



AutomationX GmbH

Sustainable Plant Optimization -
MPC in a Deinking Process

www.automationx.com

Company Overview



- AutomationX is a Member of GAW Group
- More than 1000 Installations – worldwide
- Headquarter Graz / Austria

Solutions for Pulp & Paper:

- MES Applications:
 - Coating Color Preparation
 - Wet end Solutions
 - Material tracking and tracing
- APC Solutions:
 - MPC-Model Predictive Controller
 - Empiric / physical Models

Company Overview

GAW – Group

- Founded in 1951, family-owned
- today present in 27 countries
- more than 500 employees.
- annual turnover of EUR 102 million



GAW India

IND - M/s. Regus Business Chennai Centre Pvt Ltd.
Level 6, 10/11 Dr. Radhakrishnan Salai, Mylapore,
Chennai, Tamil Nadu 600004
INDIA

Mr. Ranjit Narayanan
Mobil: +91 98 40 79 63 09

ranjit.n@gawpcs.com

www.gawpcs.com

Acquisition

- Mill wide / Group wide process data acquisition
- Interfaces to all process levels (horizontal and vertical integration)

Data Mining and Analysis

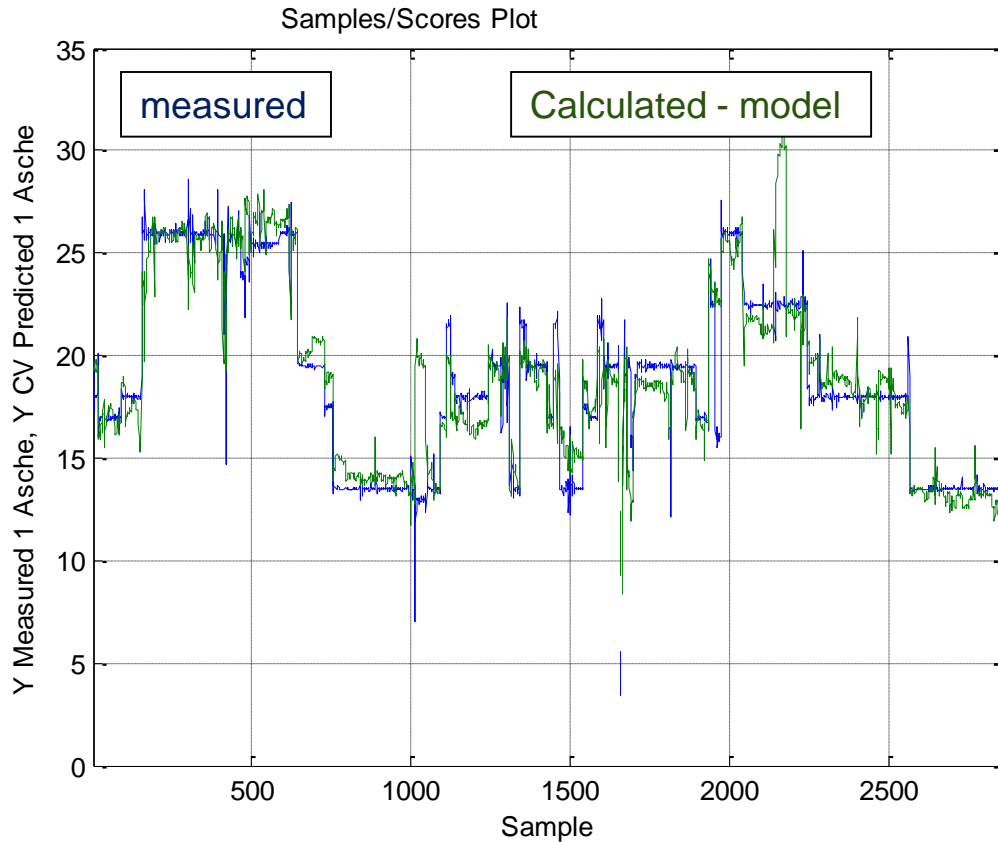
- Inter-dependencies between production/process and quality data
- Description of identified dependencies by mathematical models
- (empiric, physical, hybrid)
- Use of Soft Sensors (instead of physical measurements)
- Simulation

Predictive, model based optimization algorithms

- Yield maximisation
- Quality optimization
- Cost reduction / optimization
- Reduced rejects/broke

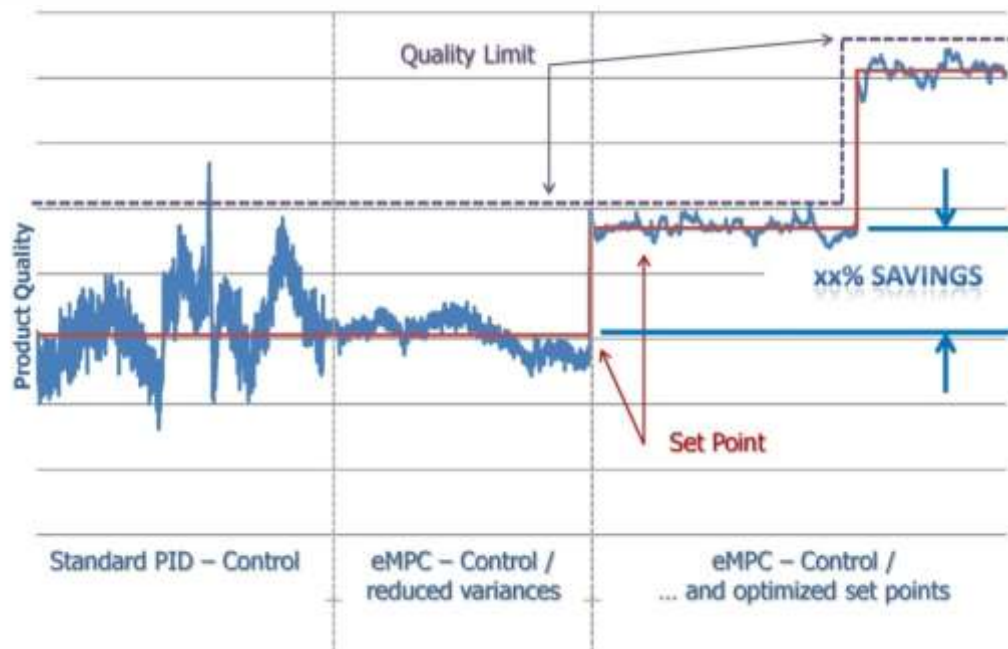


Ash content in raw paper – model quality 90%



Processvariables
ASA flow (sizing agent)
ASA starch flow (sizing agent)
Filler PM
Production Headbox
Refiner power
Refiner spec. Energy
Refiner freeness
Polymer spec.
Whitewater Consistency
Vertical screener inlet
Vertical screener diff. pressure

MPC Advantage in comparison to PID



Plant Optimization DIP4 at Holmen Paper in Madrid / Spain

Initial DIP Settings

- Start-up: 2005
- Main suppliers: Voith, Andritz, GLV
- Maximum capacity: 970BDt/24h
- Range capacity: 55-100%
- Efficiency: 95%
- Ash content: 12%
- Brightness: 62%ISO
- Yield: 1.28t RCP/t paper
- Feed: 16% Newsprint
16% Magazine
68% Mix



Plant Optimization DIP4 at Holmen Paper in Madrid / Spain

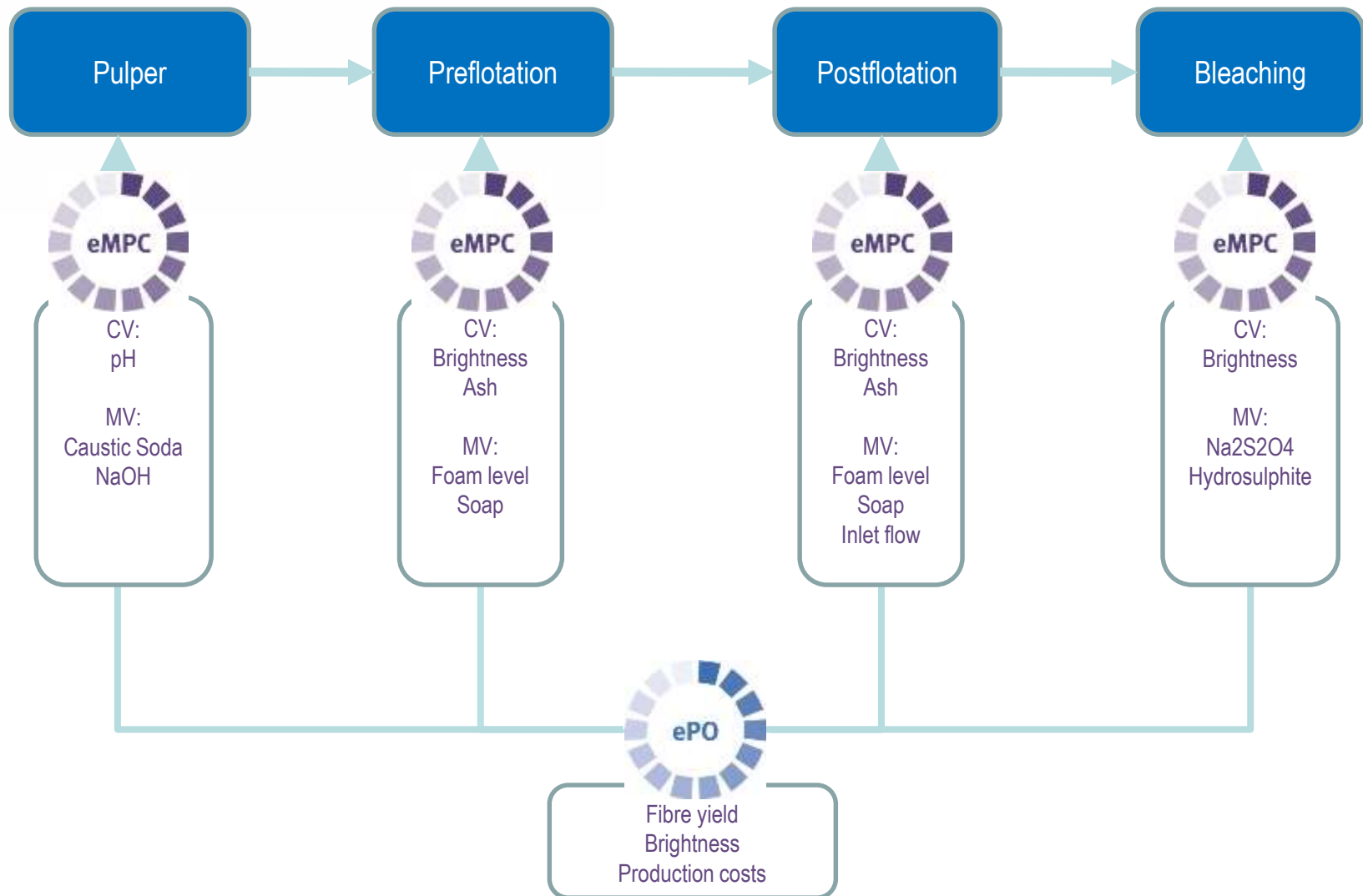
Initial Situation

- High Variances because of different quality of waste paper
- continuously adjusting the process parameters manually
- High operational costs

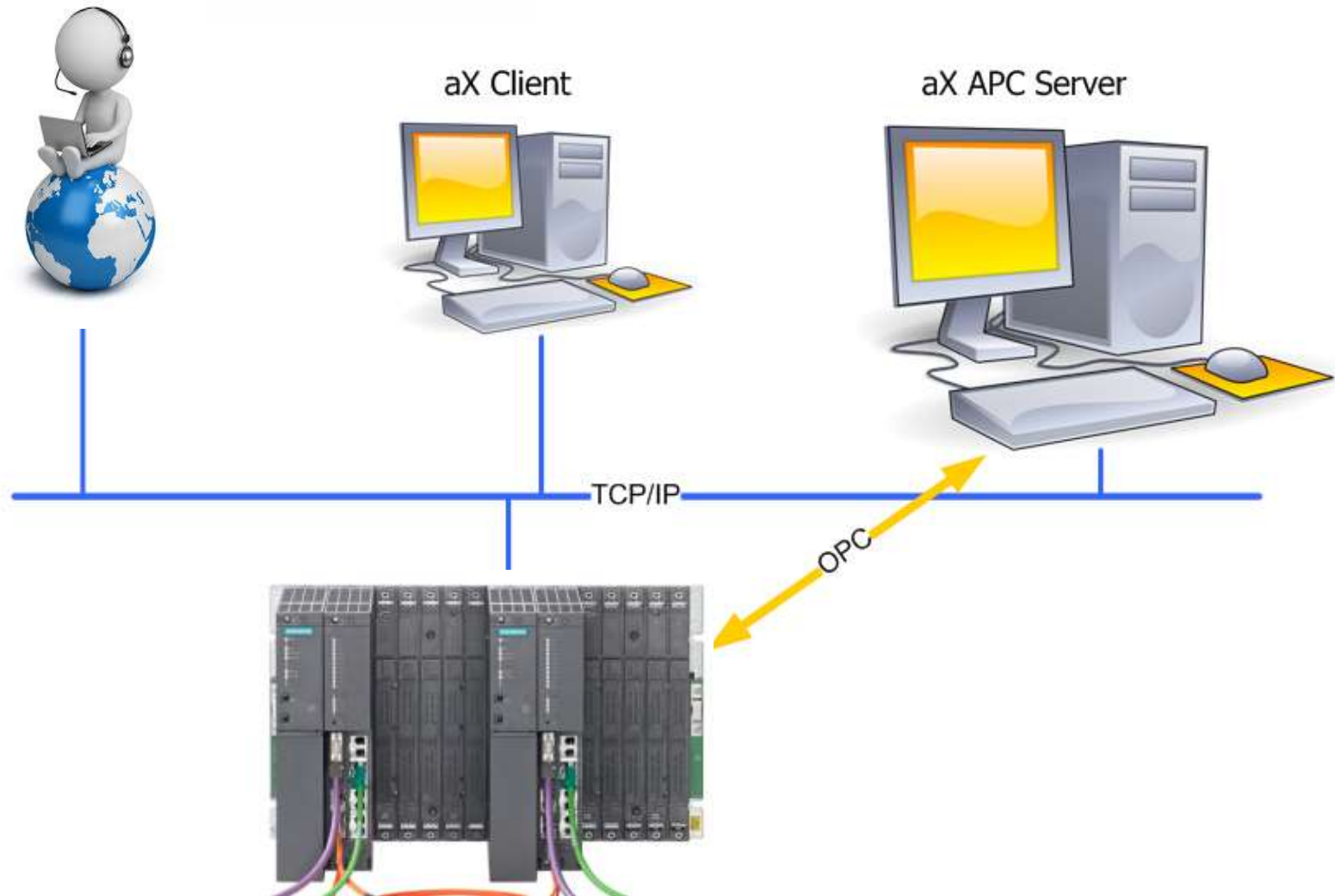
Project Objectives

- Reduction of variances
in brightness and ash > 35%
- Reduction of Operator Workload
- Reduction of operational costs > 1€/ton

eDIP: Control Concept



eDIP: DCS Interface



eDIP: MPC Overview



Drum Pulper

Production Flot1
48.07 bdt/h

Pre flotación

Production after BL
55.68 bdt/h

Post flotación

Production Rate after BL
37.77 bdt/h

Blanqueamiento

pH Filt DR - VA
8.00 pH

pH first loop
7.96 pH

Caudal Silicato DP SetP
11.00 kg/t

Blancura SAL - VA
58.50 % ISO

Brightness to Disperger
57.63 % ISO

Cenizas SAL - VA
26.00 %

Ash after Flot1
24.98 %

Blancura SAL - VA
60.00 % ISO

Brightness PostF
60.06 % ISO

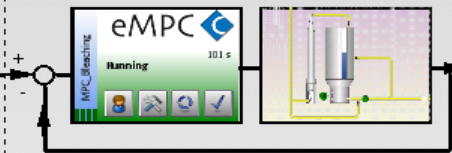
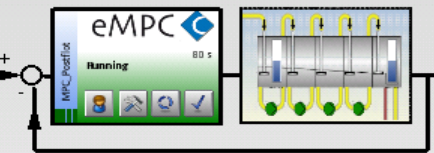
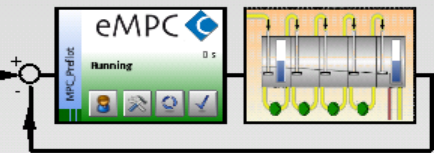
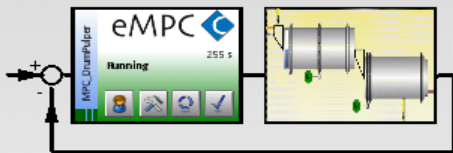
Cenizas SAL - VA
16.50 %

Ash Inlet DF2
16.29 %

BLANCURA Final - VA
59.80 % ISO

Final Brightness ST 3 hours
60.27 % ISO

Final Brightness ST
60.20 % ISO



variables de control valor de ajuste MPC

Sosa_spec MPC
1.18 %

variables de control valor real

Sosa_spec real
1.12 %

variables de control valor de ajuste MPC

Jabon MPC
2.90 %

Nivel Espumas Prim MPC
17.80 %

Nivel Espumas Sec MPC
20.52 %

variables de control valor real

Jabon real
2.88 %

Nivel Espumas Prim real
17.48 %

Nivel Espumas Sec real
19.95 %

variables de control valor de ajuste MPC

Jabon MPC
0.68 %

Nivel Espumas Prim MPC
16.51 %

Nivel Espumas Sec MPC
14.74 %

Caudal MPC
60907.12 l/min

variables de control valor real

Jabon real
0.69 %

Nivel Espumas Prim real
16.51 %

Nivel Espumas Sec real
15.09 %

Caudal real
60917.30 l/min

variables de control valor de ajuste MPC

Hidrosulfito MPC
0.00 %

variables de control valor real

Hidrosulfito real
0.00 %

Date & Time	Event

Date & Time	Event
10.09.2013 09...	eMPC controller switched on.
10.09.2013 09...	Startup sequence over, controll...

Date & Time	Event
10.09.2013 09...	eMPC controller switched on.
10.09.2013 09...	Startup sequence over, controll...

Date & Time	Event

producto selección

Standard xx.001
 Standard xx.002
 Standard 45.004
 Blancura 60
 Cenizas 12.5
 Salmon

datos_asumir

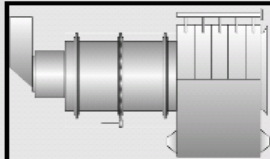
SELECCIÓN

ralea en regulador

Standard xx.001

Drum Pulper

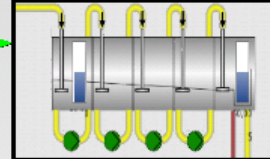
Blancura
 Def. valor de ajuste
 48.00 % ISO



atraso de tiempo
 0.00 min

Pre flotación

Blancura
 Def. valor de ajuste valor de ajuste
 58.00 % ISO 58.00

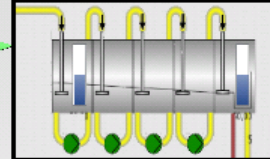


atraso de tiempo
 0.00 min

Cenizas
 Def. valor de ajuste valor de ajuste
 26.00 % 26.00

Post flotación

Blancura
 Def. valor de ajuste valor de ajuste
 60.00 % ISO 60.00

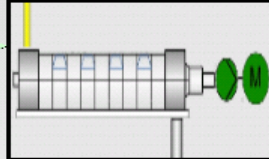


atraso de tiempo
 0.00 min

Cenizas
 Def. valor de ajuste valor de ajuste
 16.50 % 16.50

Blanqueamiento


Blancura
 Def. valor de ajuste valor de ajuste
 59.50 % ISO 59.50



atraso de tiempo
 0.00 min

← active set point shifting →

ePO Activo

ePO estado 

nuevo cálculo en
 10 min

Blancura SAL - VA aceptación en
 58.50 % ISO 0 min

valor de ajuste - regulador

Blancura SAL - VA Cenizas SAL - VA
 58.50 % ISO 26.00 %

valor de ajuste - ePO

VA Blancura PRF VA Ceniza PRF
 58.35 % ISO 26.00 %

Blancura SAL - VA aceptación en
 60.00 % ISO 0 min

valor de ajuste - regulador

Blancura SAL - VA Cenizas SAL - VA
 60.00 % ISO 16.50 %

valor de ajuste - ePO

VA Blancura POF
 60.70 % ISO

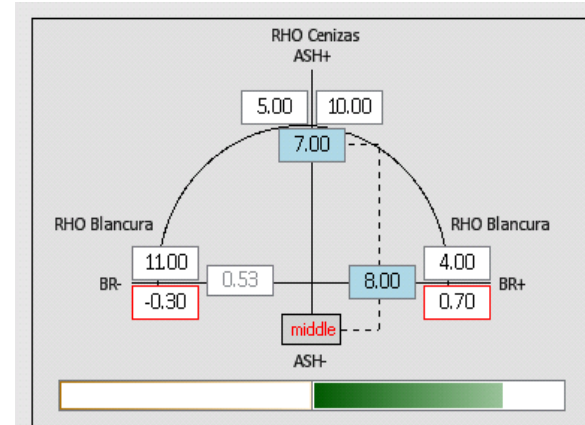
valor de ajuste - regulador

BLANCURA Final - VA
 59.80 % ISO

valor de ajuste - ePO

eDIP: Details

- Limit Violation check of any input and output
- Dynamic Weight Scheduling (Quadrant Operation for brightness/ash)
- Calculate upper and lower limits for inlet flow to post flotation
- Bleaching Model correction can be applied manually
- Grade related foam level limitations
- overload check of secondary cell



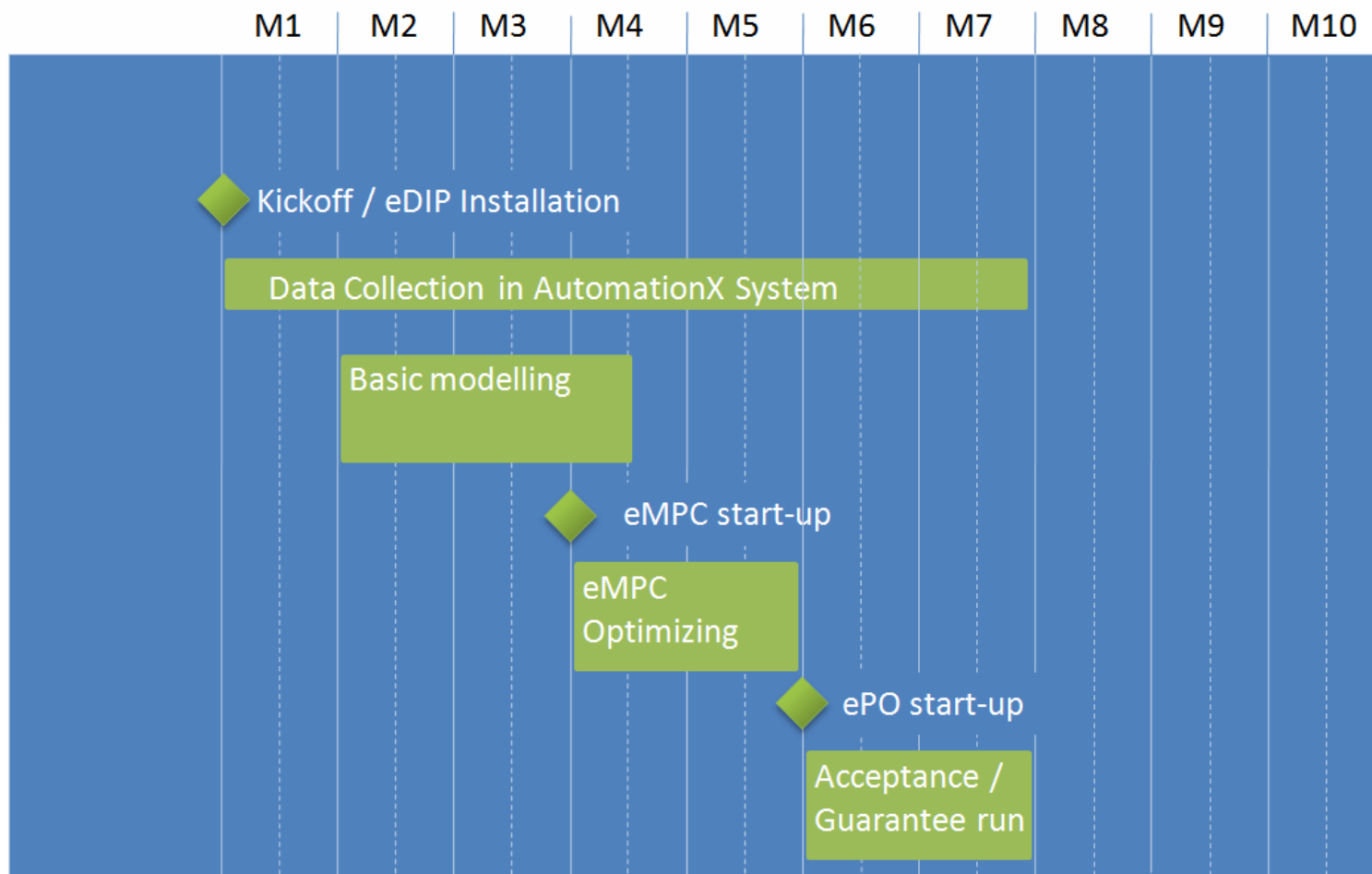
Manual Correction
for model value
Brightness after Bleaching Stage

-0.3 % ISO

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producto selección		Setpoint	actual Value
Standard xx.001	Foam Level primary low	17.00	17.00
Standard xx.002	Foam Level primary high	17.80	17.80
Standard 45.004	Foam Level secondary low	19.50	19.50
Blancura 60	Foam Level secondary high	22.00	22.00
Cenizas 12.5			
Salmon	Ash Loss Preflot	< 7.72 >	ralea en regulador actual
		Apply Limits	Standard xx.001

eDIP: Time Schedule

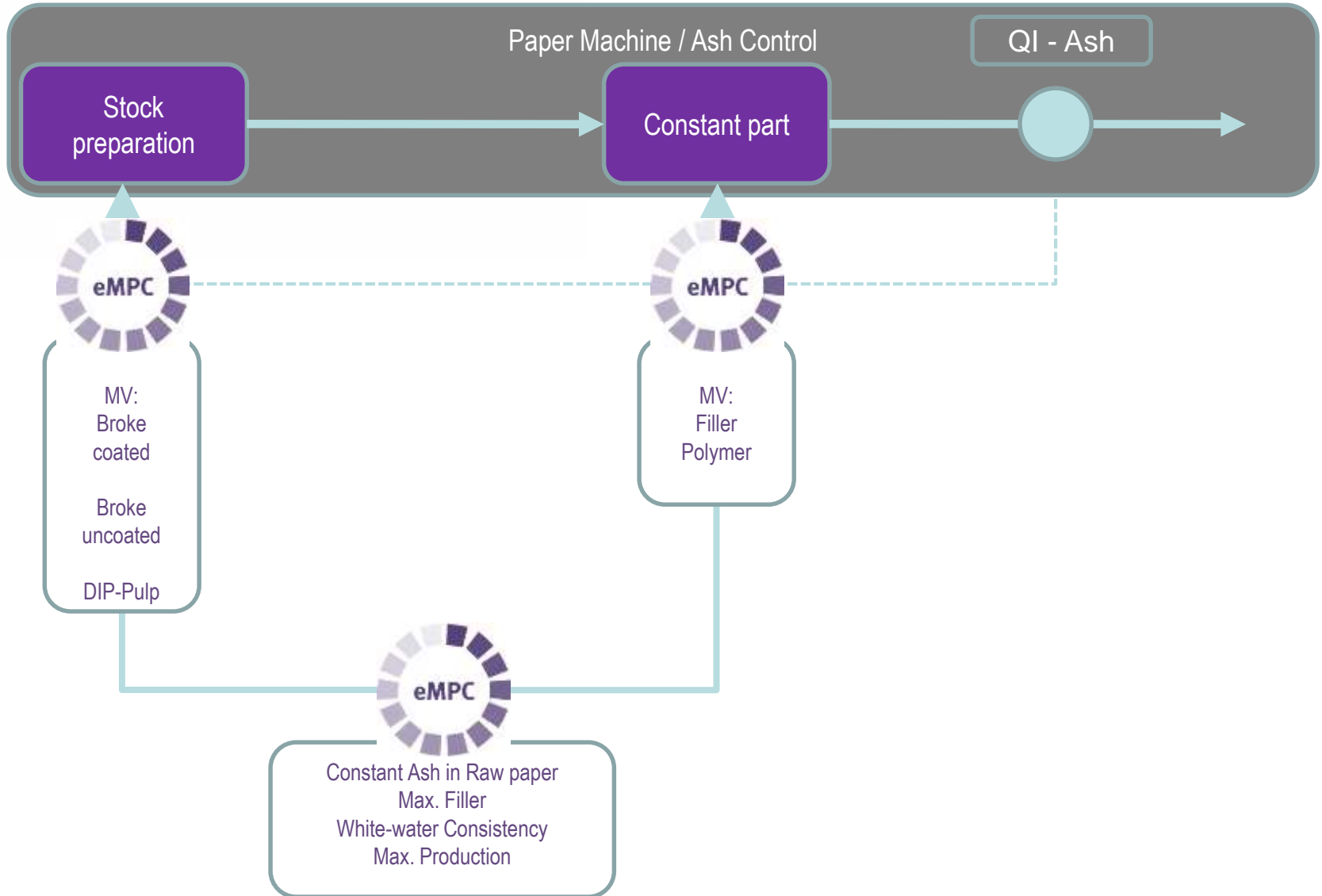


eDIP: Project Results

- 10% reduced chemicals
- Increased fibre yield > 1%
- -1,55% Operational Costs
- 40% reduced variance in brightness
- 40% reduced variance in ash
- Increase availability of control system
- automationX Autopilot runs round the clock



ePM: Sample

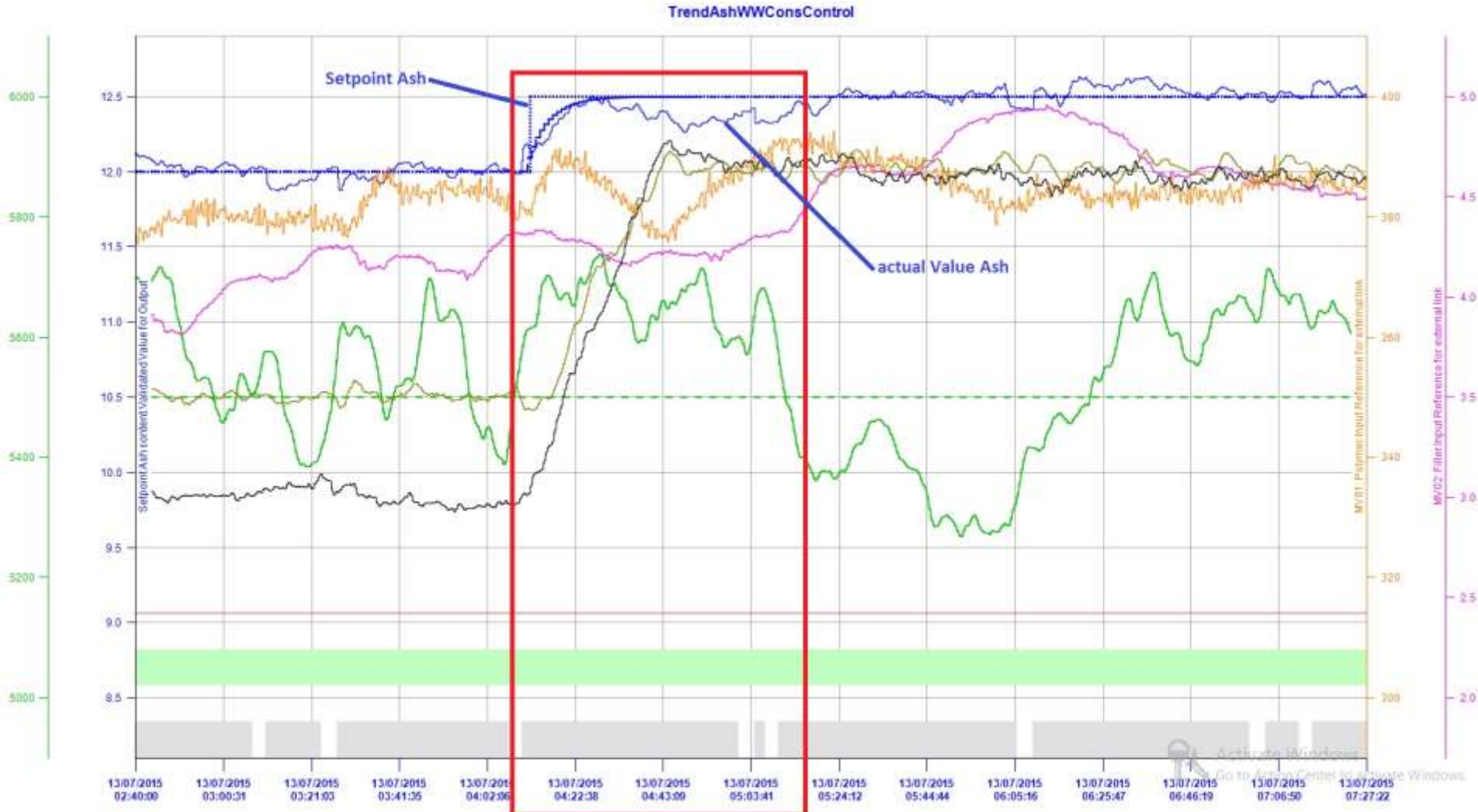


ePM: Grade Change Sample

Project Objectives / Results

- 1% more ash in final paper

40% reduced variance in ash



References

- Leipa/Schwedt DIP1
- Leipa/Schwedt DIP2
- Stora Enso Eilenburg DIP
- Stora Enso Hylte Refiner
- Holmenpaper Madrid DIP
- Sappi Ehingen Bleaching
- Sappi Stockstadt Bleaching
- Sappi Alfeld Bleaching
- Sappi Alfeld CCPM
- Sappi Gratkorn Bleaching
- Sappi Gratkorn PM
- Mondi Stambolijiski Cooking
- Palm Aalen PM
- Norske Skog Golbey PM1
- Norske Skog Golbey PM2
- Norske Skog Bruck DIP
- ...



Thank you for your attention !