OptiCIP

New approach to optimize CIP-cleaning

PPA
12 Februari 2015

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Rob van den Bos – Schneider Electric

Together to the next level

NIZO food research

65 proud years of open innovation

Why
- Good food needs good science

How
- Science Hub for projects in a global food network

What
- Flavor, Texture or Health
- Process improvement
- From lab to pilot plant

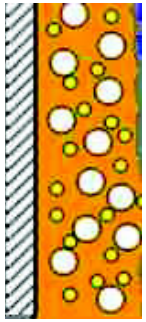
Where
- HQ in the Dutch Food Valley
- Sales offices in USA, France & Japan

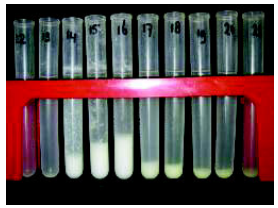
Who
- 180 professionals

OptiCIP
Approach to optimize CIP-cleaning

- CIP Cleaning - some general aspects
- The NIZO / Schneider Electric approach

Cleaning in Place (CIP)

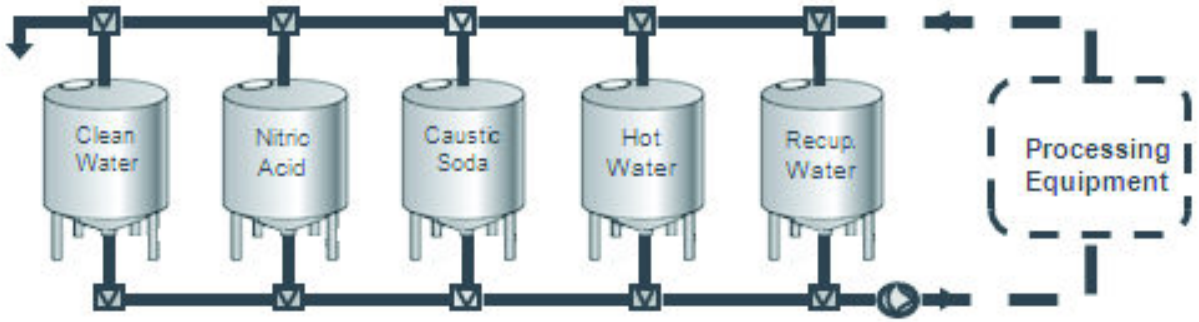




Before you start, know your enemy...
... and know what you're doing during CIP

Cleaning-In-Place (CIP)

- Automatic cleaning of equipment
  - tanks,
  - piping,
  - pasteurizers
  - filling machines,…
- An example of a cleaning cycle:
  - a first water rinse
  - a caustic wash
  - a second water rinse
  - an acid wash
  - a third water rinse

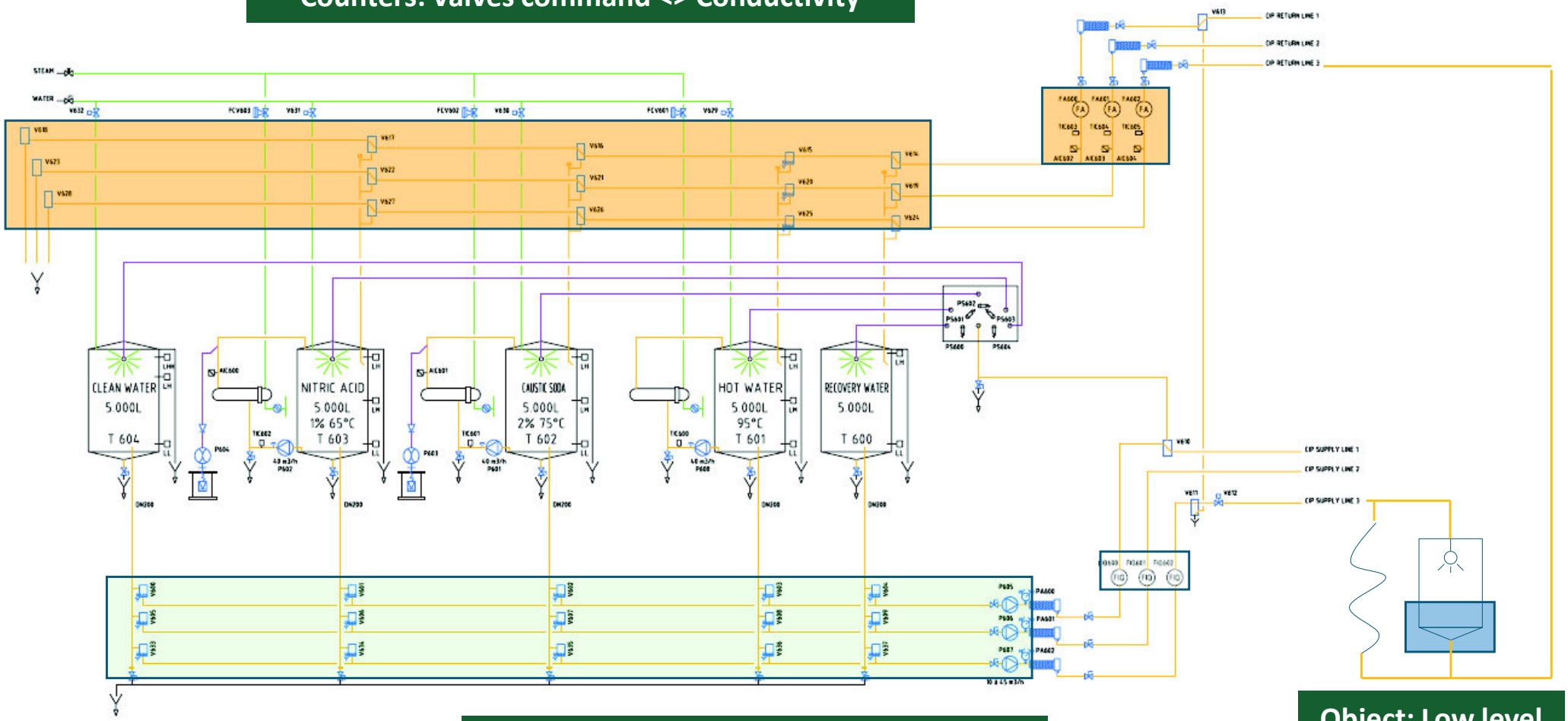


CIP Process Automation

NIZO YOUR FOOD RESEARCHERS

Schneider Electric

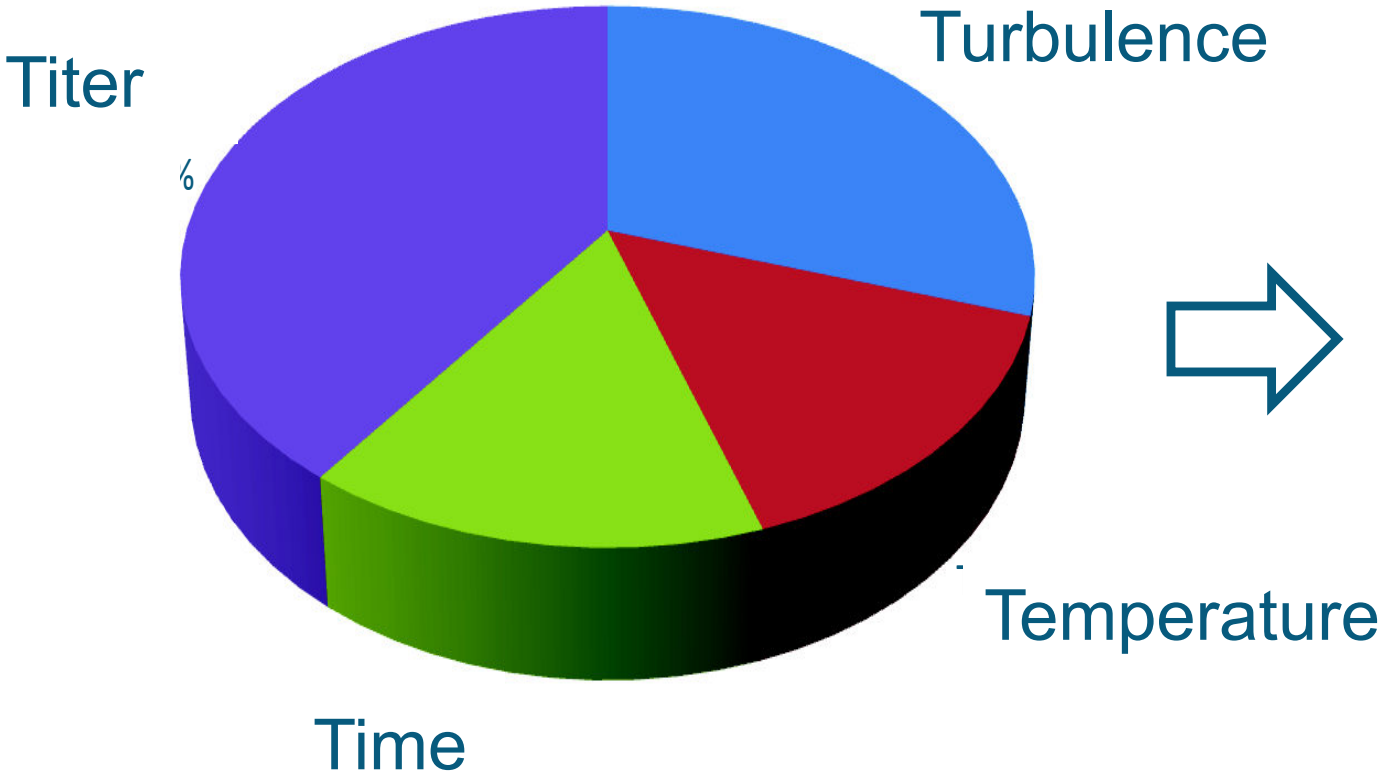
Counters: Valves command <> Conductivity



Counters: supply flow <> return flow

Object: Low level

CIP
The Sinner circle



Turbidity

5T's

Cleaning optimization
NIZO experience

CIP procedures often based on worst case scenario's
» too intensive and extended

Cleaning time

- Evaporators 1.5 to 2 hours
- Plate heat exchangers 0.5 to 1 hour
- Dryers (cleaned wet) 3 to 6 hours
- Membranes 1 – 2 hours

* strongly depends on product formulations & process settings!!
→ if you want to optimize → measuring is essential

Possible savings*:

- Average 15% reduction of cleaning time (range 10 – 30%)

Reduced use of:

- energy
- cleaning agents
- water

* Cost savings dependent on cost structure customer

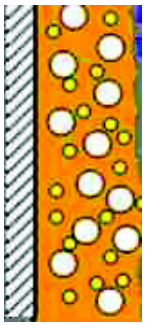
JOINT APPROACH OPTICIP – SCHNEIDER ELECTRIC / NIZO

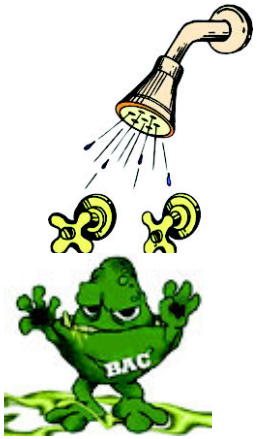
Together to the next level

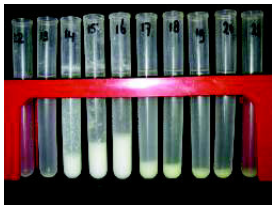
Joint approach: Combined expertise

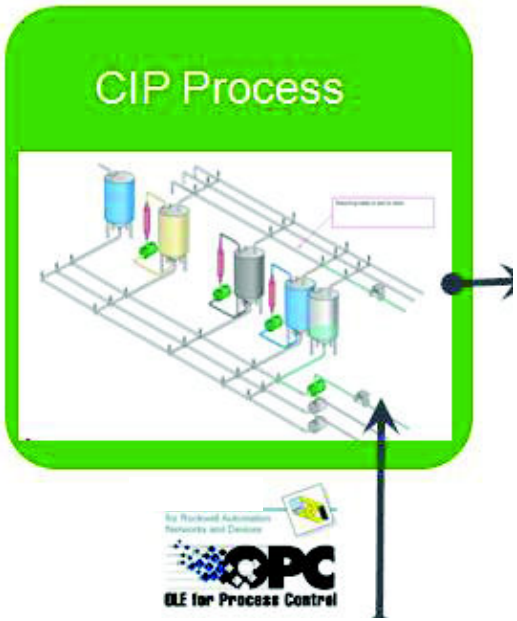
NIZO
YOUR FOOD RESEARCHERS

Schneider Electric









Your automation system

Together to the next level

Approach - OptiCIP

- Science based
- Combined strength

Customer

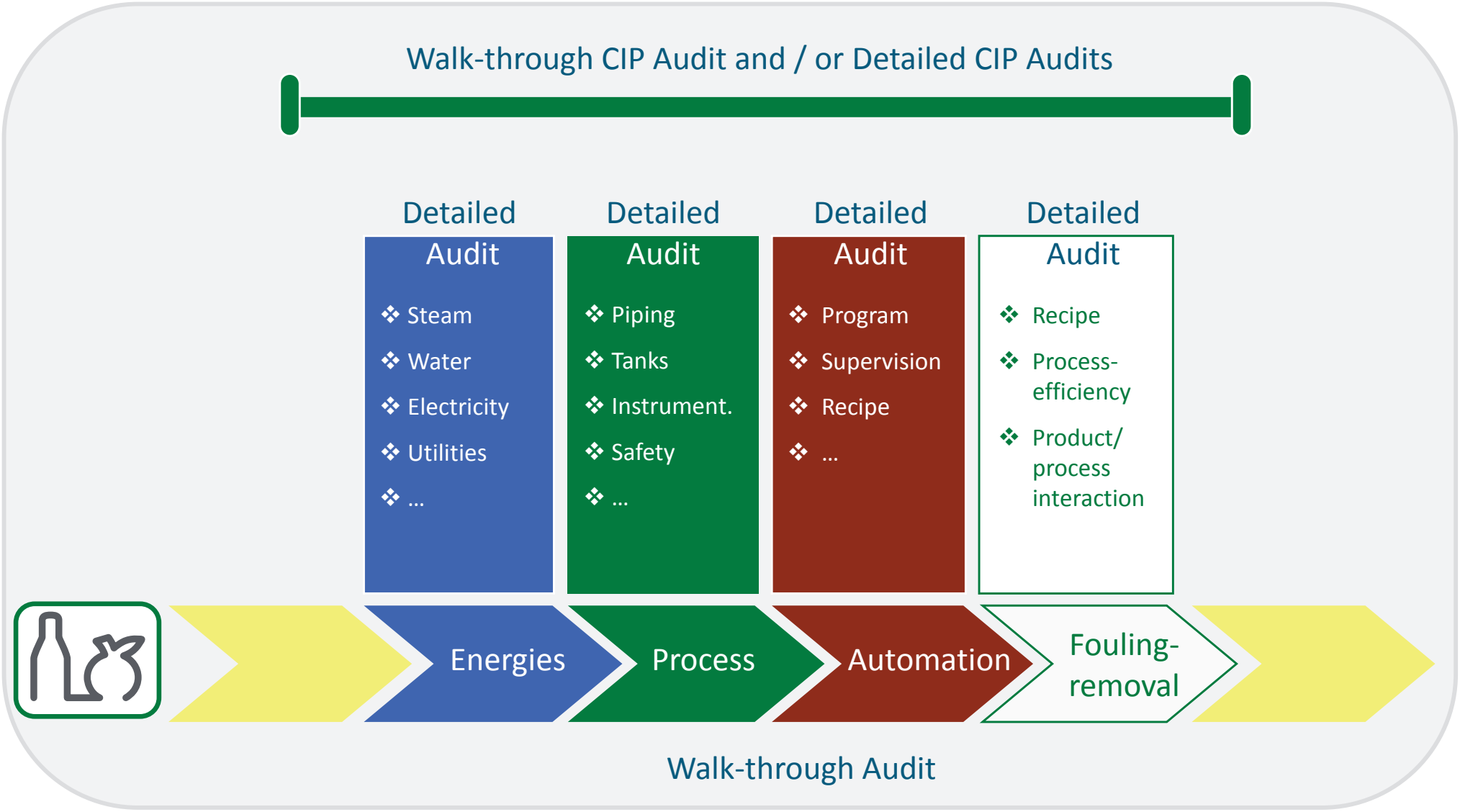
Preparation
- Walkthrough audit
- Installation measuring equipment
- Link for data collection

Data acquisition
- Monitoring Cleaning
- Process data → input from process automation system.
- Microbial (optional)

Troubleshooting
- Optimization → software / equipment
- Process adjustments

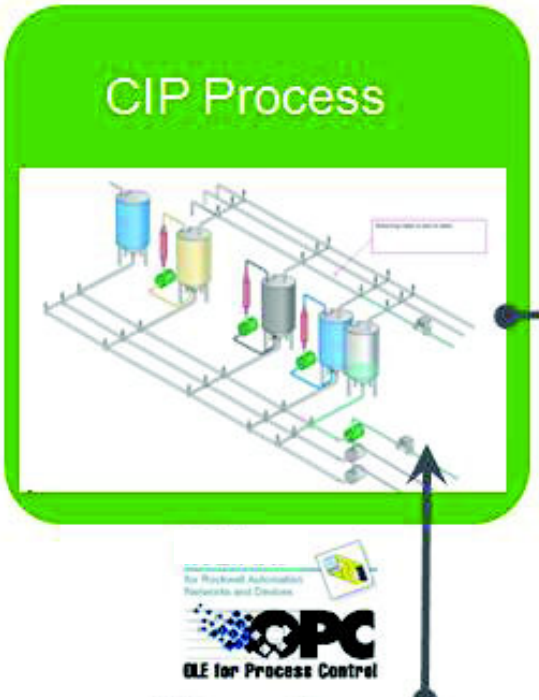
Optimization Validation measurement
- Verification + final adjustment
- Implementing CIP monitoring
- Advice & reporting

1. Walk-through Audit



2. OptiCIP tool

"Meten = Weten"



Your automation system

DB

Continuous monitoring of 5T's:

- Temperature
- Time
- Turbulence
- Titer
- Turbidity

Result:

- Continuous tracking and tracing
- Optimization

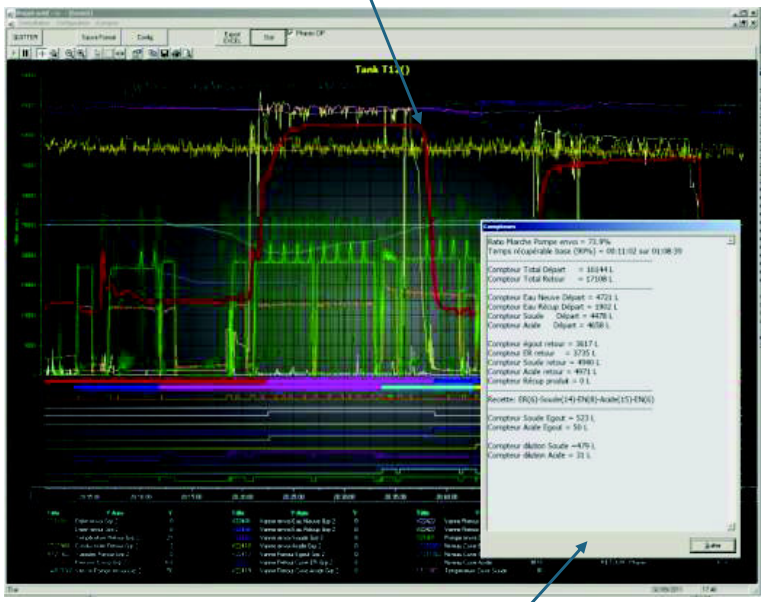
Per line and Equipment

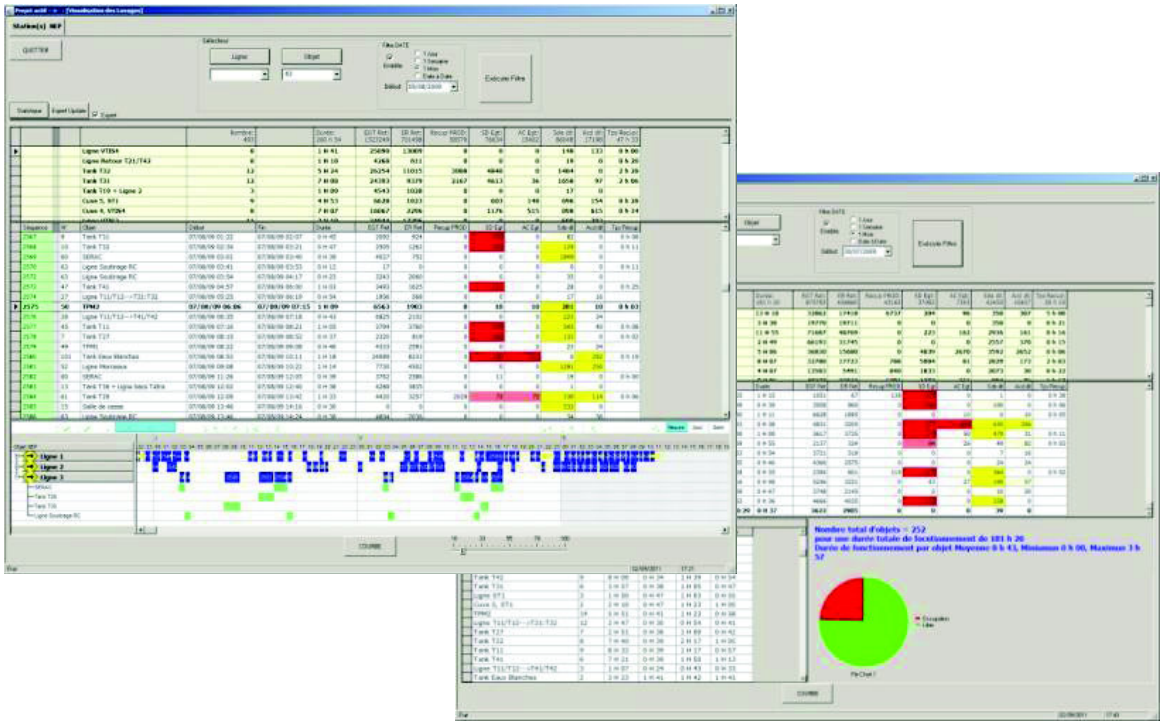
Regulation Compliance

Possible link to our Energy & Co2 dashboards

CIP Traceability and Optimization

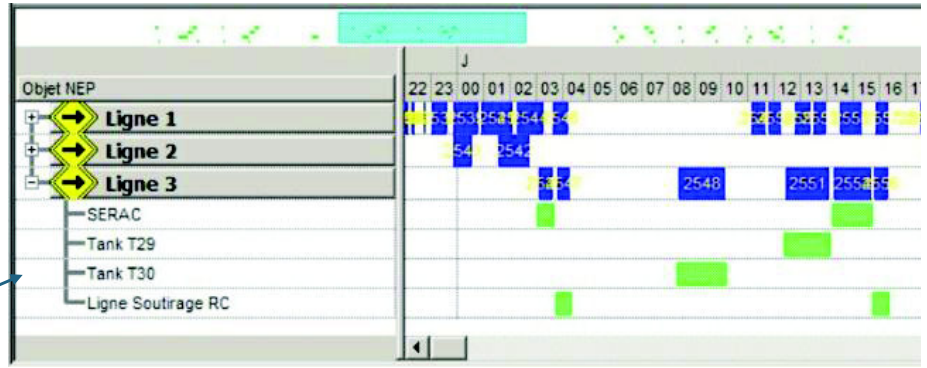
Detailed Analysis
based on trend tools



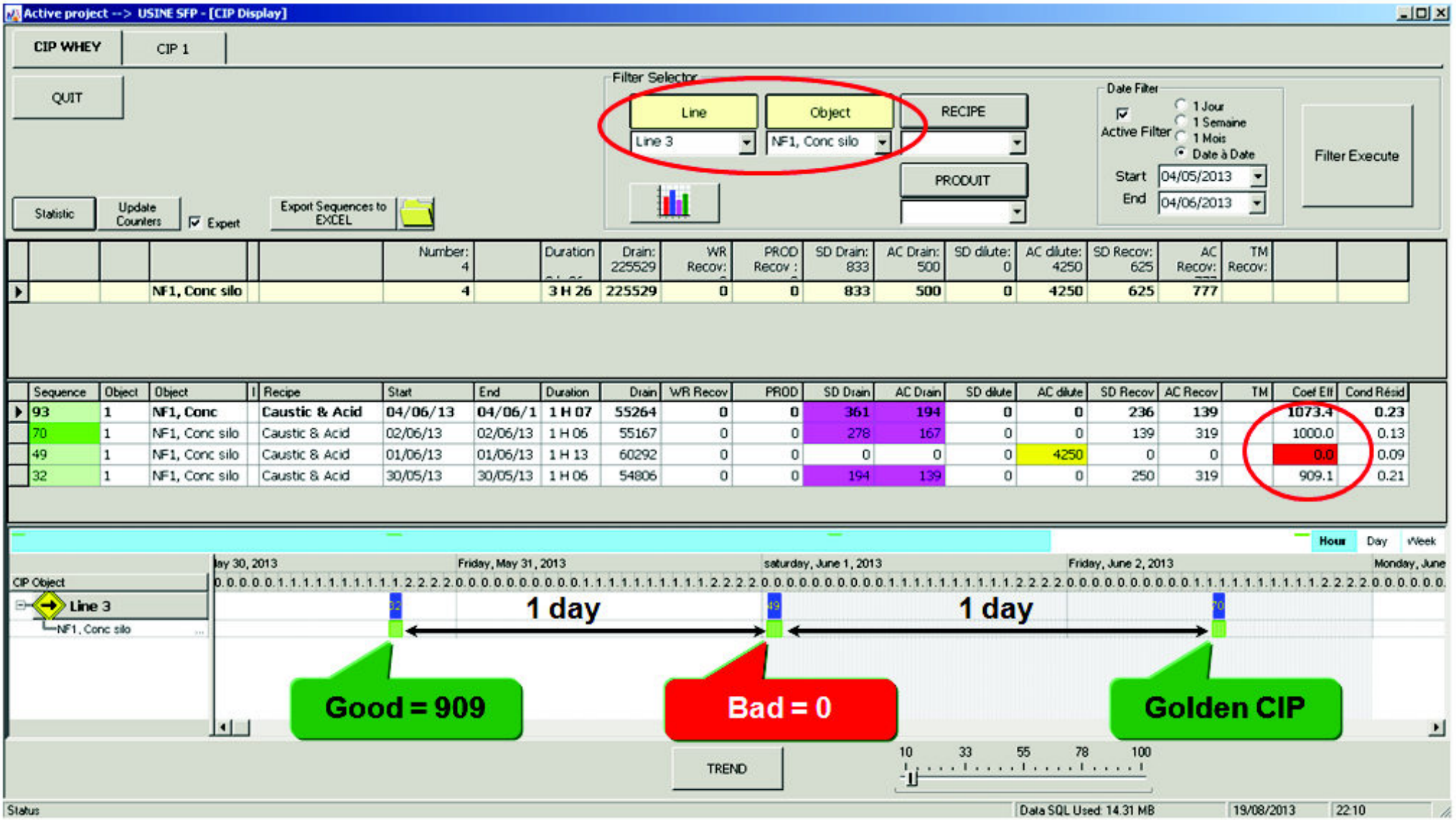


Expert Analysis

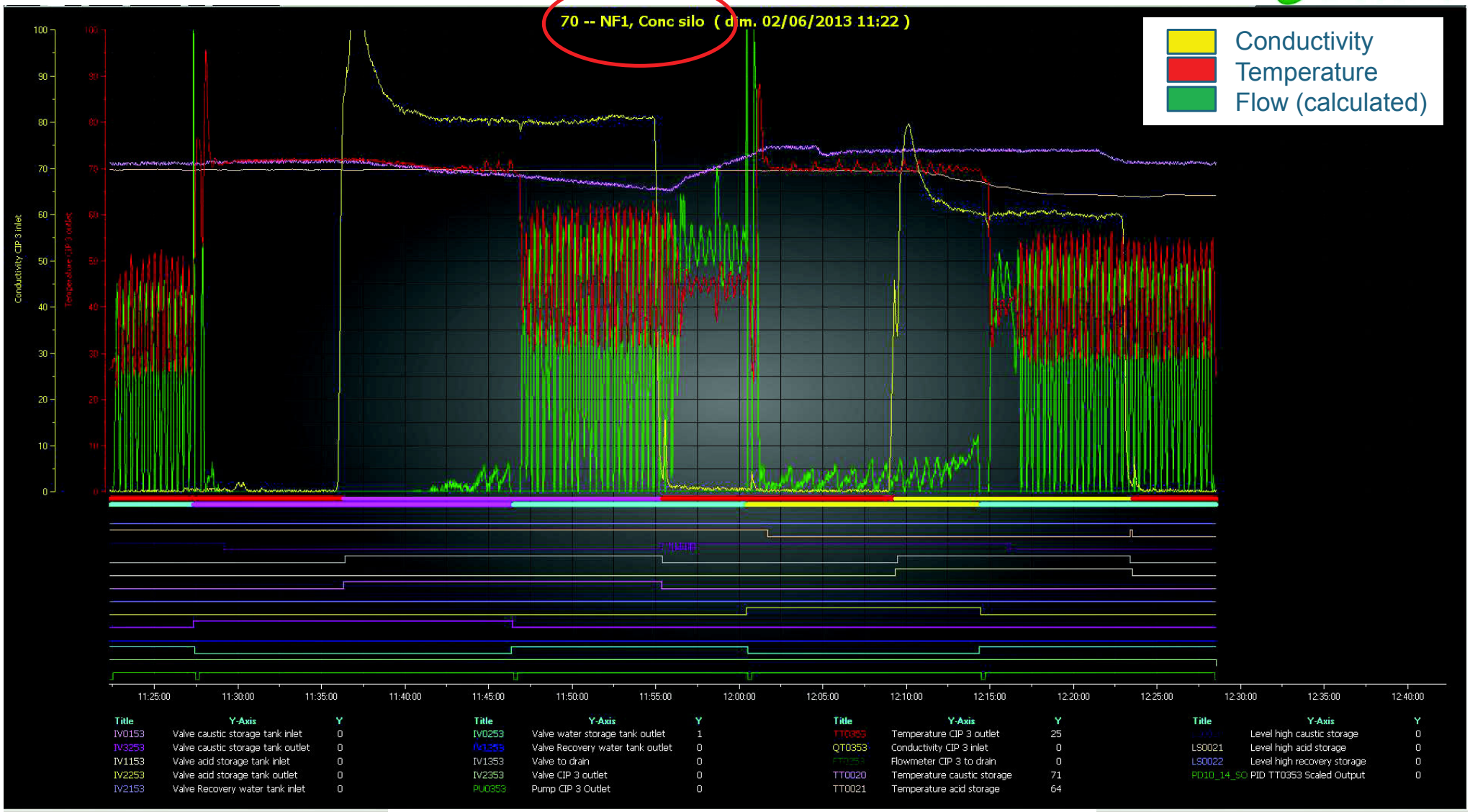
Line occupation diagrams



3. Operator interface



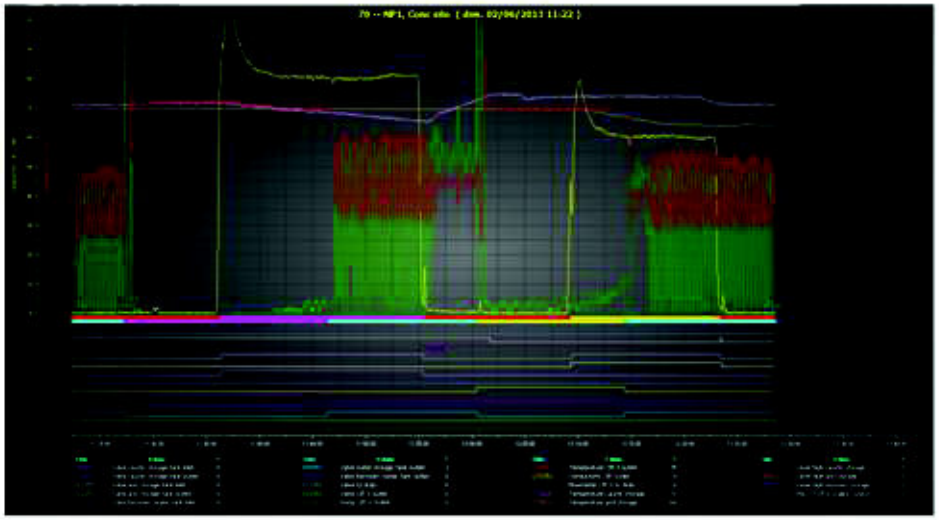
3. Analyst interface

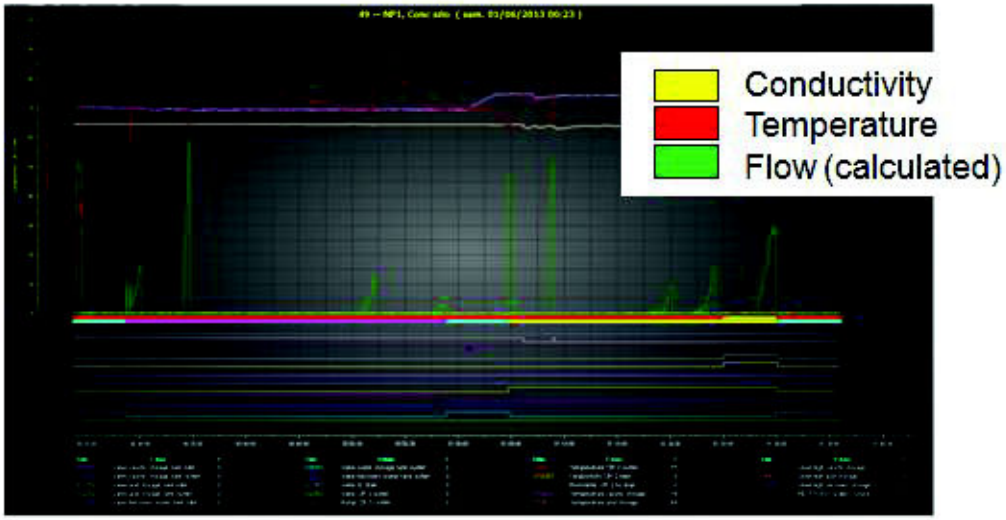


Sequence 70 – Golden CIP for Caustic & Acid recipe

3. Troubleshooting

Sequen	Object	Object	Product	Recipe	Start	End	Duration	Drain	WR	PROD	SD Drain	AC Drain	SD dilute	AC dilute	SD Recov	AC Recov	TM Recov	Coef Eff	Cond Résid
47	2	THERM 2		Caustic & Acid	01/06/13 23:16	02/06/13 01:09	1 H 53	88360	0	0	587	157	0	26	0	574		984,6	0,16
46	1	THERM 1		Caustic & Acid	01/06/13 18:02	01/06/13 19:55	1 H 53	88712	0	0	418	154	0	26	0	601		988,1	0,25
60	2	NF2, Conc silo		Caustic & Acid	01/06/13 16:51	01/06/13 17:57	1 H 06	54417	0	0	222	286	0	0	250	0		1000,0	0,31
43	2	THERM 2		Caustic & Acid	01/06/13 12:19	01/06/13 14:28	2 H 09	101690	0	0	613	78	0	3682	0	574	0 h 04	1112,8	0,32
54	7	Balance tank 1		Caustic	01/06/13 08:57	01/06/13 09:26	0 H 29	24431	0	0	250	0	0	0	111	0		1020,8	0,40
53	8	Balance tank 2		Caustic	01/06/13 06:30	01/06/13 06:58	0 H 28	23528	0	0	1194	0	0	0	0	0		973,9	0,58
59	1	THERM 1		Caustic & Acid	01/06/13 04:32	01/06/13 06:26	1 H 54	88882	0	0	961	157	0	52	0	679		1000,0	0,20
38	2	THERM 2		Caustic & Acid	01/06/13 01:30	01/06/13 03:23	1 H 53	89026	0	0	666	157	0	0	0	496		1016,1	0,31
49	**1**	**NF1, Conc silo**		**Caustic & Acid**	**01/06/13 00:23**	**01/06/13 01:36**	**1 H 13**	**60292**	**0**	**0**	**0**	**0**	**0**	**4250**	**0**	**0**		**0,0**	**0,05**
36	1	THERM 1		Caustic & Acid	31/05/13 19:16	31/05/13 21:10	1 H 54	89091	0	0	444	193	0	26	0	418		1021,3	0,23
33	2	THERM 2		Caustic & Acid	31/05/13 11:43	31/05/13 13:37	1 H 54	88921	0	0	627	104	0	0	0	692		1011,7	0,24
32	1	THERM 1		Caustic & Acid	31/05/13 09:17	31/05/13 11:09	1 H 52	88347	0	0	587	157	0	26	0	535		989,2	0,11
41	7	Balance tank 1		Caustic	31/05/13 08:43	31/05/13 09:13	0 H 30	24458	0	0	191	0	0	0	0	0		1000,0	0,40
39	2	NF2, Conc silo		Caustic & Acid	31/05/13 06:45	31/05/13 07:51	1 H 06	55014	0	0	333	198	0	0	250	278		934,2	0,22
38	8	Balance tank 2		Caustic	31/05/13 04:45	31/05/13 05:13	0 H 28	23458	0	0	989	0	0	0	0	0		975,7	0,40
28	2	THERM 2		Caustic & Acid	31/05/13 03:16	31/05/13 05:09	1 H 53	87120	0	0	653	104	0	52	0	679		951,3	0,74

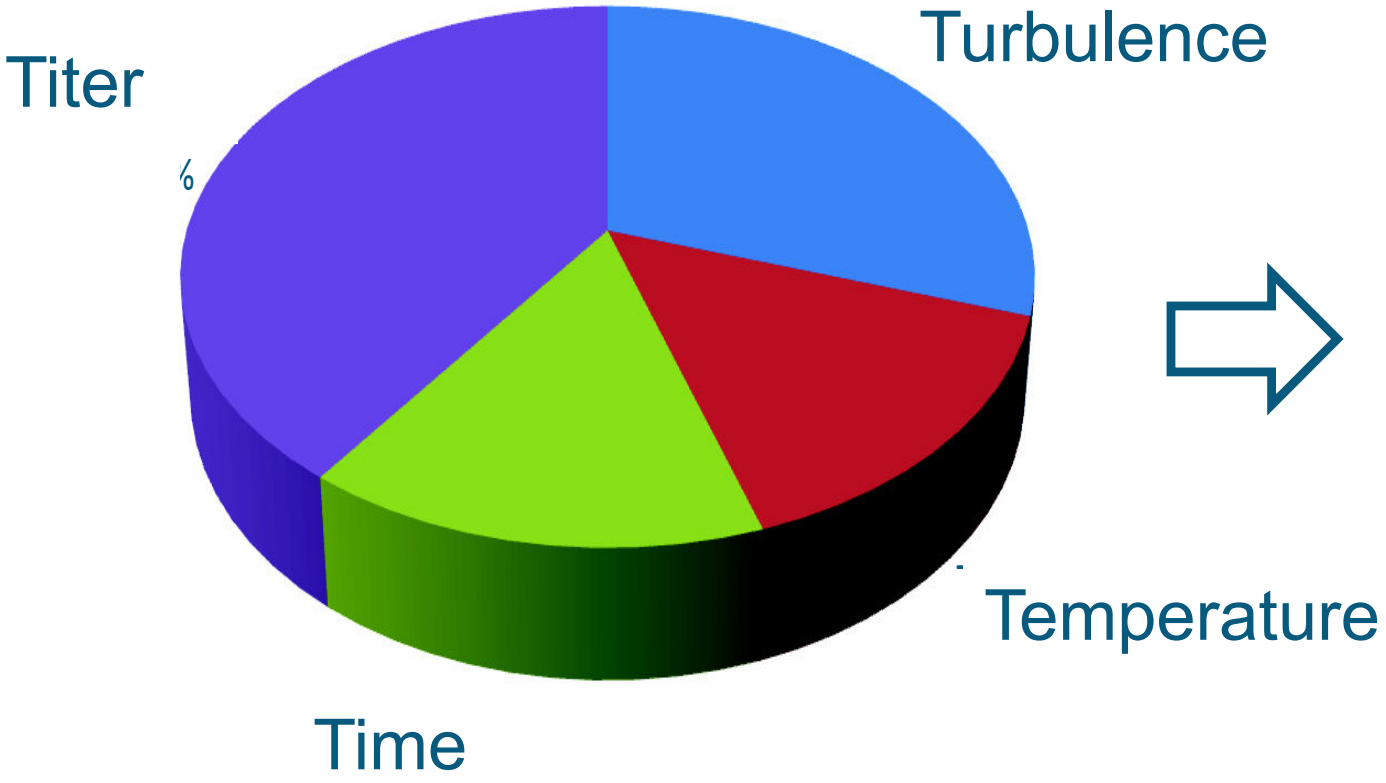




Object "Line 3 - NF1, Conc silo"

- Seq # 49 Bad coef ratio "0", June 01st 2013 at 00:23 am
- Seq # 70 Golden CIP
- A new cleaning program was launched on the object only one day later June 02sd 2013 at 00:28 pm

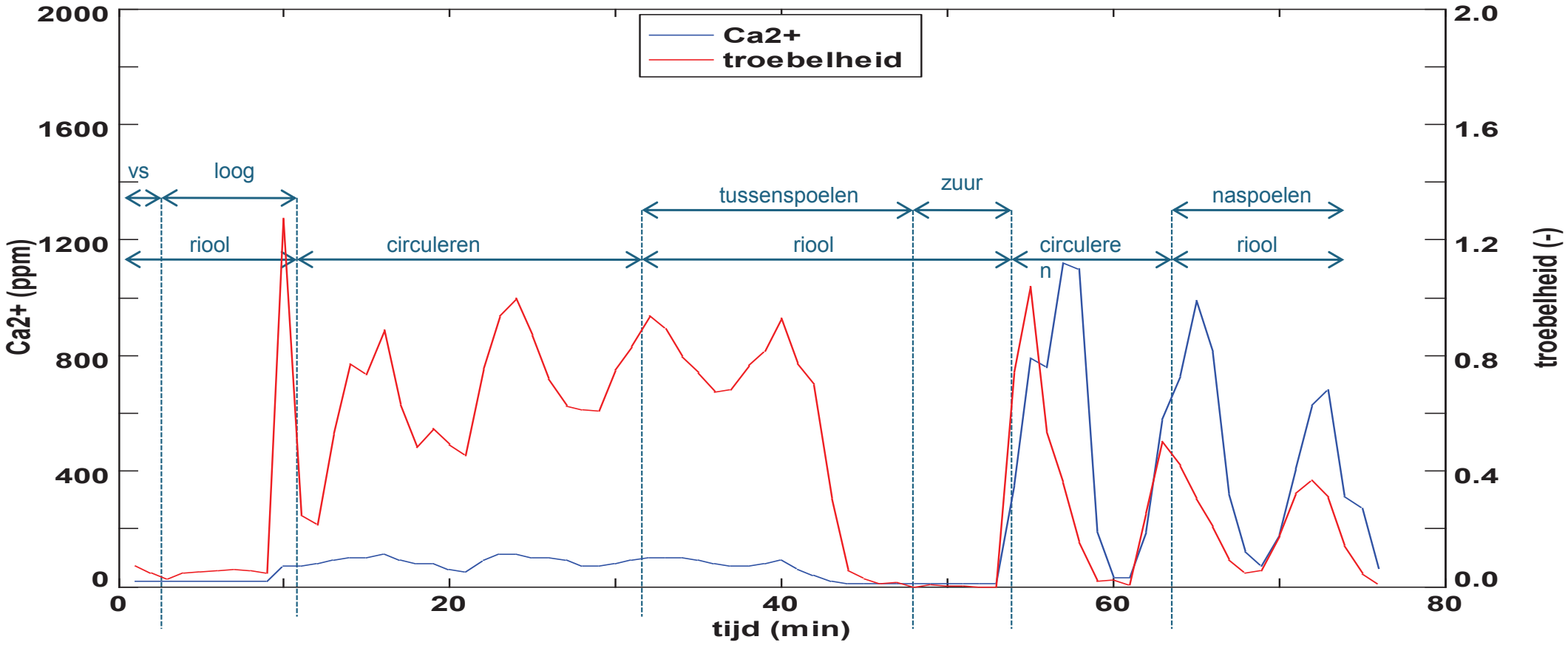
CIP
The Sinner circle



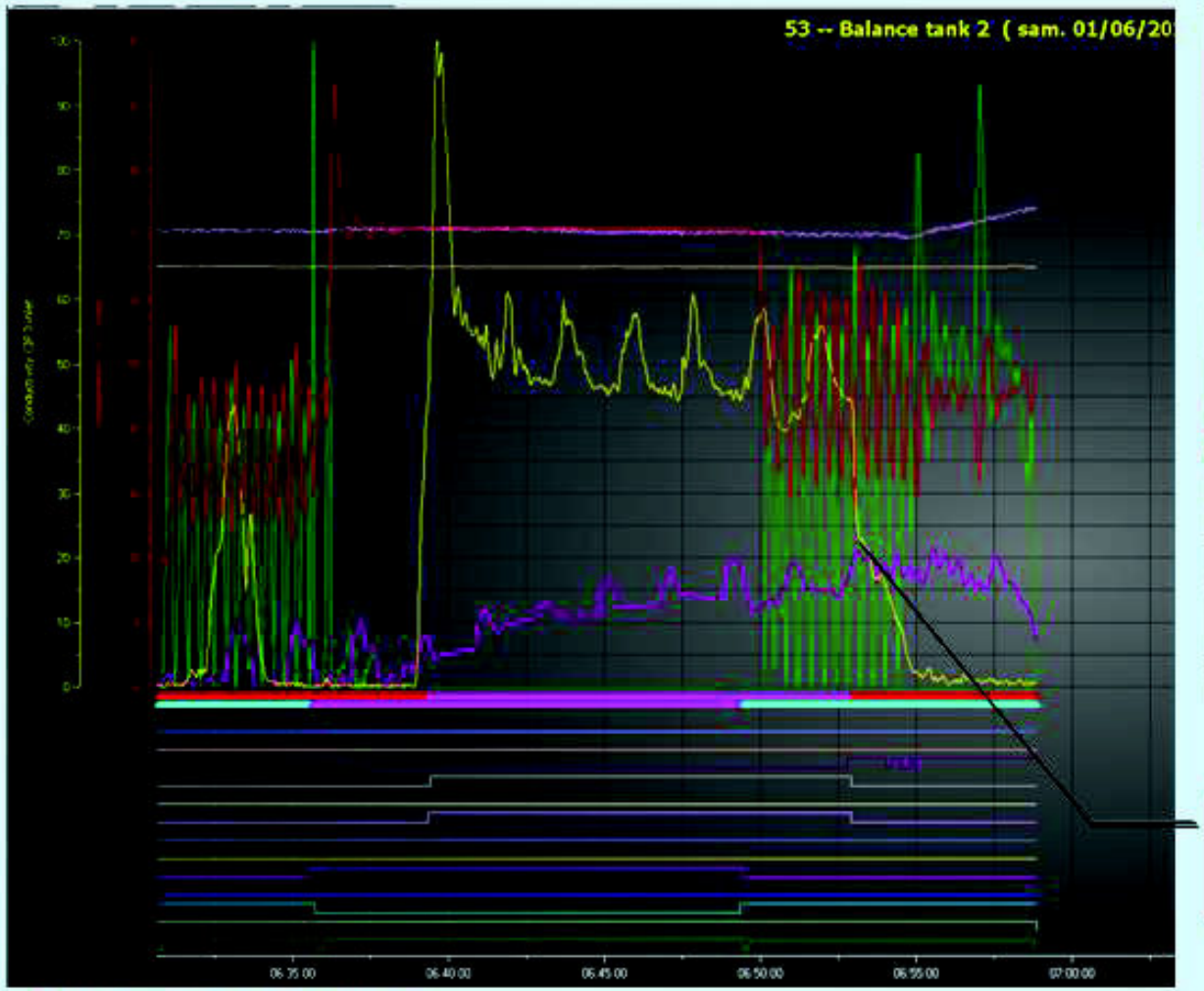
Turbidity

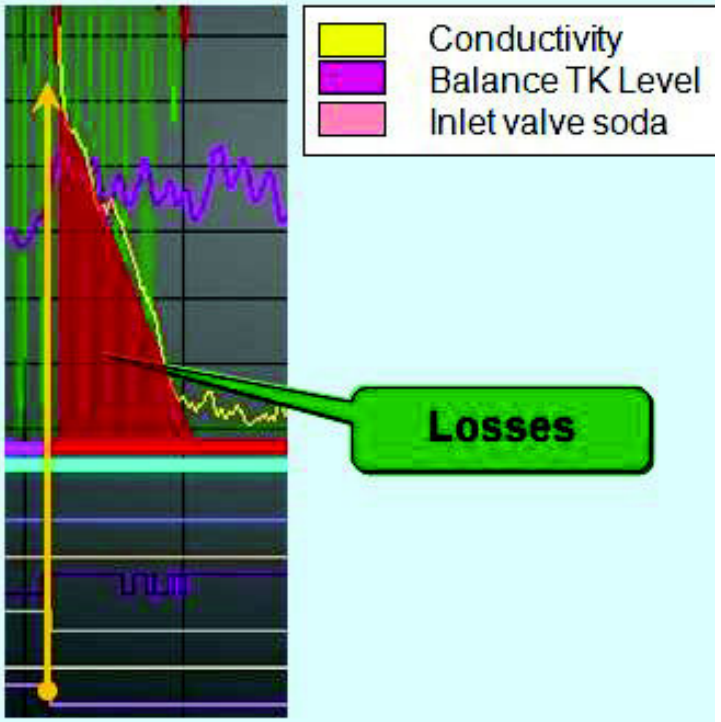
5T's

Turbidity
Monitoring fouling removal



4. Optimization





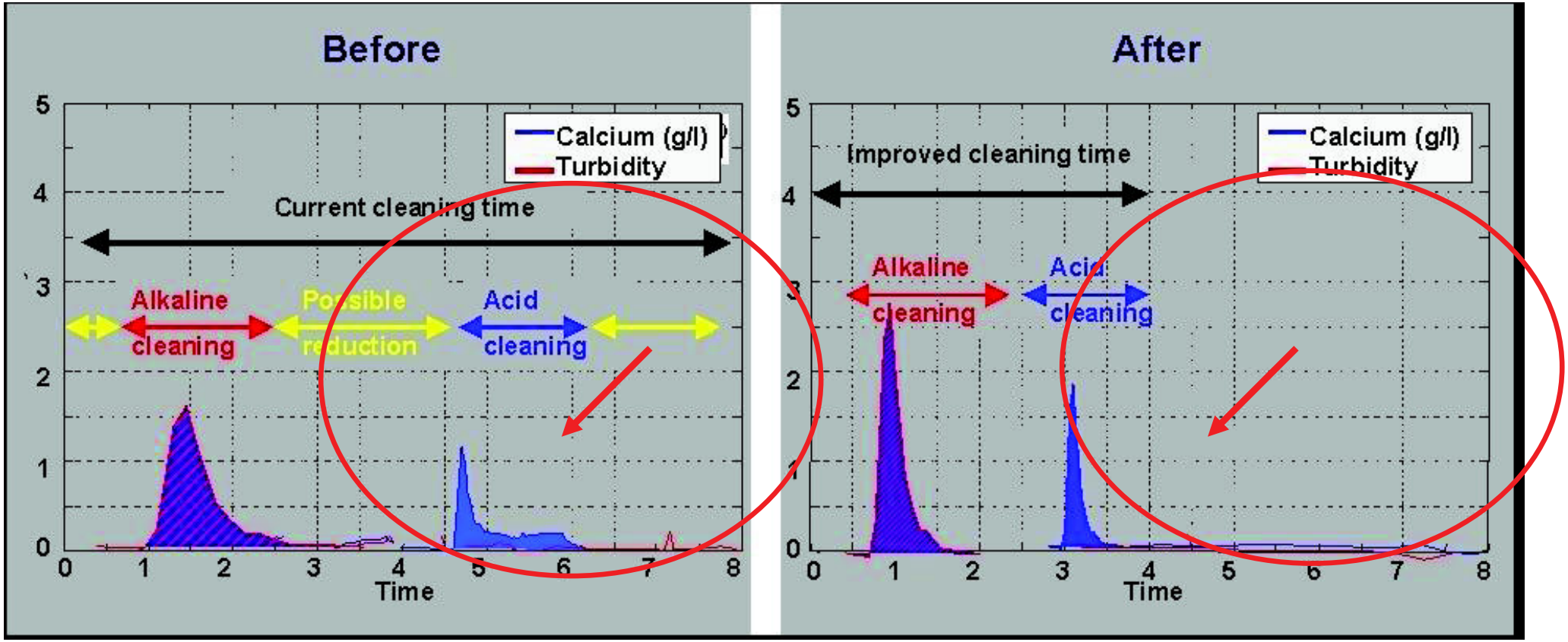
Potential chemical mixing – Low level of the balance tank

Object "Balance tank 2"

- No Low level checking between each CIP phase (Risk of chemical mixing)

4. Optimization and validation of CIP-recipe

Results before and after optimization



OptiCIP by Schneider Electric & NIZO

- Cost savings and increased:
  Food safety and Utilisation of production processes
- Easy assessment by the operators, and easy analysis by technologists per individual CIP-sequence
- Assistance by experts of both Schneider Electric and NIZO food research (on site and/or by remote access)

Other Products by NIZO & Schneider Electric will be developed!!

Questions
&
Answers