

Opportunities and Limitations on Remote and Automatic Coke Cutting

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Dr. Wolfgang Paul

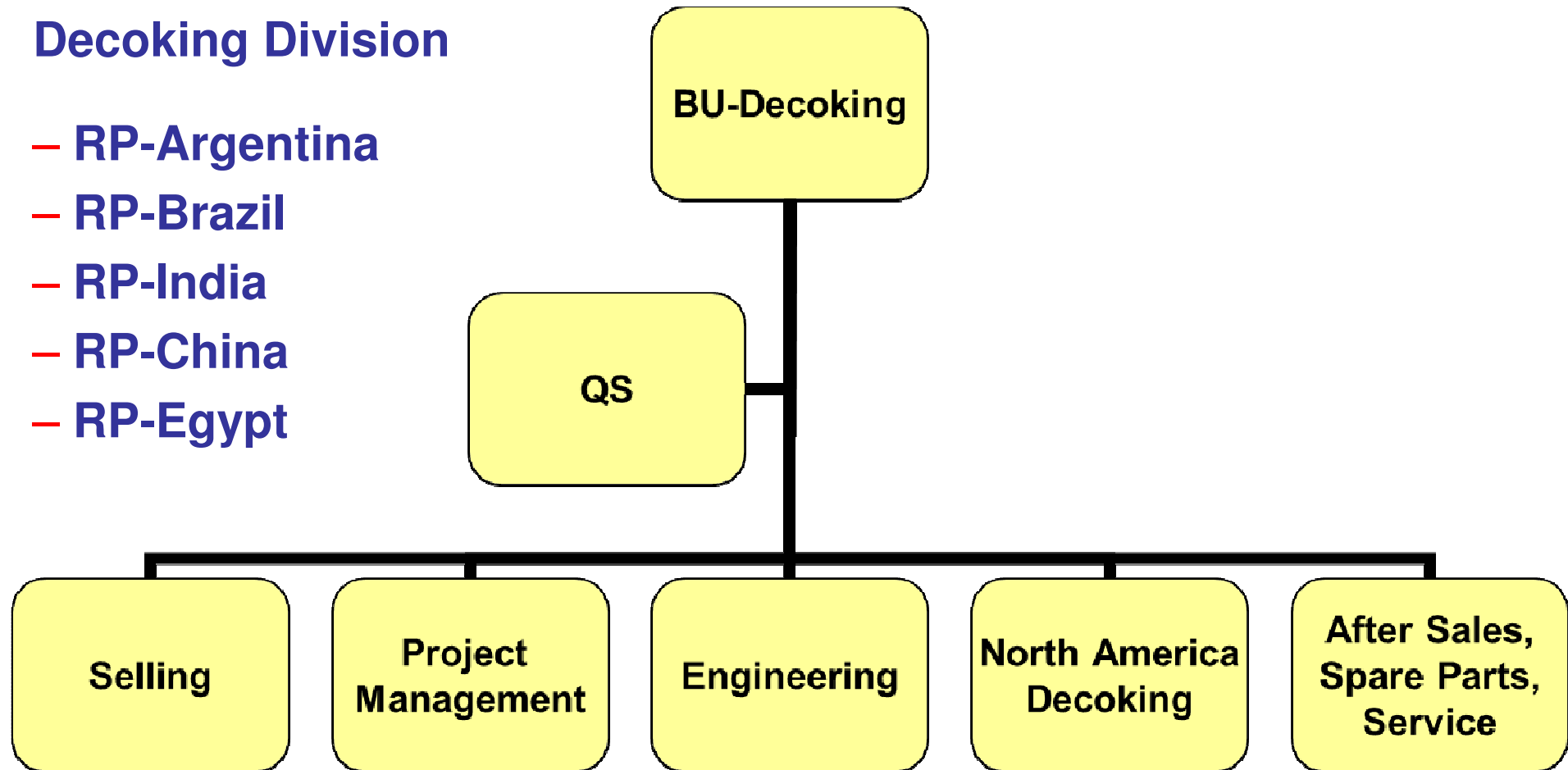


Ruhrpumpen - Organisation

Pump Division

Decoking Division

- RP-Argentina
- RP-Brazil
- RP-India
- RP-China
- RP-Egypt



Coke Cutting System

Opportunities for Remote / Automatic Decoking

Safe and smooth
operation

Short Cutting Time

**Automatic
Decoking**

Reduced failure
rate

NO STUCK TOOL

Requirements for Rem/Auto Coke Cutting

- **Coke Cutting System**
 - Lifting System with enough Power for Automatic Coke cutting
 - Hydraulic or electric driven Hoists and Drill Stem Drives
 - 5000 kg pull force lifting system
- **Control System**
 - Signal channelling from Cutting System to PLC
 - Operator Panel with Signal visualization through PLC
 - PLC-program with Automatic Cutting System Program

remote CC
autom. CC
- **Drum Vibration Monitoring System and Camera System**
 - Vibration Probes at drum
 - Camera Systems for Cutting Deck and Chute observation
- **Manual override**
 - Installation and Maintenance

Decoking Jet Pump



Jet Pump India

- Jet Pump unit
- LOU
- Decoking Control valve

Capacity 295 m³/h
 1300 gpm

Head 3158 m
 4492 psi

Speed 3923 rpm

Temperature 65 °C

Medium Water with
 coke fines

Control system



Main Control Panel,

Pump area

- Operation of pump unit,
- Lube oil unit
- Panelview
- Condition monitoring
- Maintenance provision
- Status indication by Imps

Cutting system: Hoist and DSD

Electrical system

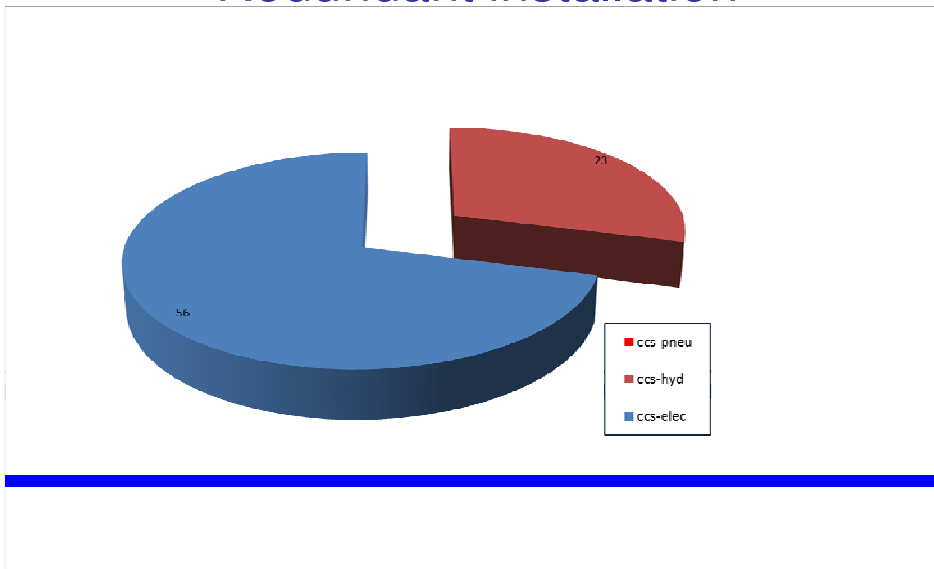
- **Features**
 - 1 VFD set for hoists
 - 1 running, 1 stand by
 - 1 VFD set for DSDs
 - 1 running, 1 stand by
 - VFDs, 1 set per coker,
 - Installed in safe area, or
 - Cutting deck
 - Redundant installation

Hydraulic system

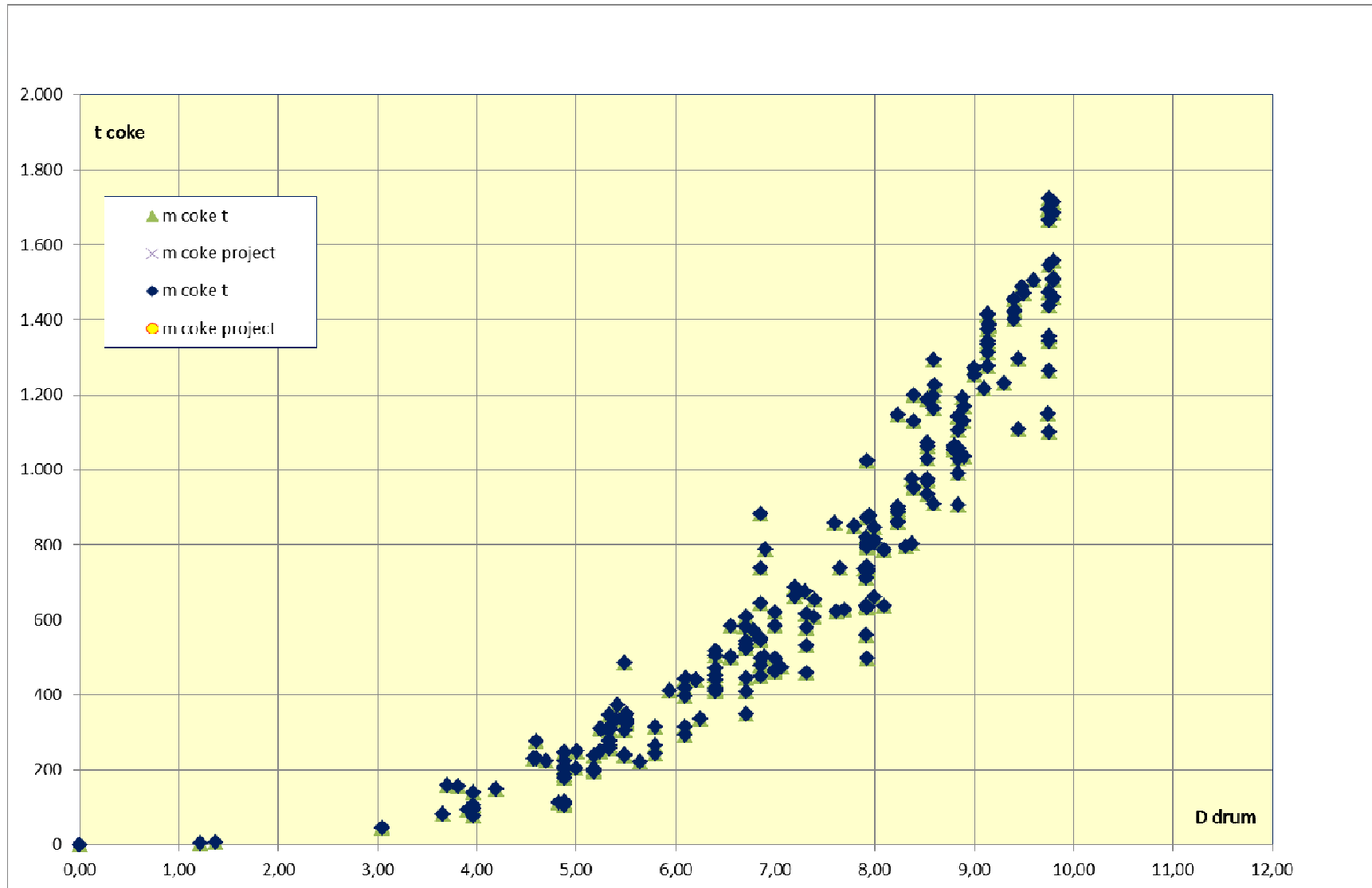
- **Features**
 - Hydraulic power unit
 - 1 hyd. hoist/DSD per drum
 - 1 Operator panel per drum pair
 - Control electric/electronic
 - Integrated in PLC system
 - Measurement of force, tension

Pneumatic system

- **Not recommended**
 - Un- sufficient power,
 - Oil polluted air
 - High noise level
 - Remote / automatic control
 - Not reliable

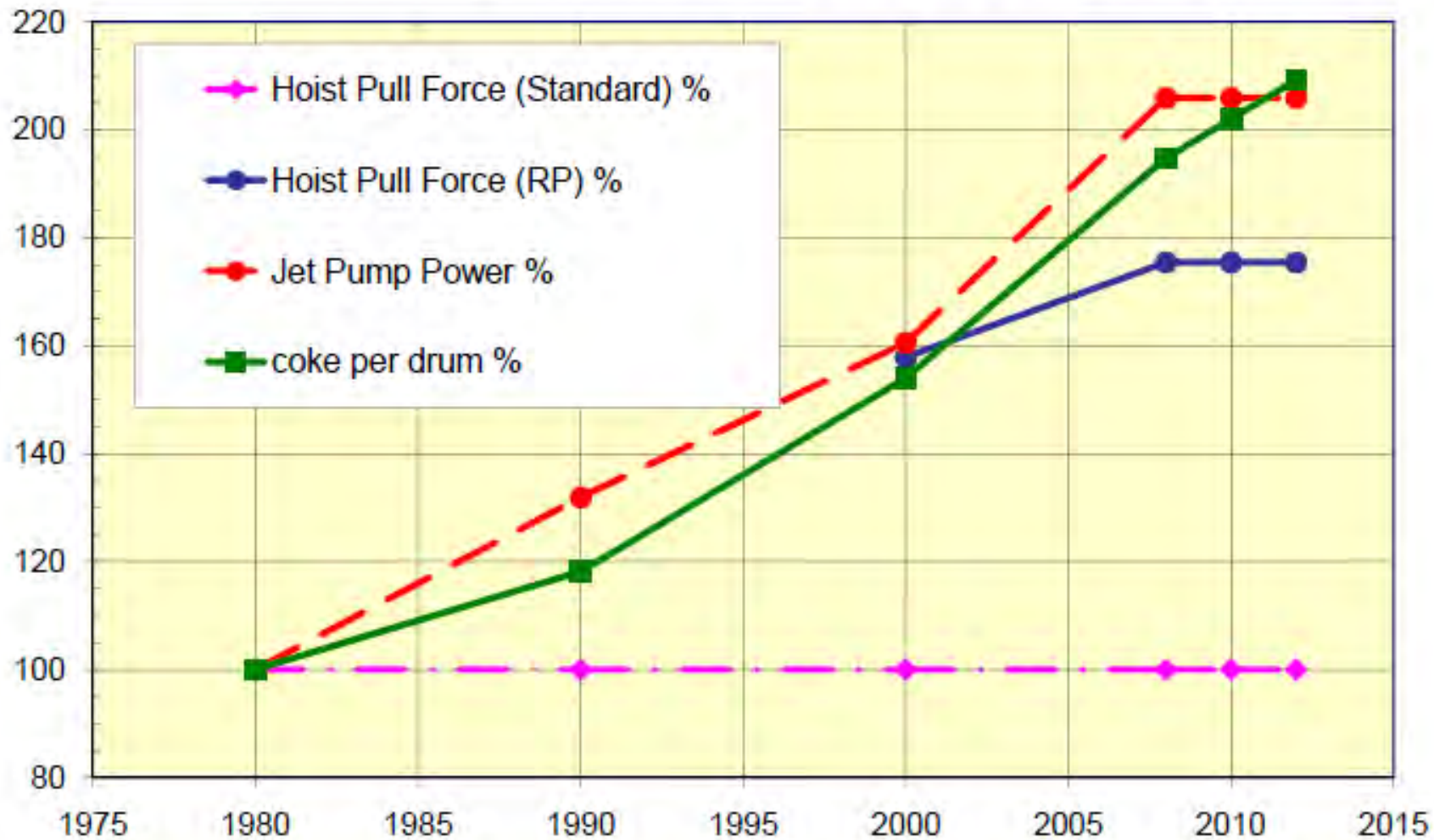


Weight of Coke



Cutting System Performance

Hoist pull force related to drum size and jet pump power



Hoist and Rope



- **Hoist with integral cartridge gear**

- drum with grooves
- Pull force 5 t
- slack rope indicator
 - locks the hoist

- **Rope**

- measurement of tension in the rope
- indication at the operator panel
- avoiding of overload

Hoist, Block and Rope



Hoist, electrical driven, cartridge gear

- Electric driven, 45 kW
- Triple Brake system
- Pull force 5.000 kg,
- slack rope device
- API Baseplate
- Safety cage

Rope

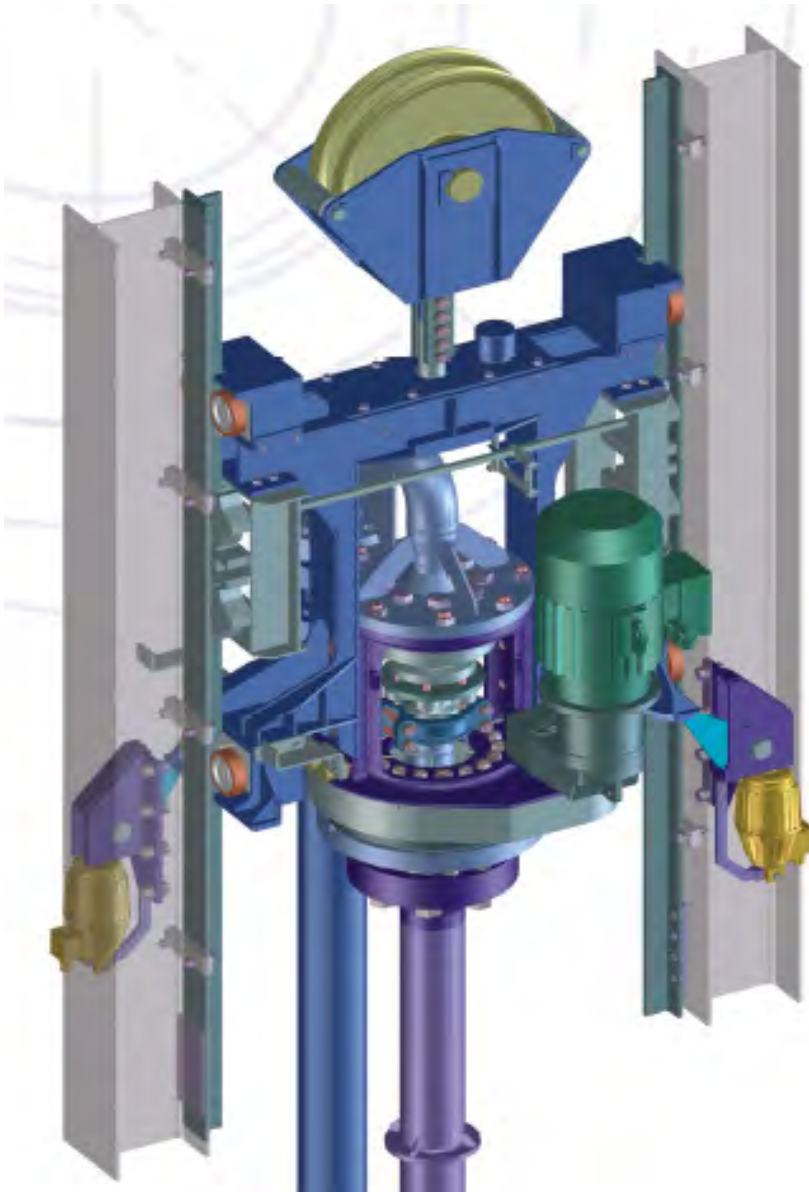
- 16/18 mm
- measurement of rope tension
- indication at the operator panel
- avoiding of overload

Drill Stem Drive



- **Drill Stem Drive**
 - Electric motor
 - High load bearing
 - Grease lubrication
 - Cartridge packing
 - Swivel
 - Standard version
(down to -20 °C)
- **Variable Frequency Converter VFC**
 - At Cutting deck, or
 - At safe area

Crosshead with FFA and DSD



Ruhrpumpen Drill Stem Drive

- grease lubricated
- modular design
- packing cartridge
- one main bearings
- hydraulic / electric

Tolerances of installation

Main beams

outside-outside	1640 mm
acting width	1400 mm

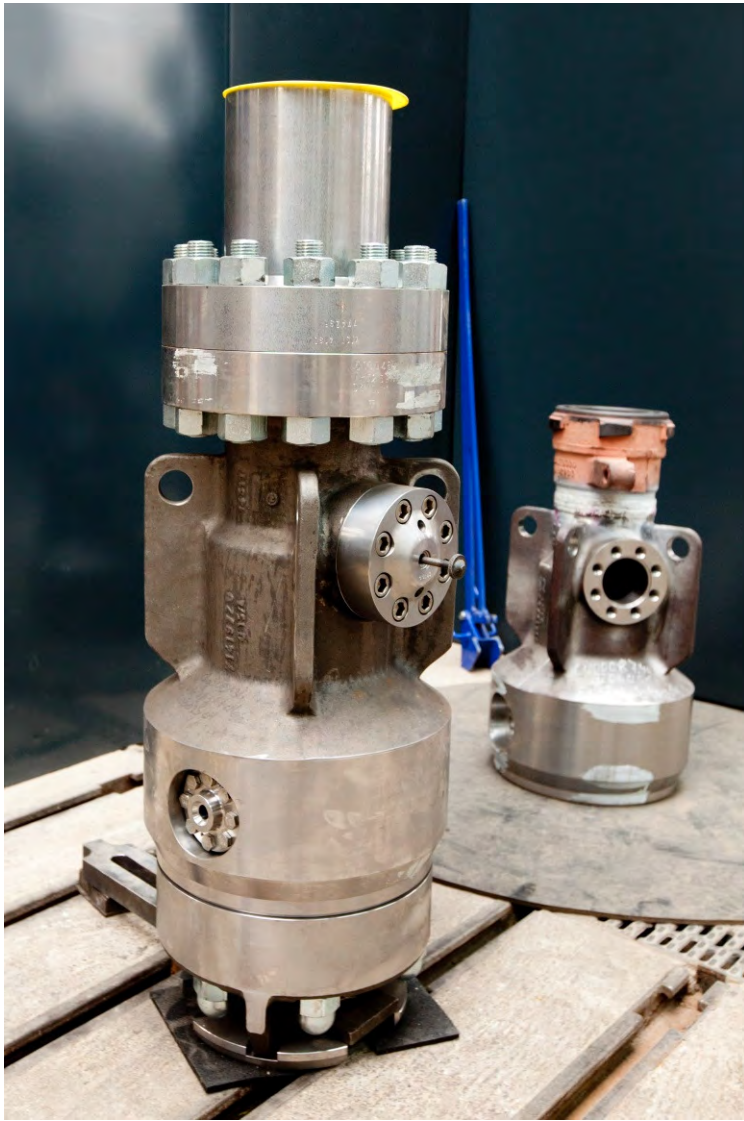
Tolerances

guide beams/rails	+3/- 3 mm
main beams	+5/-15 mm
	+50/-25 mm special

weight 850 kg

Reduced shock load Vert. main beams

Automatic Cutting 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

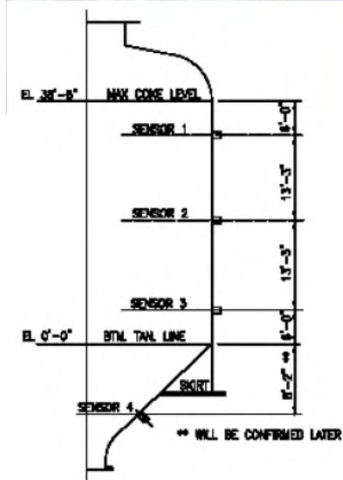
- 1 strong centre nozzle
- 3 periphery nozzles

Drum Monitoring System



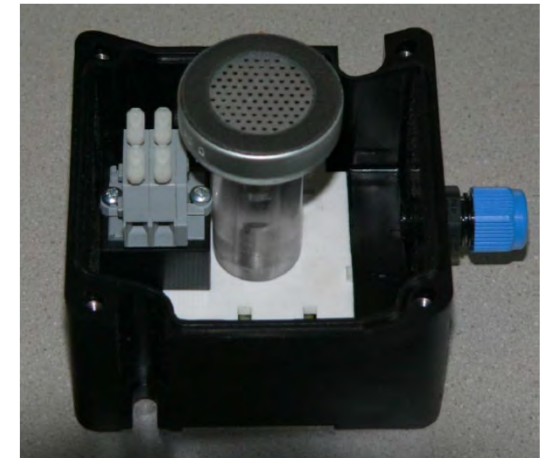
Drum Monitoring

Signals are channelled to PLC System,
Operation Information/Signals for Cutting
System



Vibration

Noise



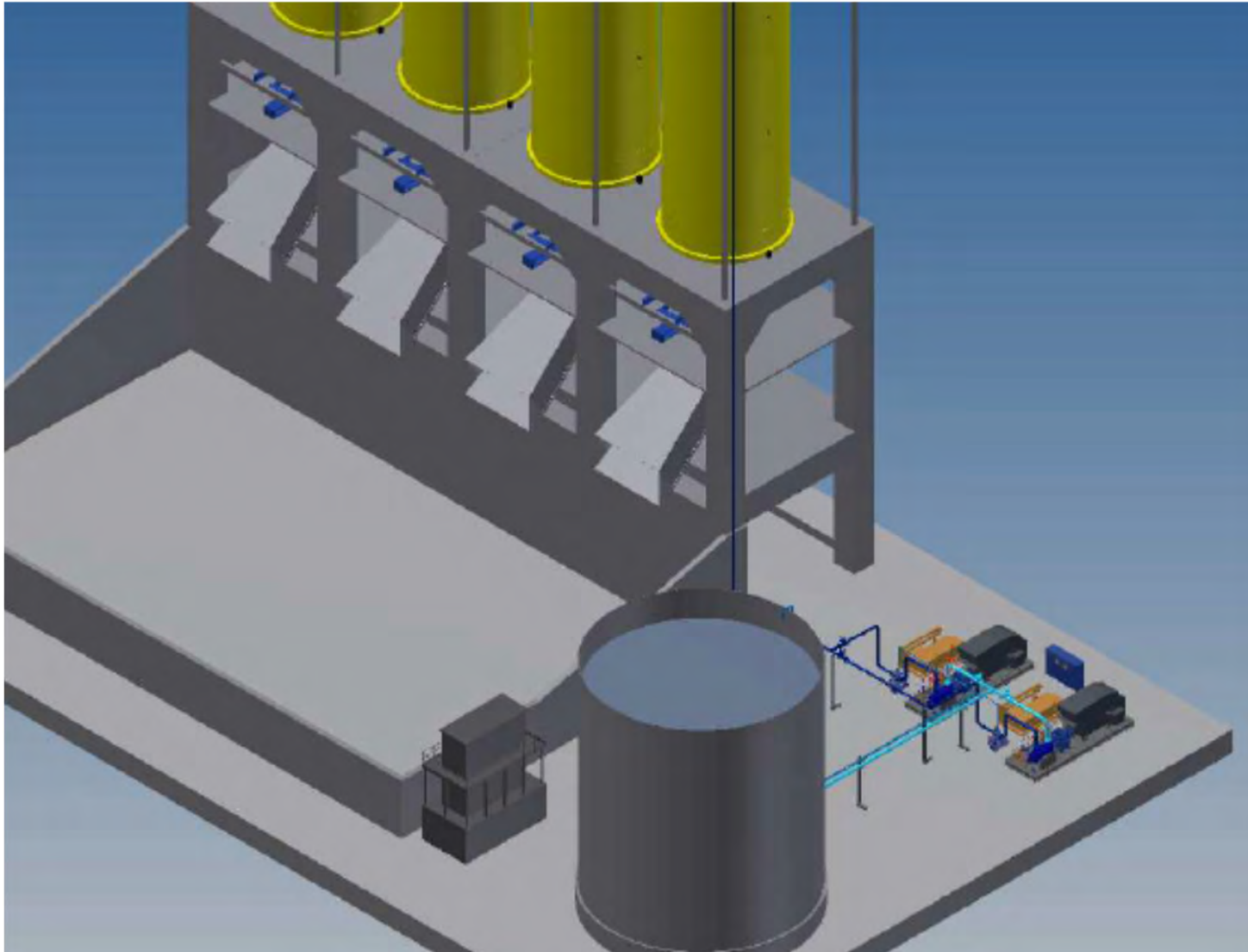
Operator Shelter with Panel



Local Operator panel

- Operation of
 - Decoking valve
 - Isolation valve
 - Hoist
 - Drill stem drive
- Interactive P&ID

Basic design



Operation
remote

Remote Operator Shelter

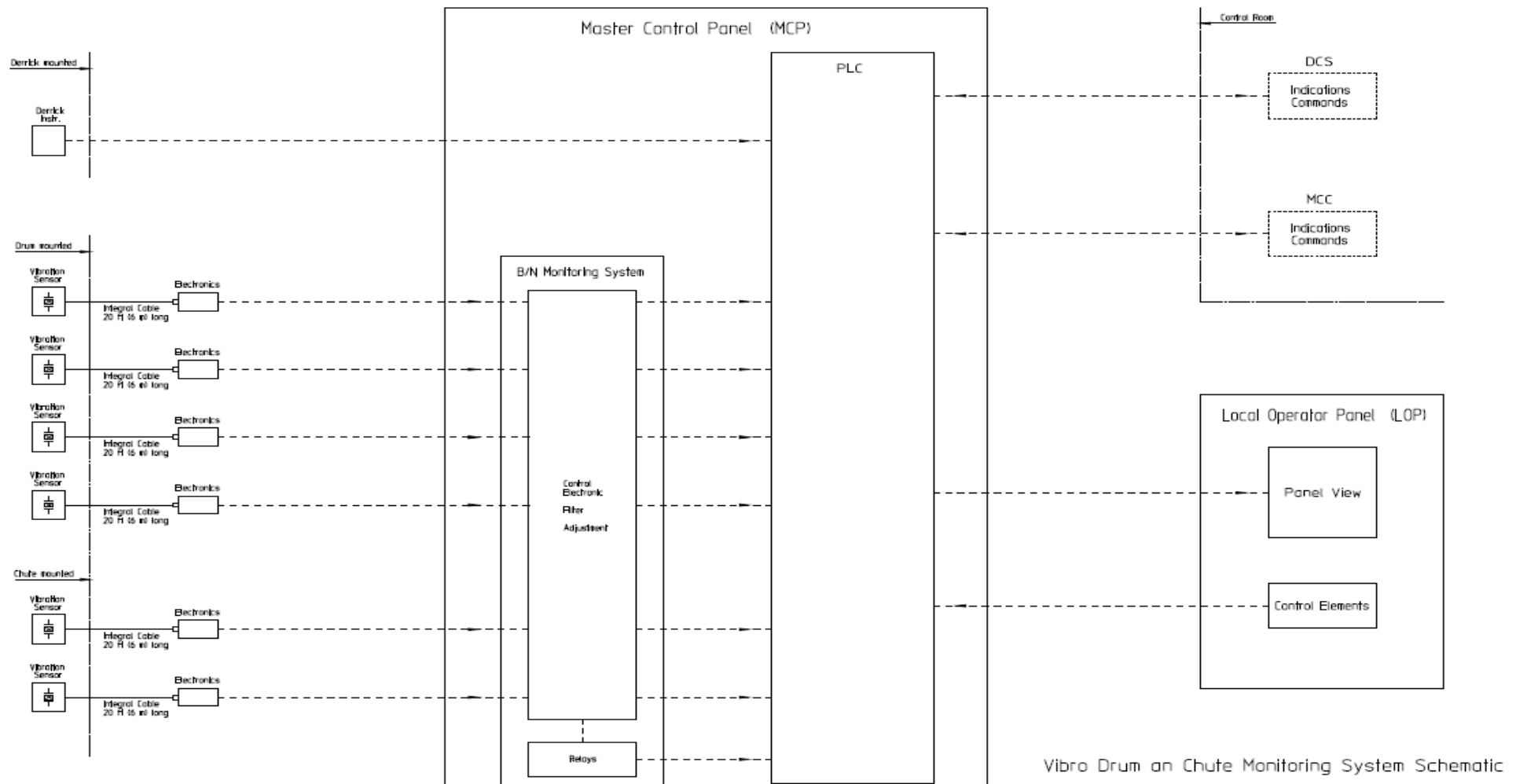


Remote Cutting System

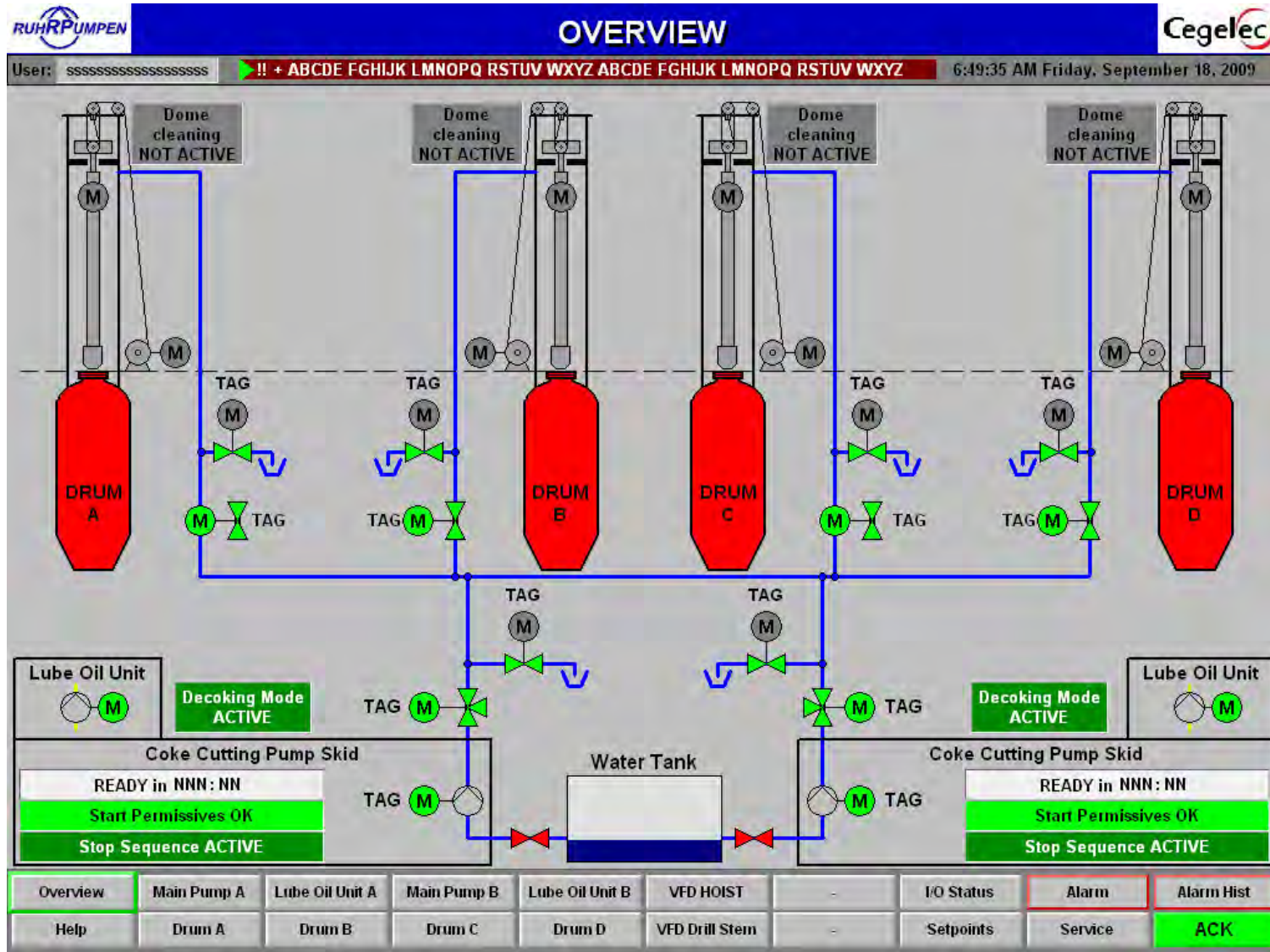
Frontier, Kansas,
USA 2008

Remote - Automatic Decoking

Instrumentation drum-shute vibro-system



Control and Process visualisation



Coke Cutting system

Limitations of Remote / Automatic Coke Cutting

- **Coke Cutting System**

- Weak points of Cutting System cannot be eliminated
- Power of Cutting System cannot be improved
- Safety issues cannot be solved
 - Except Operators are removed from Cutting deck
 - Except Operators are hurt and fatalities are avoided

- **Control System**

- Program is as good as information from site are implemented
- Program is as good as experience from supplier are implemented
- Program is as good as special operation features are implemented
 - Different Feedstocks can be handled only when procedures are implemented

- **Optimization**

- Optimization is an ongoing process

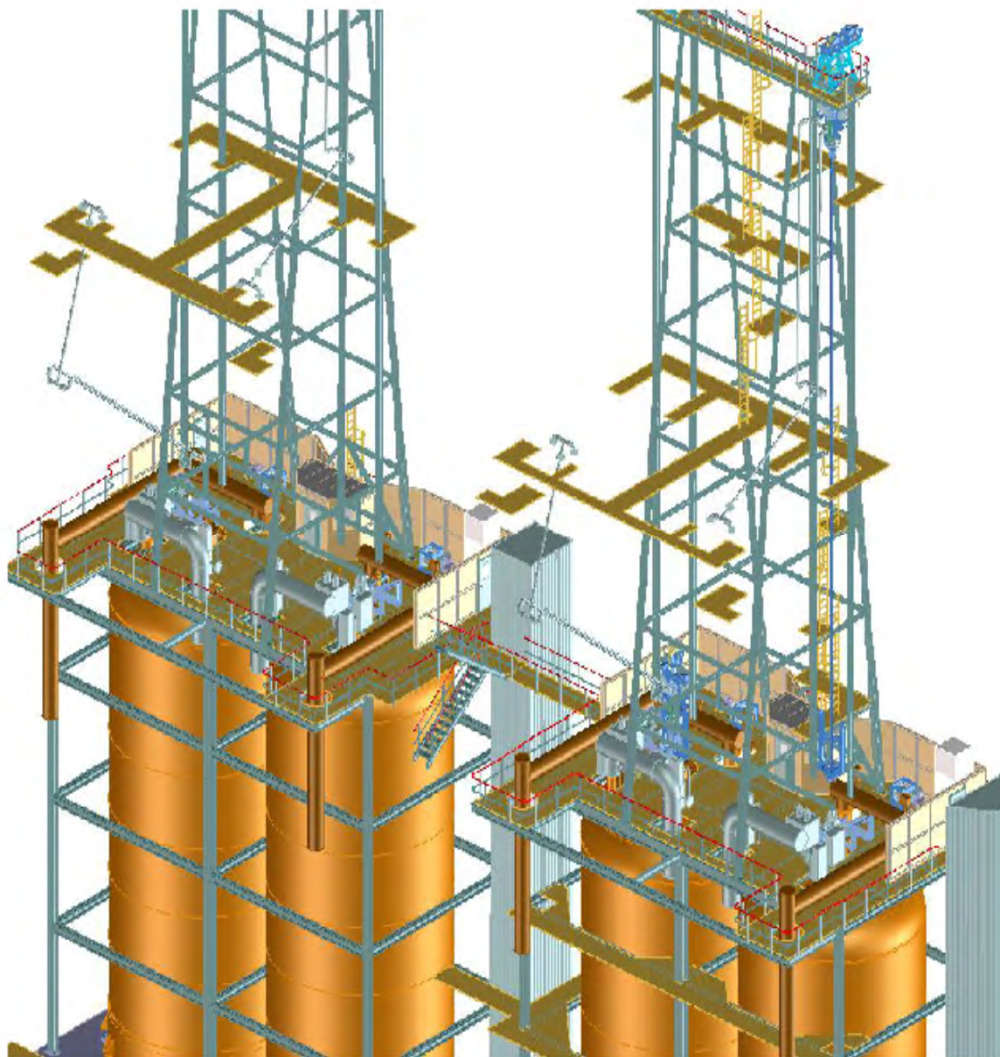
References, running for several years

Germany,	2006	BP	remote, automatic
USA,	2009	Frontier	remote, manual
Argentina,	2010	Shell	remote, manual
USA,	2010	Hunt refining	remote, manual

RP has actual

**2 orders for remote coke cutting system
3 orders for remote / automatic system**

BP-Gelsenkirchen



**BP-Gelsenkirchen,
Germany**

Licencor: FW

Scope

- Cutting system, automatic
- Bottom deheading, semi-auto
- Top deheading, semi-auto

Order: 2003-06

Start up: 2004-05



Frontier, Kansas, USA

Licensor: Lummus

EPC: CBI

Scope:

- Cutting system,
- 1 pumps, 2 drums

- Order: 2007
- Start up: 2008

- remote cutting system



Hunt, AL, USA

Licensors: Lummus

EPC: Commonwealth Eng.

Scope:

- Cutting system,
- 2 drums, revamped coker
- Electrical cutting system

- Order: 2009

- Start up: 2010

- remote cutting system



Hunt, AL, USA

Scope:

- Cutting system,
- 2 drums, revamped coker
- Electrical cutting system

- Order: 2009
- Start up: 2010

- remote cutting system



Hunt, AL, USA

Scope:

- Cutting system,
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- Electrical cutting system

- Order: 2009
- Start up: 2010

- remote cutting system

Remote and Automatic Coke Cutting

Results of Remote and Automatic Coke Cutting

1. Safety

- Increased Safety
- “No Men in the structure during Coke Cutting”

2. Operation / Process

- Increased Stable process
 - More Data and information to the operator remote
 - More Data and information to Control Room remote/automatic

3. More through put => more money

- Stable process, more through put
- Reduced failure rate, reduced downtime, reduced maintenance
- Minimizing of “human factor” with automatic coke cutting



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THANKS FOR YOUR

ATTENTION

