

LoopTEC

Corporate Presentation



LoopTEC
Plant Engineering

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AGENDA

Make ecology happen

LoopTEC at a Glance
LoopTEC Recycling Technology
**LoopTEC Cycling Technologies in
Textile Manufacturing**
Benefits for Customers
Ideal Customer
Water and Effluents in Textile Industry
LoopTEC Caustic Recycling Plant
LoopTEC Size Recycling Plant
LoopTEC Indigo Recycling Plant
Installations
Competition

LoopTEC at a Glance

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- ➔ LoopTEC Plant Engineering GmbH with Headquarter in Pfaeffikon, Switzerland
- ➔ Ulrich Kuklinski - CEO - well experienced engineer
Willi Armbruster - Technical Consultant, Inventor of GTV-Technics and former owner
- ➔ Young Engineering- und Manufacturing Company for Chemical Recycling Plants - mainly Size Recycling, Caustic Recycling, Indigo- and Color Filtration
- ➔ We are Engineers – servicing customers worldwide to save money in production processes

LoopTEC Recycling Technology



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- LoopTEC Recycling Plants are looping effluents coming from wash boxes, recycling them and redirecting them for reuse to the existing manufacturing plants just-in-time and quality needed. This direct recycling we call **'looping'**
- The most common plants LoopTEC designs and delivers are Sizing Recycling Plants based on the principle of cascading filtration using different membranes matched to the textile manufacturing requirements of hot effluents and a long lifetime expectation of customers
- Further development of ecovery Plants originally designed by the former GTV company
- We are engineers – servicing customers worldwide to save money in production processes

LoopTEC Recycling Technology

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- ➔ The essential characteristic of the Pollution Prevention approach of **LoopTEC** is the 'reduction at source' principle. Instead of accumulating different effluents the generation of pollution can be reduced or eliminated in the cleaning **reuse of chemicals, energy and water** already paid for
- ➔ The long experience in different countries with highly different customer requirements form the unique design and fitting to the textile industry

LoopTEC Recycling Technology

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- ➔ If we talk about recycling plants and recycling processes we should talk about the difference between **water demand** and **water consumption**
- ➔ In textile manufacturing there are many processes with a high water demand. It is not necessary to supply this demand by fresh water consumption at drinking water quality. As a surplus in almost every process **energy and chemicals can be recycled and reused**

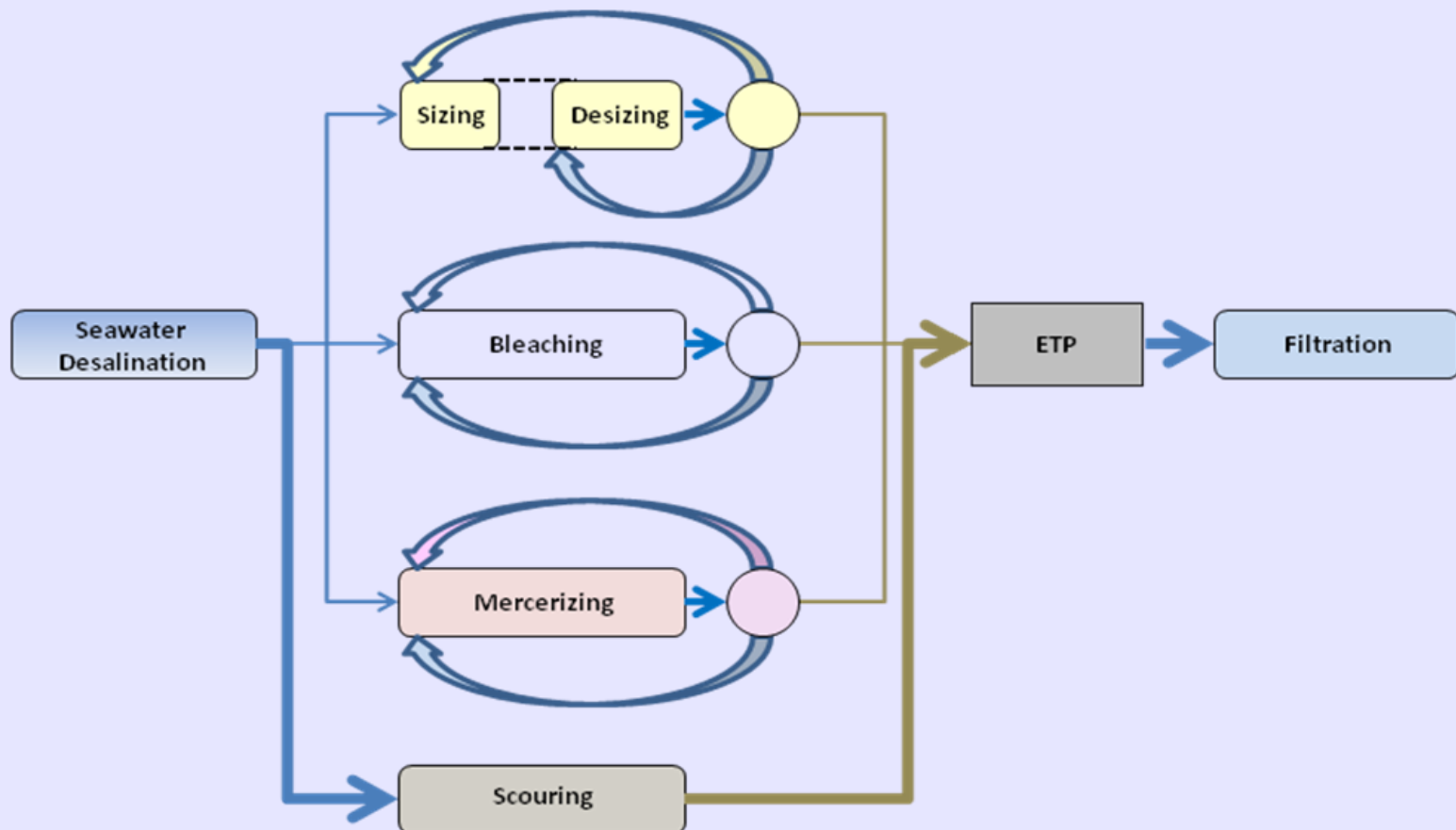
LoopTEC Cycling Technologies in Textile Manufacturing

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- ➔ Recycling of effluents containing assets can be done after the ETP or – if is done by the **LoopTEC way** – the recycling and reuse preparation is done directly after the manufacturing process
- ➔ This method avoids losses **in chemicals, energy and water**
- ➔ Below there is an overview how the **looping of chemicals** and water can be described at a glance. For every process a recycling station is added (nearby or remote) and the **individual chemicals** are **cleaned** and **recycled** to **reuse**

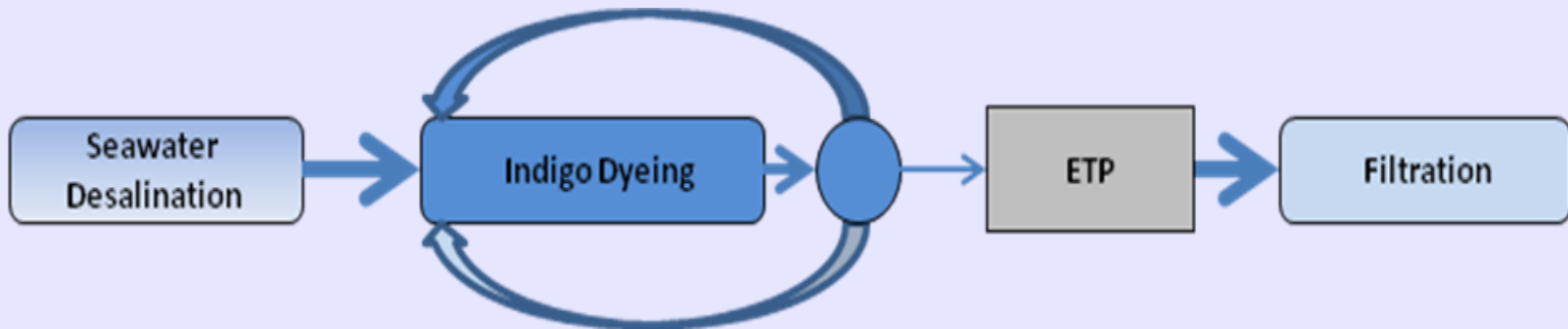
LoopTEC Cycling Technologies in Textile Manufacturing

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LoopTEC Cycling Technologies in Textile Manufacturing

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Benefits for Customers

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- ➔ **Eco-friendly** manufacturing is smart manufacturing
- ➔ Ecology is a source of **savings, environmental benefits** and **brand image** enhancements

Benefits for Customers

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- ➔ Existing **manufacturing processes** can be kept **as they are**
- ➔ In most cases the **adjustments are small** and the overall benefit for the company and the local environment are easy reachable
- ➔ Raising operational **efficiency** and **profitability**
- ➔ There are numerous success cases of textile mills using Recycling Plants to enhance their **efficiency** and **profitability**
- ➔ **Sustainability** and **Competitiveness** go **together**

- ➔ **Potential customers** should show the **following conditions**:
 - ➔ weaving plant (terry or fabric)
 - ➔ cotton or poly/cotton
 - ➔ in-house finishing and desizing
 - ➔ production volume at least 300.000 kg/month

- ➔ The **ideal customer** is **every weaving mill** facing any of these threads:
 - ➔ customers demanding **lower prices at better quality**
 - ➔ **decreasing production costs**
 - ➔ **higher margins**
 - ➔ **less energy consumption**
 - ➔ **waste minimization, minimization of pollutant**
 - ➔ **fulfilment increased local water guidelines**

Water and Effluents

in Textile Industry

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- Water demand and effluent volumes in textile industry are high. There are different ways to get this under control
 - The **traditional way** is using **fresh water**, **heating** it and dumping all different **effluents** after using it into one ETP pool treating it them together to **reduce the pollution load**
 - The result is no drinking water but it should be water without harmful ingredients. **Additionally** there is a lot of **sludge** and **salts** to get rid of. **Salts** remain in any process – they **can not be degraded biologically**

Water and Effluents in Textile Industry

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- ➔ Having an ETP does not really mean that the efficiency of the ETP is high or it is fitting to actual production volumes and production effluent types. Chemicals Recycling is a good completion that really can **save money** with some small changes in piping
- ➔ Pollution Prevention and Chemicals Recycling means substantially **savings to the company**

LoopTEC Caustic Recycling Plants

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Advantages

- ➔ **LoopTEC** strongly recommends the concentration and **reuse** of the Mercerizing Wash Boxes at least 99 % of the salt burden in the ETP and to reuse the caustic soda being part of the effluent
- ➔ This method reduces costs of manufacturing normally at least by 0,1 US-\$ per kg fabric depending on local costs and conditions
- ➔ The effluent coming from the wash boxes can be separated and 100% of the **caustic soda** can be **recycled** and **reused** in a **LoopTEC recycling plant**
- ➔ As result almost no effluent reaches the ETP from this section because it is looped into **reusable caustic liquid** and **reusable water**

LoopTEC Caustic Recycling Plants

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Advantages

The advantages of the Cycling Technology are savings:

- 95 % less water consumption**
- 100 % less acids for neutralisation**
- 95 % less effluent volume**
- 75 % energy savings**
- 100 % salt effluent avoided**

Method of Caustic Recycling

- ➔ In the caustic recycling plant the low concentration of the caustic lye from the washing boxes is taken and in a fully automatic process of **evaporation** a separation is done
- ➔ As result there is water and distillate redirected to the wash boxes and **caustic lye** redirected to the application stage of the mercerizing process
- ➔ The **caustic lye** is delivered at the concentration ratio required. Both streams are available directly at the mercerizing plant where they are needed
- ➔ Some losses arise from the specific and precise pre cleaning of the effluent which is needed to get a superior quality caustic liquid for **permanent reuse**

Reasons to do Caustic Recycling

- ➔ Based on a monthly mercerising volume of 1.200.000 kg fabric there is a NaOH (caustic soda) demand of 300.000 kg per month. 90 % (270.000 kg) of this amount can be found in the effluent. These effluents at a high pH come to a neutralisation stage where 310.000 kg acid is added to get the ph of nearly 7 to send it to the ETP finally
- ➔ This effluent of the neutralisation stage contains 580.000 kg per month (**20 tonnes a day**) salts as result of the neutralisation
These **salts** are **not biodegradable!**
- ➔ If there is a final filtration by reverse osmosis after the ETP to recover as much water as possible after of the biological ETP processes the result are two liquids: a reusable water stream and additionally strong a highly salty liquid stream not reusable and not further biodegradable

LoopTEC Size Recycling Plants



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LoopTEC Size Recycling Plants

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Advantages

- ➔ **LoopTEC** strongly recommends the filtration after the desizing department to substantially reduce at least 50 % of the sludge of the entire ETP and to reuse the sizing agents being part of the effluent. This reduces the cost of manufacturing normally at least by 0,1 US-\$ per kg fabric depending on local costs and conditions. A higher cost reduction can be seen if high efficient power looms are used and in sequence the existing sizing recipe contains more than 20% PVA
- ➔ From the desizing wash boxes the effluent can be separated and **80%** of the **sizing agents** can be **recycled** and **reused**

LoopTEC Size Recycling Plants

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Advantages

The advantages of the Cycling Technology are savings:

- ➔ 60 % **less BOD in effluents of the whole plant**
- ➔ 85 % **less water demand in sizing/desizing**
- ➔ 90 % **less chemicals demand in sizing/desizing**
- ➔ 85 % **effluent volume of sizing/desizing**

LoopTEC Size Recycling Plants

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Advantages

Additional advantages in the weaving mill

- ➔ **App. 2-5 % higher weaving efficiency (higher pick rate per loom)**
- ➔ **Reduction of over-all manufacturing time (no dwell time means a time reduction 8 to 12 hours)**
- ➔ **More quality A fabric (less shadows in dyeing)**
- ➔ **100 % desize efficiency (starch normally leads to a ratio of 98-99%)**

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Method of Size Recycling

- ➔ In the size recycling plant the **low concentration** of the **size effluent** from the washing boxes is taken and in a fully automatic process by ultra filtration a separation is done
- ➔ As result there is water redirected to the wash boxes and size liquid redirected to the application stage of the **sizing process**
- ➔ The size liquid is delivered in nearly every concentration ratio required. A truck to connect to a remote sizing plant is possible
- ➔ Some losses arise from the specific and precise pre cleaning of the effluent which is needed to get a **superior quality size liquid** for permanent **reuse**

LoopTEC Size Recycling Plants

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Reasons to do Size Recycling

Savings

- The savings mentioned result from closed processes of manufacturing and recycling the effluent from washing boxes
- In a closed loop the recycling plant does a **cleaning** from **impurities** and the **separation of water** and **chemicals**
- **Water** and **chemicals** are sent to the manufacturing plant in the **quality** and **concentration needed**
- The **thermal energy** can be saved because the **hot water** can be **reused** in the washing processes

LoopTEC Size Recycling Plants

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Reasons to do Size Recycling

Quality of new sizing agents/blends

- synthetic size agents stand for:
 - higher solubility
 - less size add-on needed
 - less dust accumulation in weaving mill
 - higher weaving efficiency by less warp yarn breaks
 - no chemicals needed for desizing

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Reasons to do Size Recycling

Quality of recycled size liquid

- ➔ Same viscosity as virgin size if quality A size agents are used, (very cheap sizes normally contain impurities and the recycling process may change them).
- ➔ Recycled size liquor comes at nearly **80°C** to the **size cooker**.
- ➔ **80-85%** of the **size** is recovered. A loss derives from weaving, lint sieves and cleaning processes.
- ➔ **water demand** is **10-15%** of the **traditional water demand** without recycling.

Disadvantages of traditional Processes

- Although starch is cheaper than synthetic sizing agents there are some grave disadvantages:
 - the size add-on using starch is much higher than using synthetic sizes
 - **Weaving efficiency** is higher if using synthetic sizes only
 - **Starch** that **needs enzymes** for desizing is not reusable

LoopTEC Size Recycling Plants

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Reasons to do Size Recycling

ETP Efficiency

- ➔ **Starch** has a real **high BOD** what leads to a long degradation time in the ETP and –a after the biological degradation – to sludge. And the BOD (Biological Oxygen Demand) of **starch is 10 times higher** than the **BOD** of **PVA**.
- ➔ High local environmental guidelines force many weaving mills to look for alternatives to reduce their water consumption.
- ➔ PVA is not as cheap as starch but if we count all the advantages and disadvantages it enables a weaving mill to **recycle** the **chemicals** and the **water** needed and enhance their **weaving efficiency** considerably.

LoopTEC Indigo Recycling Plants



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LoopTEC Indigo Recycling Plants

LoopTEC Indigo Recycling Plants



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Advantages

The advantages of recycling technology are
Savings and no blue wastewater

50% less water consumption

50% lower wastewater volume

25 % energy savings

100% avoidance of INDIGO in wastewater

Advantages

- ➔ **LoopTec** recommends refocusing the **INDIGO** from the dyeing process as part of the wastewater to reuse it.
This **avoids 99%** of the **indigo pollution** in the **wastewater treatment plant**

Method of Indigo recycling or infiltration of indigo

- ➔ In order for reuse to be possible, the washing liquid must be cleaned. Due to adhesion of the indigo dye to lint, losses occur during the recovery of the dyestuff
- ➔ After weaving, the fabric is washed if necessary. In the Indigo recycling plant, the indigo contained in the washing water from the washing boxes is filtered out and concentrated in a fully automatic process by filtration. The water is excreted
- ➔ As a result, the excreted water is returned to the washing boxes. The indigo dyestuff, which has been filtered out and concentrated by this way, is fed into a new dyeing process.
- ➔ If jeans fabric has also been mercerized, special consideration must be given to cleaning and recovering the lye.

Installations

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54 installations of technologies mentioned above by LoopTec and GTV - some examples:

Textile Mills

INTA	Size Recycling
Santens	Size Recycling + Incoming Water Filtration
WestPoint Home	Size Recycling + Total Water Recycling after ETP
Kaltex	Size + Indigo Recycling
AFROZE	Caustic Soda Recycling
Gul Ahmed	Caustic Soda Recycling
Lucky Textile	Caustic Soda Recycling
Nishat Chunian	Size + Caustic Soda Recycling
Nishat Mills	Size + Caustic Soda Recycling
Söktas	Size + Colour Recycling
Ortadogu Rulman	Colour Recycling
Nahar	Size Recycling

Oil Filtration Plants

Fehr	Oil Filtration
Daimler Benz	Oil Filtration
Bosch	Oil Filtration

Competition

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- Filtration in very hot circumstances with specific membrane types at a very high efficiency that is the advantages and the experiences of LoopTEC. Same experiences can be told for the evaporation in caustic circumstances.
- Other suppliers of membrane tubes and filtration plants in Europe, US and in Asia. Almost all of these companies mentioned take care for filtration at 20°C to 30°C. The difference we face in textile manufacturing is that we operate at 80°C and with high volumes. (Cooling the effluents down to 20°C or 30°C would ruin the advantage of energy).
- LoopTEC uses singular membrane tubes. Most filtration membranes available cartridges, there the cost of replacements needed from time to time are higher. LoopTEC offers a specific superstructure on demand to enlarge the lifetime of the membrane tubes.

Why LoopTEC Recycling Plants are High Class:

- ➔ Long experience in recycling processes matched to the specific textile effluents
- ➔ Highest recycling rate of chemicals and water
- ➔ Largest number of installations in the textile industry of the technologies mentioned
- ➔ State of the art European process control and measuring technology
- ➔ Singular replacement of membrane tubes leads to low maintenance cost
- ➔ Ongoing development for more textile matching recycling plants

LoopTEC Size Recycling Plants

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Size Recycling Plant and insulated storage tanks for a company with a monthly production capacity of 450.000 kg fabric

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Size Recycling Plant at Clemnson SC, USA