



Coking.com 2008

Decoking with *RUHRPUMPEN*

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reliable, safe, automatic

**Coking.com Safety Seminar
Cologne 30th – 2nd October 2008**

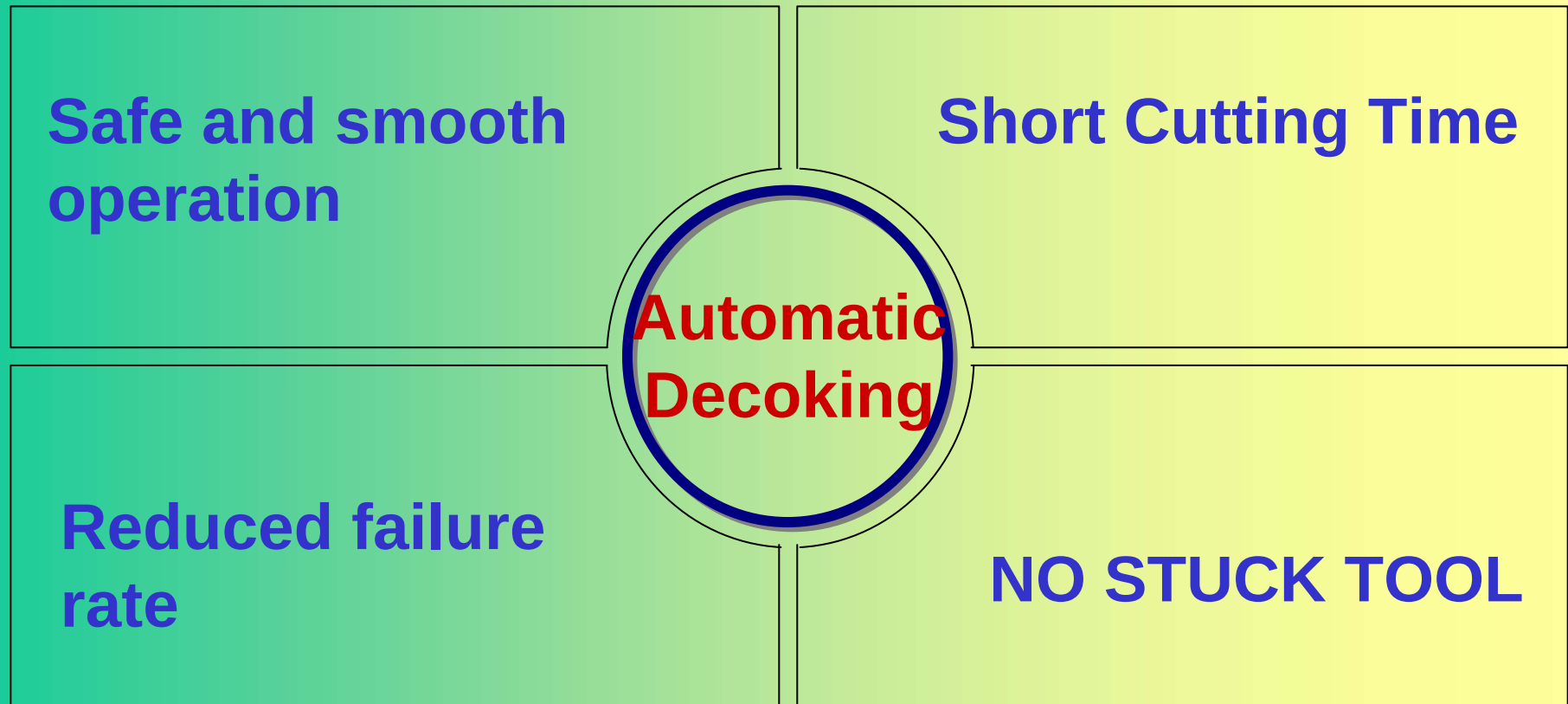
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RP – Hydraulic Decoking System

Basics for Automatic Decoking



Hydraulic Decoking System

Targets



RUHRPUMPEN Hydraulic-Decoking-System



HDS

Control system

- PLC
- Process visualization
- Automatic control

Pump area

Pump unit

Suction line

- Valve
- Strainer
- Instrumentation

Discharge line

- Decoking valve
- Pressure bleed valve
- Instrumentation

Derrick Platform

Operator panel

- Panel
- Cubicle
- Drill stem guide plate

Valve

- Isolation valve
- Drain valve
-

Hoist

Derrick

Crosshead Free Fall Arrestor

Drill Stem Drive

Tool

Auxiliaries

Pumps

- Feed Pumps
- Pit Pumps

Top deheading system

- flanged / bolted
- Double gate valve

Bottomdeheading syst

- flanged / bolted
- Double gate valve

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Hydraulic-Decoking-System



HDS

Control system

- PLC
- Process visualization
- Automatic control

Pump area

Pump unit

- HP-Barrel-pump
- Driver, gear if app.
- Lube oil system

Suction line

- Valve
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Discharge line

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Derrick Platform

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Valve

- Isolation valve
- Drain valve
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Hoist

Derrick

Crosshead

- Crosshead, Guide rails
- Free Fall Arrestor
- Pulley blocks

High Pressure line

- HP water hose, swivel
- Drill stem
- Tool

Drill Stem Drive

- Gear
- Motor, pneu,hyd,elec,
- Seal cartridge

Auxiliaries

Pumps

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Top deheading system

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Hoist, Block and Rope



- **Hoist with integral carriage gear**
 - drum with grooves
 - Pull force 4,5 t
 - slack rope indicator
 - locks the hoist
- **Rope**
 - measurement of tension in the rope
 - indication at the operator panel
 - avoiding of overload
- **Material class II**

Hoist, Block and Rope



- **Hoist, electrical driven, cartridge gear**
 - Pull force 5 t
 - slack rope device
 - MDMT -45°C
 - ATEX, CSA
- **Rope**
 - measurement of tension in the rope
 - indication at the operator panel
 - avoiding of overload
- **Variable Frequency Converter VFC**
 - Installed in safe area

Hydraulic Decoking System

Derrick

- **Drill Stem Drive DSD** **Electrically or hydraulically driven**
- **Crosshead with Free Fall Arrestor** **Guide rails, certificates**
- **High Pressure Water Line,** **HP Hose, Drill Stem, Valves**
- **Tool, manual or automatic**
- **Pulley blocks system** **Rope, instruments for position and load**
- **Instrumentation,** **Latches, Position switches**

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Hydraulic-Decoking-System



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- Discharge line**
- Decoking valve
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Derrick Platform

- Operator panel**
- Panel
 - Cubicle
 - Drill stem guide plate

- Valve**
- Isolation valve
 - Drain valve

- Hoist**
- Hoist, pneu,hyd,elec,
 - Hydraulic unit
 - Slack rope device

Derrick

- Crosshead**
- Crosshead, Guide rails
 - Free Fall Arrestor
 - Pulley blocks

High Pressure line

Tool

- Drill Stem Drive**
- Gear
 - Motor, pneu,hyd,elec,
 - Seal cartridge

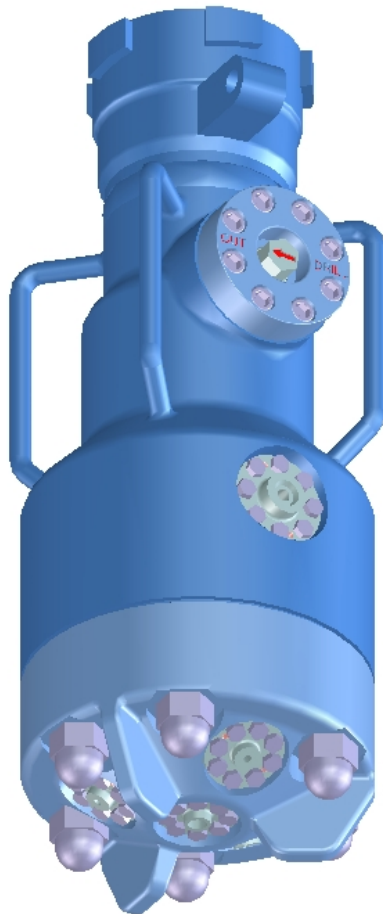
Auxiliaries

- Pumps**
- Feed Pumps
 - Pit Pumps

- Top deheading system**
- flanged / bolted
 - Double gate valve

- Bottomdeheading syst**
- flanged / bolted
 - Double gate valve

RUHRPUMPEN - Combination Tool



Basic design

- Slim tool, OD 13"
- Low lift force
- Low torque

• Switching devices

- Manual / Automated
- At the top of the tool

• Valves

- Ballshape valves
- No seals
- Pressure operated

• Nozzles, cutting

- 0°
- 10° up both cutting nozzles

• Nozzles, drilling

- 1 strong centre nozzle
- 3 periphery nozzles

RP - Cutting Tool



19.05.2006

Basic design

- Slim tool, OD 13"
- Low lift force
- Low torque

Switching devices

- Manual / Automated
- At the top of the tool

Valves

- Ballshape valves
- No seals
- Pressure operated

Nozzles, cutting

- 0° or 10° up both cutting nozzles

Nozzles, drilling

- 1 strong centre nozzle
- 3 periphery nozzles

Patent available

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Hydraulic-Decoking-System



HDS

Control system

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Pump area

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- Driver, gear if app.
- Lube oil system

Suction line

- Valve
- Strainer
- Instrumentation

Discharge line

- Decoking valve
- Pressure bleed valve
- Instrumentation

Derrick Platform

Operator panel

- Panel
- Cubicle
- Drill stem guide plate

Valve

- Isolation valve
- Drain valve
-

Hoist

- Hoist, pneu,hyd,elec,
- Hydraulic unit
- Slack rope device

Derrick

Crosshead FF-Arrestor

High Pressure line

- HP water hose, swivel
- Drill stem
- Tool

Drill Stem Drive

- Gear
- Motor, pneu,hyd,elec,
- Seal cartridge

Auxiliaries

Pumps

- Feed Pumps
- Pit Pumps

Top deheading system

- flanged / bolted
- Double gate valve

Bottomdeheading syst

- flanged / bolted
- Double gate valve

Crosshead - FFA



- Drill Stem Drive
 - hydraulic driven
- Free fall Arrestor
- Pulley Block
- Gooseneck / Swivel

Crosshead w DSD



- Drill Stem Drive
 - hydraulic driven
- Free fall Arrestor
- Pulley Block
- Gooseneck / Swivel

Material class II, CA

Drill Stem Drive



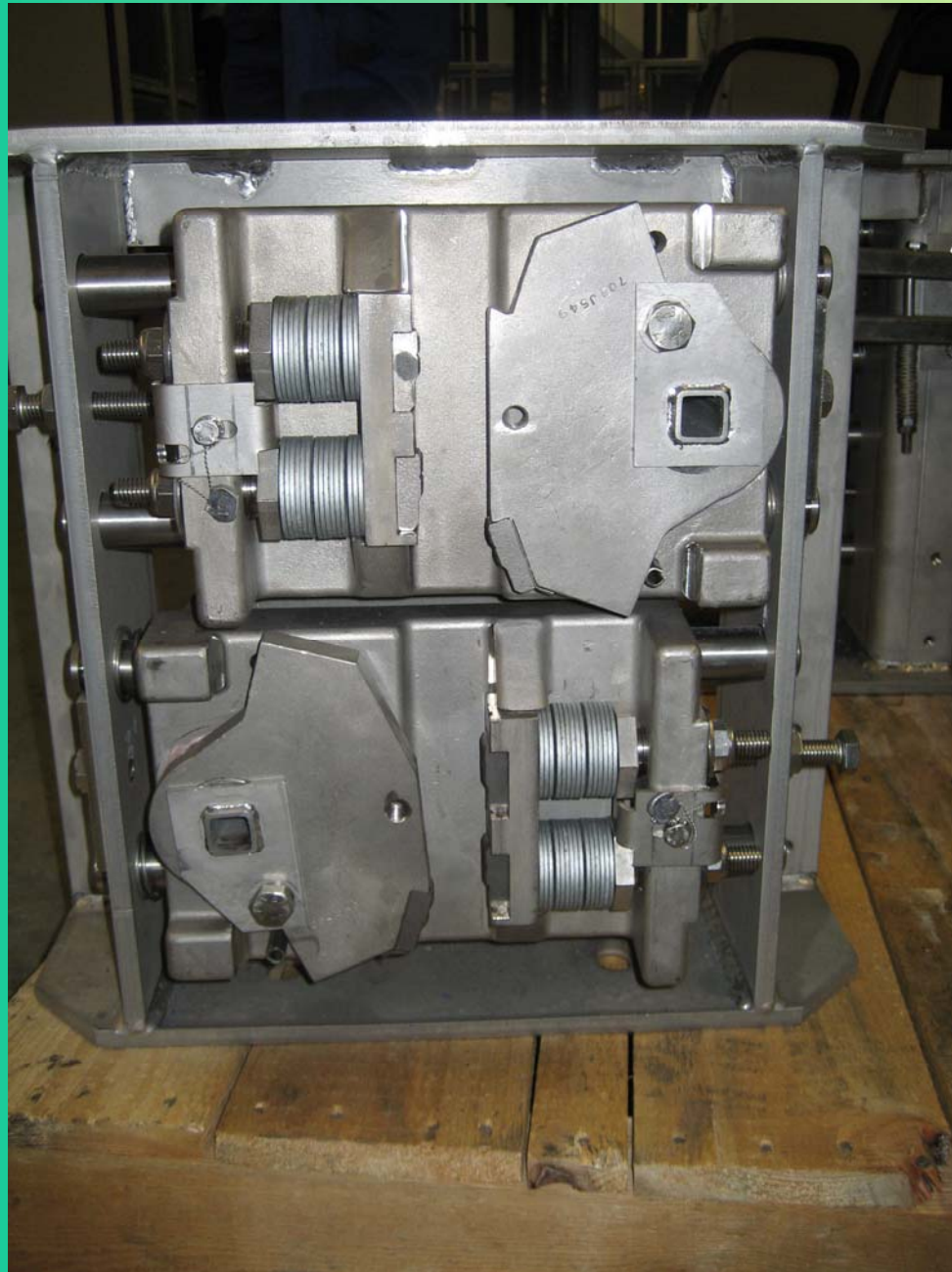
- **Drill Stem Drive**
 - Electric motor
 - High load bearing
 - Grease lubrication
 - Cartridge packing
 - Swivel
 - MDMT -45°C
 - MAWP like Pump

- **Variable Frequency Converter VFC**
 - At Cutting deck, or
 - At safe area

Crosshead - FFA

Free Fall Arrestor

Full load functional test of
Free Fall Arrestor
Weight 8600 kg



Crosshead - FFA



**Crosshead test
stand
3rd party**

Full load functional
test of
Free Fall
Arrestor
Weight 8600 kg

Crosshead - FFA

Crosshead test
stand
3rd party

Full load functional
test of
Free Fall
Arrestor
Weight 8600 kg



Hydraulic Decoking System

Control system

Standard

- Master Control Panel MCP
 - PLC and BN-system in control room or in Main Pump Panel
- Main Pump Panel MPP
 - installed near pump
- Local Control Panel LCP,
 - Installed in Operator shelter, cutting deck or remote
- Cabinet with VFD's for hoist and DSD,
 - When operated electrically
- Drum vibration monitoring system optional
 - for remote and/or automatic cutting
 - installed at cutting deck, drum and chute

Control system



- Local Operator panel
Operator deck
 - Operation of
 - Pump (Stop)
 - Decoking valve
 - Isolation valve
 - Hoist
 - Drill stem drive
 - Interactive P&ID

Control system



Local Operator panel

Operator deck

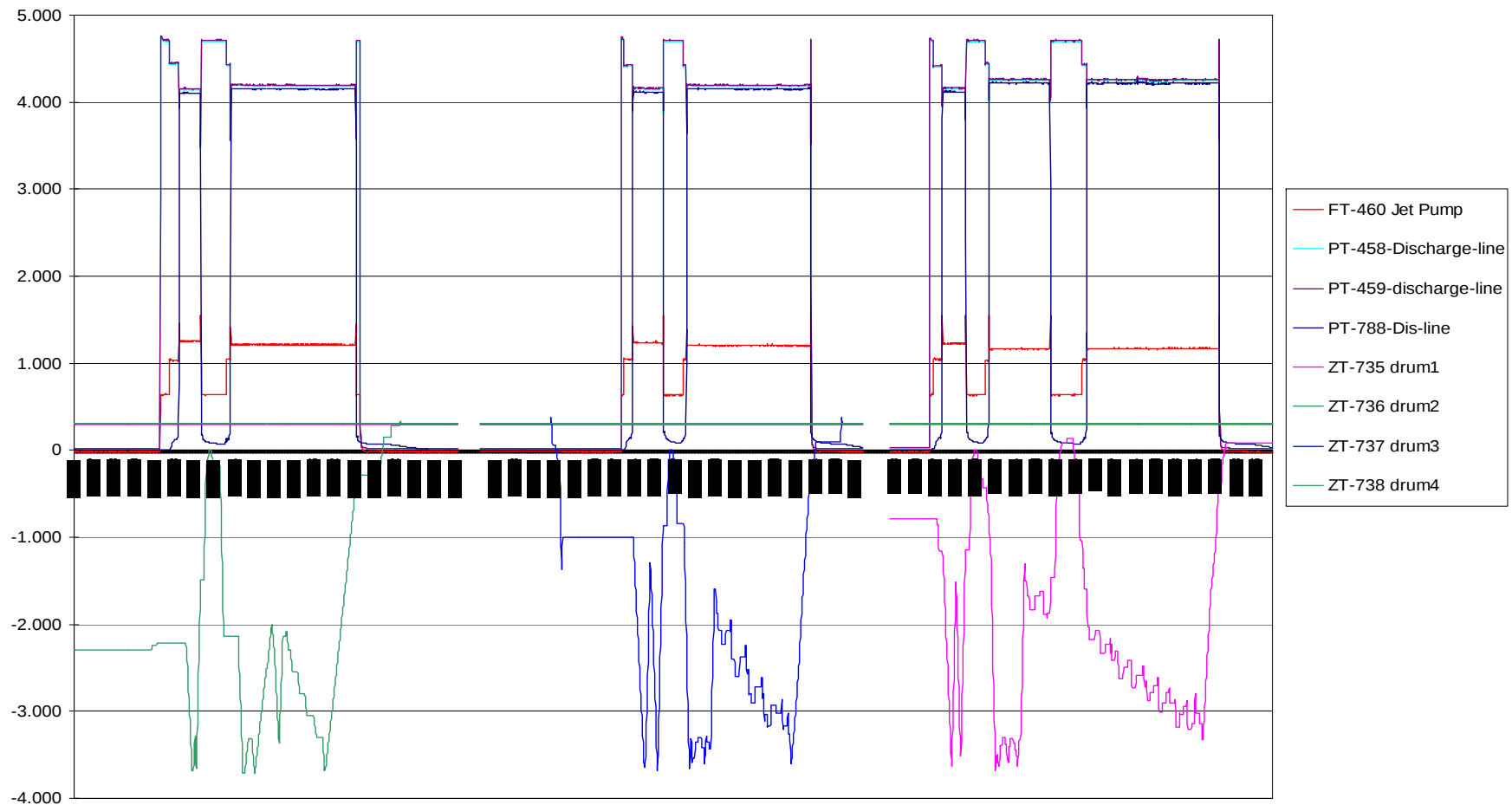
- Operation of

- Decoking valve
- Isolation valve
- Hoist
- Drill stem drive

— Interactive P&ID

Control and process visualisation

14/15-02-2005



Automatic Decoking

Operation

- **Manual operation**
 - LOCAL: commissioning, trouble operation, maintenance
 - REMOTE: from operator shelter at safe location
- **Batch operation (remote or semi-automatic)**

• Batch	Drilling
• Batch	Cutting
• manual override	Cleaning
- **Automatic Operation**

• Standard program	Drilling, Switching, Cutting, Cleaning
• Self Optimising program	Integrated control subroutines Integrated problem solving routines

Remote Decoking

Operation from Remote Location

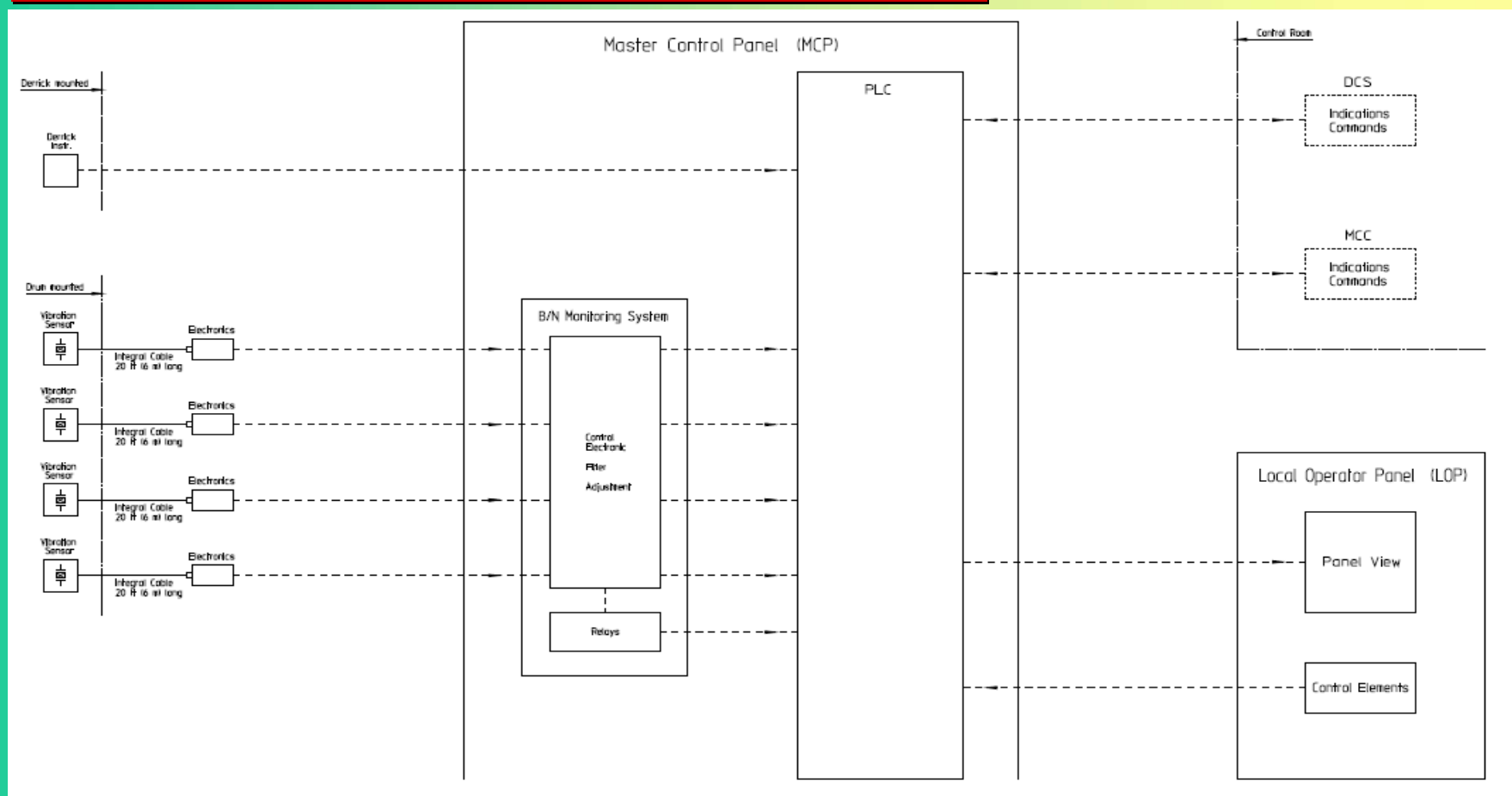
- Remote Control Panel RCP
 - installed in remote shelter or remote Operator shelter

Instrumentation in field

- Cameras
 - Indication Clear operation at cutting deck
 - Vibration probes
 - Indication Jet to Wall
- Cutting deck, chute
- Drum wall

Remote Decoking

Instrumentation drum-vibro-system



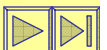
Automatic Decoking

Operation by PLC from Control Room

- **PLC Control Panel PLC-CP**
 - installed in Control room
 - one local panel at cutting deck for auto – local operation

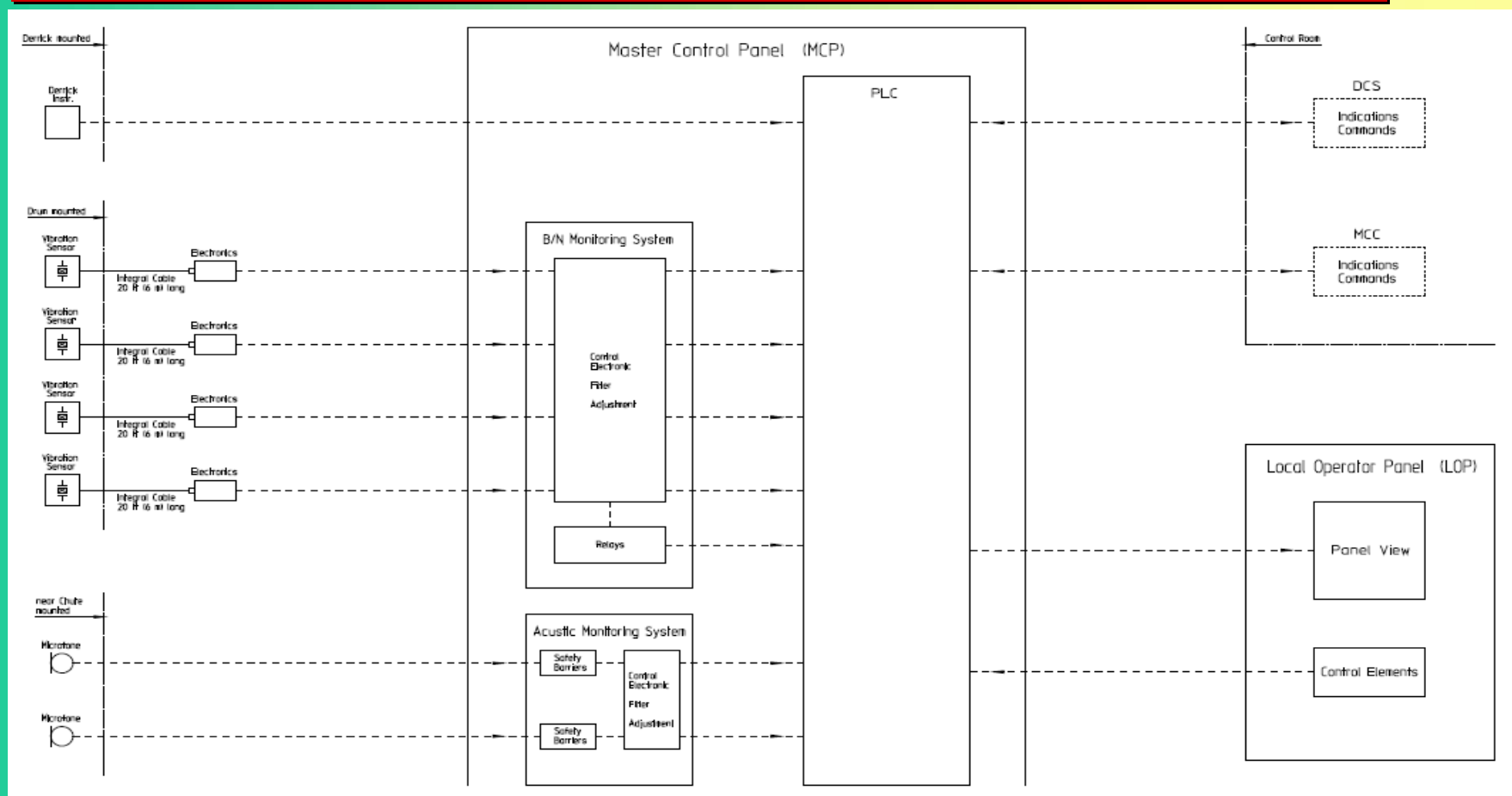
Instrumentation in field

- | | |
|--|---|
| • Cameras | Cutting deck, chute |
| <ul style="list-style-type: none"> • Indication | Clear operation at cutting deck and chute |
| • Vibration probes | Drum wall |
| <ul style="list-style-type: none"> • Indication | Jet to Wall |
| • Vibration Probes/Microphones | Chute |
| <ul style="list-style-type: none"> • Indication | Coke fall out |



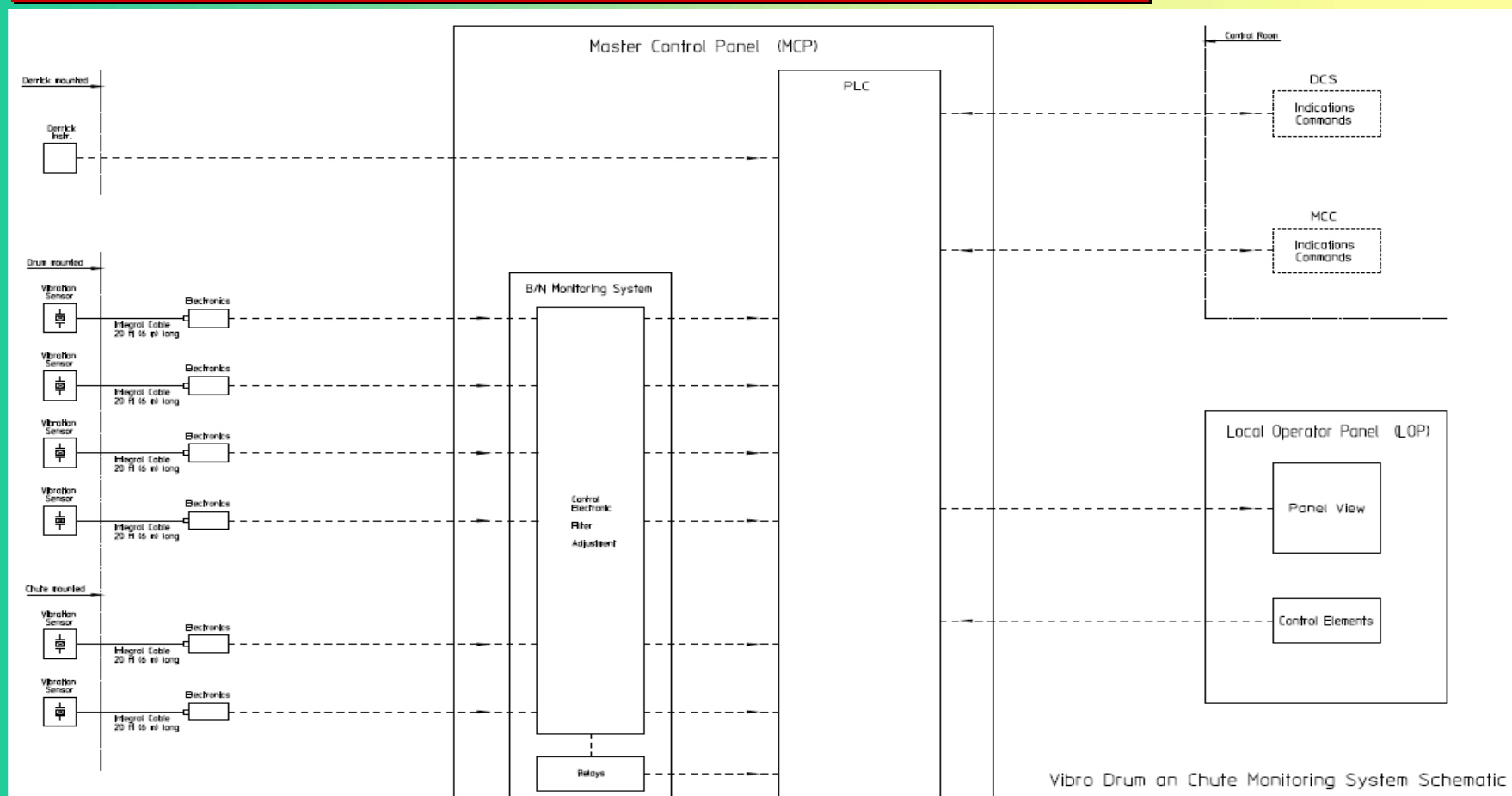
Automatic Decoking

Instrumentation drum-shute vibro/acoustic-system



Automatic Decoking

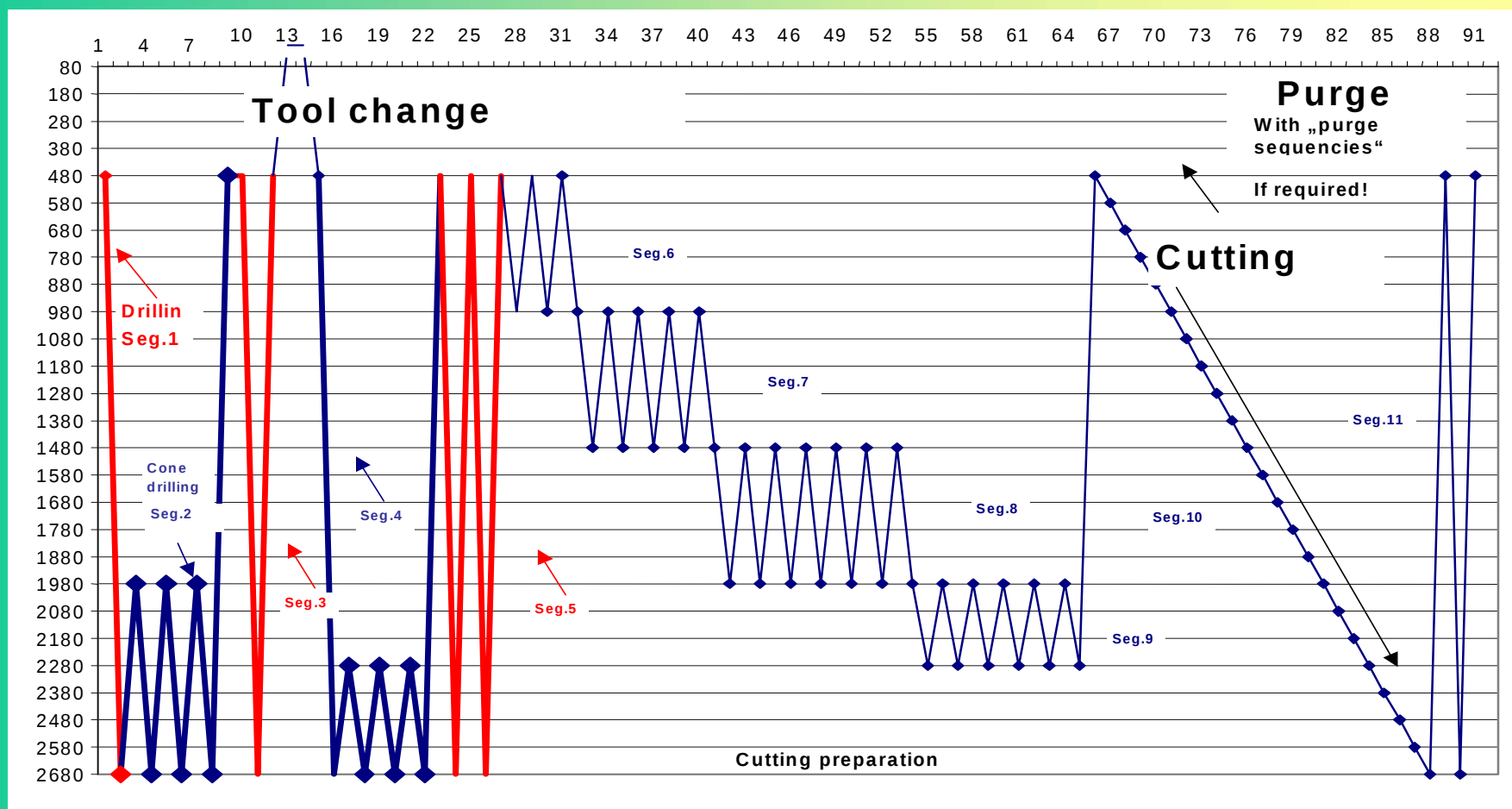
Instrumentation drum-shute vibro-system



Automatic Decoking

Automatic Drilling and Cutting Procedure

bb-bp-ge



Automatic Decoking

Automatic Drilling and Cutting

RP- Hydraulic Cutting System

RP- Automatic Tool

RP – Safety System

RP – Control System

RP – Automatic Drilling-Cutting System

Savings + Benefits

Short cutting time

NO STUCK TOOL

Safe operation

Smooth operation

Reduced failures

Longer life time

Automatic Coker Operation

Dynamic Drum Control DDC

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In order to

- improve safety (high-level-valve-interlock-system)
- maximize feed throughput by optimizing cycle-time,

a new control-program has been developed.

DDC (dynamic drum control) includes the following subroutines :

 DDS (dynamic drum sequences).

 STO (step time optimizer) to stabilize drum cycle time.

 DFR (dynamic forecast report) to optimize maintenance activities and minimize feed losses.

 SFR (schedule feed rate) to meet the integrated production plan

 ADD Automatic Drilling and Cutting

Automatic Coker Operation

Dynamic Drum Control DDC

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Basic Instrumentation and Functions



Field-PLS-DCS-Level Interaction



DDC Components and Interaction



Time management with DFR

(Dynamic Forecast Report)



Process optimization with STO

(Step Time Optimizer)



Time function of an entire drumcycle



Process optimization with DDS

(Dynamic Drum Sequence)



Sequence – Automatic Drilling and Cutting



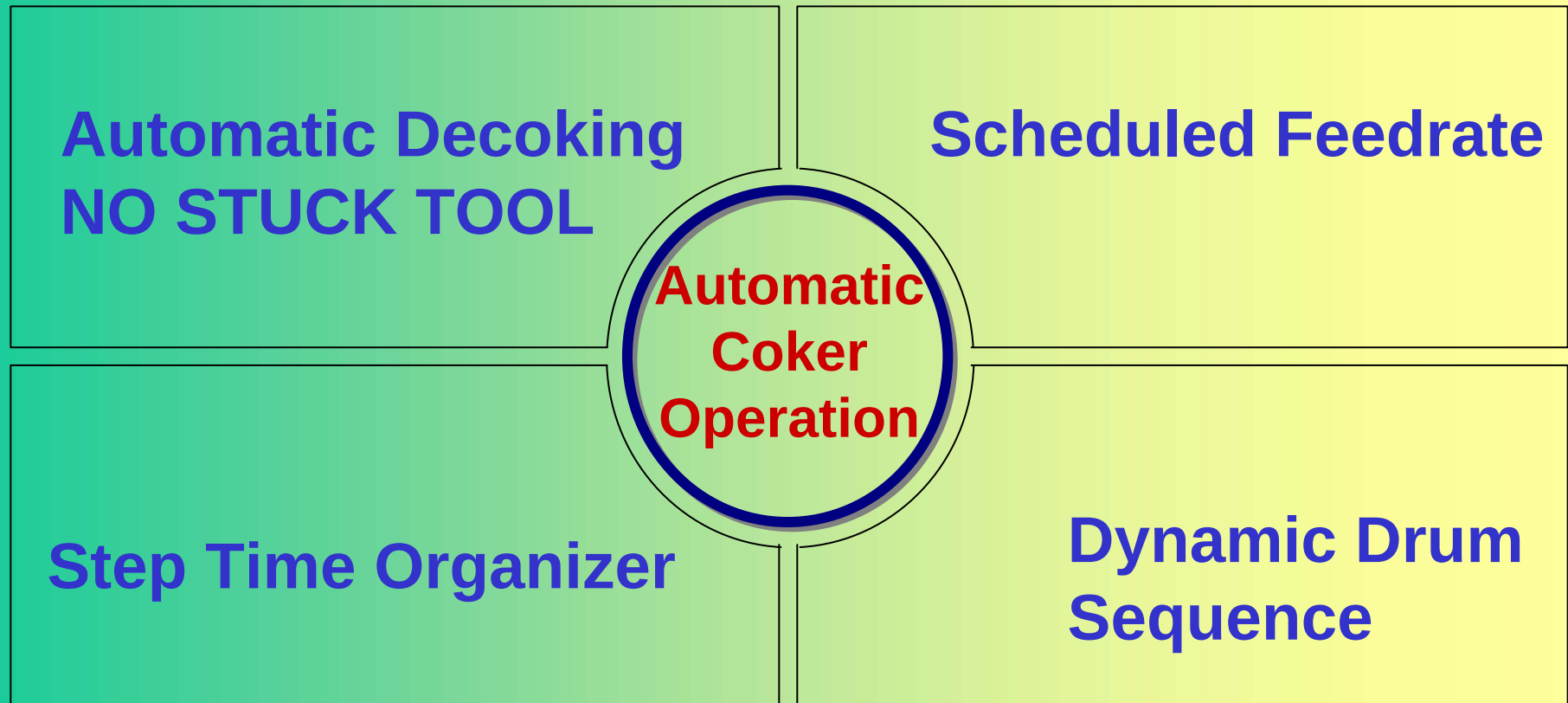
Process optimization with SFR

(Scheduled Feed Rate)

Automatic Coker Operation

Dynamic Drum Control DDC

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**THANKS FOR YOUR
ATTENTION**

