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Closed Coke Slurry System (CCS System)

TRIPLAN

Presenter
Bernd Lankers
bernd.lankers@triplan.com
Co-Presenter
Josef Wadle
josef.wadle@triplan.com

TRIPLAN AG
Auf der Krautweide 32
65812 Baden Soden/Ts.
www.triplan.com

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The Future In Coke Handling...

The Closed Coke Slurry System

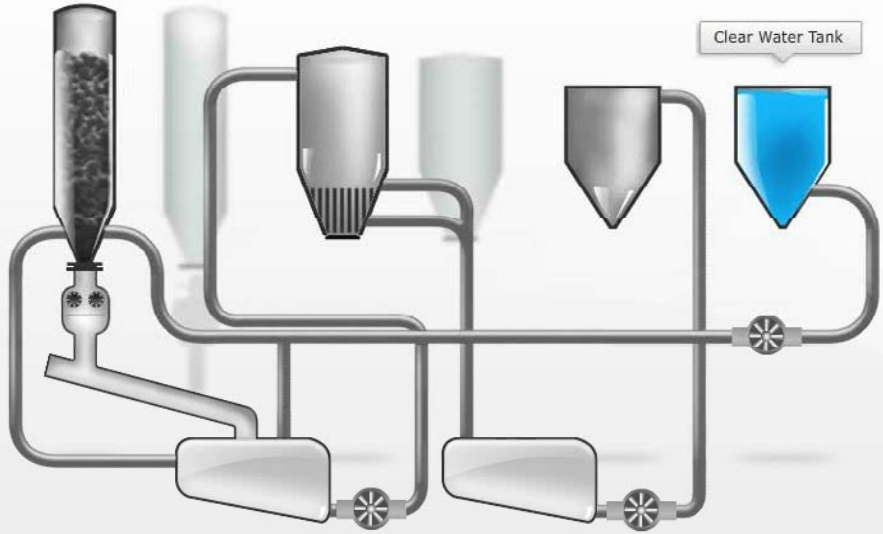
What Can You Expect From The Closed Coke Slurry System...?

**A Step Change in Coke Handling Operation
Between Cutting And Coke Load-Out**

And These Are The Benefits...

- **State-Of-The-Art Design For Zero-Dust-Coker, VOC- & Steam-Releases**
- **Fluidized Operation --- Similar To Many Refining Processes**
- **Effective Fines- & Water-Management / No Silt Disposal**
- **Unparalleled System Reliability (98+%) Through
Unique Design Features & Material Selection**
- **Low Manpower Requirements Through Instrumentation & Logic
Control Features**
- **Flexible To Suit Retrofitting & Grassroots Coker**

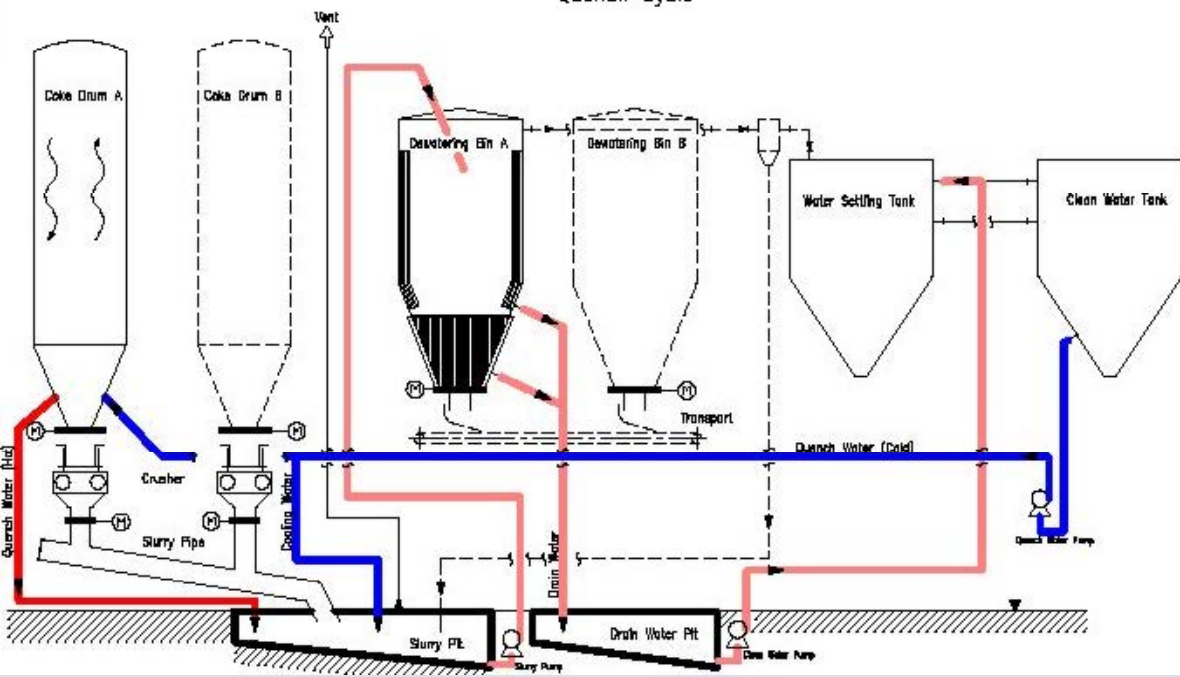
Quench Cycle



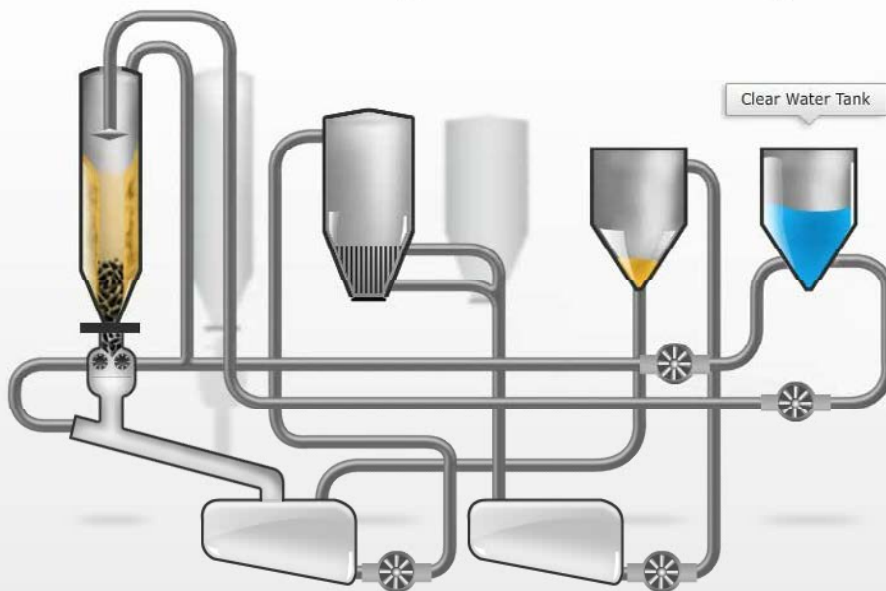
[Prev](#)

[Next](#)

Quench Cycle



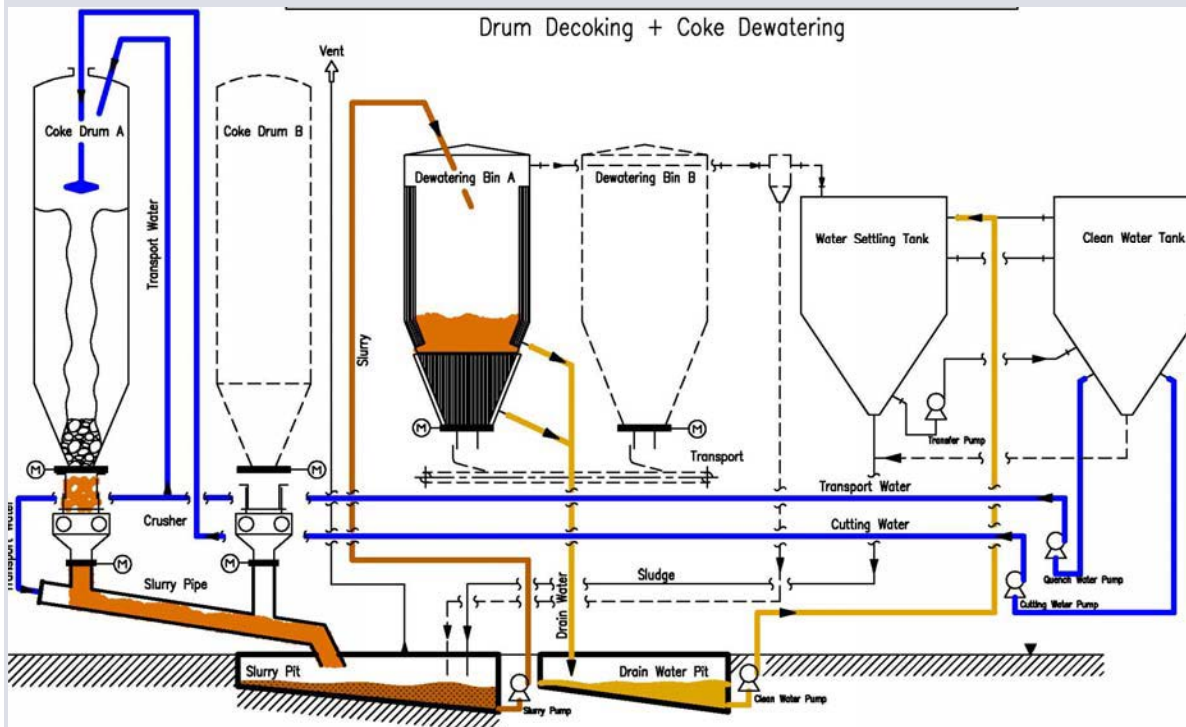
Drum Decoking + Coke Dewatering



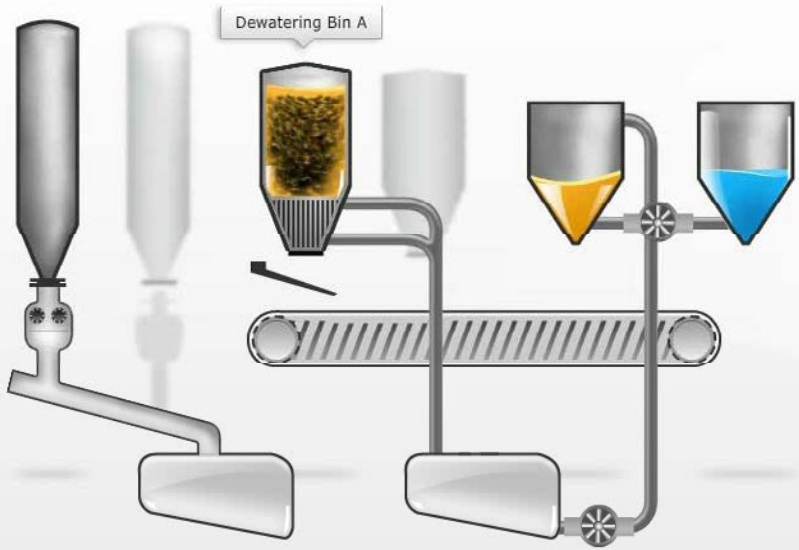
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[Next](#)

Drum Decoking + Coke Dewatering



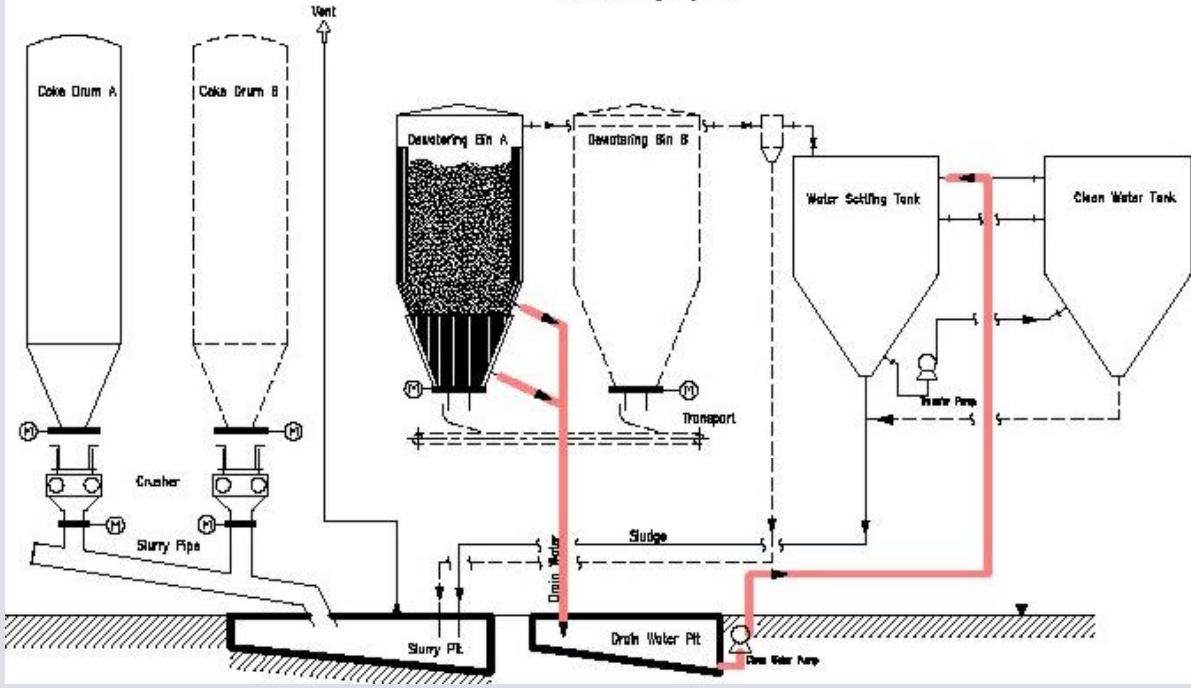
Dewatering Cycle



[Prev](#)

[Next](#)

Dewatering Cycle



Unique System Components Provide Safe and Reliable Operation

Crusher With Shute (Proprietary Design)

- Double Roll With Independent Direct Drive
- Fully Automatic Operation through DCS architecture
- Roll dimensions / Teeth Pattern Developed For Peak- & Impact Loads
- Dedicated Crusher for each Drum is recommended
- Unlimited Swallow Capacity For Any Cutting Rates & Coke Quality
- Crushing Ratio 10:1 e.g. 1.000 mm To 100 mm ; 40" To 4" resp.
- Triple Casing Material Combination For Long Life Cycle -
Overall Wall Thickness 2"
- Safe Operation: Shute Hydraulically Raised & Automatically Docked to
Drum Flange or Bottom Valve

Slurry Pump

- Special Design For "Ultra Low NPSH" Operating Conditions
- Unique Material Selection For Extended Life Cycle

Closed Slurry Pipe

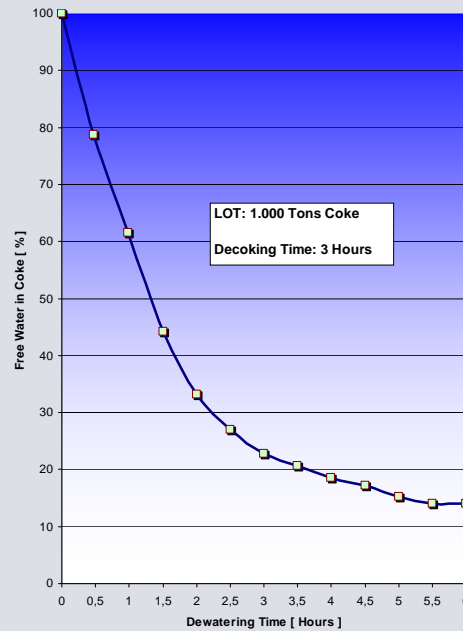
- Special Design For Optimum Slurry Fluidization - Non Clogging -
- Design is a function of velocity, layout and experience - non trench type -
- Special Material Selection & Construction For Extended Life Cycle

Dewatering Bins (Proprietary Design)

Fast And Efficient Entrainment Through...

- Pure Gravity Flow – No movable Devices
- Screen Design With Maximum Surface Arrangement
- Cone Section Fully Perforated For Uniform Dewatering of Wet Feet
- Overall Short Travel Distance For Free Water Entrainment
- more than 6 Years uninterrupted operation
- more than 99,5 % fines retainment in Coke bed

Bin Dewatering Effect over Time



Typical Cycle Schedule (2 Drum Unit – 1.000 to Coke/Drum)

CLOSED COKE HANDLING SYSTEM	hours	1	2	3	4	5	6	7	8	9	10	11	12 - 24
Drum Decoking...	3	█											
Coke Crushing (In-line)	3	█											
Coke Dewatering in the Dewatering Bin	7	█											
Coke Transport/ Loading								█					

Duration, total: 7 hours

How Will The Closed Coke Slurry System Be Implemented?

Retrofitting e.g. Replacement for Open Pit

- Suitable For Multi-Drum Coker
- Layout Planning / Equipment Installation by Considering the
Than Idle Coke Pit
- Revamp Time / Implementation Within Scheduled Envelope for
Coker Turnaround

Capital Projects

- Early Involvement into Planning Phase Allows Smooth Approval Procedures with Authorities, Substantial Capital Cost Savings & Economic Improvements Upfront
 - Eases Authorities Concerns During Project Approval Phase
 - Streamlined Cycle Design Enables Shorter Cycle Time
 - Shorter Payout period with High Unit Reliability (98+%)
 - Substantial Reduction of Planned Manpower
 - Omission of Investment In Pit & Overhead Cranes
 - Lower Structure Elevation/ Less Steelwork

Main Advantages of the CCS-System At a Glance...

- **Workers Health / Inherent Hazards/ Workplace Safety & Environment**
 - **The CCS-System Eliminates Concerns from EPA / OSHA, Local Authorities, Environmental Agencies or other Sources**
 - **Constitutes Benchmark Process as 'Best Available Technique (BAT) For Mineral Oil Refineries' According To European EEU Directive 2008/1/ EC: 'Integrated Pollution Prevention and Control'**

- **State-Of-The-Art Process**
 - **Reference Unit for Zero-Dust Coke handling and Equipment Reliability (98+%) For Years to come**

- **Manpower**
 - **Minimum Manpower through Instrumentation with Logic Steps**
 - **High Workers Acceptance to Similarities with other Refining Processes**

- **Fines & Sludge handling**
 - **Efficient Separation & Removal of Fines (No External Silt) To Produce Excellent Cutting Water Quality by Extended Equipment Life Cycle**

- **Reliability**
 - **Unique Proprietary Material Selection & Combination For Trouble Free, Uninterrupted Operation Between Planned Turnarounds**
 - **Reference Unit in Continuous Operation for 6 Years**

Experience Facts on an existing Unit with over 6 Years Operation

- **No Field Operators**
- **No Maintenance - only Inspection for the Crusher Lube Oil Unit**
- **6 Years Operation equivalent to 3.000 Cycles**
- **1.000 to of Petrol Coke per Cycle**
- **No Deterioration in the Cutting Water Pump Performance**
- **No Corrosion and Erosion in the total CCS System**
- **No Incidents**
- **Delivers Commercially dry Coke with 14% Humidity on a Constant Basis**
- **only 0.5% (5 to) of Coke Fines appears in the Water Settling Tank**

Thanks for your attention

TRIPLAN AG
Auf der Krautweide 32
D-65 812 Bad Soden/Ts.
www.triplan.com
info@triplan.com