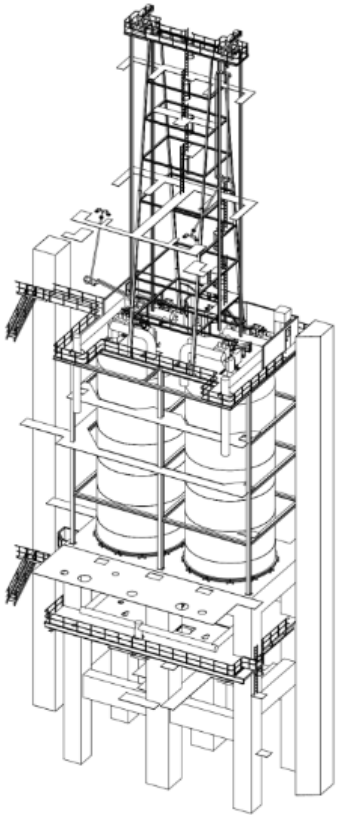
REFCOMM®

ROTTERDAM

30 September–3 October 2019

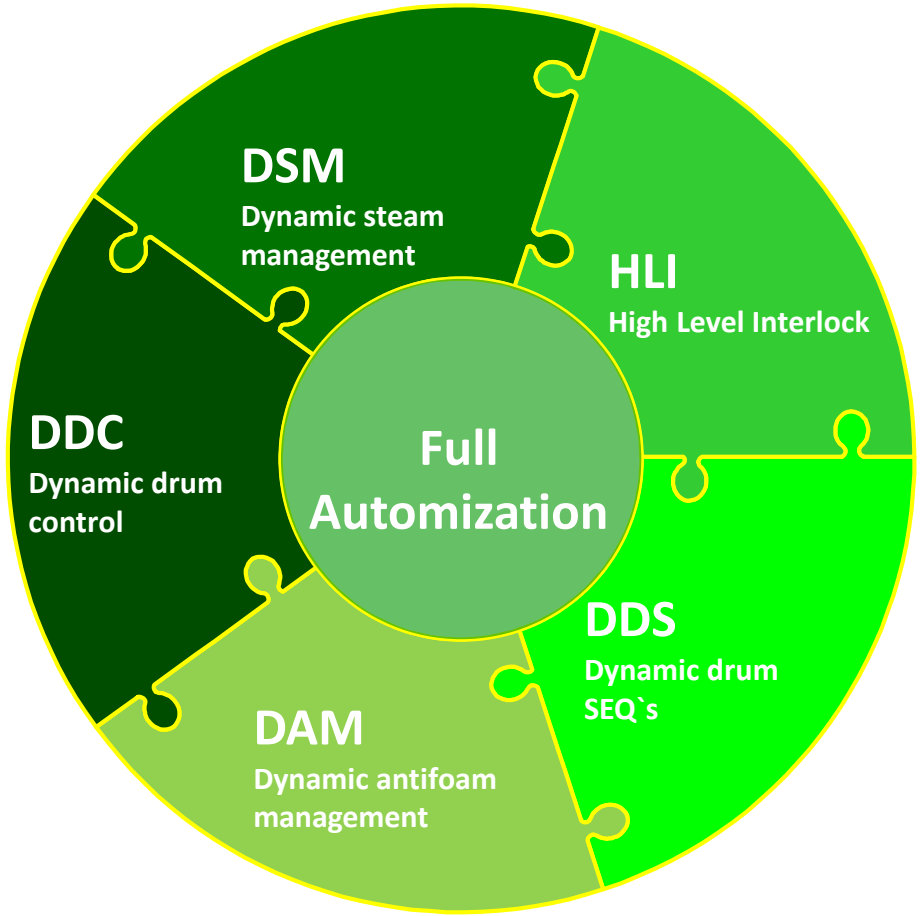
Non-Operator Tower of the Coker

G. Breuer – Ruhr Oel GmbH BP Gelsenkirchen
A. Nau – Ruhr Oel GmbH BP Gelsenkirchen



Content

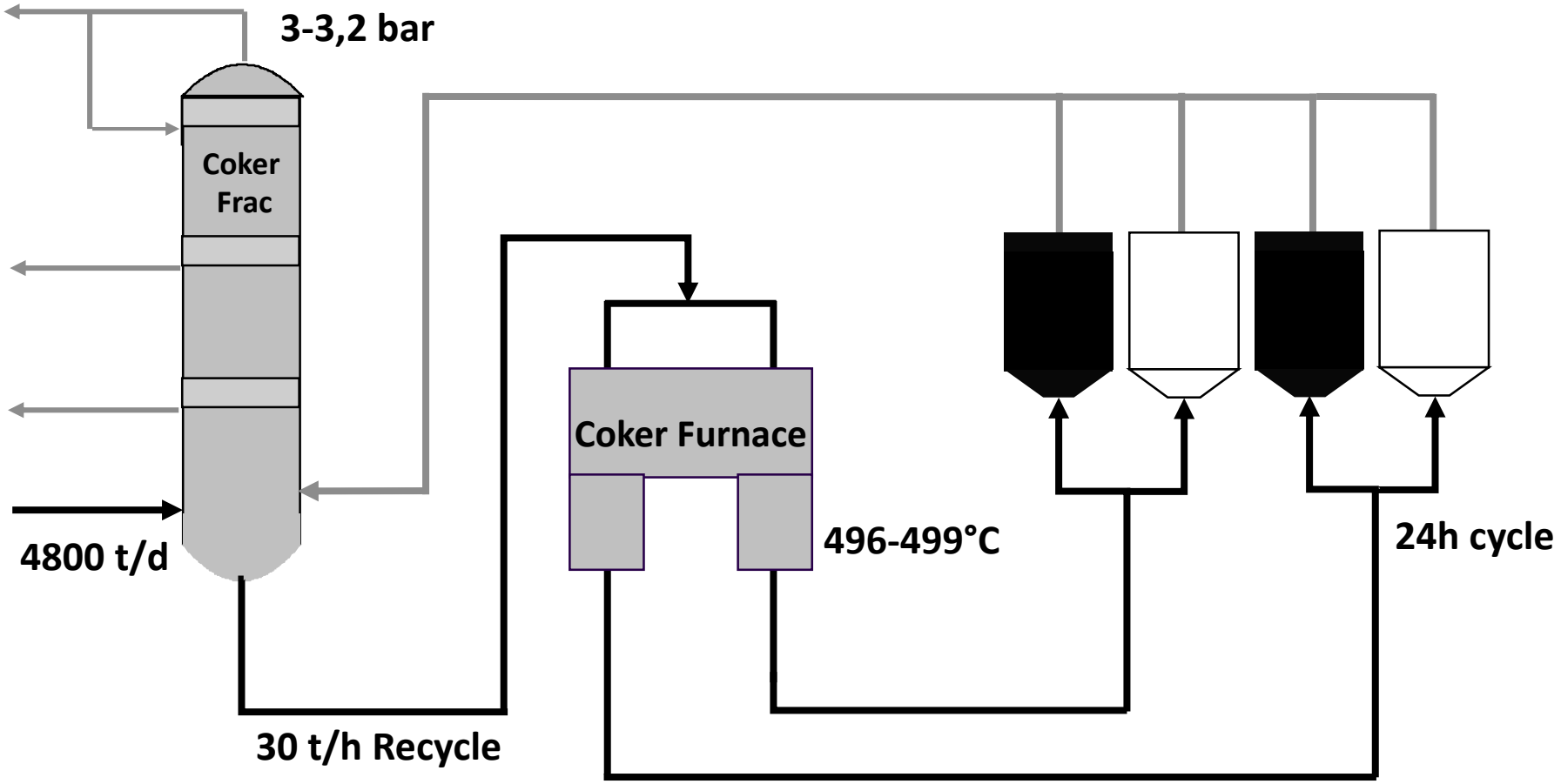
- Background
- Safety philosophy
- Overview Gelsenkirchen Coker
- Pre-Automization Steps
- HLI
- Sequences
- Full-Automization
- Goals



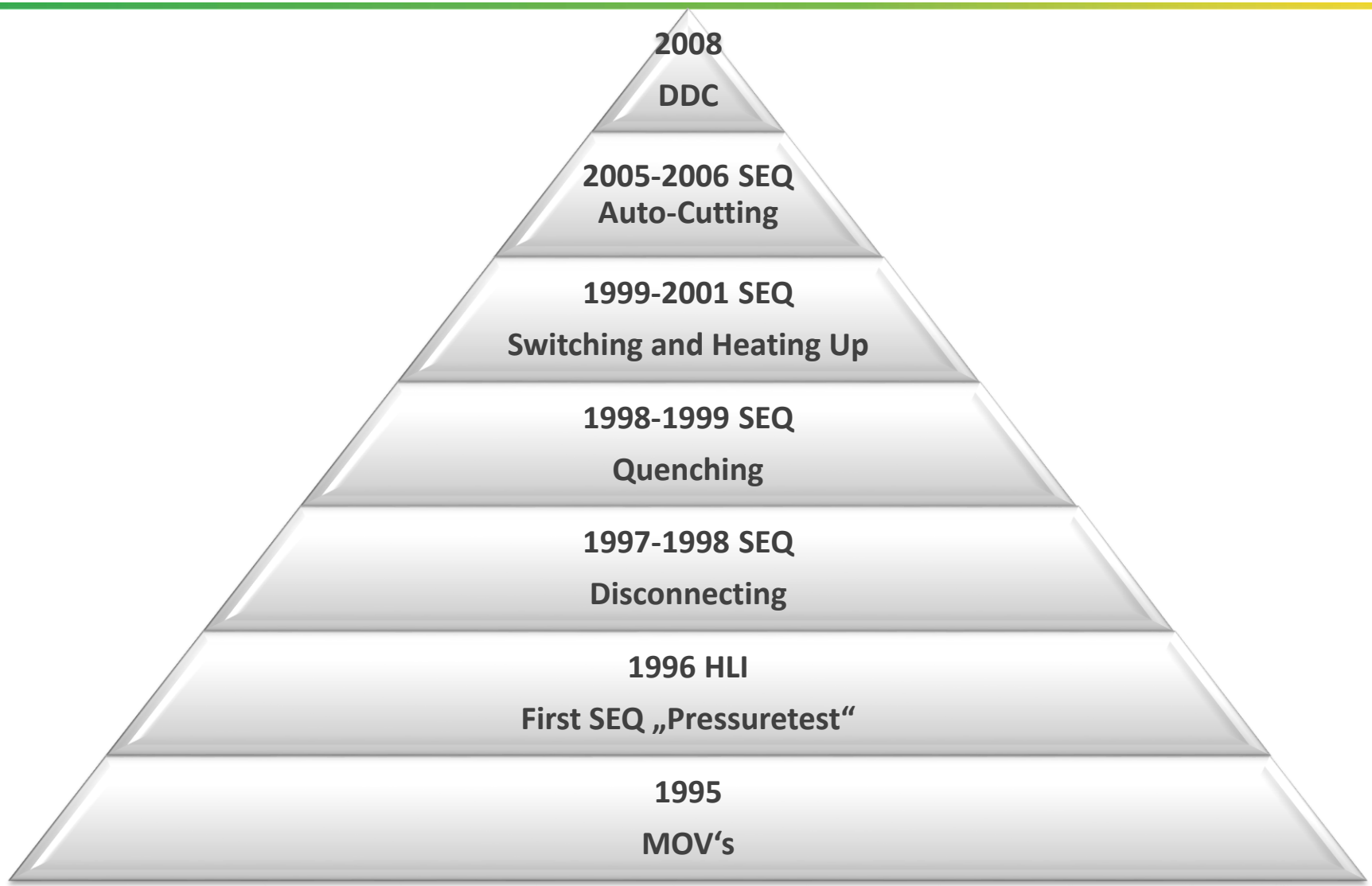
Background

- Due to an accident in 2001, Gelsenkirchen refinery decided to automize the coker operation
- New development, as the market didn‘t provide any solution
- Development of an engineering concept to ensure permanent controls
- Development of a logic for implementation into the existing PLC/DCS
- Integration of a PLC/DCS interlock-system to avoid failure in operation
- Goal: Reduce residence time for operators in the structure to zero!

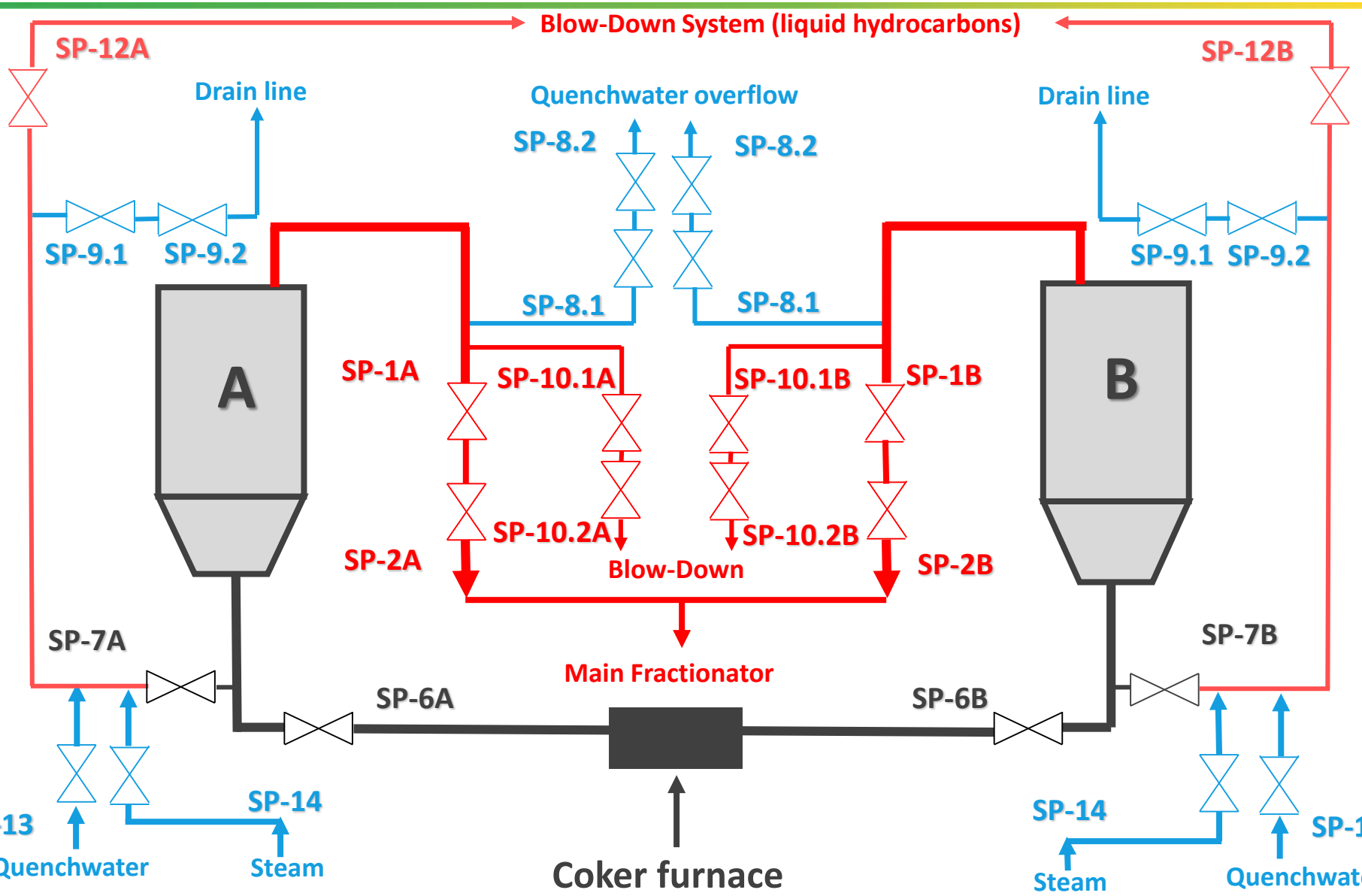
Overview Gelsenkirchen Coker



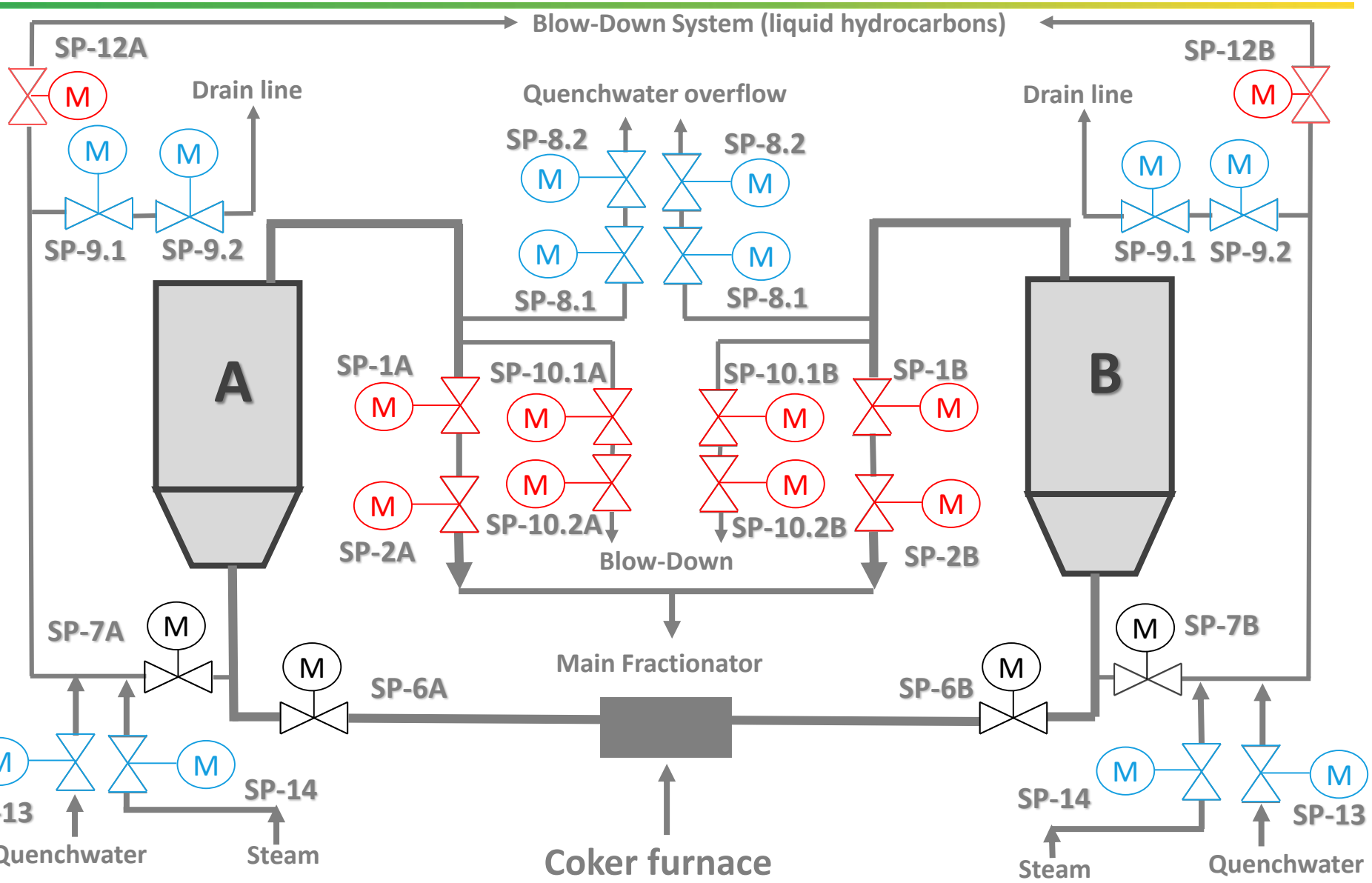
Development phases of automization



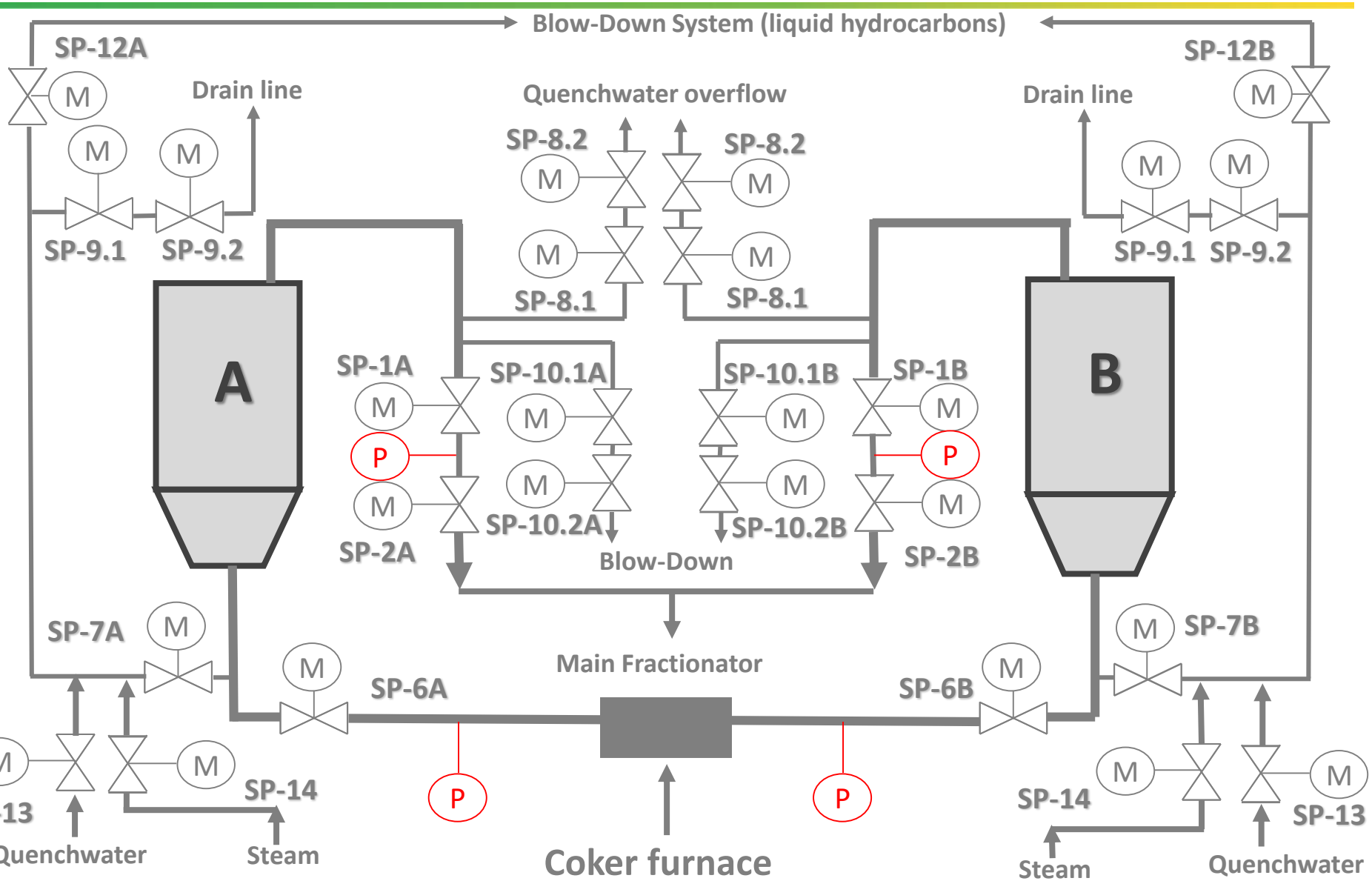
SP Valve Description



Implementation of MOV‘s

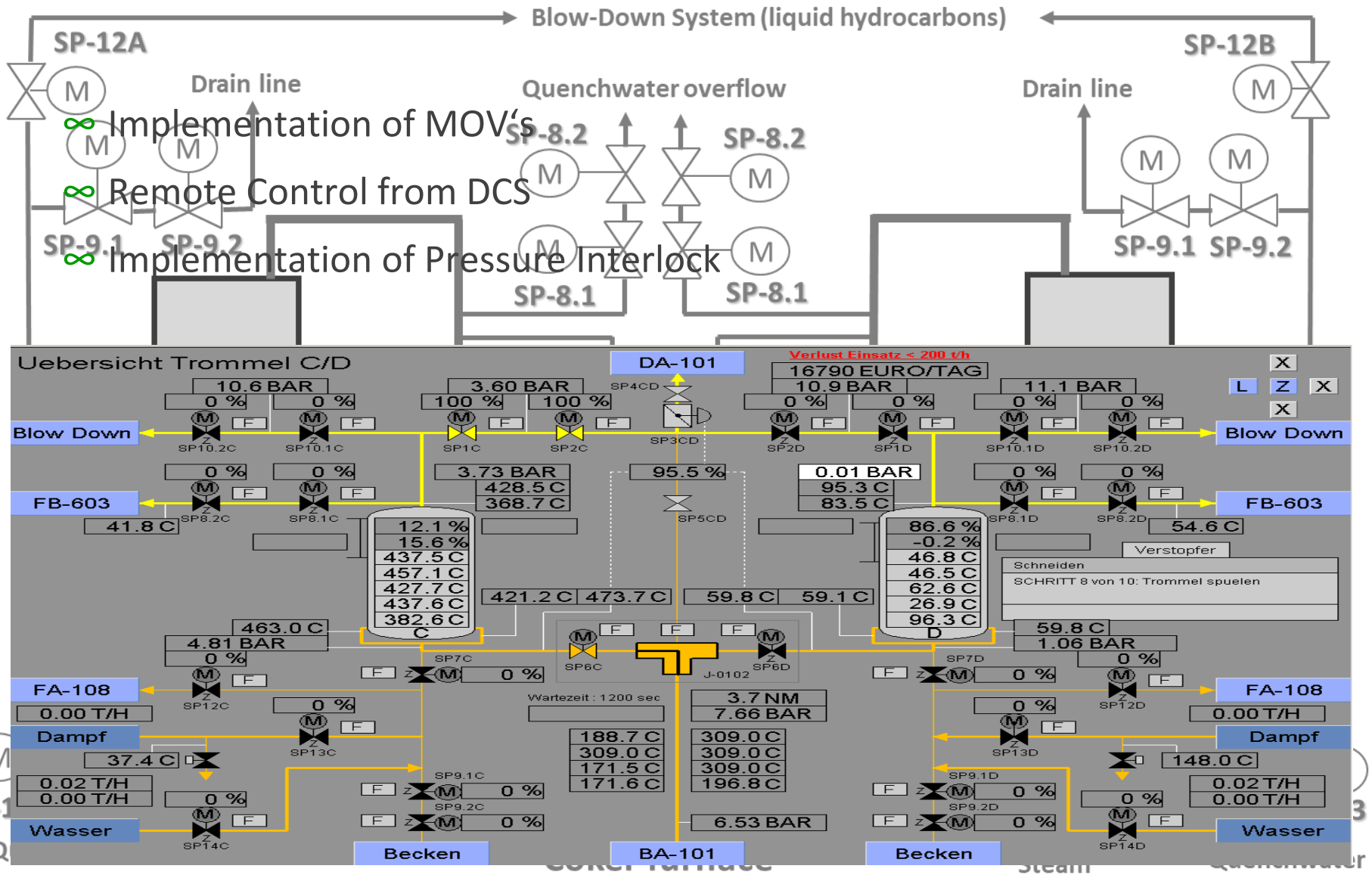


Implementation of Pressure Interlock

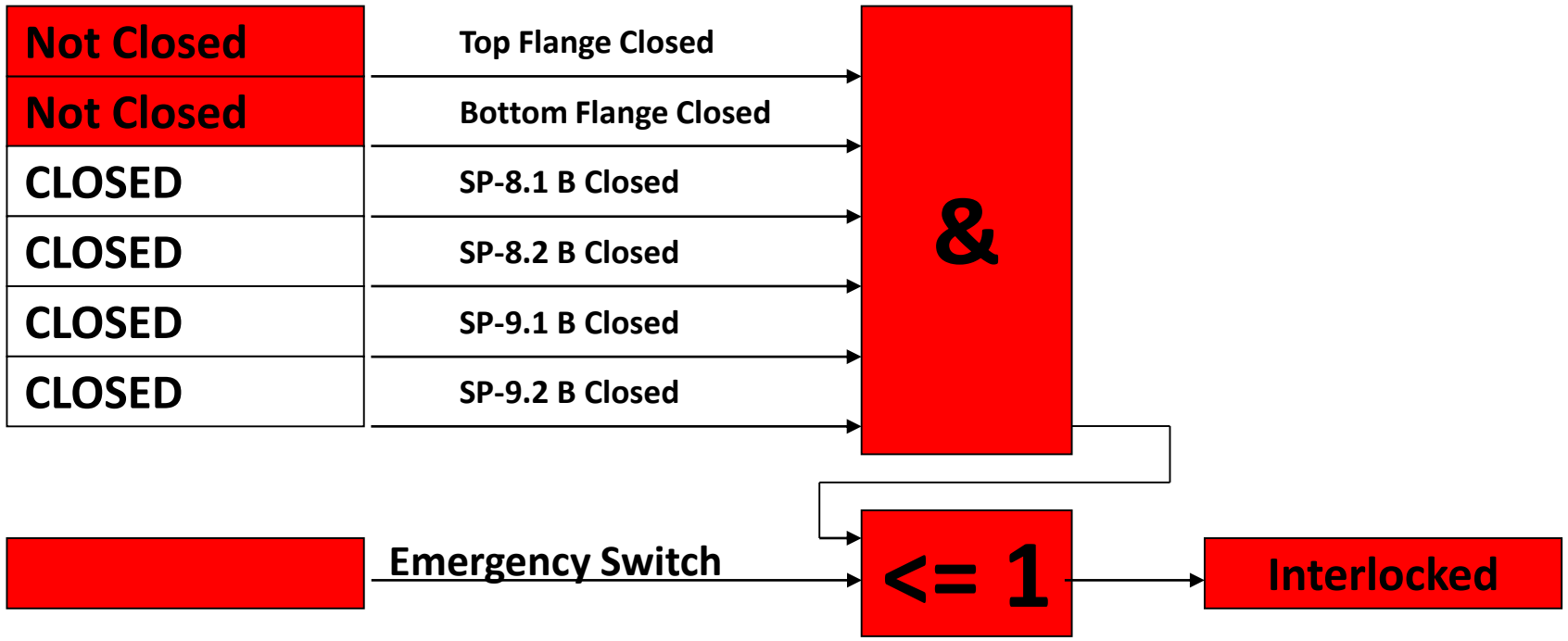


Pre-Automization Steps

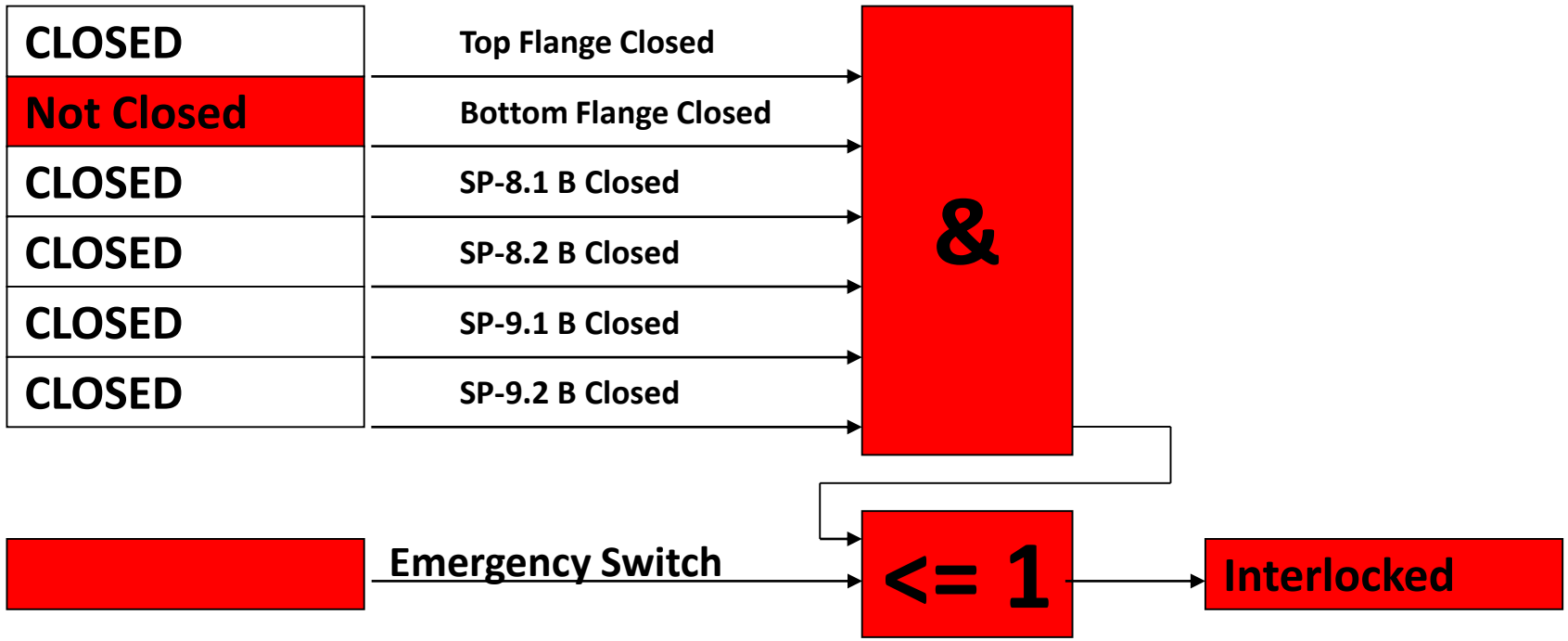
- Implementation of MOV‘s
- Remote Control from DCS
- Implementation of Pressure Interlock



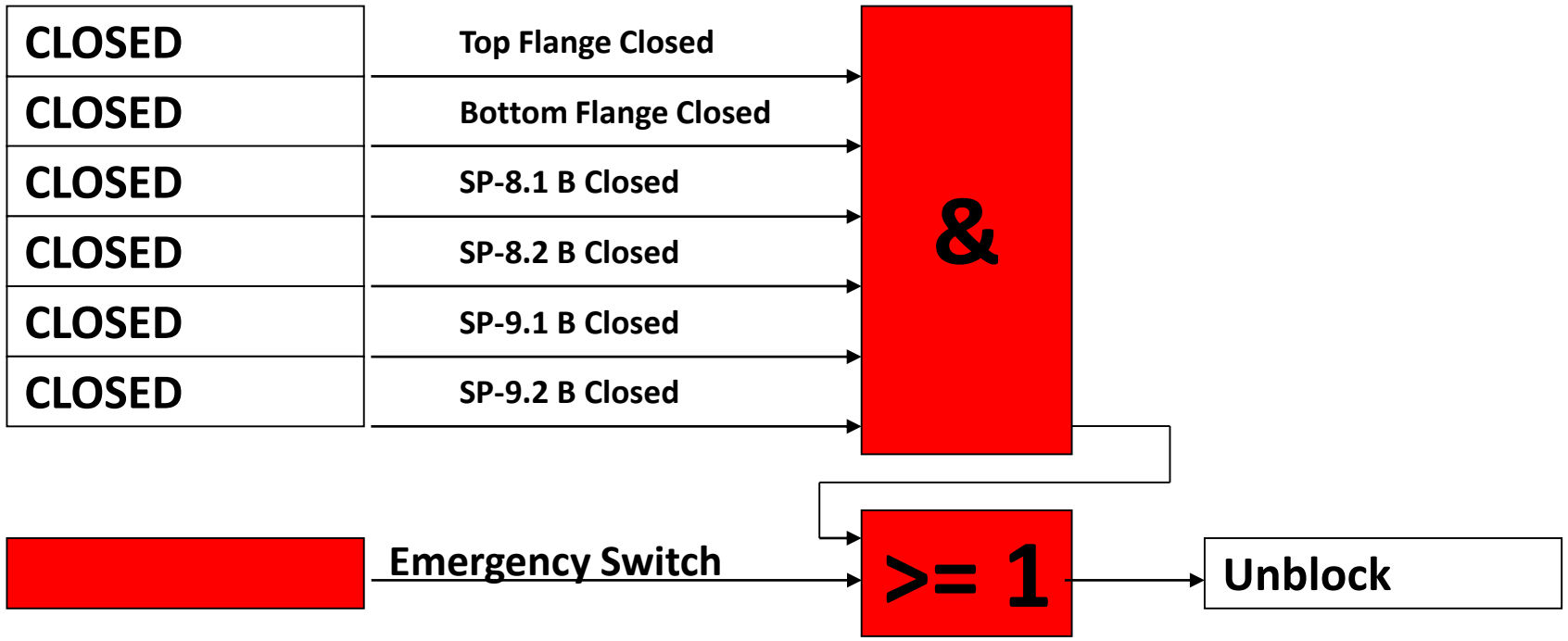
High Level Interlock System



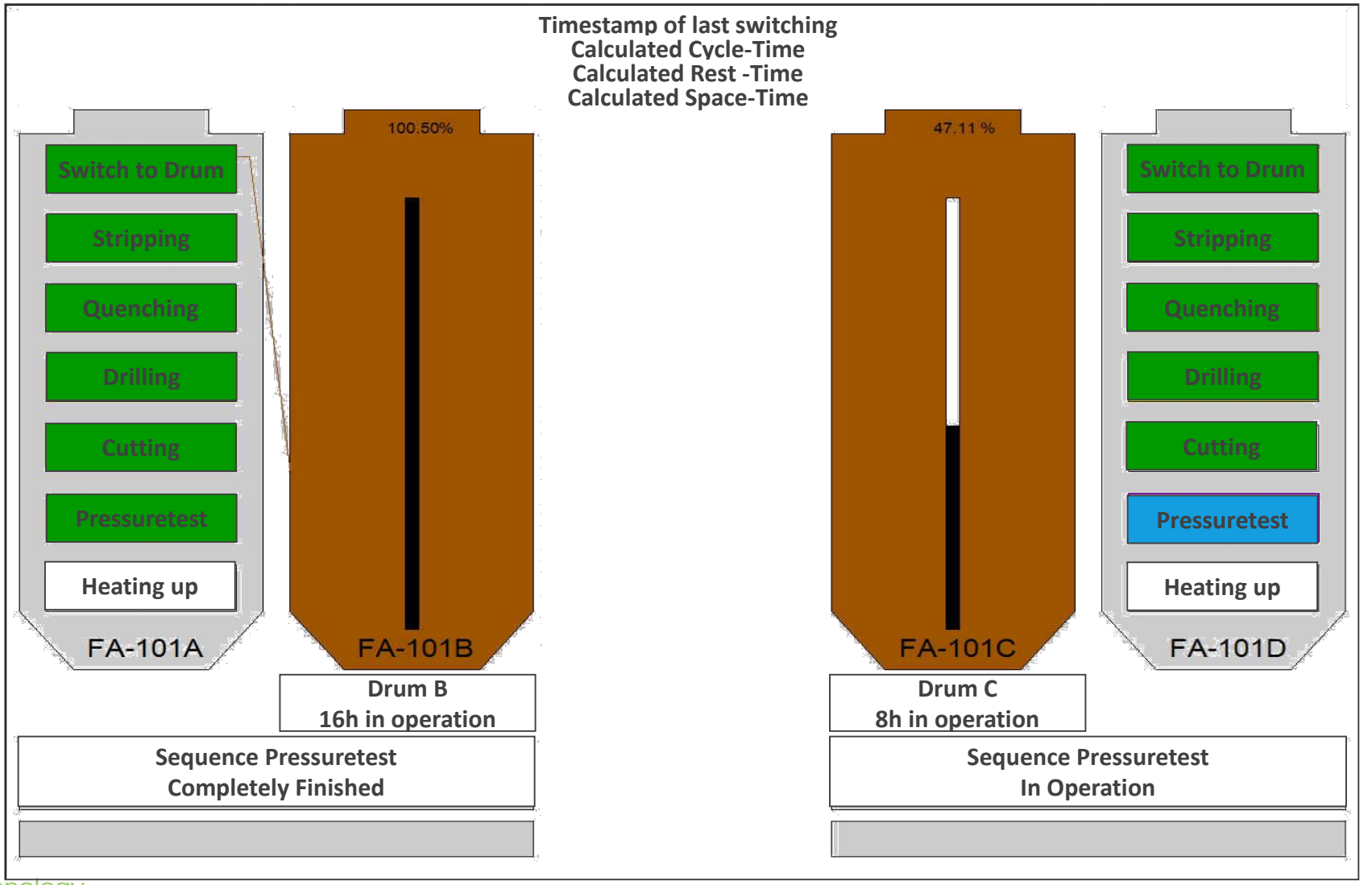
High Level Interlock System



High Level Interlock System



DDC Layout


Timestamp of last switching
Calculated Cycle-Time
Calculated Rest -Time
Calculated Space-Time
100.50%
47.11 %
Switch to Drum
Stripping
Quenching
Drilling
Cutting
Pressuretest
Heating up
FA-101A
FA-101B
FA-101C
FA-101D
Drum B
16h in operation
Drum C
8h in operation
Sequence Pressuretest
Completely Finished
Sequence Pressuretest
In Operation

Sequence „pressure test“

Neutralisation and pressure test Drum A

Step1	Connection to distribution station	utilities	SP7A	open
Step2	Remove oxygen in drum A	Overflow FB-603	SP8.1A	open
Step3	Remove oxygen in drum A	Overflow FB-603	SP8.2A	30%
Step4	Isolation valve at distributor	Steam to drum A	SP13A	open
Step5	Set required amount	Steam to drum A	F-1008	12 t/h
Step6	Neutralisationtemp. > 110°C	Overflow FB-603	SP8.2A	close
Step7	Drum pressure 0.6 bar > op. pressure	Steam to drum A	F-1008	close
Step8	Isolation valve at distributor	Steam to drum A	SP13A	close
Step9	Dewatering at drum lowest point	dewatering	SP9.1A	open
Step10	Dewatering at drum lowest point	dewatering	SP9.2A	20%
Step11	Drum pressure = op. pressure	dewatering	SP9.1A	close
Step12	Dewatering deck 22m	Overflow FB-603	SP8.2A	20%
Step13	Drum pressure 0.6 bar < op. pressure	Overflow FB-603	SP8.2A	close
Step14	System pressurised and dewatered	Overflow FB-603	SP8.1A	Close

Failure

Sequence end

Sequence „disconnecting / stripping“

Disconnecting and Stripping Drum A

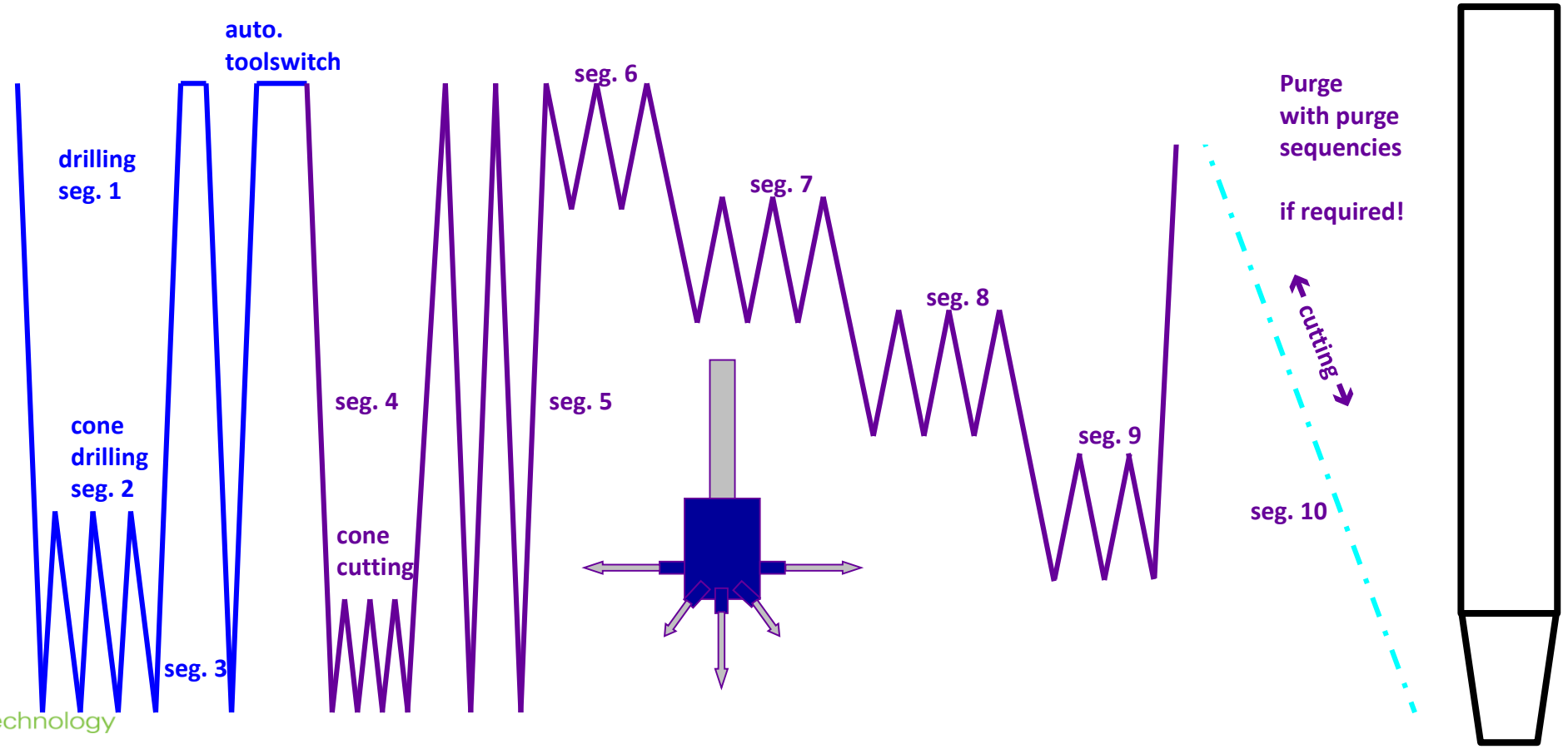
Step1	Product inlet is closed	control	SP6A	close
Step2	Set the required amount	Steam to drum A	F-1008	1 t/h
Step3	Blow-Down valve opens	Vapours to Blow Down	SP10.1A	open
Step4	Disconnecting / SP2A closes AND	Vapours to Blow Down	SP10.2A	10 %
Step5	Disconnecting / SP1A closes AND	Vapours to Blow Down	SP10.2A	open
Step6	Set the required amount	Steam to drum A	F-1008	7 t/h
Step7	Connection to distributor	Water to drum A	SP14A	10%
Step8	Set the required amount	Water to drum A	F-0161	4 t/h
Step9	Pressure-time monitoring	Stripping time	DCS	1 min

Failure

Sequence end

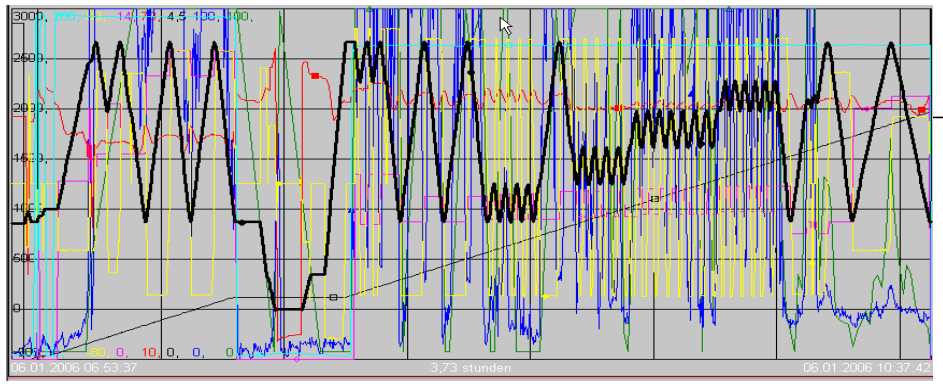
Sequence – Cutting & Drilling

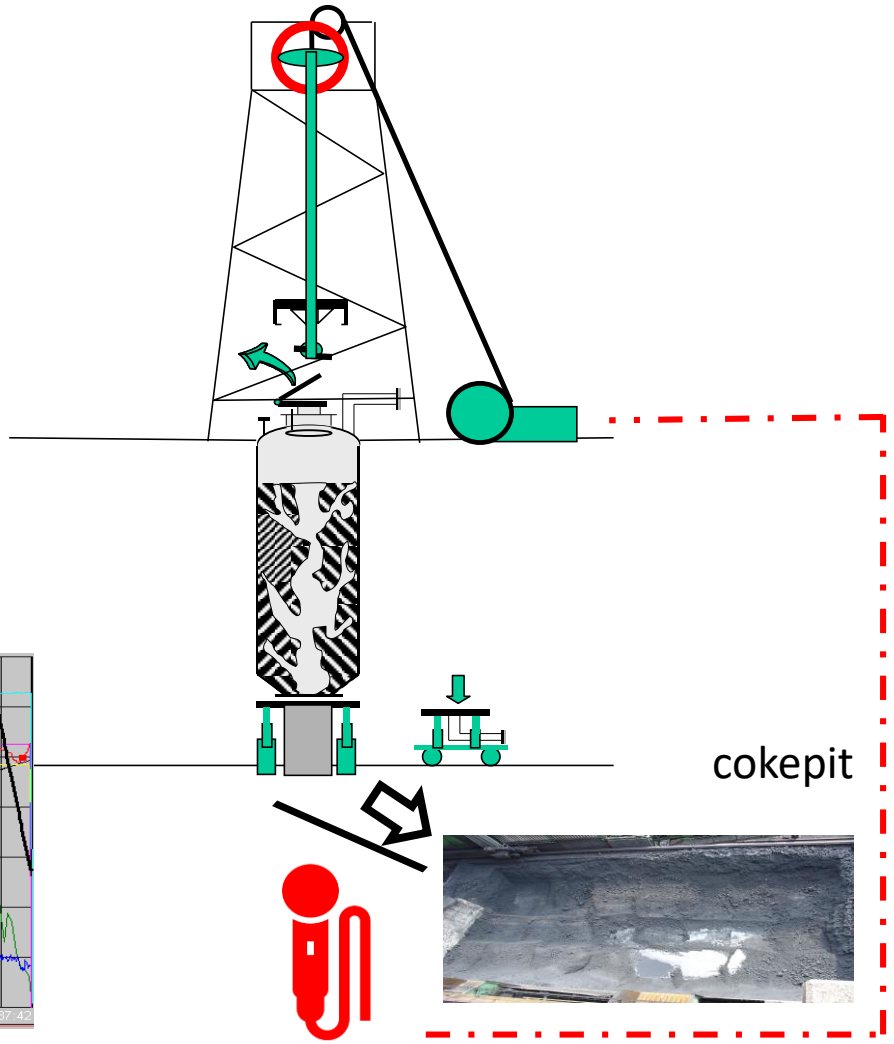
Eleven adjustable segments have been defined to provide maximum flexibility. In all segments, the speed of the drilling heads, direction of rotation and winch speed (down/up) can be adjusted as required.



Automatic Cutting & Drilling Control

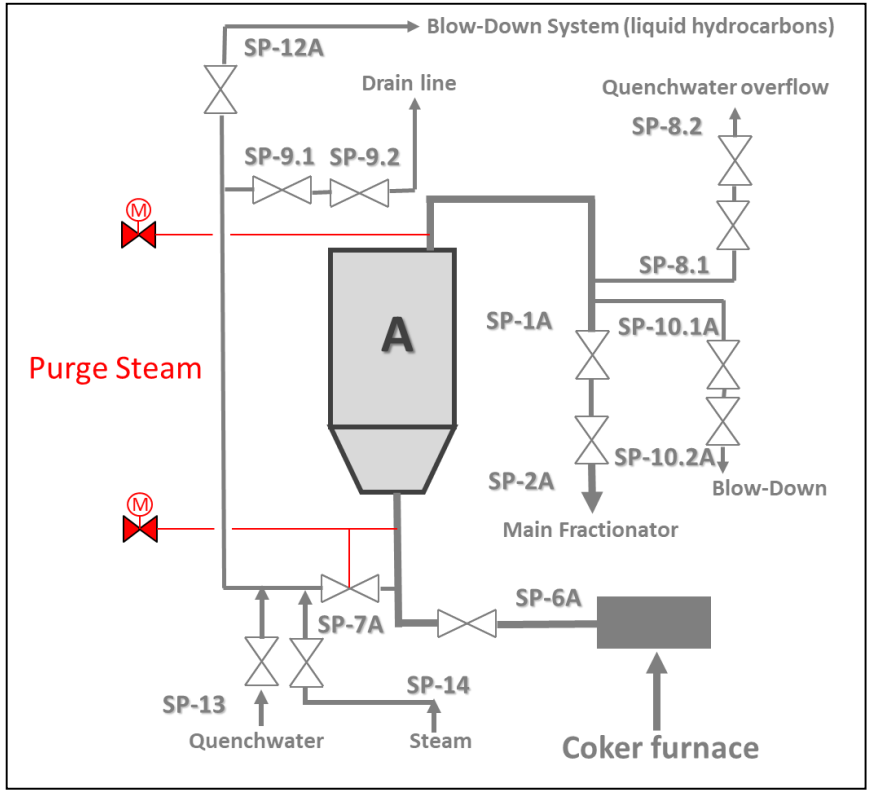
- Automatic cutting via microphone under the chute
- Blocked pilot whole function
- Completely PLC/DCS controlled
- No operator in the top shelter



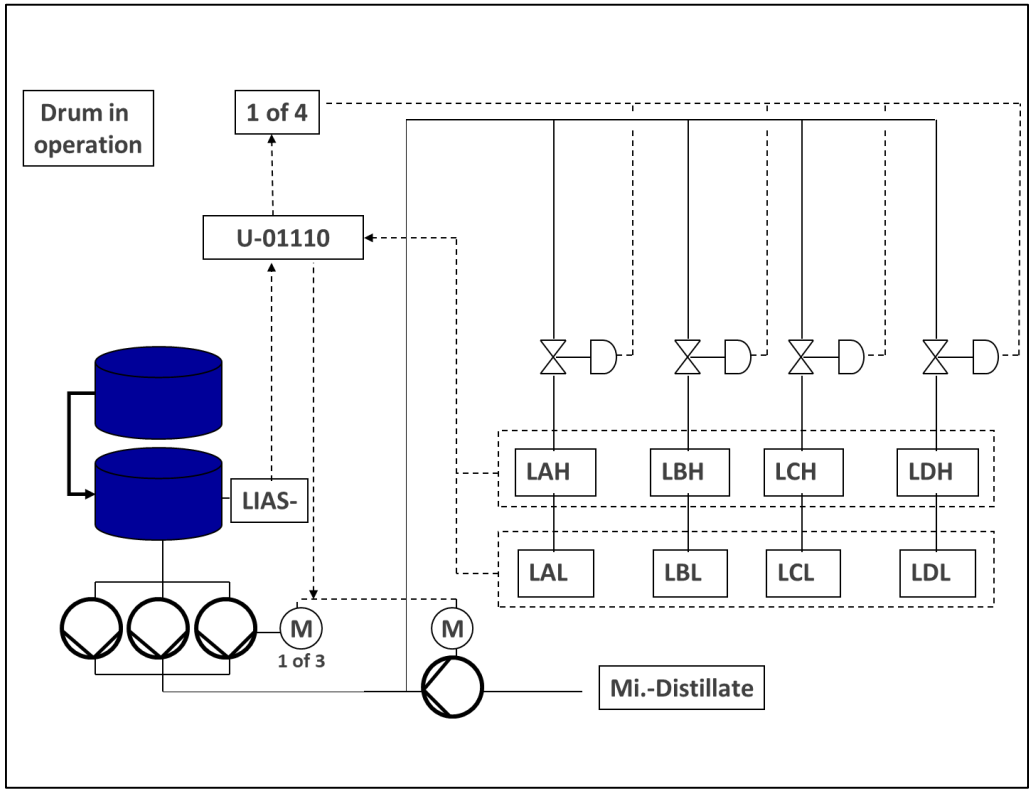


Dynamic Steam and Antifoam Management

Steam control



Antifoam control



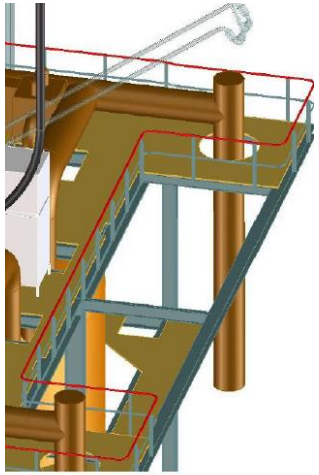
Full automization

Bottom Slide Valves

Next steps:

- Eliminitation of manua' heading/unheading
- Implementation ' d Bottom Slide Valves
- Upgrade of
- Upgrad' xisting sequences: Quer en drum) and Cutting (cl)
- esidence time of the or in the structure

Top Slide Valves



Non-Operator Tower

Goals

- Non-Operator drum operation – maximum safety
- Operator convenience
- Transparency and monitoring
- Harmonize Coker operation over all shifts
- Exclusion of false operation (High Level Interlock)
- Provision of rapid fault diagnosis and debugging
- Visualization of all program steps in the DCS
- Flexible sequence parameters to optimize cycle time
- Reliable operation