Sustainability in commercial laundering processes

Module 6
Special aspects

Chapter 7

Management Systems

Content

- Quality management system – principle
- Saving potentials
- Features - overview
- Operating data
- Process data
- Machine data
- Application of data
  - Process controlling, maintenance, traceability
  - Requirements
  - Operating data washing

Learning targets

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After finishing this chapter, you will:

- Know, what a management system is
- Understand why management systems are applied
- Recognize efficiency potentials for laundry practice
- Know, how management systems work
- Know, what monitoring and controlling mean
- Recognize the difference between monitoring and controlling
- Know, which kind of data have to be gathered within a management system
- Know, how to analyse gathered data material

Principle quality management system

- Quality management measures and/or –instruments shall improve working procedures and processes in laundry to enhance their efficiency
- A management system collects data which are observed continuously
- The difference between a management system and “simple” controlling is, that several machines and processes are networked
- Data material delivers information for anticipatory (laundry) process controlling
- Thereby processes are most efficiently arranged – avoidance of rejects and/or over-production, which means a profit for the environment (sustainable production)

Saving potentials

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Savings are possible in the following fields:

- Water
- Detergents
- Energy (depends on water consumption)
- Time (shorter and more efficient programs, increased number of laundering cycles per day, longer machine uptimes, optimal load, optimal residual moisture

Further Effects:

- Reduction of effort and costs
- Reduction of complaints (validated processes, traceability, documentation

→ Meeting of legal regulations

Saving potentials

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Water

- Water consumption is monitored steadily
- And compared with programmed water consumption
- Higher water consumption and causes can be identified

Possible causes of excessive water usage:

- Leaking drain valve, hoses
- Too much condense water due to bad steam installation
- Bad programming
- Also see 3-2, 3-3

Saving potentials

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Detergents

- Correct amount of detergents leads to correct amount of water consumption

- Too much detergents lead to
  - High waste water load
  - Higher amount of rinsing water

- Too little detergent leads to
  - Insufficient result
  - Increased washing time to obtain the desired washing result
  - Repeated washing process means waste of water, detergents and energy

Energy

- High water consumption leads to higher energy costs due to additional need of heating energy

  - Correct water consumption leads to optimization of energy costs

Saving potentials

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Load, residual moisture

- Over-loading leads to insufficient washing and rinsing results
- If load is too little, capacity is not used sufficiently
- Recapitulation of washing process means waste of time and capacity and additional abrasion of textiles
- Low residual moisture is an important pre-condition for a sustainable ironing process
- Laundry with high residual moisture contents has high energy demands for drying
- If residual moisture is too low, mangling can lead to abrasion of textiles

Operating data - overview

"Collecting data about state of processes in laundry"

Organizatorial operating data (production data)

- Time → *for washing (per day)*
- Amounts
- Weights → weight of textiles (per wash/per day)
- Consumption data (per wash/per day)
- Temperature → *(also: process data, see next chart)*
- Number of pieces each production lot
- Work progress
- Order status

Process data - overview

“Process parameters, setting data”
Also known as “technical operation data”

- Temperature
- Time
- Duration
- G-factor
- Rotation of drum
- Laundry weight per wash
- Duration of drum rotation
- Heating and cooling rates

Machine data - overview

"Machine data → "active controlling"

Interface between machines and data processing

data processing for analysis of process efficiency and possibility to influence the process actively

- Capacity/number of particles
- Efficiency
- Duration
- "Condition of machines" (primary processing time, secondary process time, maintenance, overhaul)
- Consumption (water, energy)

Application of data

controlling, maintenance, traceability

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A management system comprises selected data to control the selected processes ideally

Modern Management systems also provide possibility of data analysis

- Batch data
- Analysis of productivity
- Consumption analysis
- Washing cycles analysis
- Machine uptimes analysis
- Costs analysis

Application of data

controlling, maintenance, traceability

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In addition, recorded data are basis for:

- Traceability-systems
- Simultaneously, they ensure process validation
  - Validation means to proof effectiveness of processes
  - For laundry practice, that is: application of correct washing process
- Validation data is to prove application of correct processes
- Additional possibility for validation: wash monitors
  - Also see chapter 5

Application of data

interfaces

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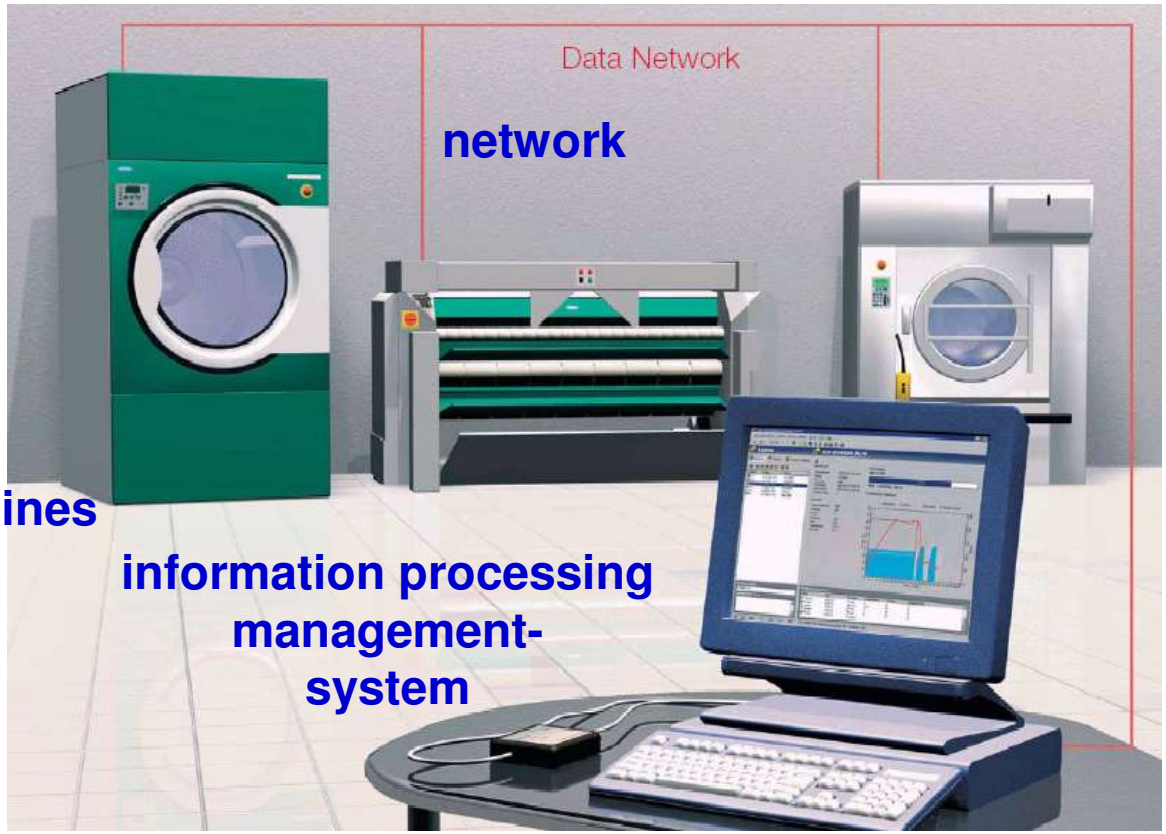
Analysis of machine data for active controlling necessitate

Interfaces between production technique and information processing

Application example from laundry practice



source: Electrolux

Application of data
online-collection of data

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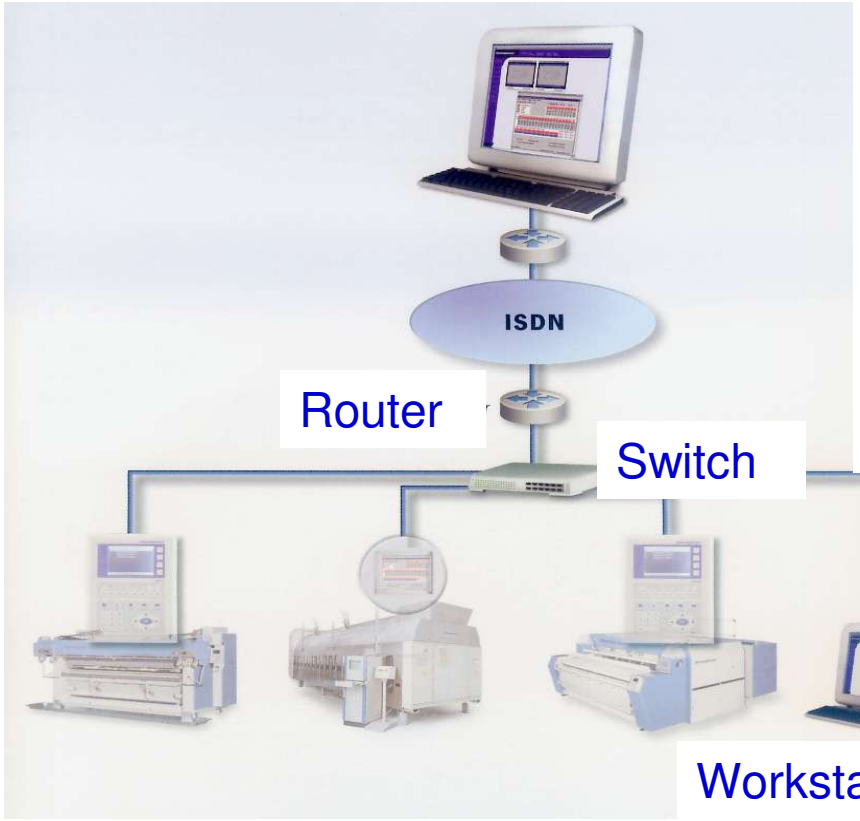
Modern management systems run online



Requirements:

- Hardware
- Operating system
- Data base
- USV
- Server
- Internet connection

source: Kannegiesser

Application of data pre-conditions

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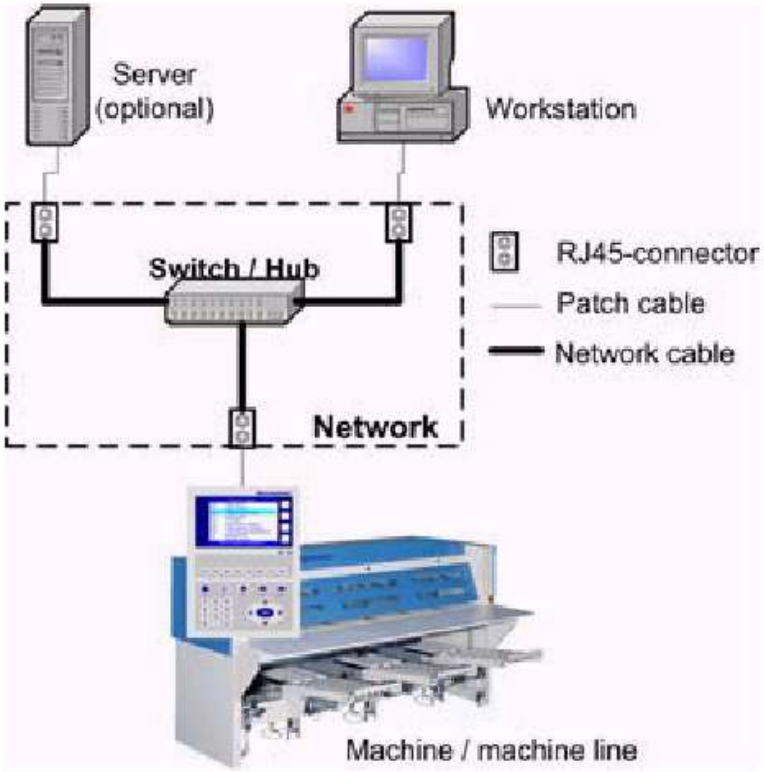
To install a management system in laundry, following pre-conditions are necessary

- Machines with a transmission protocol (connection that provides the possibility to share data from computers)
- Data network
- PC/Server with connection to data network with management-system software

Application of data pre-conditions - Ethernet



Passive components

Patch cables, data connectors, should meet the requirements specified in ISO-norm standard 11801, category 5 (class D), max. transfer rate: 100Mbit/s, max. cable length < 100m

Active components

Switches and hubs are absolutely necessary as data distributors and signal amplifiers between connected network participants

source: Kannegiesser

Application of data pre-conditions - software

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Management system software nowadays is mostly installed on servers.

If there is only few machines connected, software could also be installed on PC`s/workstations

This leads to the following requirements:

- Server requirements

  Equipped with special components such as UPS and a fail-proof hard disk system

  Operating system: Windows 2000 or 2003

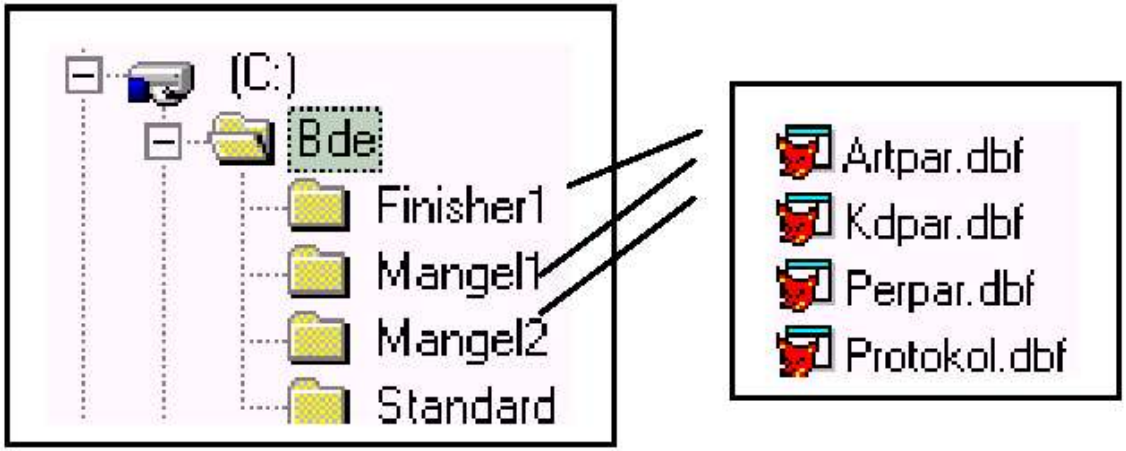
- Workstation requirements

  Standard PC

  Operating system: Windows 2000 or Windows XP professional

Application of data integration into operating system

Machine data on PC or server are organised in folders. On the hard disk of the file server, one folder per machine is created for data exchange and released for network access



When switched on, each machine creates a fixed connection to the relevant folder and stores the production data there in the form of the file

source: Kannegiesser

Application of data operator interface

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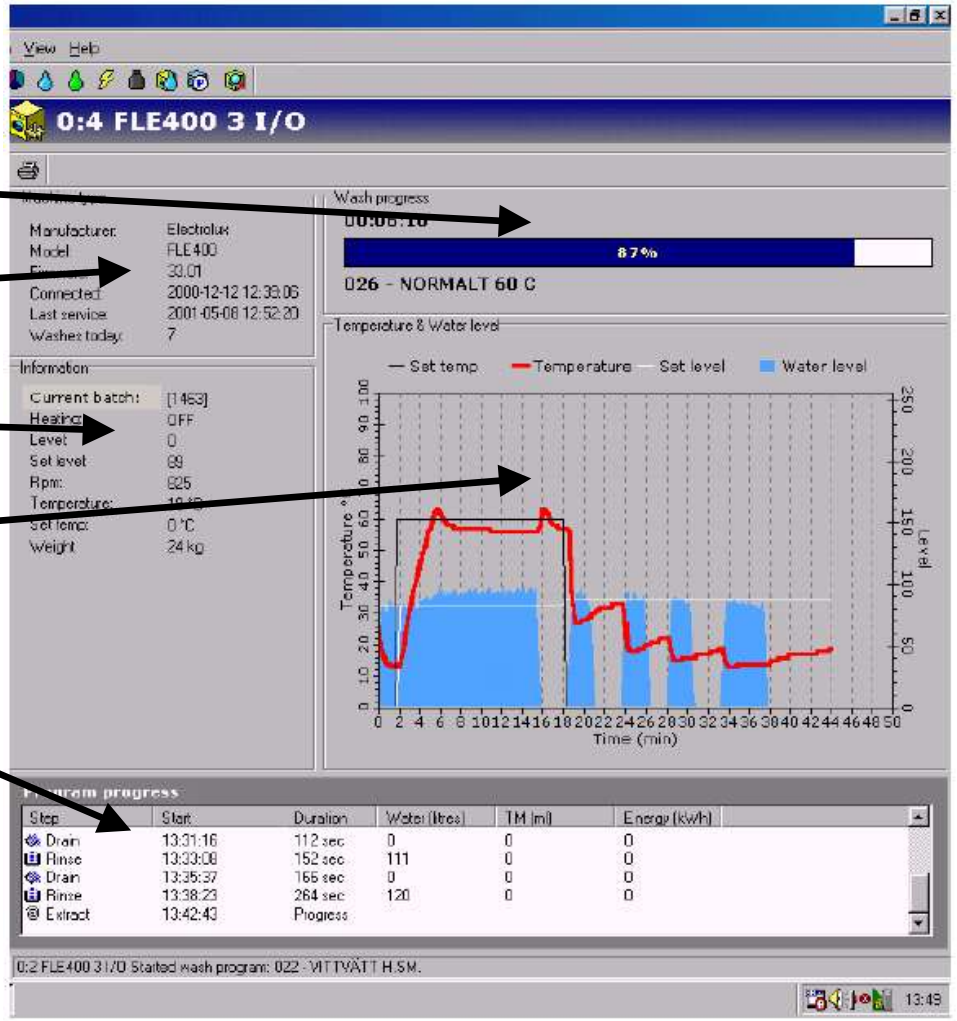
Consists of 5 different windows:

- Wash progress
- Machine type
- Information
- Temperature and water level
- Program progress



Quelle: Electrolux

Application of data statistics

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- statistics can be presented as graph or as table...
- can be imported in an EXCEL-Sheet
- and be printed

Quelle: Electrolux

Production data for process control data

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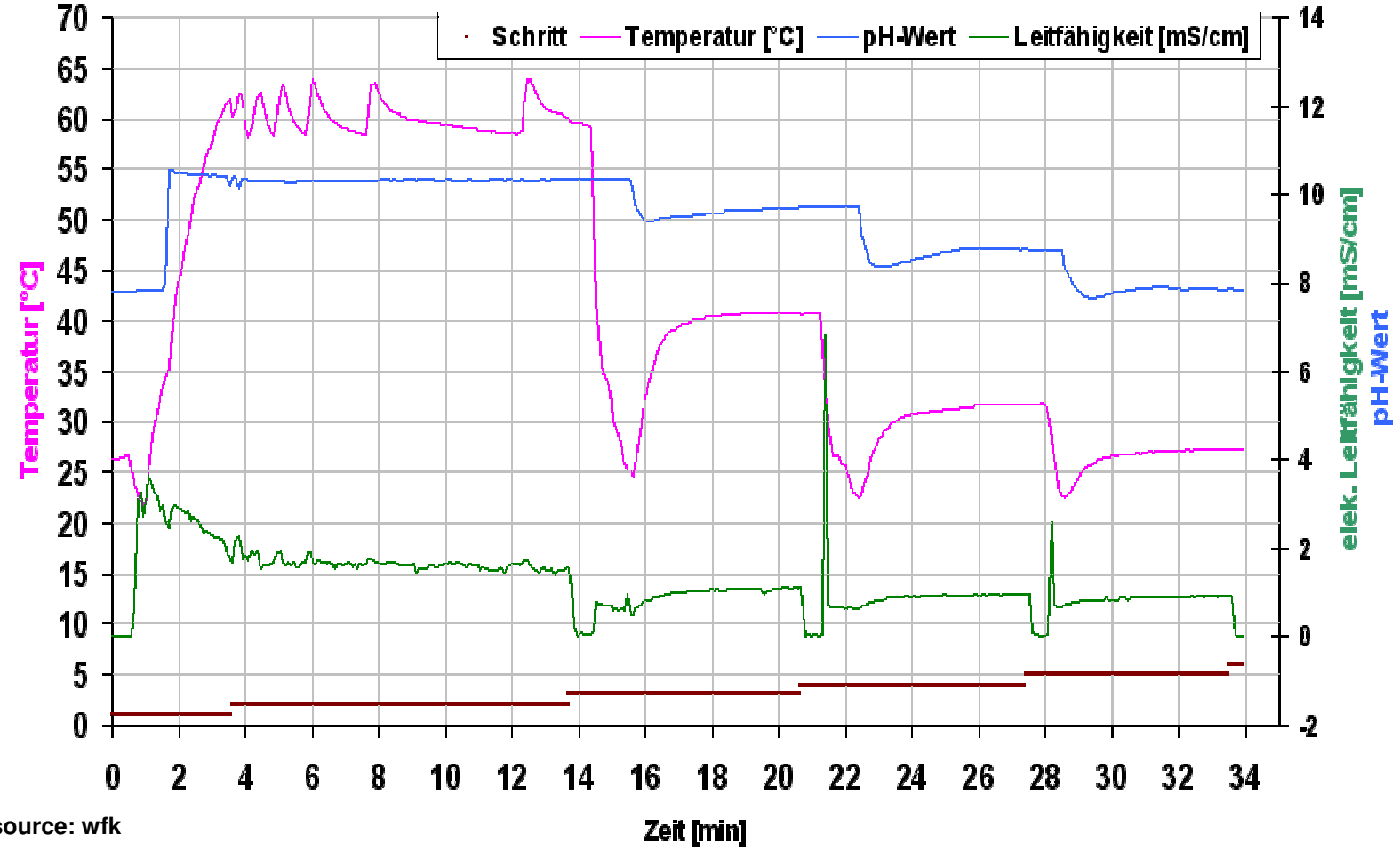
The following data are relevant for process control, e.g.

- Load ratio
- Bleach/dosage
- Max. temperature of liquor, residence time
- Liquor ratio
- Main wash, rinse
- Concentration of alkalinity
- Water consumption

Process data for controlling washing machine



source: wfk

Process data washing
product consumption

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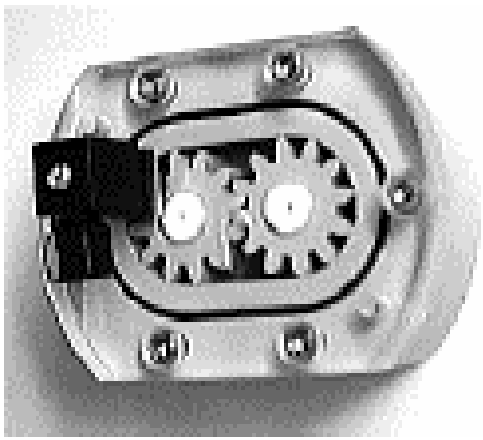
Product consumption is acquired by flow control unit



Process data washing
integrated weight system

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- Integrated weight systems (IWS are mostly part of integrated management systems
- IWS provide the possibility of load control during the process. Thus, optimum usage of machine capacity is ensured
- Additionally, controlling of residual moisture should be possible within an integrated management system

  (Residual Moisture Control, RMC)
- To obtain optimal residual moisture for mangling

Process data washing examples

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Consumption data

- Product consumption per product and dosing unit and/or per kg dry laundry

Dosing programmes of washing machine

- Amount of dosage per impulse
- Pump power per minute
- Dosage per kg laundry

source: ECOLAB

Washing machines

- Start of programme of individual washer extractors, necessary load and duration of programme
- Amount laundering cycles of tunnel washers, input/output signals

source: ECOLAB

Process data washing failure indications

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Failure protocol

- Product failures
- Devices failures
- Exceed of dosage time
- Flow control

For each failure note

- Name of failure
- Allocation of device
- Allocation of machine
- Begin of failure/date/time
- Duration of failure in min
- Save of last 50 failure notes

source: ECOLAB

Process data washing examples

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Daily production

- Amount dosage programmes per washer extractor
- Batch per washer extractor in kg
- Overall batch in kg

Time recording

- Washing time
- Run-time of machines
- Idle time

Manual functions

- Kind, time and duration of manual intervention

Listing of all dosage features

- Per dosing unit
- Power per minute/per second
- Date of last calibration

source: ECOLAB