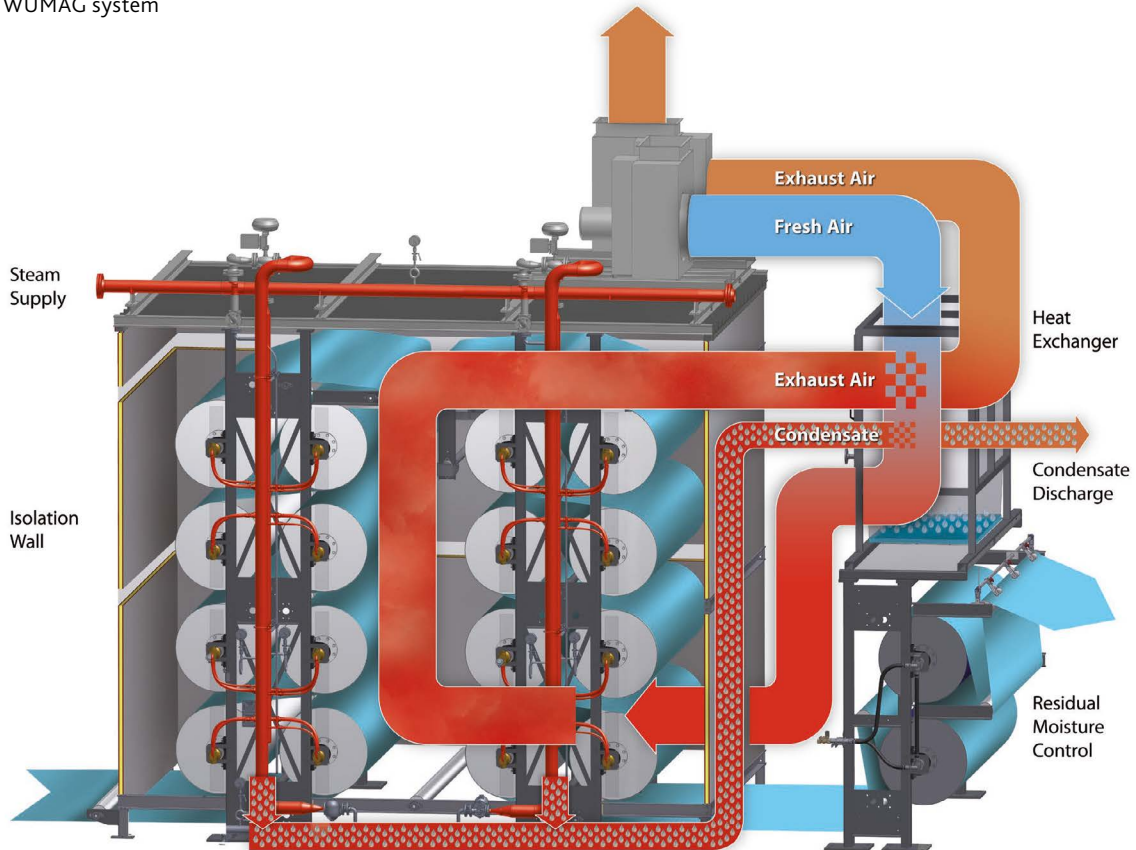
FACTS

- COD values less than 100 mg/l
- Conductivity less than 200 uS/cm
- Purified waste water is colorless; it can be reused without any problems in the production process
- COD reduction of waste water from desizing and bleaching
- Pre-cleaning of mercerizing lye
- Decoloration and desalination of dyeing waste water
- Size recovery
- Suitable for up to 500 m³ of waste water per day

EXHAUST AIR HEAT RECOVERY (EHR) & INSULATION

Payback after 12 months

Diagram
Innovative fabric drying concept
WUMAG system



The WUMAG TEXROLL cylinder dryer is insulated from the surrounding atmosphere by a special heat insulation with a high insulating efficiency. As a result the supplied air and exhaust air flow rates can be precisely conditioned. This method enables an overall cylinder energy balance in which the convection and radiation losses can be lowered to the physically possible minimum. The system is completed by continuous adjustment of the drying capacity with a residual humidity control and recirculation of the cylinder steam with the SteamPlus technology. The result is an increase in the maximum drying capacity of approximately 10 percent and minimum energy savings of 20 percent.

FACTS

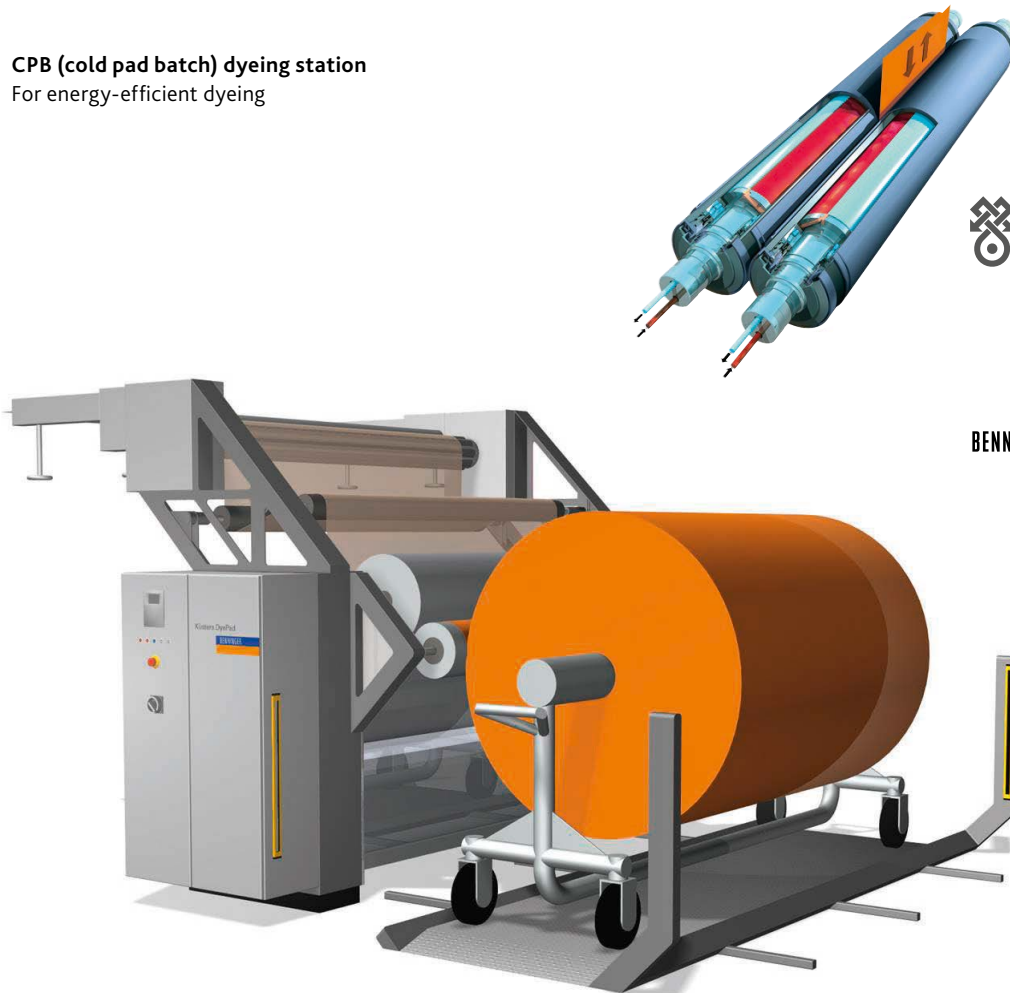
- Minimum energy savings of 20 percent by reduction of the fresh steam consumption
- Increase in production capacity (typically: 10 percent)
- Payback time of 12 months
- Simple, space-saving design with maintenance-friendly modules
- Low level of heat exchanger soiling due to the self-cleaning effect
- Automatic control of the air flow rates of the supplied and discharged air
- Perfect temperature accuracy
- Automatic control of the drying capacity and residual moisture

KÜSTERS DYE PAD

Payback < 12 months

Dyeing without compromise

CPB (cold pad batch) dyeing station
For energy-efficient dyeing



KÜSTERS
Member of the Benninger Group



During the CPB dyeing process the reactive dye is fixed during dwelling at room temperature. The Benninger Küsters CPB dyeing station with controlled dyeing conditions makes this process an unlimited option for cellulose fibers. Savings are not only achieved by the fact that the dye is fixed at room temperature, but also by the outstanding dye yield and it is also a salt-free dyeing process.

With more than 1,000 installed original Küsters dye pads in the woven fabric segment alone, Benninger has clearly proven its market leadership in this extremely efficient and resource-conserving technology. The CPB process is also a highlight in the knitwear segment of our company with more than 100 production systems in operation.

FACTS

- Liquor ratio < 1:1
- No steam consumption
- No salt
- Minimum liquor content
- Just-in-time dosing
- Simple partial flow waste disposal of high-concentration residual dyes
- High dye fixing yield
- Water savings of up to 75 percent
- Energy savings of up to 60 percent

WHAT ARE THE BENNINGER ADVANTAGES?

Benninger – your partner for textile finishing!

Technological competence

Benninger is distinguished by its comprehensive process know-how in both application consulting and project planning as well as by its close communication with customers throughout the entire life cycle of the installed plants. With its focus on engineering and a high standard of technical competence, Benninger is a recognized global pioneer in technology.

- High technology and application expertise
- Process consulting and project planning
- Sustainable resource management
- Carbon footprint
- Best available techniques (BAT)

System solutions

As the leader in its line of technology, Benninger provides competent advice and supplies innovative and effective product solutions to the required quality standard by the agreed deadline for a fair market price, backed by reliable, first class customer service.

- Complete product range (woven and knit)
- High process reliability and lower operating costs
- Performance guarantee / Payback calculation
- Technology trends and product innovation
- Premium-quality OEM components



CPB dyeing station - dyeing at room temperature



Heat recovery system



Heat exchanger



Steamer with insulation

After-sales service – full service

With Benninger you are always in good hands. Specialists are always at your disposal at the Benninger service centers and provide competent, prompt customer service. Regular maintenance by expert technicians minimizes unexpected downtimes and, as experienced instructors, they pass on their know-how. In addition, the specialized spare parts service team guarantees fast and reliable supply of original Benninger spare parts, rounding off the range of Benninger services.

- Customer-oriented service solutions
- Preventative maintenance (service contracts)
- Fast on-site service
- Competent help desk (software and hardware)
- Technical audits
- Customized modernization solutions
- Original Benninger spare parts (warranty)
- Customer training

Development cooperation and partnerships

Benninger is distinguished by its process and customer orientation, focus on the demands of the market and its customers, as well as continuous and systematic improvement. All this ensures customer confidence and satisfaction. Benninger – your partner for textile finishing!

- High specialist competence
- Consistent customer orientation
- Reliability and integrity
- Local representation in strategic markets
- Large number of reference installations
- Excellent reputation and long-standing customer relationships
- Goal-oriented development cooperation



Zero Discharge



Three-stage lye recovery system



Five-stage lye recovery system

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