VOITH Papermaking 4.0 – Using the Internet of Things

2016-11-23, DTIP Bled, Dr.Chr.Naydowski





Papermaking 4.0 applies novel Information Technologies to papermaking.

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Future



DEE > 90% Stable

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Stable means to sustain a gain



Time



ComCore

is designed to integrate data from any source.

Why is data networking beneficial for future paper and board manufacturing?



Today. Arbitrary fluctuations lead to fluctuating quality and avoid KPI target achievement.



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4,0

VOITH Why do papermakers struggle to keep strength variations within the target corridor for packaging paper ?

Case study, Gap Former, Testliner and Medium, 100 gsm, 380,000 tpa (2013)



Fear to miss KPI. Overdosing of starch. Needlessly.

target corridor excess starch utilization 200 area 190 001 180 N 170 N 160 160 150 140 out of specification area 130 1.7 1.5 1.6 1.8 1.9 1.4 SCT CD (kN/m) \otimes reached 01/12 - 05/13 specified guaranteed value for CM of 100 g/m² \bigotimes specified typical value

Testliner Feasibility Study

(2013, Germany, 380,000 tpa)

Current behavior

Strength fluctuations are compensated by excess starch dosage

→ "Angst cost" (2€/ton)



The most overlooked reason for process fluctuations



Limited Tools for Decision-making

Humans are not able to continuously determine in real-time best action for overall process efficiency such as stability, quality, and cost.

=> Too much data & not enough relevant information



The revolutionary is:

data management.

The revolutionary result is: a novel level of performance

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The IoT is the enabler to move process automation: from singular matrix levels into a cyber physical system





VOITH Digital solutions

- Data based pattern recognition
- Utilization of clouds, Sensors, Actuators, MPC
- Early detection and control of process fluctuation
- Crosslinking of process and economic causes
- Reduction of operator specific KPI's
- Elevated attention to ensure 24/7 reliability of sensors, actuators and software by residential and remote access





Who is a client for next level digitization ?



RELIABILITY

Papermaking 4.0 - Introduction

The sum of three big talents in a "system of systems"



The digital portfolio to stabilize complex industrial issues is modular. More elements to come.



* Demo 1st Qu 2017

OnE Cockpit: Easy-to-grasp Visualization





Cockpit function. Every information must be relevant to the issue and meaningful for a fast decision-making.



The sheet forming process



A fast changing cycle driven by 8 interdependent actuators. Cycle starts by flocculation followed by shear in headbox.



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Time scale in a sheet forming process



Example GAP-Former 1500 m/min

The diffusor destroys any floc created before head box. The sheet is created by REFLOCCULATION.





Novel algorithms have been developed to control actuators stabilizing the entire sheet creation process



Operating area

Field results: OnEfficiency Dry Line Control

Double ply board, 450.000 tpy







- Dry line stable
 despite changes in
 -refining
 -dewatering
 -lip sclie opening
- Less energy costs
- ➔ More constant quality paper production

OnEfficiency Strength

Realtime Control of strength in packaging

OnEfficiency Strength Lay out for doube ply board 450.000 tons p.a.



VOITH



The virtual Sensor predicts strength data realtime STFI and Mullen

High confidence interval: ± 2.5%; Field test double ply 450.000 tons p.yr



Field results B & P: OnE Strength

Double ply board, 450.000 tons per yr, February 2016





Tomorrow: A pivotal new level of transparency & controls. Stabilizing processes to meet target KPIs.





OnCare – a part of the jigsaw Papermaking 4.0





OnCare AM – mobile solution





Pump



200-040-030-010-010-030 Cardan shaft 1

Object code: 200-030-010-050-010 PM02. Broke-Pulper 1. Agitator 2. Motor





OnCare - Augmented Reality in Preventive Maintenance

Navigation Mode



 Identifying and showing hidden objects

Inspection Mode



- Object status at a glance to prevent redundant work order requests
- ✓ Arrow is showing route direction

Inspection Route



- Inspection route including task list and work order request generation
- Equipment view with documents, maintenance history and engineering data

Prepared for Voith Cloud database support in Papermaking 4.0



Benefits - OnCare





OnCare Maintenance Excellence Optimization Program

Case study in North America



Maintenance cost optimization



Comparison of Technical Data

	Before	Target after 24 months
Machine uptime [%]	92	>95
Machine production [tpd]	820	>1,000
Machine speed at reel [fpm]	2100	3000
Maintenance cost [\$/ton]	37	<27
Actions to reach the Target		

Maintenance Excellence with OnCare

Maintenance Excellence Content

- Implement best practices for shutdown planning & scheduling (MEx)
- Implement best practices for planning & scheduling, non-shutdown (MEx)
- Development of a risk based reliability maintenance program (MEx)

Why Voith? Big Steel meets Big Data

Top Papermaking Know-how

- Over 150 years experience in paper industry
- Over 300 Process and Plant experts
- A local yet global partner





Top Digital Expertise

- 50.000 Users / 14 Global Data Centres
- Over 600 Automation, IT specialists and
 34 computer security experts
- Cross Industry Platforms

What our customers say....

We would like to see intelligent, easy to use and fully automated machines with advanced analytics to secure our future competitiveness." Modular is the only way! Nobody wants another complex controls project..."

Benchmarking with other companies will be an important tool in the future to improve our performance." We need flexible and easily adjustable systems allowing our operators to understand what they are doing and build up process knowhow."

Engineered Reliability