SPIRE-1

SPIRE
Brokerage event
October 22nd
2013

SUSTAINABLE PROCESS INDUSTRY

EUROPEAN INDUSTRIAL
COMPETTIVENESS TROUGH
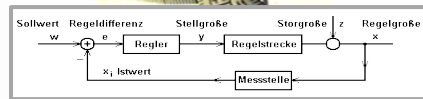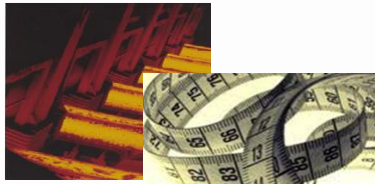RESOURCE AND ENERGY EFFICIENCY

"Optimisation of batch processes by new inline measurements and *Iterative Learning Control*"

SPIRE
Sustainable Process Industry through
Resource and Energy Efficiency

Organization

VDEh-Betriebsforschungsinstitut (BFI) is one of the leading European providers of application-focused **R&D** in the field of steelmaking and neighbored industries **located in Düsseldorf, Germany,** with a staff of 130 people. BFI's field of activities covers the entire **production process chain, from charged materials to the final product.** Core competences lie in the fields of **process engineering, energy and resources and measurement techniques / process automation.**

Division "Measurement & Automation":

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Measurements in the liquid phase
Measurements in the solid phase
Process automation in liquid phase
Process automation in solid phase
Quality Control and Information technology

- *Measuring, testing (process and product, mechatronics, always online)*
- *Control (setup, open loop, closed loop, manual support)*
- *Monitoring, supervision, diagnosis, optimisation*
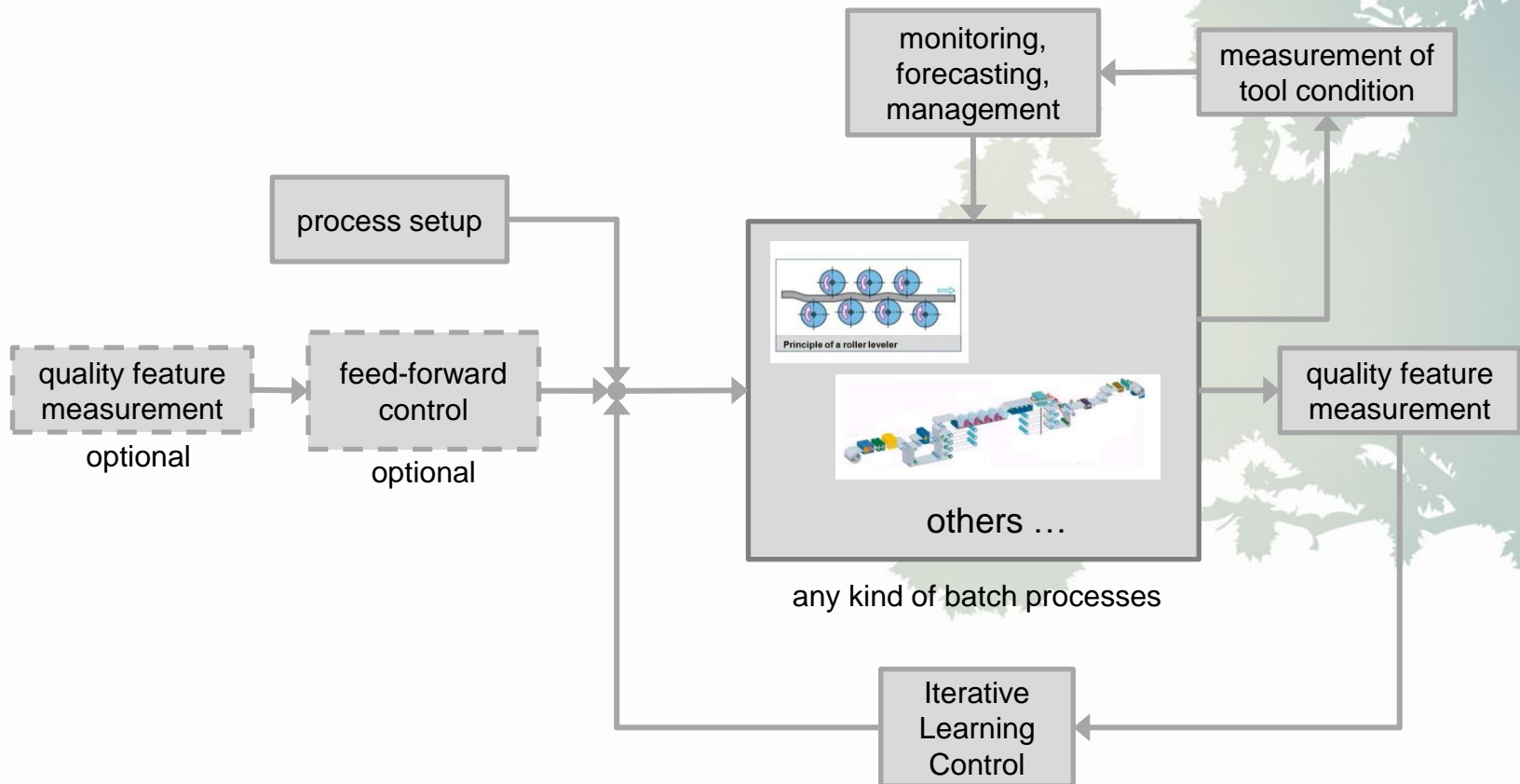- *HMI, communication, protocols, data acquisition, Data Mining, etc.*

especially „through-process" ….

Sustainable Process Industry through Resource and Energy Efficiency

Project Idea Concept

PLEASE USE 2 SLIDES TO SUMMARIZE THE MAIN CONCEPT OF YOUR PROJECT IDEA AND LINK IT TO THE RELEVANT KEY COMPONENT / KEY ACTION AS REFLECTED IN THE SPIRE ROADMAP AVAILABLE AT HTTP://WWW.SPIRE2030.EU/ . INDICATE AS WELL THE CALL TOPIC YOU WILL ADDRESS.

1. Batch processes at which some quality aspects of the product can only be measured at the process end, large dead times

2. New measurement devices for fast inline detection of product quality at the end of the process (e.g. optical measurement of straightness of long products, detection of scale on flat products and online measurement of their thickness by combination of optical and ellipsometric measurements; other industries….)

3. New measurement devices for fast inline detection of the condition of tools which are relevant for the process (e.g. detection of surface and internal defects of rolls by combination of 3D-optical and contactless ultrasonic devices=> sensor fusion; other industries ….)

4. Investigation of correlations between tool conditions and product qualities

5. Batch to batch optimisation with process control by "iterative learning control" concepts (e.g. control of straightening process of long products, pickling of flat products; other industries …)

6. Intelligent management of tools (e.g. rolls of rolling mills; other industries ….) based on measurement and monitoring results on the one hand and wear models on the other

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Project Idea Concept

monitoring, forecasting, management

measurement of tool condition

process setup

quality feature measurement

optional

feed-forward control

optional

Principle of a roller leveler

others …

any kind of batch processes

quality feature measurement

Iterative Learning Control

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Idea Impact

PLEASE USE 2 SLIDES TO HIGHLIGHT THE MAIN EXPECTED IMPACT OF THE IDEA RELATED TO THE CALL TOPIC YOU WILL ADDRESS AS WELL AS THE SPIRE ROADMAP AVAILABLE AT HTTP://WWW.SPIRE2030.EU/ INDICATE AS WELL THE **CROSS-SECTORIAL CHARACTER OF THE IDEA.**

1. New fast inline measurements of product features and tool conditions in the field of batch processes
2. New solutions for monitoring of product features and tool conditions
3. Intelligent and condition dependant solutions for tool management
4. Better process operations with respect to resource and energy efficiency and maintenance costs
5. Improved quality of final product and at the same time reduced production costs
6. Strengthening of European industry

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Idea Impact

Relation to SPIRE roadmap:

- SPIRE key component 2, Process

- Key action 2.3: Process monitoring, control and optimization

  Realisation areas:
  - Implementing measurement devices for all aspects of intermediate/final product quality and their integration into process control
  - Robust optimization methods to local targeted process control and energy supply

Cross-sectorial aspects:

- Interesting for all industries with batch processes with large dead-times and processes in which tools influence largely product quality and process behaviour

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Existing Project Consortium

PLEASE USE 1 SLIDE TO INDICATE THE EXISTING PROJECT CONSORTIUM AS WELL AS THE MAIN ROLE OF THE PARTNERS.

1. BFI as coordinator
2. Two industrial partners from steel industry (one long, one flat products)
3. Research partner in the field of metal forming
4. Producer of rolls (SME)
5. Supplier of measurements devices (SME)

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Looking for partners…

PLEASE USE 1 SLIDE TO INDICATE THE PROFILE OF THE PARTNERS YOU WILL BE LOOKING FOR AND THEIR ENVISIONED ROLE

1. Industrial partners from outside steel industry with similar tasks in the field of batch process optimisation, e.g. non-ferrous metals forming industries or others

2. Suppliers of measurement devices to detect conditions of tools outside steel industry (SME)

3. Supplier of Automation solutions

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