Master Training Program on Water (Water Supply, In-house Processing, End-of-Pipe) in Textile and Garment factories

Promotion of Sustainability in the Textile and Garment Industry in Asia - FABRIC

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

FABRIC Asia

Day 1: **Presentation 4**

Checking of Parameters – Step towards RFT

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Outlines

Contents

More details on RFT

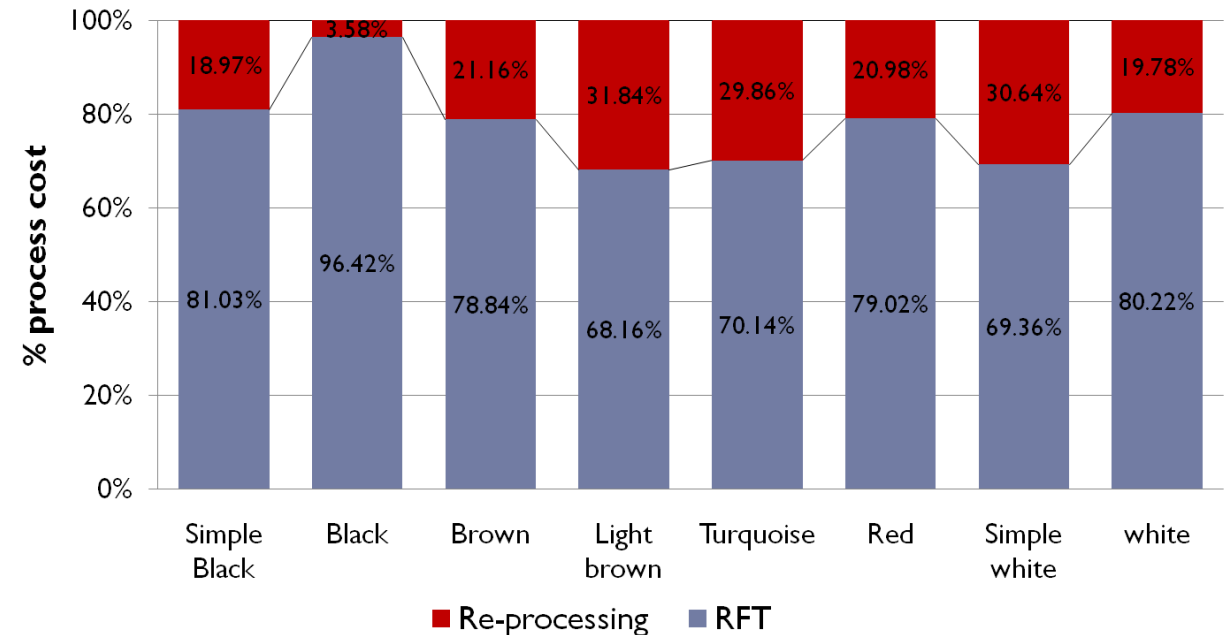- ✓ Lab to Bulk and Bulk to bulk

Processing parameters

- ✓ Common parameters

- ✓ Batch vs semi-continuous/continuous

Sensors' performances

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RFT (Right first time)

Right first time (RFT)

- Improve productivity
- Reduce water consumption
- Reduce chemical consumption
- Increase profitability
- Ensure smooth operation

Source: Mohammad Abbas Uddin 2009

What Could be different?

- **Mechanical restrictions, and the agitation speeds of the dyebaths**
- **Substrate:**
  - ✓ Labdip fabric and bulk fabric
  - ✓ Original fabric weight is less due to the scouring/Bio-polishing loss
- **Dyes and Chemicals**
  - ✓ Lab sample and bulk dyes in store
  - ✓ Strength
  - ✓ Moisture content: Lump formation?

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Lab to bulk RFT

What Could be different?

Process consistency

- ✓ Water quality
- ✓ liquor ratio
- ✓ Weight measurement: Human error?
- ✓ Alkali dosing in the lab
- ✓ Dyeing parameters

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Lab to bulk RFT

What could be be done

- **Substrate:**
  - ✓ Fabric dyed in laboratory and bulk should be same
  - ✓ Adjust wt. of Labdip fabric according to wt. loss in bulk (4-8%)
- **Dyes and Chemicals**
  - ✓ Purity of dyes: Insoluble matters and moisture
  - ✓ Quality checking of Lab dyes and bulk dyes: Dyeing in identical condition, check colour
  - ✓ Use / change dyes and chemical with a same strength
  - ✓ Check solubility of dyes

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Lab to bulk RFT

What could be be done

- **Process consistency**
  - ✓ Frequent checking of water
  - ✓ Liquor ratio: As close as possible
  - ✓ Alkali solution must be made to the reference pot
  - ✓ Check weigh system
  - ✓ Use the exact lab recipe for first bulks OR adjust lab recipes prior to 1st bulk are based on empirically proven correlation factors
  - ✓ Bulk dyeing and use the same recipe to do lab dyeing
  - ✓ Update Batch card
- **Reduce multiple sampling stages in dyeing**
- **Create a formal failure analysis procedure**
- **Use an automated dispenser, Central dyehouse controller**

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Scenario: Repeat dyeing

- Short Interval
  - ✓ Differences in the degree of pretreatment such as scouring,
  - ✓ Fluctuations in the water quality
  - ✓ Inappropriate dye selection
- Long Interval:
- Change in Dyeing Machine
- Differences in the weight of the fabric
- Changes in Liquor ratio
- Change in Dyes/Chemical combination
- Change of dye lot: Strength change

What could be be done

- Proper Planning
- Use enzyme/chemicals in proper condition and applicable to broad range
- Use dyes with high reproducibility
- Use compatible dyes in chemicals
- Check s.g., pH of the dyebath
- Create a formal failure analysis procedure
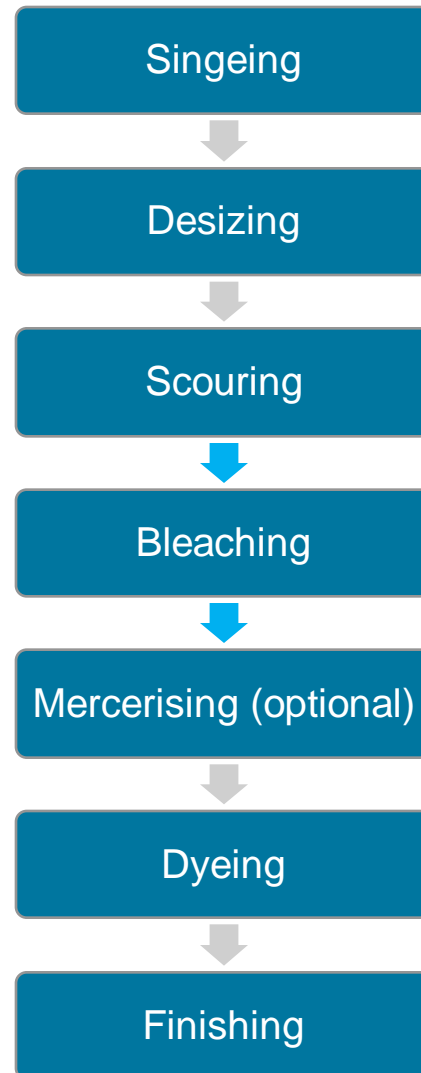- Use an automated dispenser, Central dyehouse controller

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Textile Wet Processing

Wet processing

- **Textile dyeing – Batch vs Continuous**

  - ✓ Pre-treatment

  - ✓ Dyeing

  - ✓ Finishing

- **Garments washing**

- **Other dyeing**

  - ✓ Yarn dyeing
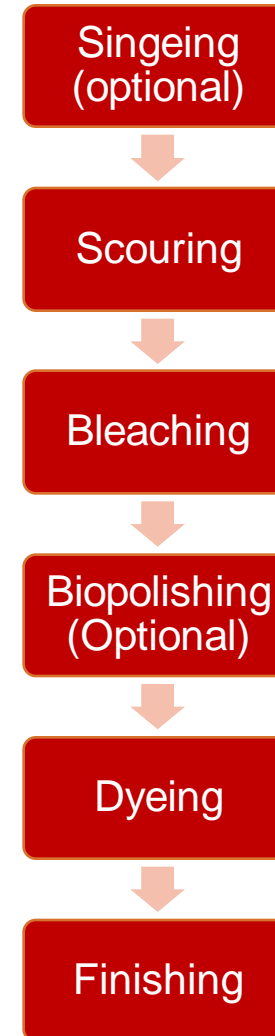
  - ✓ Fibre dyeing

  - ✓ Accessories dyeing

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Pretreatment

- Desizing
- Scouring
- Washing
- Bleaching
- Biopolishing
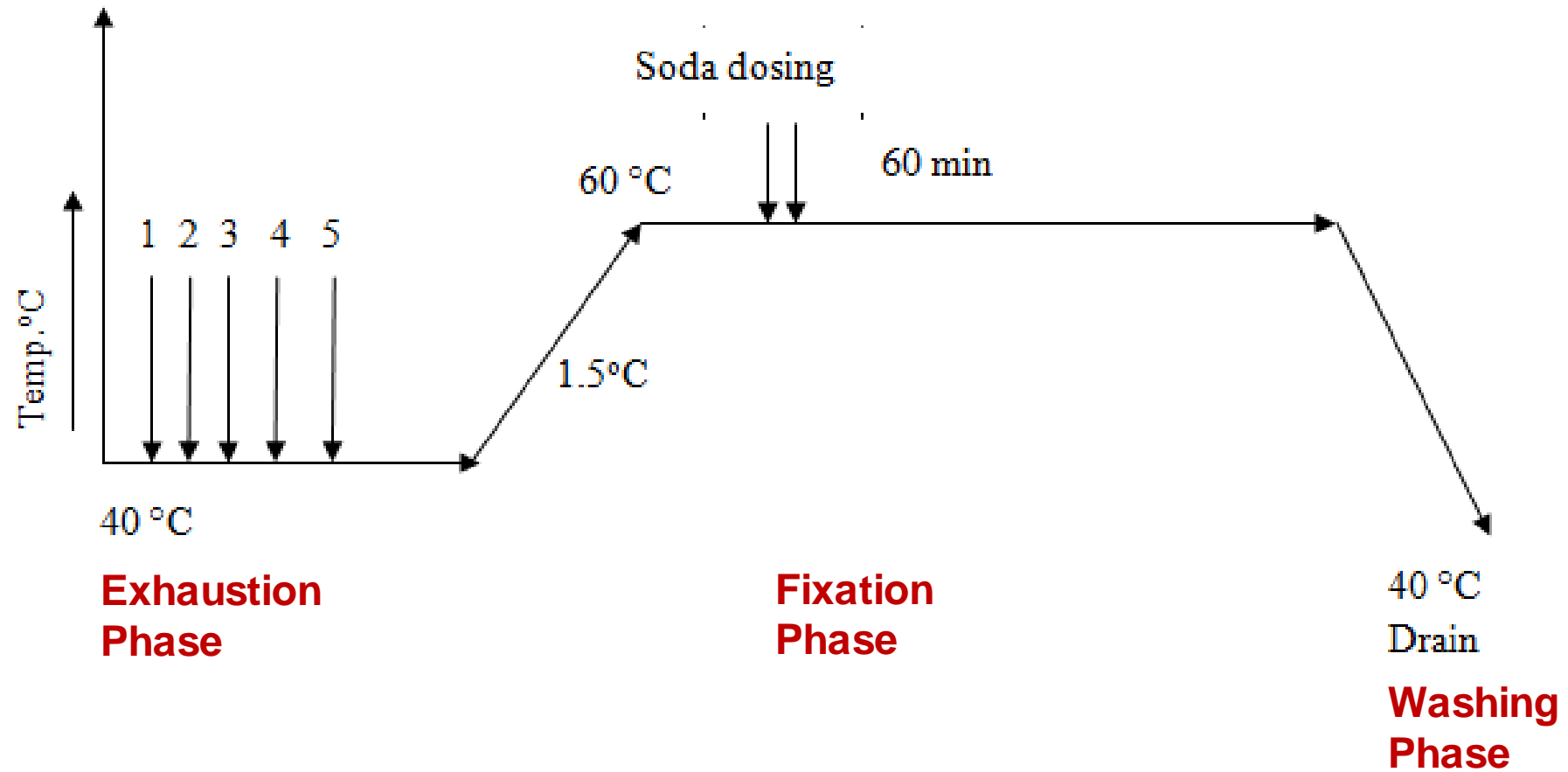- Heat setting
- Singeing

Woven fabric processing sequence

Singeing
↓
Desizing
↓
Scouring
↓
Bleaching
↓
Mercerising (optional)
↓
Dyeing
↓
Finishing

Knit fabric processing sequence

Singeing (optional)
↓
Scouring
↓
Bleaching
↓
Biopolishing (Optional)
↓
Dyeing
↓
Finishing

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Textile dyeing

Substrate	Machine	Production	Fabric	Pressure	Substrate	Dyes
Natural: Cotton/Wool/Silk	Vat	Batch	Knit	Open	Fibre	Natural
Synthetic / manmade	Jig	Continuous	Woven	Closed vessel	Yarn	Reactive/metal complex
Blend	Jet/	Semi-Continuous	Twill/Denim	High pressure	Garments	Acid/Basic

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Dyeing Curve

- Drying, compacting/sanforizing, heatsetting
- Basic – Softening, dry finish
- Functional Finish – Antimicrobial, wrinkle resistant, moisture management

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Wet processing parameters

- **Common parameters**
  - ✓ Water Hardness
  - ✓ pH
  - ✓ Temperature

- **Batch dyeing**
  - ✓ Liquor ratio
  - ✓ Pressure
  - ✓ Electrolytes

- **Continuous/Semi-continuous dyeing**
  - ✓ Pick up speed
  - ✓ Pickup percentage

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- **Fabric : liquor: : 1:?**

  - ✓ Wt/wt
  - ✓ Chemical concentration g/L
  - ✓ Dyestuff % of the materials (fabrics/Yarn)

- **pH of the bath**
  - ✓ Depends on the process
  - ✓ Adjusted by acids/alkalis
  - ✓ Wash off after use

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- **Hardness of the water**

  - ✓ Depends on the process
  - ✓ Adjusted by WTP
  - ✓ Adjusted in the bath (by adding sequestering agents)

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- **Temperature of the bath**
  - ✓ Depends on the process
  - ✓ Adjusted by adding steam/hot water/ heat exchanger

- **Pressure of the bath**
  - ✓ Depends on the process
  - ✓ Adjusted by compressor

Electrolytes

- **Electrolytes of the bath**
  - ✓ Depends on the process
  - ✓ Adjusted by salt/soda

- **Measured by either TDS meter or Baume hydrometer**

Pick-up speed

- **Pick-up speed of the dyes**

  ✓ Depends on the process/fabrics

  ✓ Adjusted by overflow / reel speed / chemicals

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Checking the sensors' performances

- Sense the parameters
- Automatic / manual decision making tool
- Regular maintenance is a must
- Always replace with the best quality (if necessary)

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