

# **Upgrading Existing Delayed Cokers** with **Ruhrpumpen Remote Coke Cutting Technology**

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**Valencia, Spain, 2018-10-03**

**Dr. Wolfgang Paul**

# Introduction



**Our Mission: Become a worldwide company**

**1950 Founded in Witten / Germany**

Specialist for: API Process pumps  
API Pipeline pumps for Crude Oil,  
Products, Water

**1963 Part of THYSSSEN AG**

THYSSSEN RUHRPUMPEN

**1997 Part of Cooperation EG, Monterrey,  
Mexico**



**Location: RuhRPumpen Witten, Germany**

**2000 Start with Hydraulic Decoking  
System**

**2001 First Order: Petroleras Ameriven  
/04** ConocoPhillips, PdVSA, Chevron Texaco

**Since that time orders for revamps, new  
Units and Components**





Aerial picture of Witten Plant  
by Bavaria Luftbild Verlags

## Witten, Germany

Area: 48,000 m<sup>2</sup>  
Testing: 8,850 HP



## Tulsa, USA

Area: 28,000 m<sup>2</sup>  
Testing: 2,000 HP



## Monterrey, Mexico

Area: 14,370 m<sup>2</sup>  
Testing: 7,500 HP



## Changzhou, China

Area: 7,500 m<sup>2</sup>  
Testing: 6,000 HP



## Chennai, India

Area: 7,500 m<sup>2</sup>  
Testing: 6,000 HP



## Orland, California

Area: 2,500 m<sup>2</sup>



## Rio de Janeiro, Brazil

Area: 7,500 m<sup>2</sup>  
Testing: 6,000 HP



## Buenos Aires, Argentina

Area: 7,500 m<sup>2</sup>  
Testing: 1,500 HP



## Suez, Egypt

Area: 2,280 m<sup>2</sup>  
Testing: 2,680 HP



## Target and goal of a revamp project

**Reliability**      increase for the next 20 years

**Safety**      increase to the actual technical standard in the industry  
for operators and equipment

**Maintenance**      reduction of maintenance activities  
reduction of downtime

**Environment**      improve of environmental issues  
- noise, oily air, steam

**Spare Parts**      availability for all components



# Ruhrpumpen – major revamps



## BP-Gelsenkirchen, Germany

### Goal / Target

Increase of safety

Modernization of cutting system

### Scope

- Cutting system, elec operated
- Bottom deheading, semi-auto
- Top deheading, semi-auto

Order: 2003-06

Start up: 2004-05

# RP elec Coke Cutting System

**BP-Gelsenkirchen,  
Germany (2004)**

## Goal / Target

Increase of safety

Modernization of cutting system

Remote Coke Cutting 2006

## Scope

- Cutting system,           elec operated
- Bottom deheading,   semi-auto
- Top deheading,       semi-auto

Order:     2003-06

Start up:  2004-05





# RP-semi automatic top deh.

**BP-Gelsenkirchen,  
Germany (2004)**

## Goal / Target

Increase of safety

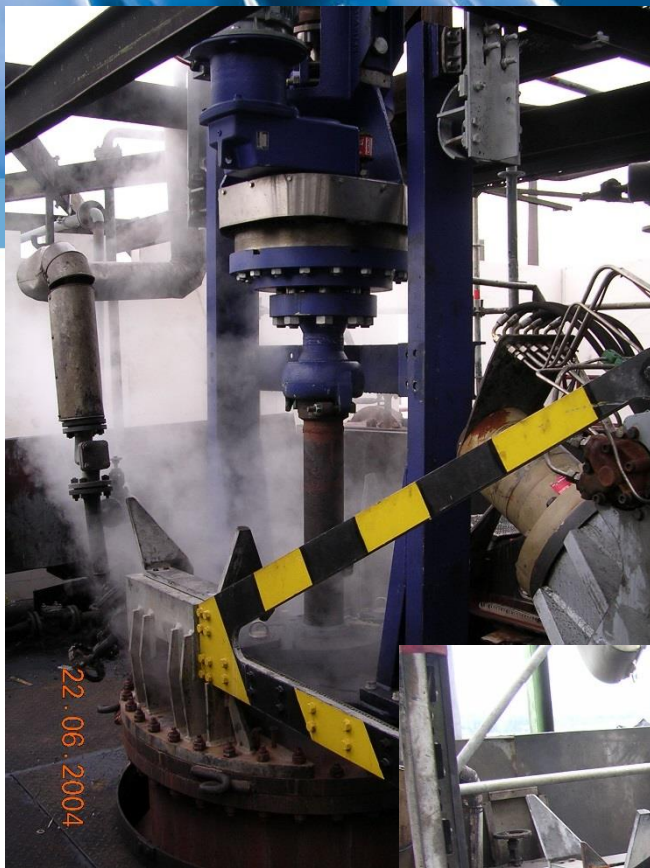
Modernization of cutting system

## Scope

- Cutting system, elec operated
- Bottom deheading, semi-auto
- Top deheading, semi-auto

Order: 2003-06

Start up: 2004-05





## **BP - ERE - Lingen Germany**

### Goal

**Increase of safety**

### Scope:

**Cutting system,**

**Top deheading,      ZJ electric driven**

**Bottom deheading, semi-automatic**

**Order:    2003-12**

**Start up: 2004-10**



# First Deheading valve in Europe



**BP - ERE - Lingen  
Germany (2004)**

**Goal**

**Increase of safety**

**Scope:**

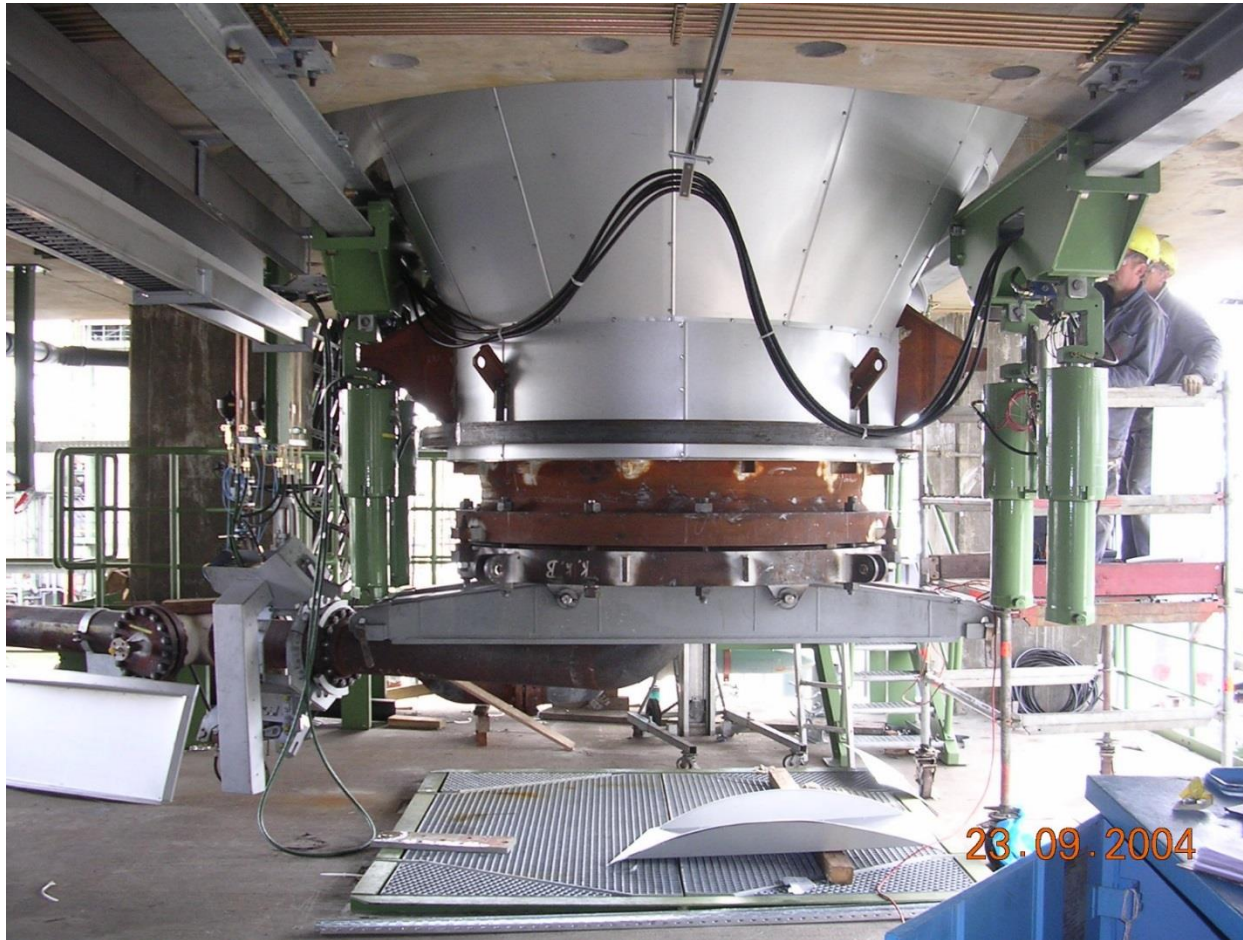
<b>Cutting system,</b>	<b>hydraulic</b>
<b>Top deheading,</b>	<b>zj-electric</b>
<b>Bottom deheading,</b>	<b>semi-</b>
	<b>automatic</b>

**Order: 2003-12**

**Start up: 2004-10**



# RP – semi automatic bottom deheading



**BP-ERE – Lingen B  
Germany (2004)**

**Goal**

**Increase of safety**

**Scope:**

**Cutting system,**

**Top deheading,**

**Bottom deheading,**

**zj-electric**

**semi-**

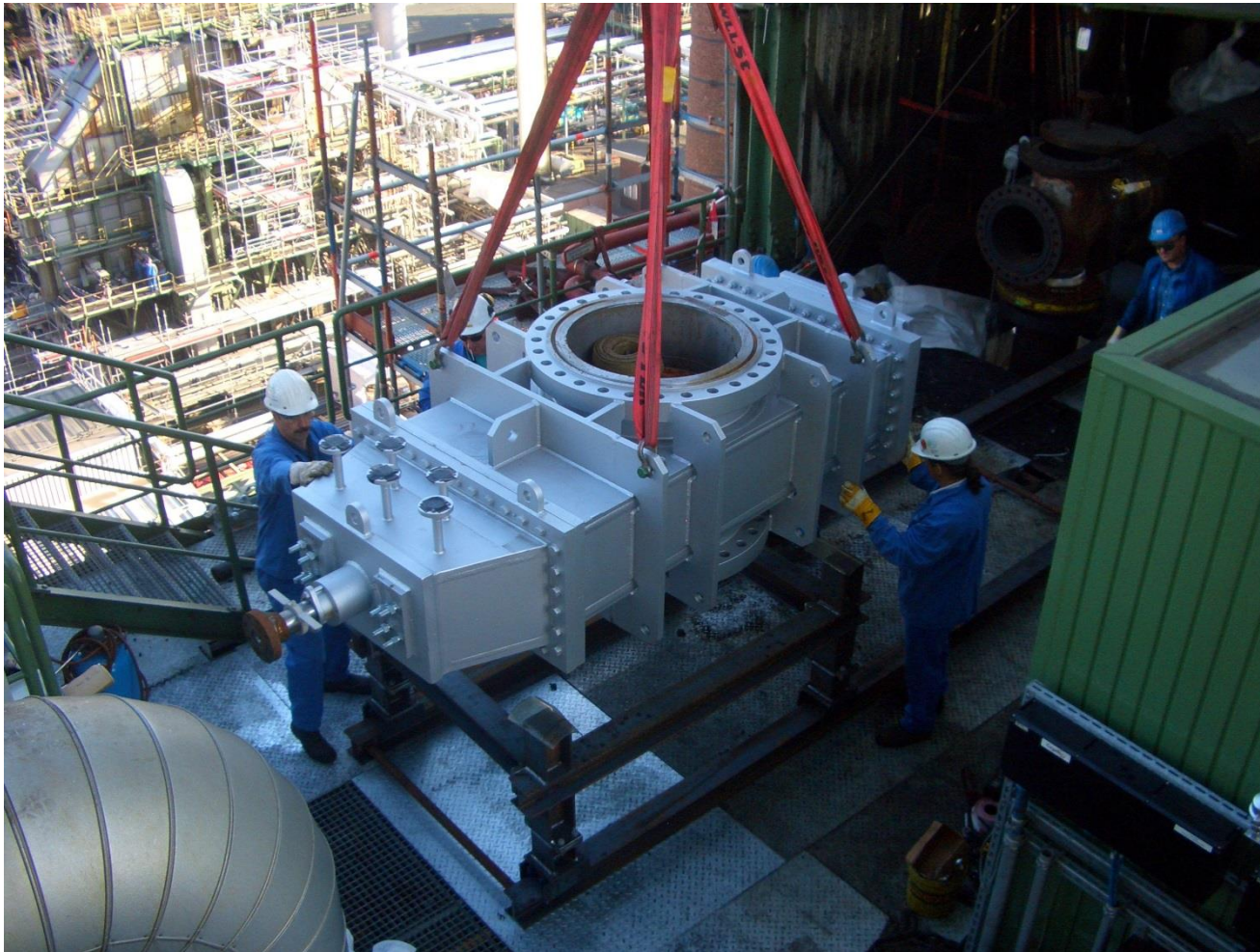
**automatic**

**Order: 2003-12**

**Start up: 2004-10**



# Top Deheading



**BP Germany  
Coker A**

**Delivered and  
Installed by RP**

**Top Valve**

- ZJ 30"
- Adapter drum
- Adapter Top

**Derrick**

- Guide device

**Weight**

- Valve 8.000 kg
- Adapter 1x500 kg

# CBI for Frontier-Oil

**Frontier, Kansas, USA**

**Licenser/EPC: CBI - Lummus**

**Scope:**

- Cutting system, electric
- 1 pump, 2 drums

– Order: 2007

– Start up: 2008

– 1<sup>st</sup> remote coke cutting system in NA





# CBI for Frontier-Oil



**Frontier,  
Kansas, USA**

**Licensors: CBI -  
Lummus**

**Scope:**

- Cutting system,
- 1 pumps, 2 drums
- Order: 2007
- Start up: 2008
- remote cutting system

# Hunt Refining



**Hunt, AL, USA**

**Licensors: CBI - Lummus**

**Scope:**

- Cutting system,**
- 2 drums, revamped coker**
- Electrical cutting system**
  
- Order: 2009**
- Start up: 2010**
  
- remote coke cutting system**



# Shell-Argentina



**Client:** Shell  
**CAPSA, Buenos Aires**  
**EPC:** CH2

## Scope

- revamp of cutting system  
hoists and DSD, elec.
- remote cutting system  
for 2 drums

## Revamp

- delivery in 2010
- start up 6 month later

# Coker in Romania



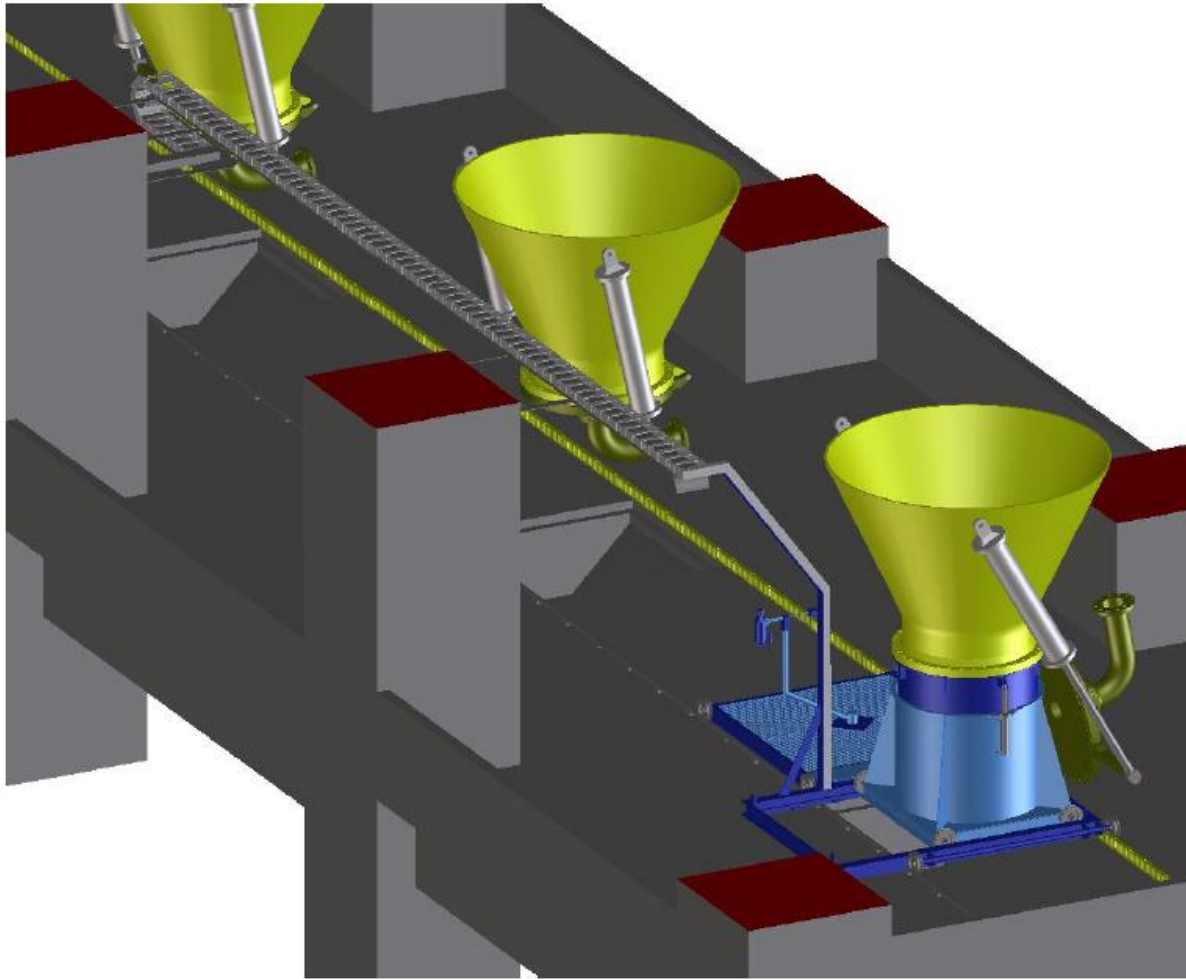
- OMV
- Rompetrol
- Lukoil



## Bottom



- up to 2015
  - open chute
  - Manual operation
  - Without safety system



## Switch deck

### Chute System

- Ruhrpumpen

### Safety Clamping Device

### Version A

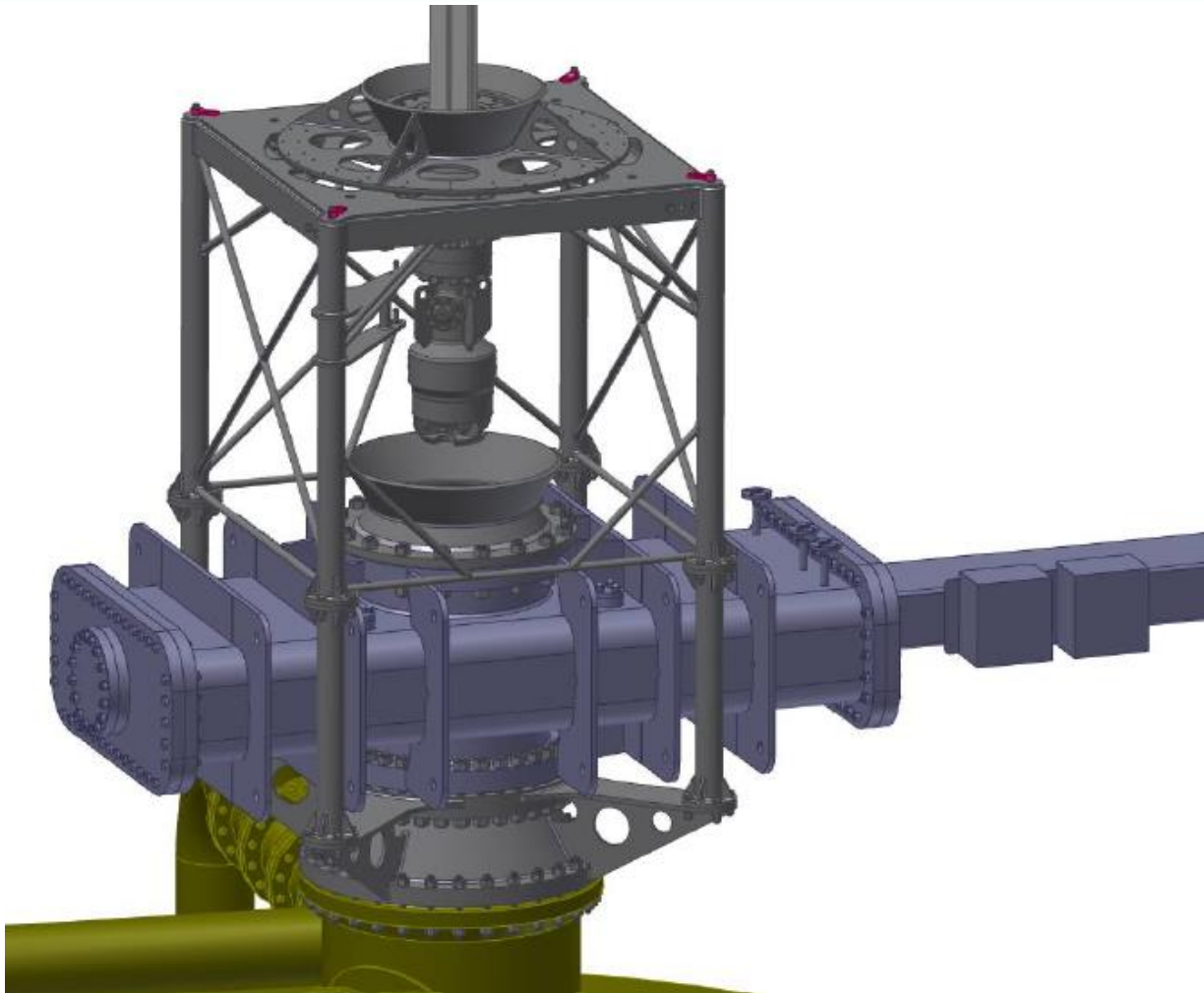
- Reinforced hydraulic cy

### Version B

### Auxiliaries

- HPU
- Operator Shelter
- MCC
- PLC Cabinet

# Petrom-OMV-realisation



## Top valve assembly

- Adapter
- Top valve
- Guide device





# Petrom-OMV-realisation



## Top valve assembly

- Adapter
- Top valve
- Guide device



# MIRO-Karlsruhe

**MIRO- (ex ESSO)  
Germany**

**Drum: 2 x 7,30 x 32 m**





# RP – Crosshead and FFA

**MIRO- (ex ESSO)**

**Germany**

- 1. automatic coke cutting (by ESSO)
- Drum: 2 x 7,30 x 32 m

**Ruhrpumpen**

- |             |  |
|-------------|--|
| <b>2006</b> | <b>Tools, auto</b>   |
| <b>2010</b> | <b>Drill Stem Drive</b>                                      |
| <b>2012</b> | <b>Crosshead, Free Fall<br/>Arrestor,<br/>HP-Water Hoses</b> |
| <b>2017</b> | <b>Top&amp;Bottom Valves<br/>(other)</b>                     |
| <b>2017</b> | <b>Enclosure (RP)</b>  |



# OMV-Burghausen

**OMV-Burghausen  
Germany**

**Drum: 2 x 6,82 x 29,92 m**



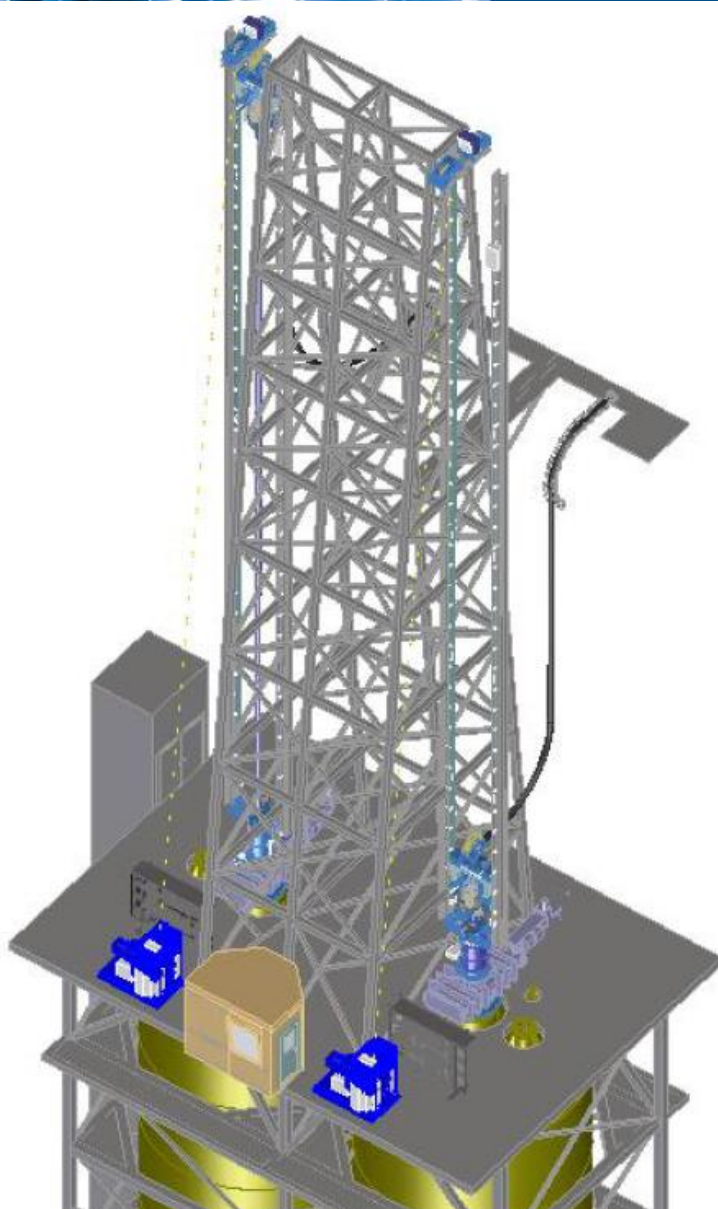


# RP – FEED study

## OMV-Burghausen Germany

“Coker 2020+ “

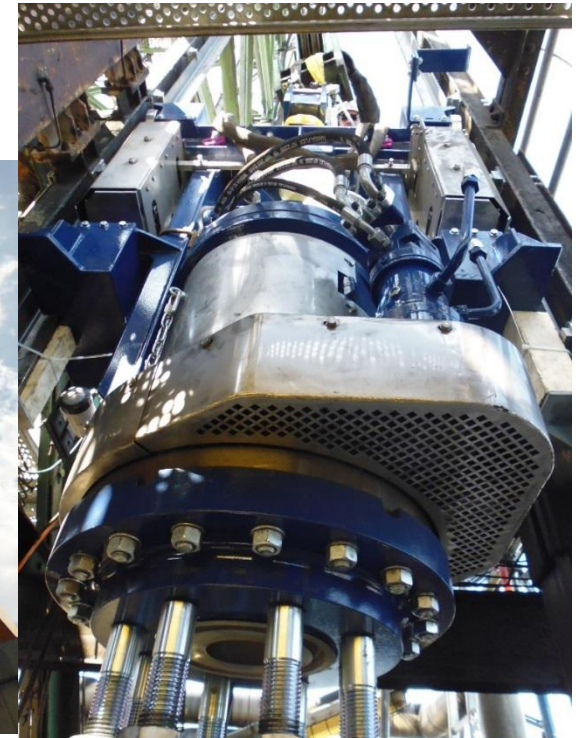
2017	Free Fall Arrestor System Drill Stem Drives (Seal)
2020	Hoists, electric Hoses instead of pipe
202x	Top and Bottom valves



# RP – DSD, Crosshead and FFA

## Ruhrpumpen

2006	Auto Tools
2007	Jet Pump+dcv
2018	CH+FFA, DSD



# **RP Coke Cutting Control System**

## **Ruhrpumpen Philosophy for upgrades and revamps**

### **1. Strong mechanical lifting system**

- Hydraulic / electric driven Hoists and DSDs
- Crosshead with Free Fall Arrestors
- Basic Instrumentation in the derrick
  - Rope load, position encoders and switches
- Reliable and simple Tool

### **2. Control System**

- Signal channelling from Cutting System through PLC to OP Panel
  - Operator Panel with signal and status visualization
  - PLC-program with Automatic Cutting System Program
- remote CC  
automatic CC

### **3. Drum Vibration Monitoring System and Camera System for remote / auto**

- Vibration Probes at drum
- Camera Systems for Cutting Deck and Chute observation

### **4. Manual override function**

For Installation and Maintenance



# Control system



## Local Operator panel

### Cutting deck

- Operation of Cutting System

- Interactive P&ID

- Safety glas

- Fire resistant material

High safety on cutting deck  
(modernization 2004)

# Control system



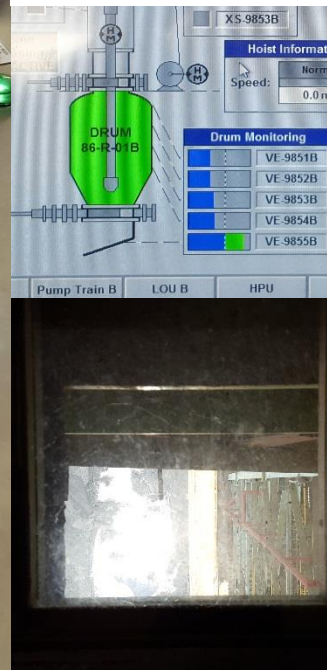
## Operator Panel, Shelter on Cutting Deck

- Operation of Cutting System from safe shelter

## – Panelview

## Indication during drill/cutting

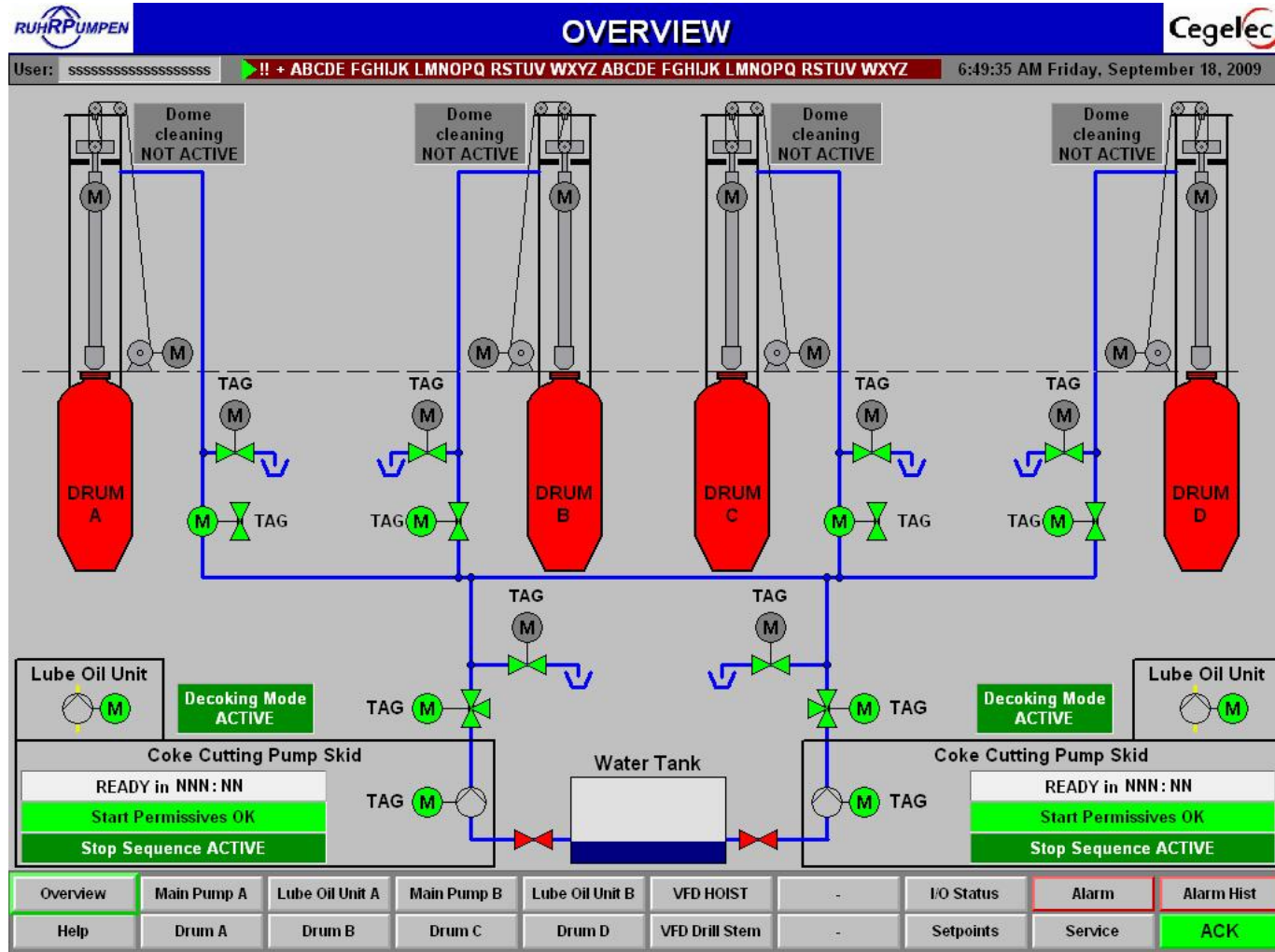
- coke fall out
- Jet to wall



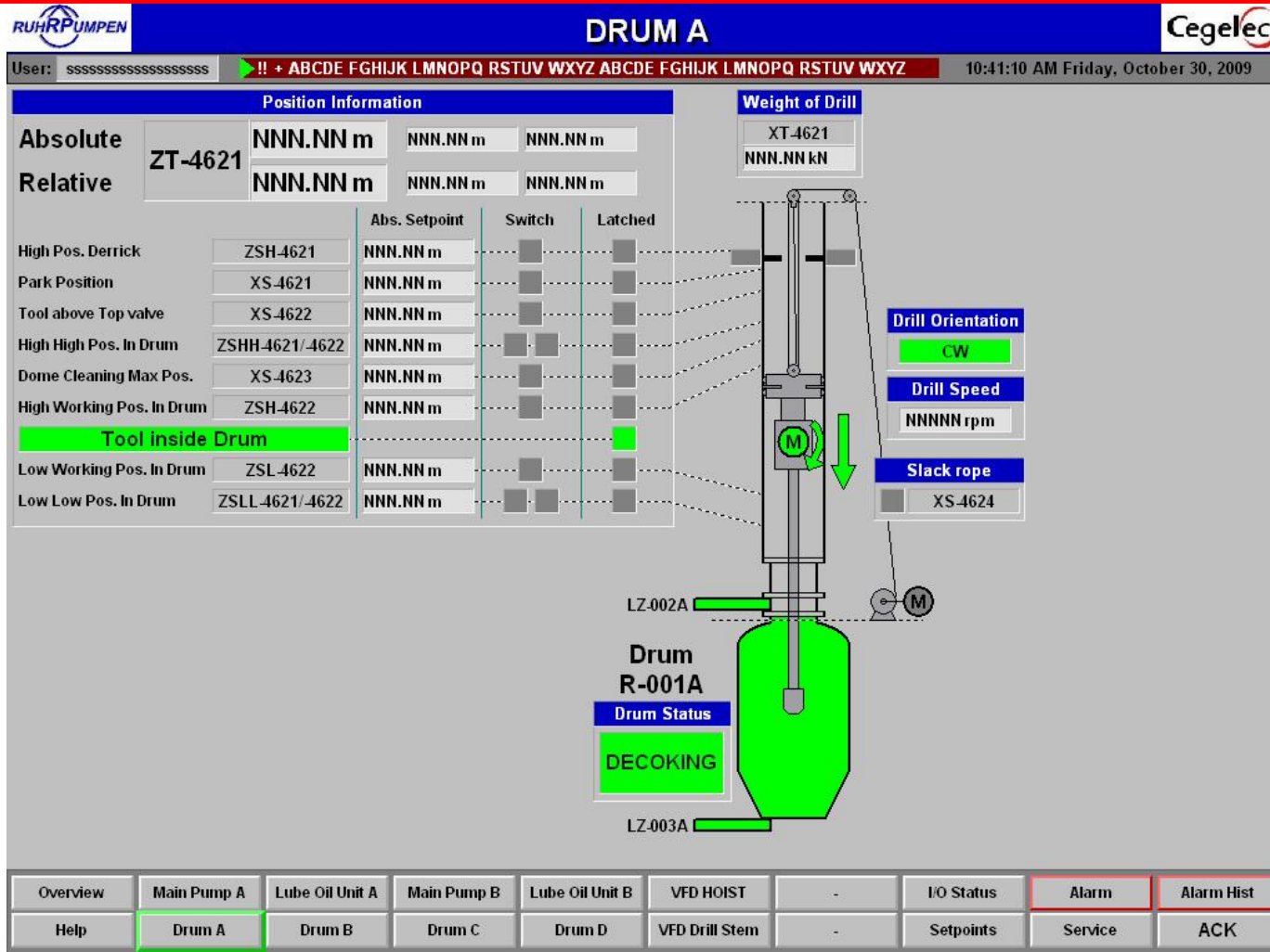
- Condition monitoring
- all data of Cutting System
- Maintenance provision
- Status indication by lamps
- View to cutting deck / hoists
- Designed for remote operation



# Control and process visualisation



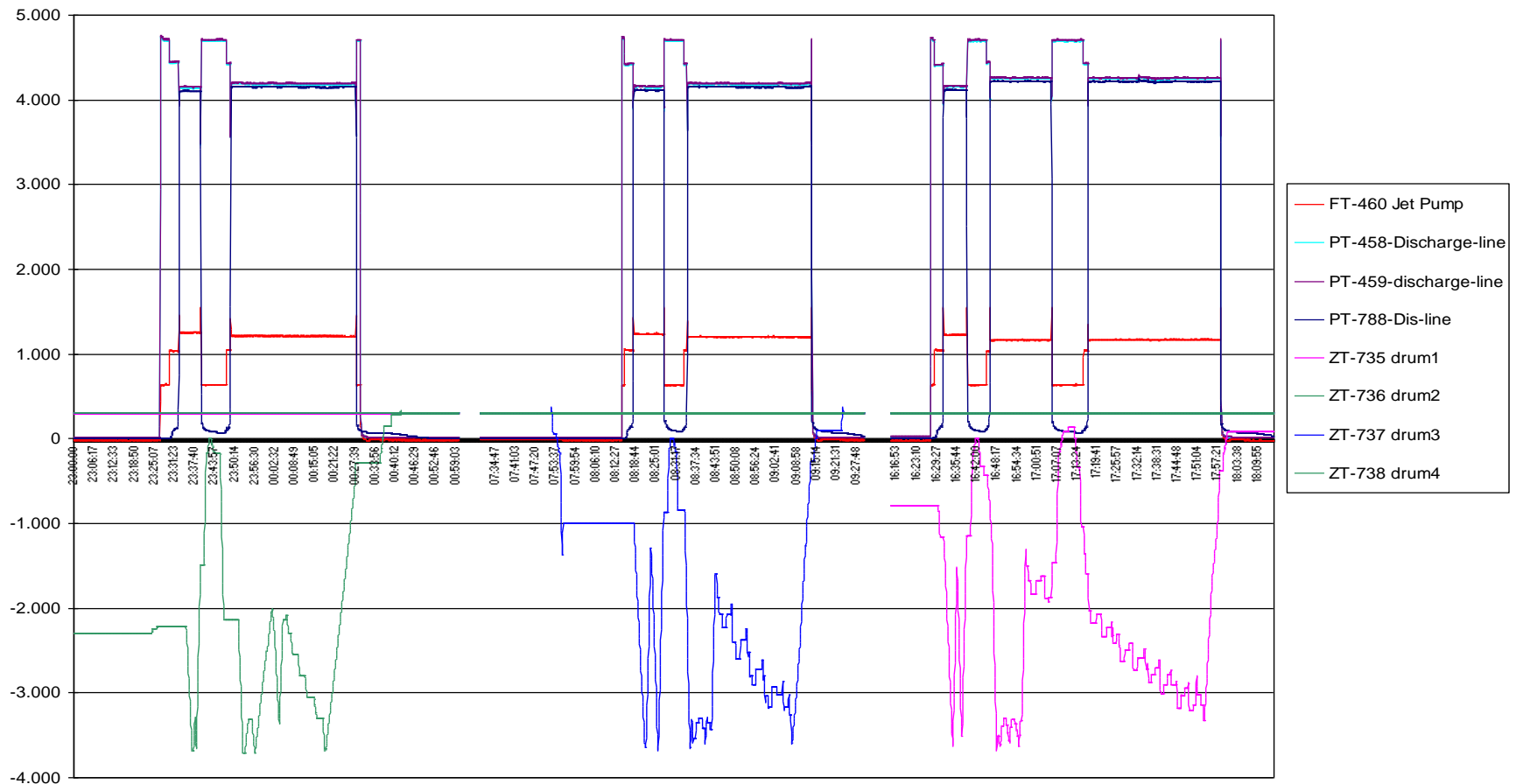
# Control and process visualisation





# Control and process visualisation

14/15-02-2005



# Remote Control system



**Frontier, Ka**  
**Operator cubicle**  
**First remote system in NA**

Remote operation

- Deheading Valves
- Coke Cutting

Auxiliaries

- HVAC
- Camera System



# Remote Operator Shelter



## Remote Cutting System

Frontier, Kansas,  
USA 2008

# Remote Operator Shelter



**Hunt, AL, USA**

**Licensors: CBI -  
Lummus**

**Scope:**

- Cutting system,**
- 2 drums, revamped coker**
- Electrical cutting system**
  
- Order: 2009**
- Start up: 2010**
  
- remote cutting system**



# Remote Operator Panel - typical



Operator Panel  
in  
Control building

# References, running for several years

Germany,	2006	BP	remote, automatic
USA,	2009	Frontier remote,	
Argentina,	2010	Shell	remote,
USA,	2010	Hunt refining	remote,
Russia	2016	LO Perm	remote,
Russia	2016	Tatneft	remote,
Russia	2016	Antipinsky	remote,
Belgium	2018	ExxonMobil	remote, start up 2018
India	2018	IOCL Haldia	remote, start up 2018

**After 2010 nearly all Ruhrpumpen Decoking Systems are built as remote system, designed for extension to automatic systems.**

**Actually, there are 3 orders in house for remote system**



# 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

# **RUHRPUMPEN**

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Supplier of Choice

We make it