Education and Culture
Leonardo da Vinci

Sustainability in commercial laundering processes

Module 5
Usage of energy in laundries

Chapter 5

Effects of modern dewatering processing on energy consumption in dryers

Content

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- Influence of extraction technology on the energy consumption in drying processes
- Energy saving potentials by reducing moisture retention
- Practical measures for moisture retention
- Even moisture retention (from batch to batch and within a batch)

Learning targets

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After finishing the module you will

- understand the influence of extraction technology on the energy consumption in drying processes.
- know the specific steam consumption for evaporating in ironers, dryers and garment finishers.
- know the potential energy savings in the entire working processes by reducing the residual moisture.
- be able to implement actions for reducing moisture retentions in practice.

Dewatering processes

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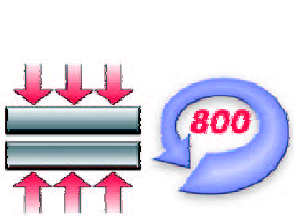
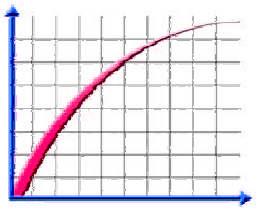
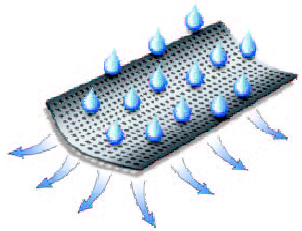
After the wash process is finished, the washed textiles have certain characteristics:

1. The textiles are clean and disinfected
2. The textiles are wet



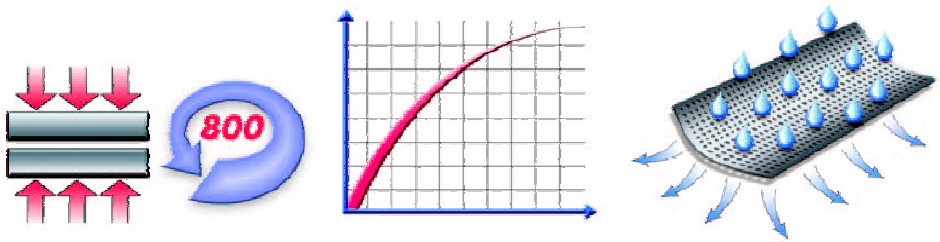
Now it is necessary to remove the water from the textiles:

1. The first step is mechanical extraction (pressing or spinning)
2. Mechanical extraction has a very low energy consumption compared compared to thermal extraction (drying)
3. The extracted water from the press or spin can be re-used in the wash process

Energy savings

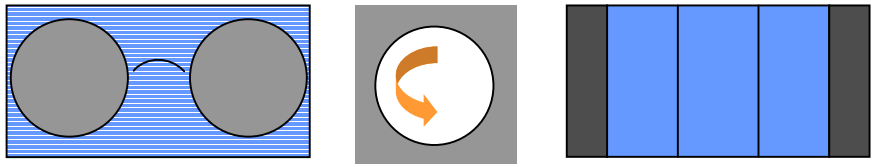
A reduced moisture retention after the mechanical extraction leads to significant energy savings in the drying processes!

Mechanical extraction processes



Energy savings!

Thermal drying processes



Specific steam consumption

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To evaporate 1 liter of water, the following steam consumptions have to be applied in the finishing processes:

- Ironer (new): **1.6 kg** of steam per litre of water
- Ironer (old, poor isolation): up to **2.5 kg** of steam per litre of water
- Steam dryer: **2 kg** of steam per litre of water
- Garment finisher: **1 kg** of steam per litre of water

With this values, the steam consumption of the finishing processes can be calculated according to the residual moisture retention.

Savings per percentage point

With a capacity of 1.5 t/h, each percentage point of residual moisture reduction leads to the following savings of energy:

- Kannegiesser High Power Ironer HPM
  ⇨ **0,72 €/h**
- Older ironers (poor insulation, no covers)
  ⇨ **1,12 €/h**
- Steam dryer
  ⇨ **0,90 €/h**
- Garment finisher
  ⇨ **0,45 €/h**

*Moisture retention reduced for instance from **50 %** to **49 %***

Estimated steam costs = 30,- €/t

Savings in practice

With a capacity of 1.5 t/h, a residual moisture reduction of 10 percentage points leads to the following savings of energy per 8 hour shift:

- Kannegiesser High Power Ironer HPM
  ⇨ **14'400 € per year**
- Older ironers (poor insulation, no covers)
  ⇨ **22'400 € per year**
- Steam dryer
  ⇨ **18'000 € per year**
- Garment finisher
  ⇨ **9'000 € per year**

*Moisture retention reduced for instance from **55 %** to **45 %***

Estimated steam costs = 30,- €/t

Reducing the residual moisture retention

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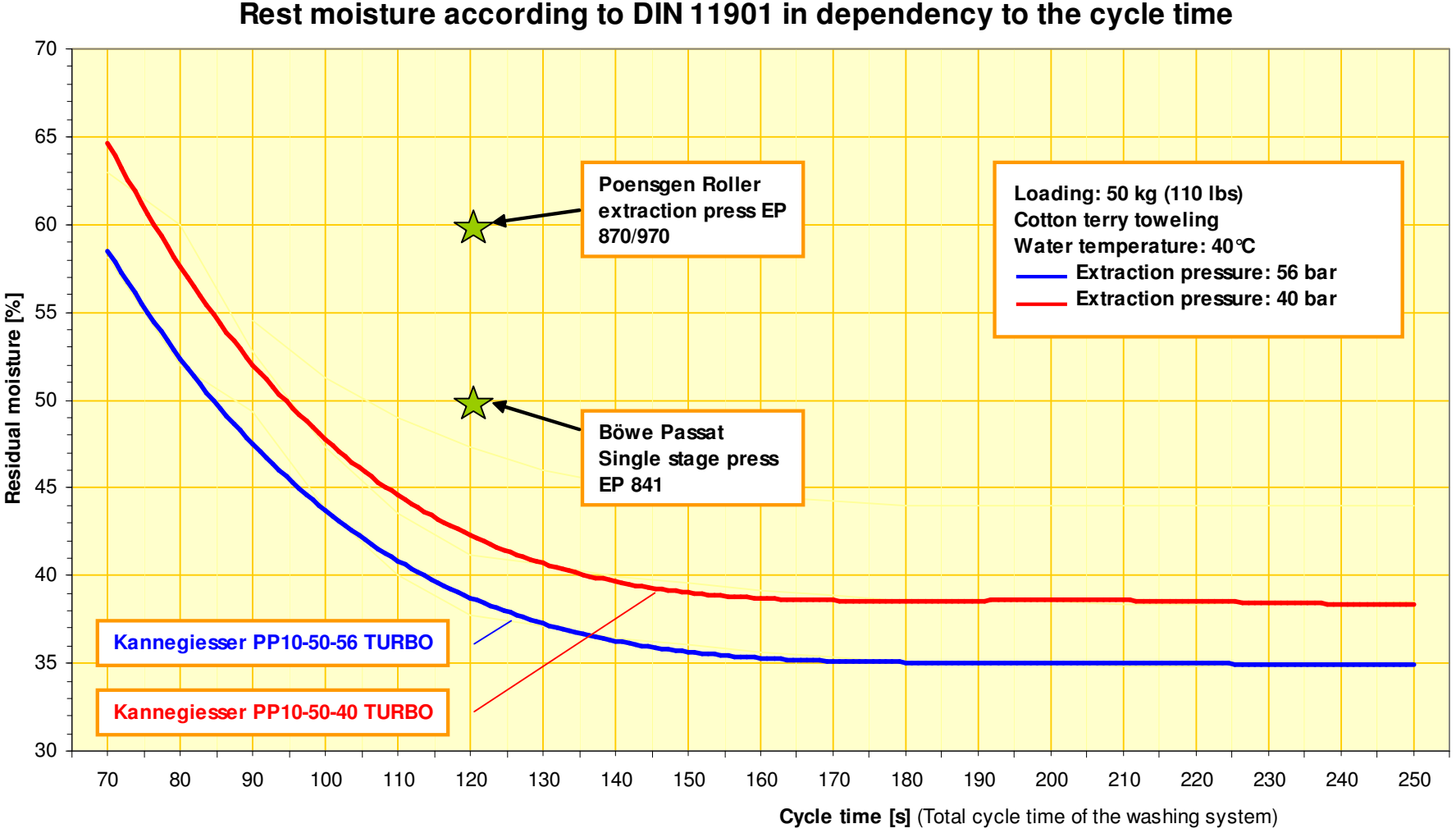
How can a reduction of the residual moisture retention be archieved?

- Reducing the **viscosity of the water**
  (e. g. warm rinsing, heating of the last compartment, warm water circulation)
- Reduced **ancillary times** ⇨ increased extraction time with high pressure (press) or high speed (spin)
- Higher **extraction pressure** with optimised pressure build-up
- Highter **g-factor** in the spin
- Improved **drainage** ⇨ fast lead away of the water

For further information please refer to the chapter "Dewatering methods" in module 2 "Machine technology".

The following diagram shows the improvements in the design of extraction presses regarding the archieveable moisture retention values.

Example: Different extraction presses



Even moisture retention

For optimized finishing processes, it is also essential to have **even moisture retentions**:

1. Even moisture retentions **from batch to batch**
2. Even moisture retentions **within a batch**

Moisture retention variation from batch to batch

- The drying process has to be act upon the batch with the highest moisture retention. Therefore, other batches will be more or less overdried.
- **Exception:** The contactless infrared temperature detection of the articles in batch dryers (Kannegiesser Infratouch) overcomes this problem, as it ensures an automatic switch-off of the drying process when goods are dry
- **Helpfull:** Constant extraction temperatures (by heating the last compartment of the tunnel washer), fixed extraction times, immediate processing of the items after extraction (i.e. avoiding dwell on the unloading belt)

Moisture retention variation within a batch

- The drying process has to be act upon the item with the highest moisture retention within a batch. Therefore, other items of the same batch will be more or less overdried.
- **Helpfull:** Flat distribution of the batch in the extraction press (affected by transport speed, water level and finishing chemicals), avoiding material mix within a batch, immediate processing of the items after extraction (i.e. avoiding dwell on the unloading belt)