

*Trusted for experience. Preferred for performance.*

## Alternative Method for Coke Handling using Hydrobin® Closed-Loop Recirculation System

*Designed to efficiently process and transport petroleum coke from coking vessels to truck.*

Presenter: Steve Ciccarelli  
Senior Application Engineer

Coking.com Safety Seminar  
Calgary, Canada  
September, 2007

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## Who is Allen-Sherman-Hoff® (A-S-H)?

### A-S-H is...

**an operating unit of Houston based McDermott International, Inc.**

- Engineering, Construction, Specialty Manufacturing, Services
- Oil, Gas, Power Generation, Commercial Nuclear, Government Nuclear
- A-S-H Office located in Malvern, PA

**a leader in material conveying business since 1917**

- Over 2,000 Material Handling Systems installed in the U.S.
- Over 130 Material Handling Systems installed in over 20 countries outside the U.S.



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## Industries Served

- Petroleum/HPI
- Electric Utility
- Pulp & Paper
- Waste to Energy
- Industrial Steam Generation

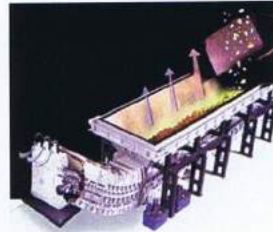


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## Materials Conveyed

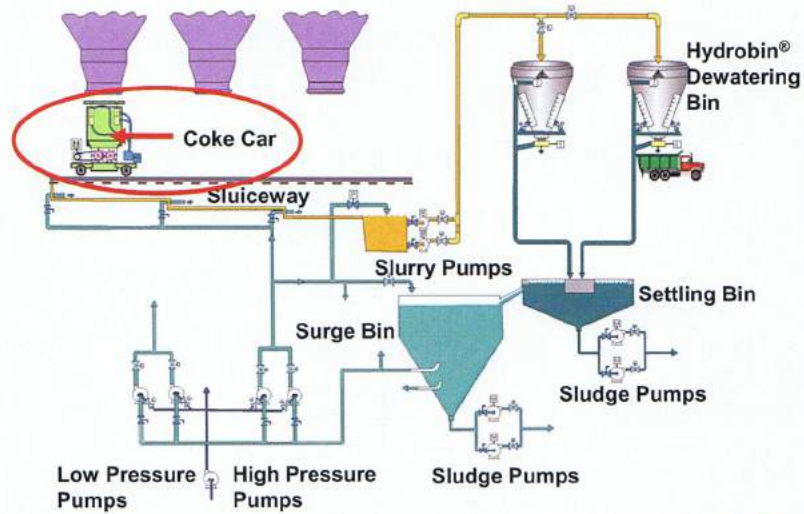
- Petroleum Coke
- Pet Coke Ash
- Coal Ash
- Oil Soot
- Waste to Energy Ash
- Bio Mass Ash



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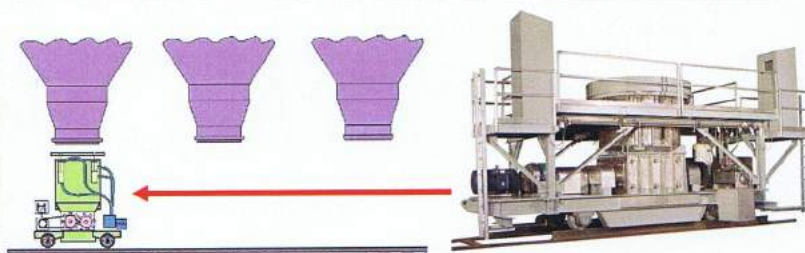
## A-S-H™ Engineered Coke Handling System



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## Coke Car – Key Component of Coke Handling System

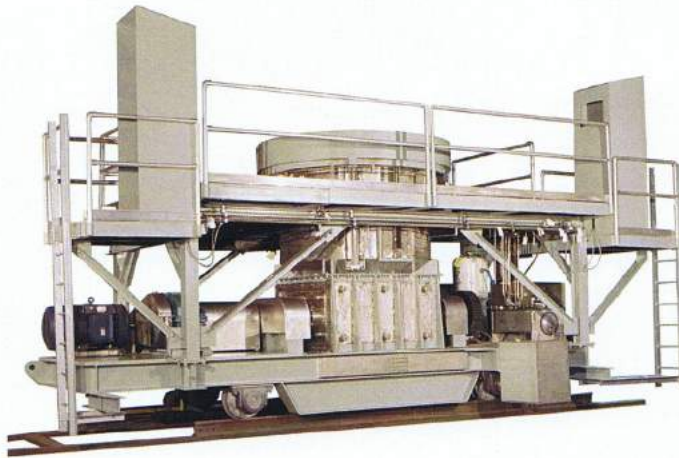


This vessel receives coke cut with high pressure water from the drums directly above. The self propelled car moves along rails and can service multiple coke drums.

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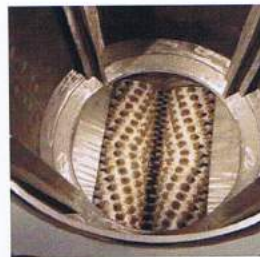
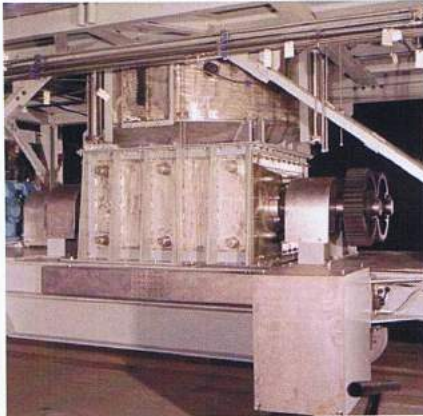
## Allen-Sherman-Hoff<sup>®</sup> Petroleum Coke Car



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## A-S-H<sup>™</sup> Coke Car Design



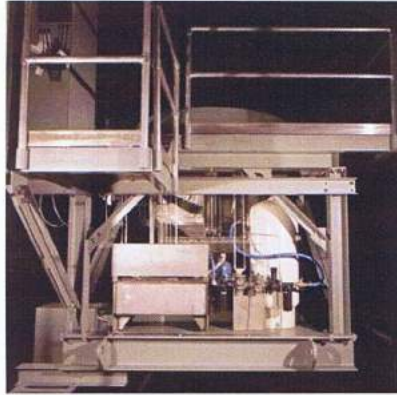
The crusher and drive unit are mounted on the car. Electrical supply can be a cable, cable reel or a festooning system.

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## A-S-H™ Coke Car Design



Hydraulic power system for “trolleying” the coke car and for extending its receiving chute up to the coke drum outlet.

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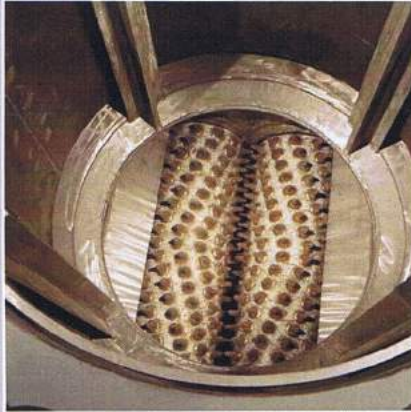
## Allen-Sherman-Hoff® Petroleum Coke Car



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## Allen-Sherman-Hoff® Petroleum Coke Car - Crusher



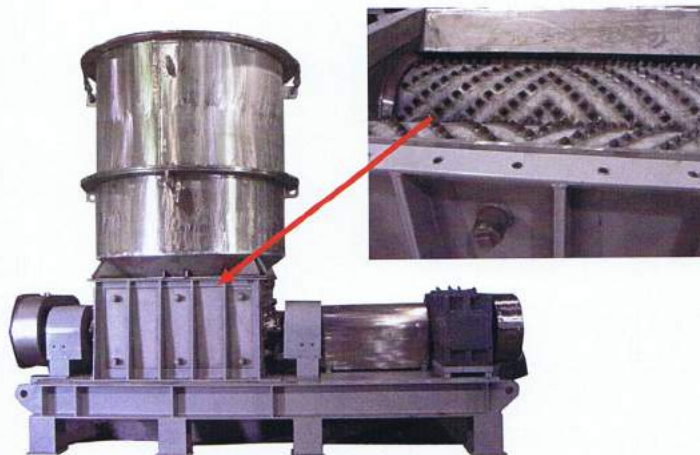
The crusher sizes coke collected from coke drums. The particles are then conveyed through a sluiceway and hydraulic transport line via slurry pumps to the selected Hydrobin® dewatering bin.

- Construction of wetted parts is 316 SS
- Capacity designed to fit Coker Cycle times
- Several roll arrangements from 2" (nominal) to 5" (nominal) particle size

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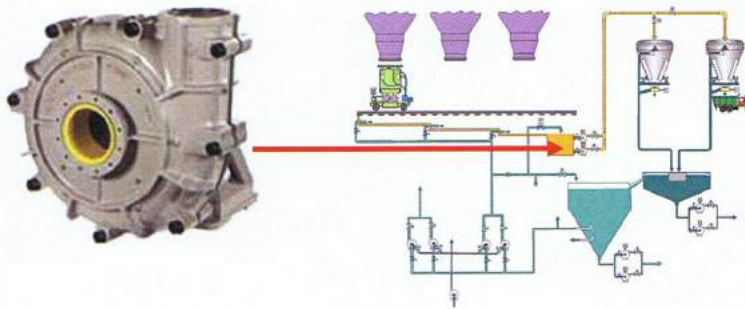
## A-S-H™ Stationary Coke Crusher



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## Slurry Pumps



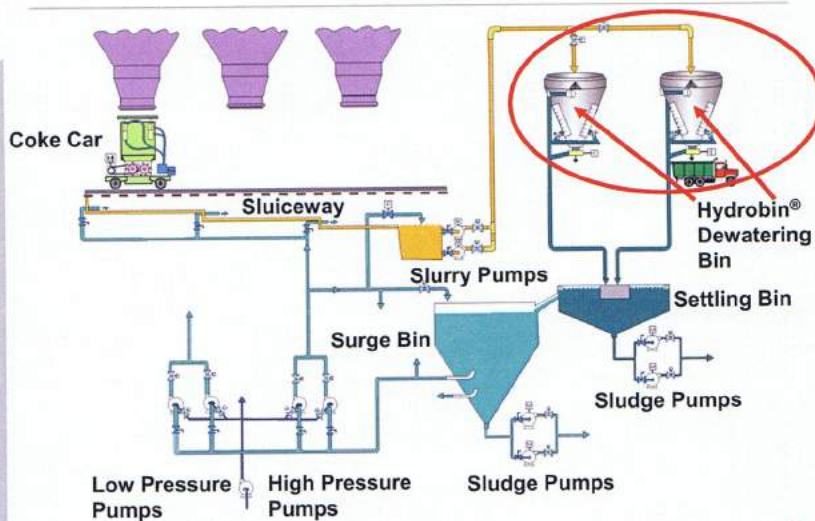
This equipment functions to convey coke slurry from the sump to the selected dewatering bin.

**Note:** The slurry pumps can be lined with a hard abrasion resistant material to best fit the application.

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## A-S-H™ Engineered Coke Handling System

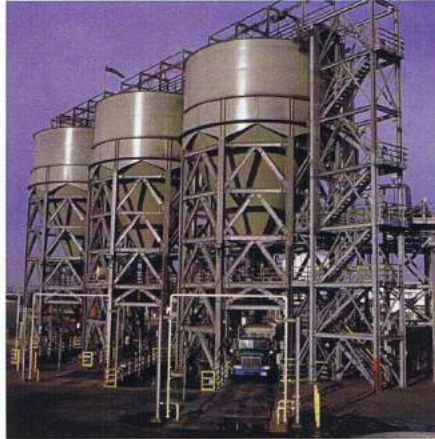


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## Hydrobin® Dewatering Bin

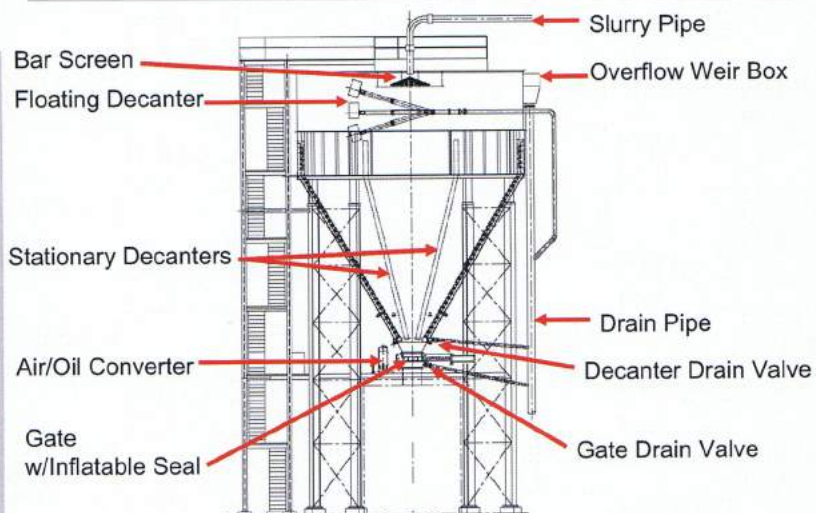


The Hydrobin® receives the coke slurry, dewateres and stores the coke before unloading into truck, railcar or belt conveyor.

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## Hydrobin® Dewatering Bin: Key Components

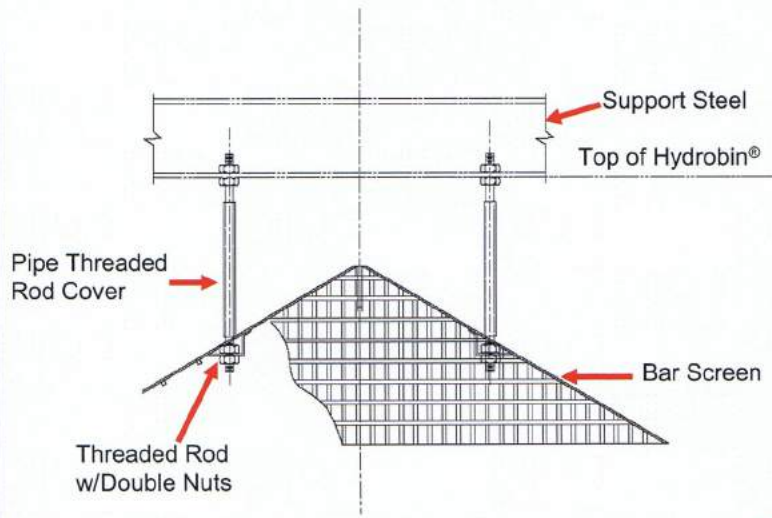


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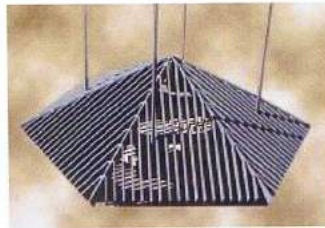
## Hydrobin® Dewatering Bin: Inlet Bar Screen



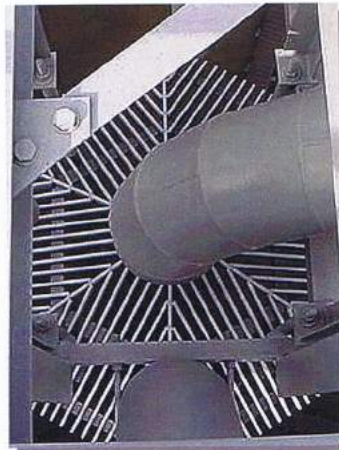
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## Hydrobin® Dewatering Bin: Inlet Bar Screen



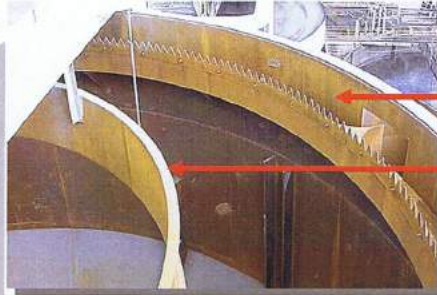
Key component to initiate the  
particle separation process.



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## Hydrobin® Dewatering Bin: Design



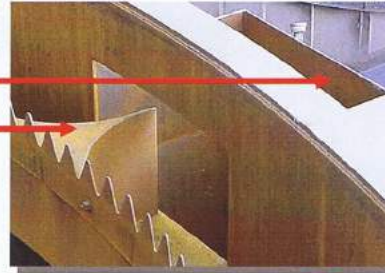
Overflow Trough

Underflow Baffle

Overflow Box/drain

Overflow Diverter

**Note: Serrated weir minimizes carryover of fines**



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## Hydrobin® Dewatering Bin: Level Detector



Each Hydrobin® is designed and sized to meet system capacity requirements.



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## Hydrobin® Dewatering Bin: Floating Decanter



Floating decanter speeds up the decant process by siphoning off the "top water" out of the bin.

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## Hydrobin® Dewatering Bin Stationary Decanter Unit

- Drains off the water retained in the Hydrobin® from the coke cutting & transport process, in preparation for unloading
- Decant elements with stainless steel screens incorporating an internal back flushing system

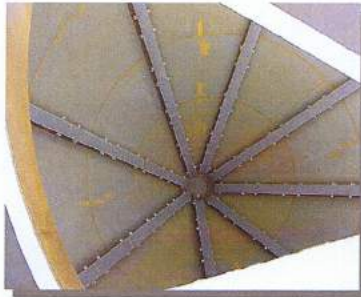


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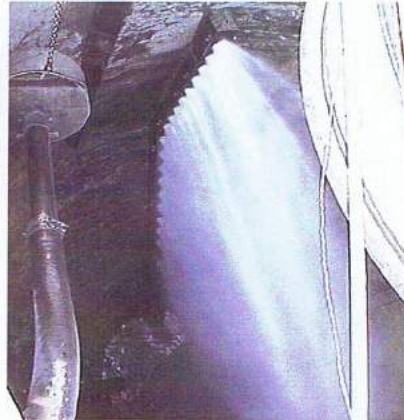




## Hydrobin® Dewatering Bin: Stationary Decant Elements



Backflushing technology to maintain proper operation of decant elements.



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## Hydrobin® Operating Conditions

**Bin interior following  
backflushing of decant  
elements**

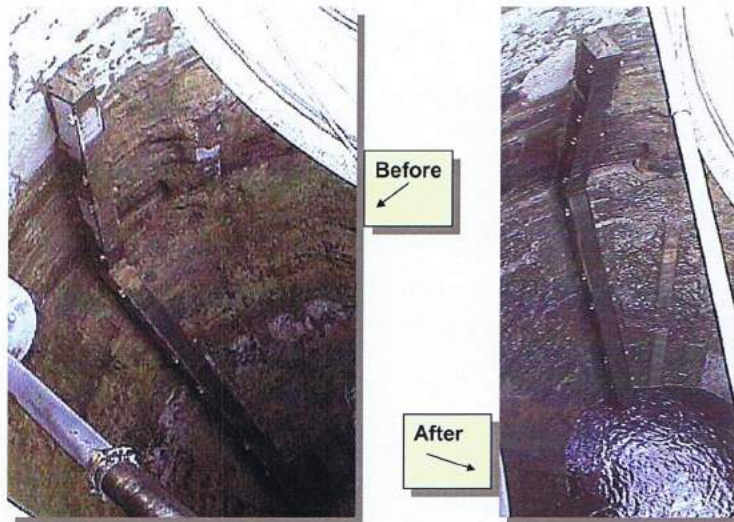
Bin is ready to receive water once stationary back flushing operation is completed. Once the bin is half full with water, bin is "Ready to Load".



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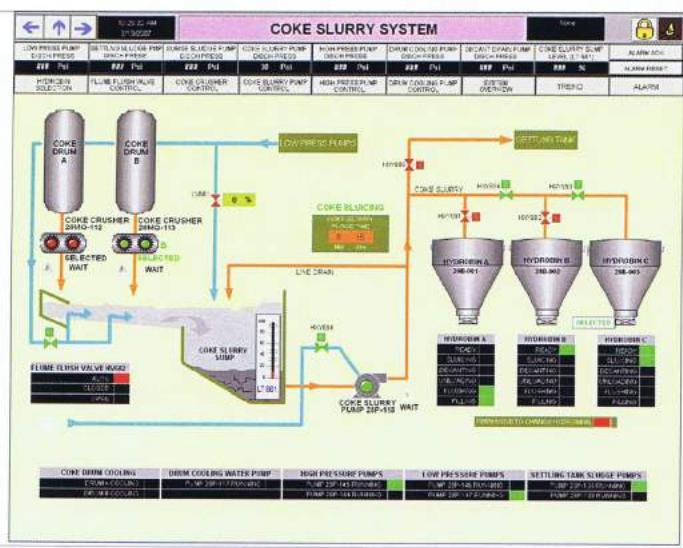


# A-S-H™ Hydrobin®



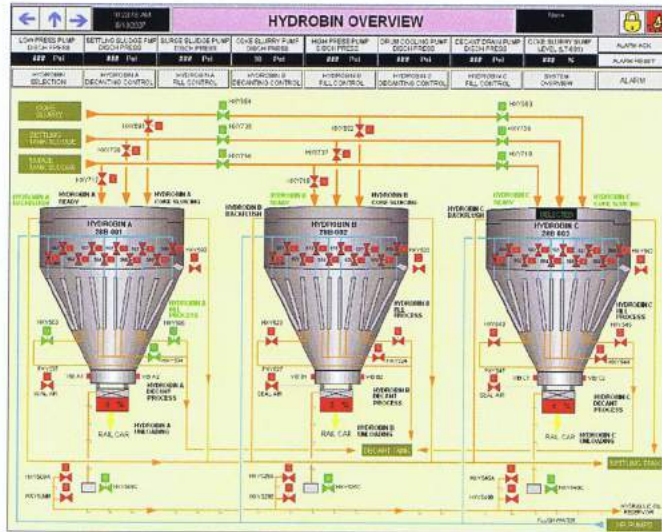
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# Hydrobin® Decanting Controls



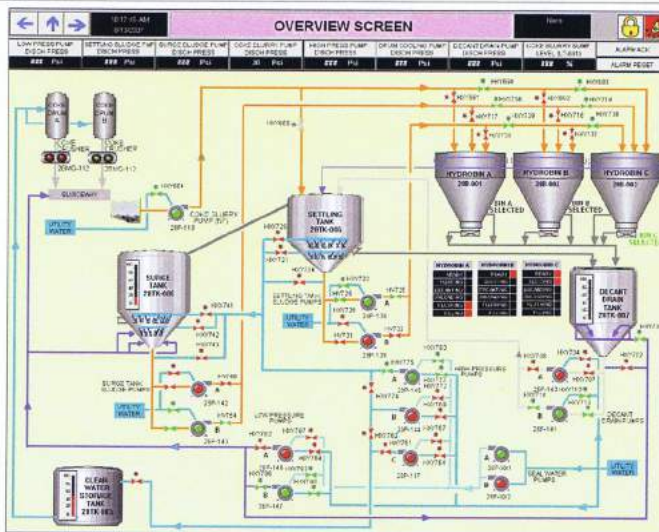
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# Hydrobin® Decanting Controls



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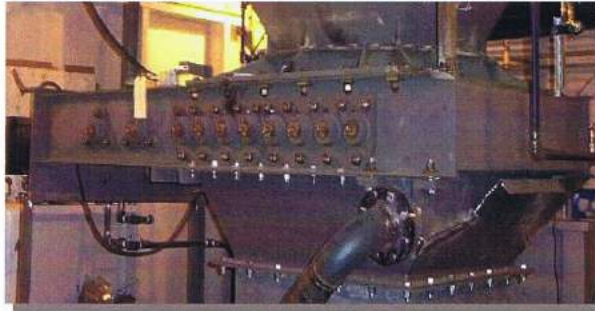
# Hydrobin® Decanting Controls



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## Hydrobin® Dewatering Bin: Discharge Gate

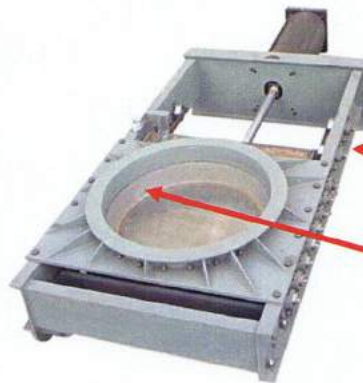


- Round fitted seal tube inflated to prevent leaks
- 3'0" diameter gate opening to maximize bin discharge
- Sealing tube properly inflated by interlock control
- Rollers mounted on eccentric axles allow for proper gate adjustment

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## Hydrobin® Dewatering Bin Gate



Gate rollers mounted on eccentric axles permit gate adjustment.

Gate seal tube is inflated when gate is closed to provide a tight closure between the gate and frame.

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## Hydrobin® Dewatering Bin: Lower Cone Section



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## Hydrobin® Truck Unloading Area



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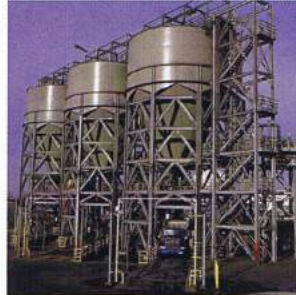




## Hydrobin® Closed-Loop Recirculation System

### Hydrobin® Dewatering Bin vs. Coke Barn

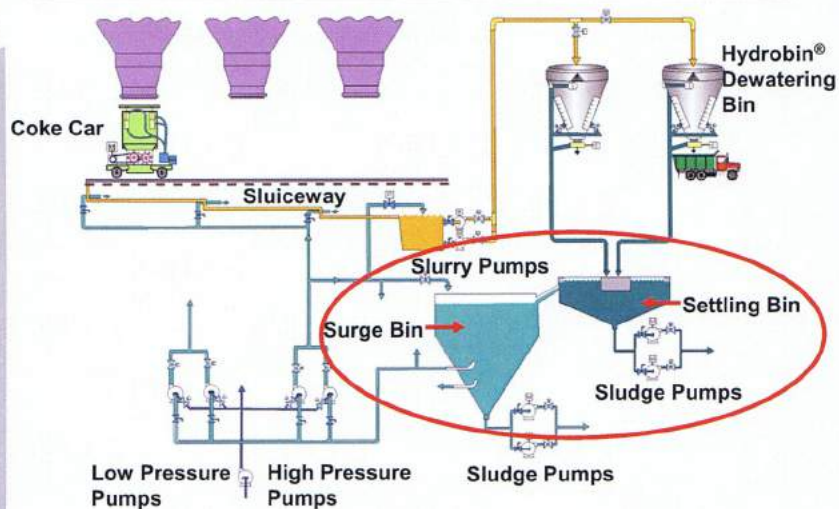
- Closed-loop system
- Reduced dewatering time
- Addresses environmental concerns
  - A-S-H Hydrobin® dewatering bin technology is environmentally friendly
- Significant reduction in real estate footprint
- Reduced maintenance (no conveyors and associated mechanical equipment)



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## A-S-H™ Engineered Coke Handling System

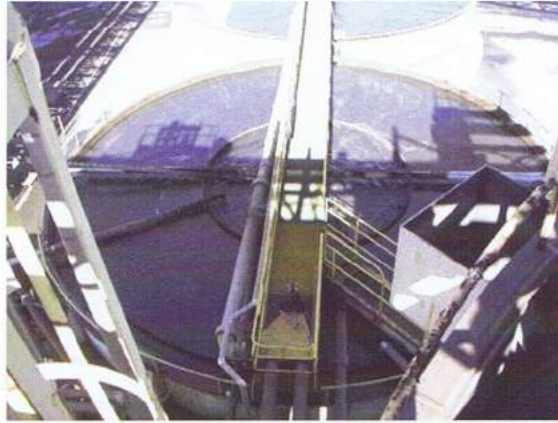


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## Hydrobin® Settling & Surge Bins



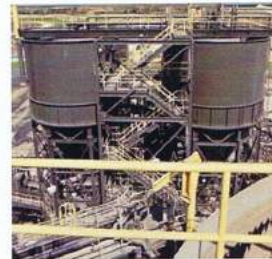
The settling bin further removes material fines from the water. The surge bin completes the closed-loop system for the A-S-H™ Coke Handling System.

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## Hydrobin® Dewatering Bin Summary

- Less direct operator interface needed:  
Decanting is automatically sequenced and controlled
- Cleaner Loading Area:  
Inflatable seal tube prevents water leakage
- Minimal maintenance: Self cleaning decanter screens provide ease of maintenance



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## Current A-S-H Hydrobin® Project

Engineered to Meet Customer Specifications for Hydrobin® Project



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## Case Study –Valero (Ultramar) Client’s Identified Issues

- Valero’s existing Coke Handling Facility had reached the end of its economic life
- The former equipment was in need of extensive repairs and capital improvements
- The former system could not be modified to support a large expansion of refinery capacity

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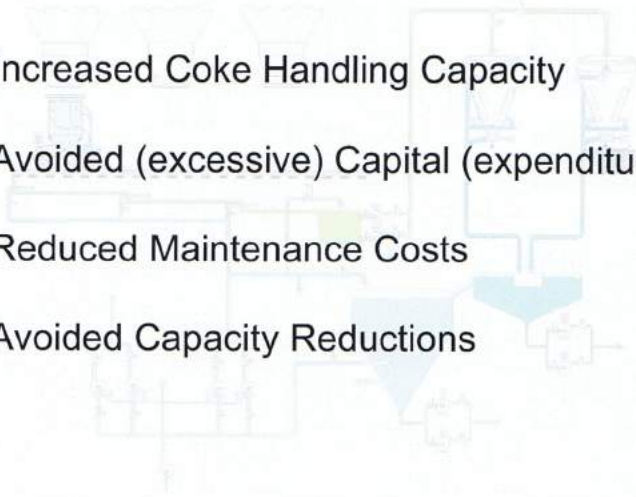






## Project Results

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- Increased Coke Handling Capacity
- Avoided (excessive) Capital (expenditures)
- Reduced Maintenance Costs
- Avoided Capacity Reductions



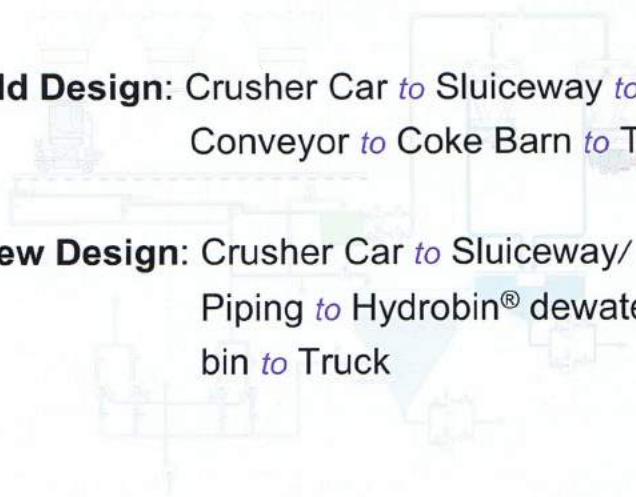
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## Old vs. New System Design

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- **Old Design:** Crusher Car *to* Sluiceway *to* Conveyor *to* Coke Barn *to* Truck
- **New Design:** Crusher Car *to* Sluiceway/  
Piping *to* Hydrobin<sup>®</sup> dewatering bin *to* Truck



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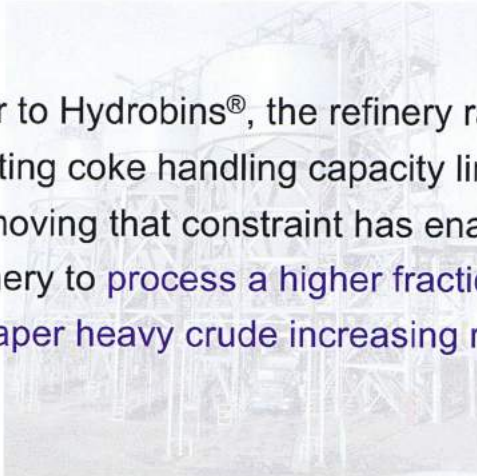




## Increased Capacity

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“ Prior to Hydrobins<sup>®</sup>, the refinery ran into existing coke handling capacity limit. Removing that constraint has enabled the refinery to process a higher fraction of cheaper heavy crude increasing revenue ”



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## Avoided Capital

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“Extensive repairs would have been necessary to ensure the former system's reliability. The capital investment to replace the existing system like in kind (with added capacity) was not economically beneficial. In addition, both Coker Units would have had to be down for 7 days to make final tie-ins.”

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## Reduced Maintenance Cost

“Our former system was inherently high (in) maintenance. In contrast, the Hydrobin® system is very simple. A significant maintenance cost reduction has been realized with the installation of Hydrobins®. Also, the simplicity of the Hydrobins® facilitated the addition of automatic truck loading. The new loading system has eliminated the need to pay contract labor to load trucks. The new Hydrobin, system has allowed the coke handling crew size to be reduced.”


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## Avoided Capacity Reductions

“Breakdowns in the former system typically resulted in Crude Unit reductions. Any future strategic projects to increase crude run and improve yield structure were limited by the capability of the former coke handling facility and the ability to increase capacity, whereas Hydrobins® would allow for an efficient future expansion of coke handling capacity.”

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## A-S-H™ Engineered Coke Handling System Summary of Benefits

- Crushing & transport of coke in an automated, “low dust” environment.
- Eliminates Coke Barn type real estate and high maintenance equipment such as conveyors, cranes and loaders
- Proven Hydrobin® dewatering technology with installations worldwide
- Safety: Moves personnel away from the dangers associated with being in close proximity to the Coker.

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*Trusted for experience. Preferred for performance.*



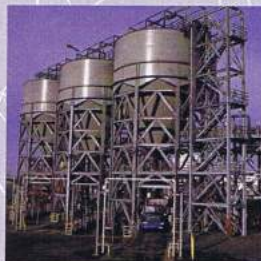
### Alternative Method for Coke Handling using Hydrobin® Closed-Loop Recirculation System

**Thank you.**  
**...Questions?**

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