

Reinhold Environmental Ltd.



2006 APC Round Table & Expo Presentation

July 16-18, 2006, Columbus, OH

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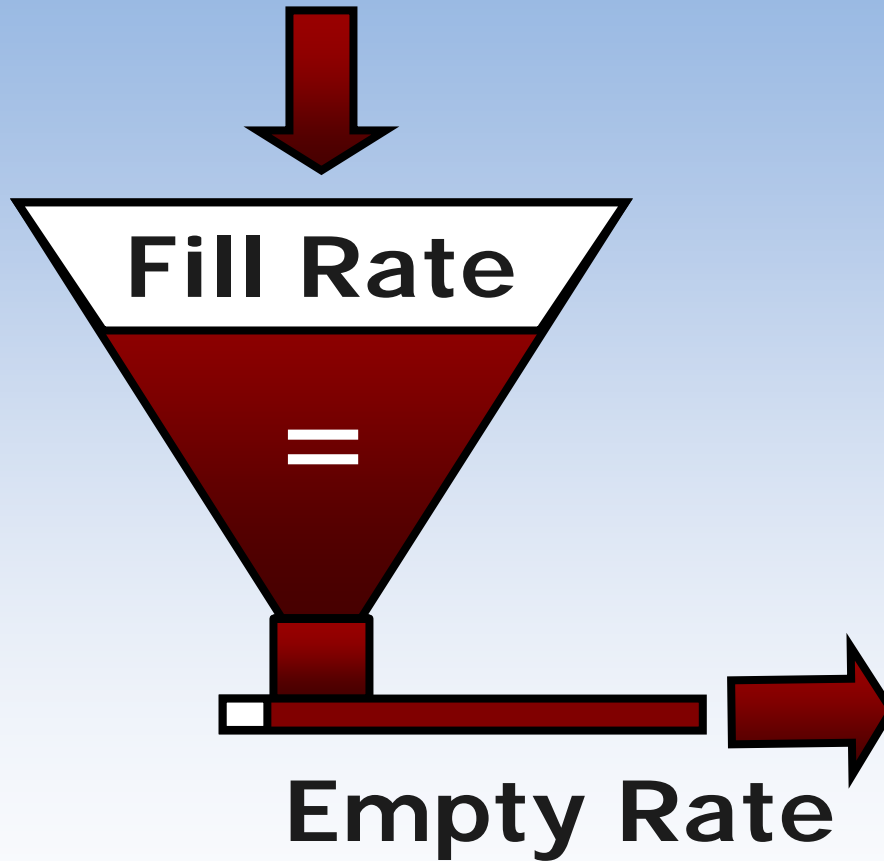
Hopper Level Management

7/17/06



NEUNDORFER **PRECIPITATOR KNOWLEDGE**

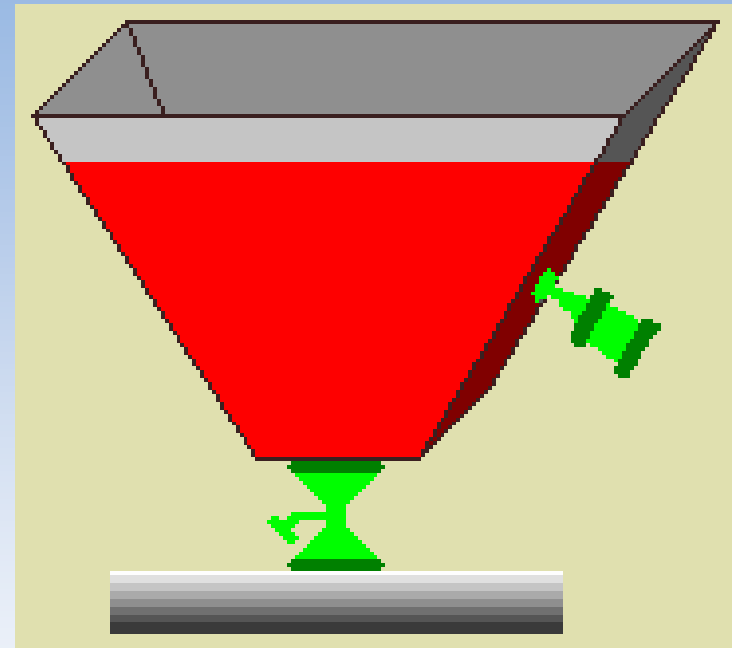
Objective



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Ash Empty Rate

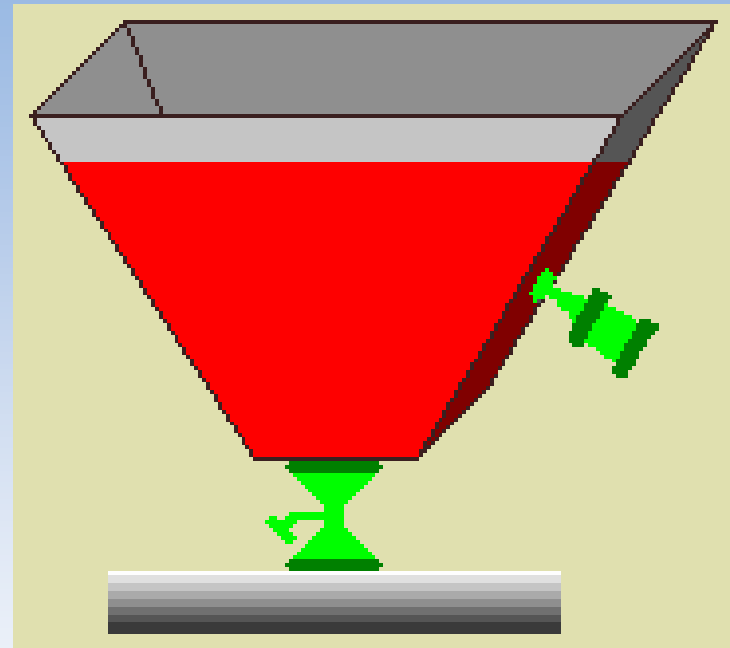
- Empty rate:
 - Evacuation Program
 - Sequence
 - Timing
 - System Capacity
 - Component size
 - Component condition
 - Conveying pressure/vacuum
 - Ash flow
 - Plugged
 - Rat-holed
 - Sticky



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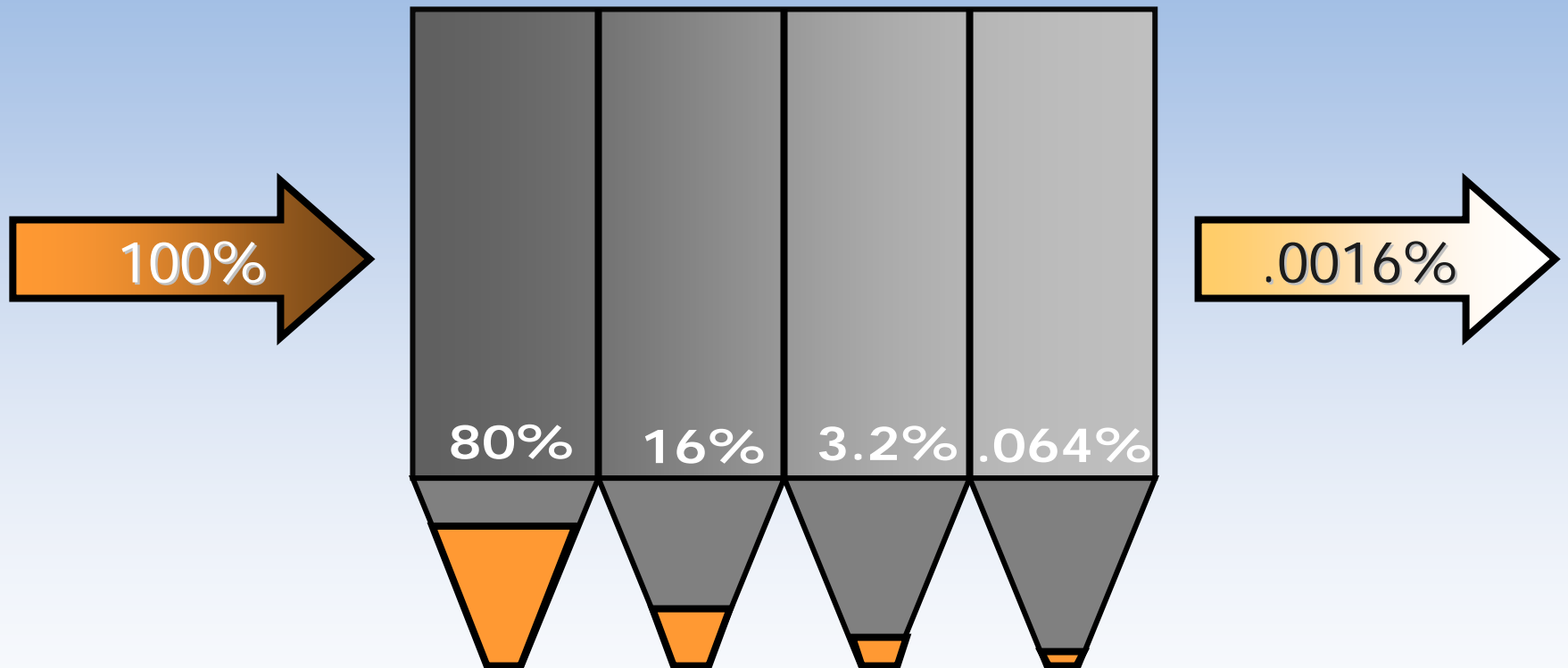
Ash Fill Rate

- Fill rate:
 - Boiler load
 - Fuel % ash
 - Fly ash / Bottom ash split
 - Section power and rapping
 - Hopper position



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Field Position



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High Hopper Levels

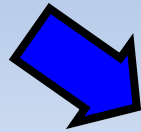
- Result in high opacity from:
 - Sections shorted
 - Boil-up re-entrainment
 - Reduced power from misalignment



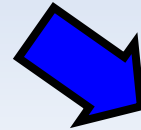
NEUNDORFER **PRECIPITATOR KNOWLEDGE**

Lost Generation

High
Hopper
Levels



High
Opacity



Lost
Generation



NEUNDORFER **PRECIPITATOR KNOWLEDGE**

Results if Hopper Doesn't Empty

- High Hopper
 - Ground out an electrical section
 - Opacity excursions
 - Lost generation / derates
 - Possible mechanical damage to Precip
 - Tons of hot ash in hopper must be dumped



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How do we know the evacuation system is working?

- Historically - High Level Detection
 - Are high level sensors trusted?
 - High level a symptom of another problem:
 - Sulfation/Condensation
 - Bridging/rat-holing
 - Equipment failure
 - Hopper outlet plugged with debris
 - Inadequate evacuation program



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How are systems controlled?

- Strict timer basis
 - Each hopper emptied for the same amount of time
- Transport pressure/vacuum feedback
 - Determines if hopper or row is emptied/finished
- Does this take into account changing fuels or other process changes?



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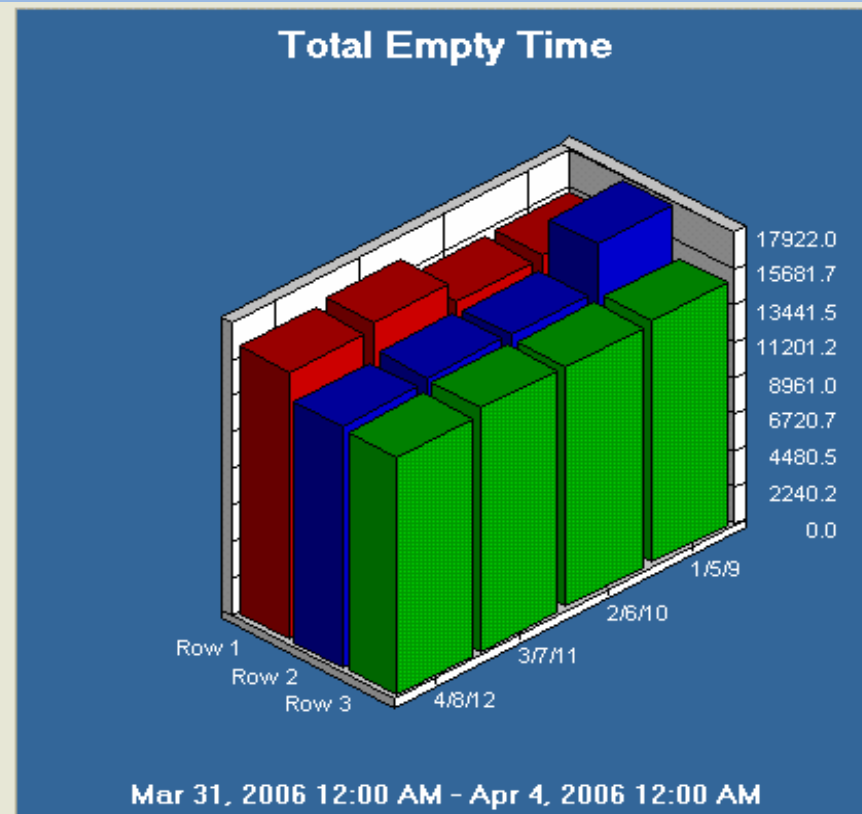
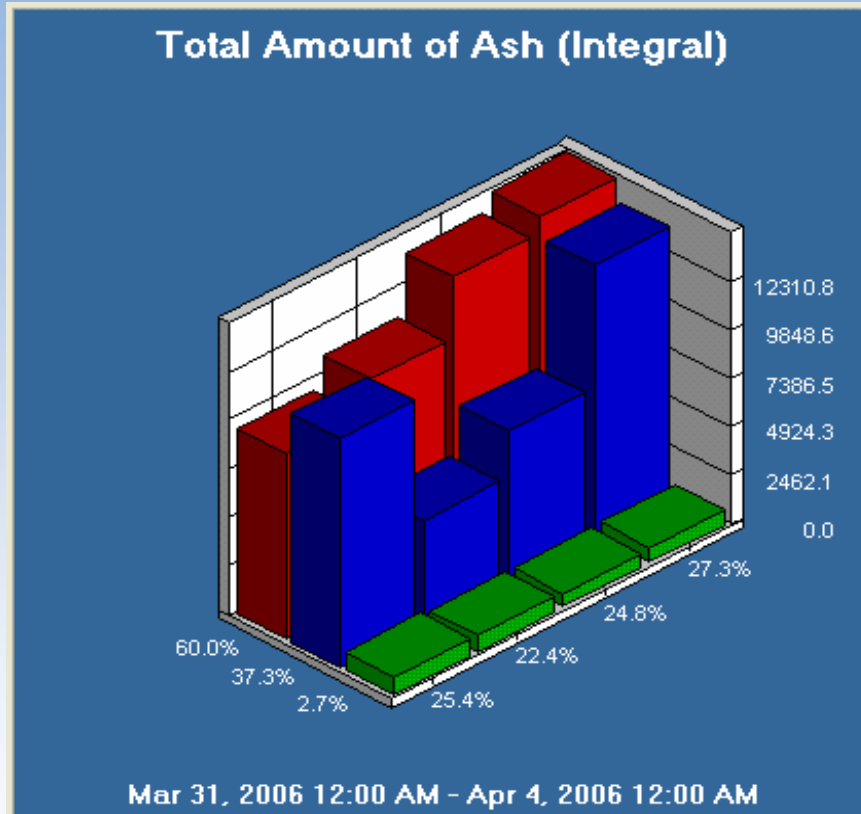
Improved Ash Collection

- Create hopper evacuation program that matches ash deposit rate
 - Spend more time emptying full hoppers
 - Spend less time on empty hoppers
- Increase capacity of the system
 - Use the system to its full potential
 - Reduce wear and tear on system by eliminating unnecessary gate cycling



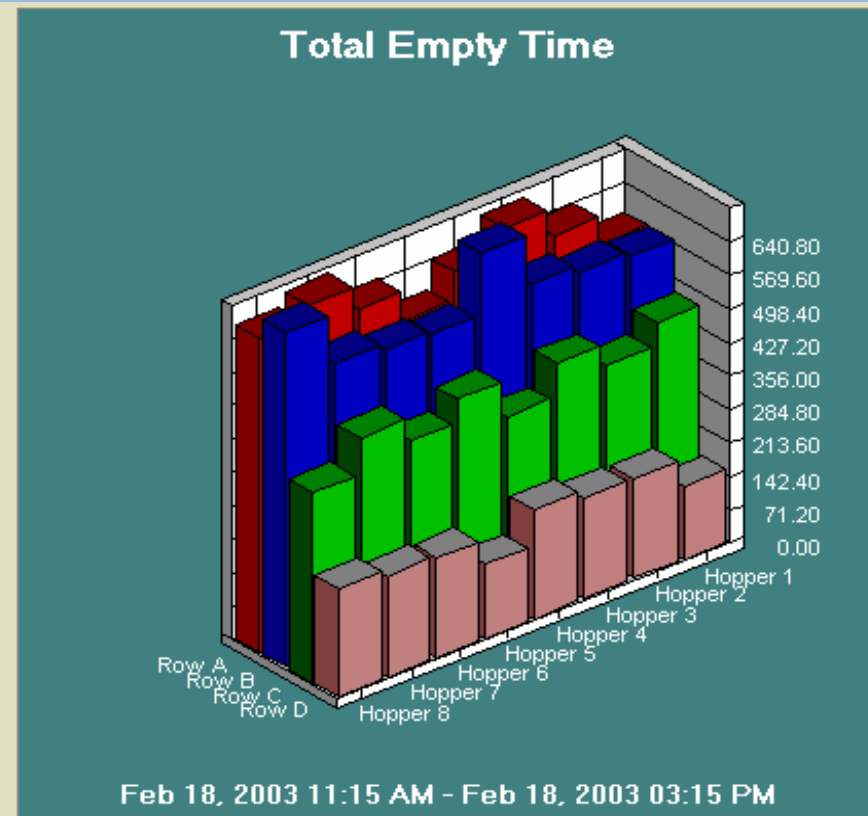
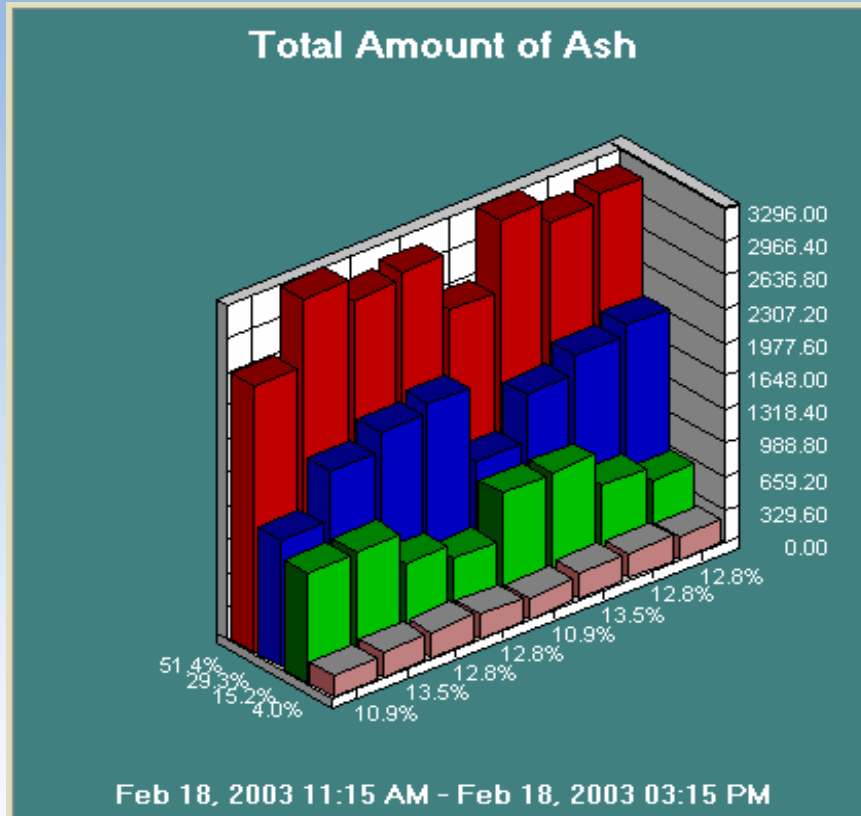
NEUNDORFER **PRECIPITATOR KNOWLEDGE**

Amount of Ash vs. Empty Time Typical



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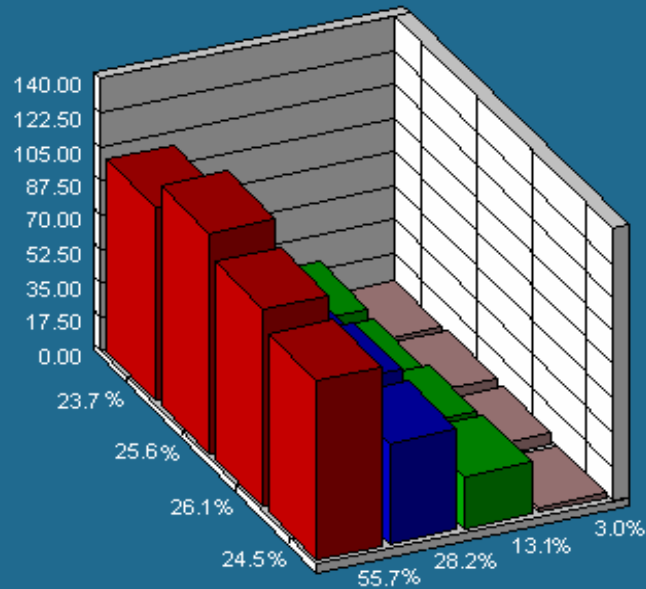
Amount of Ash vs. Empty Time Based on Feedback



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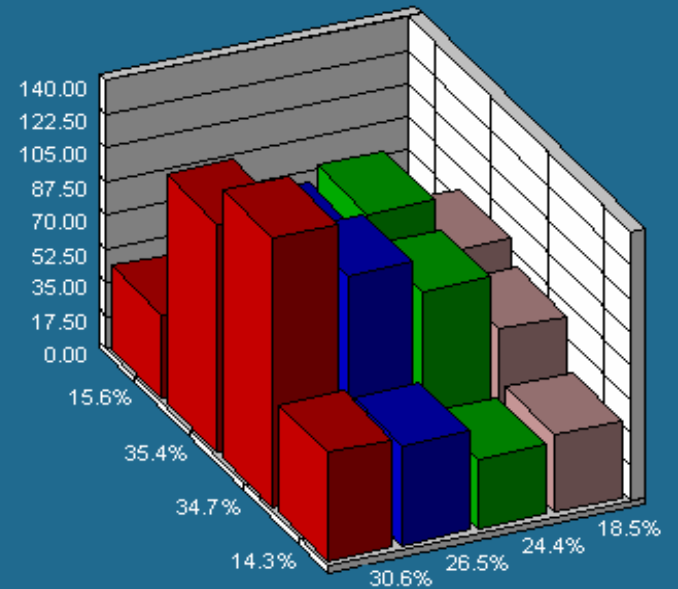
Hi Load vs. Low Load

Total Amount of Ash



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Total Amount of Ash

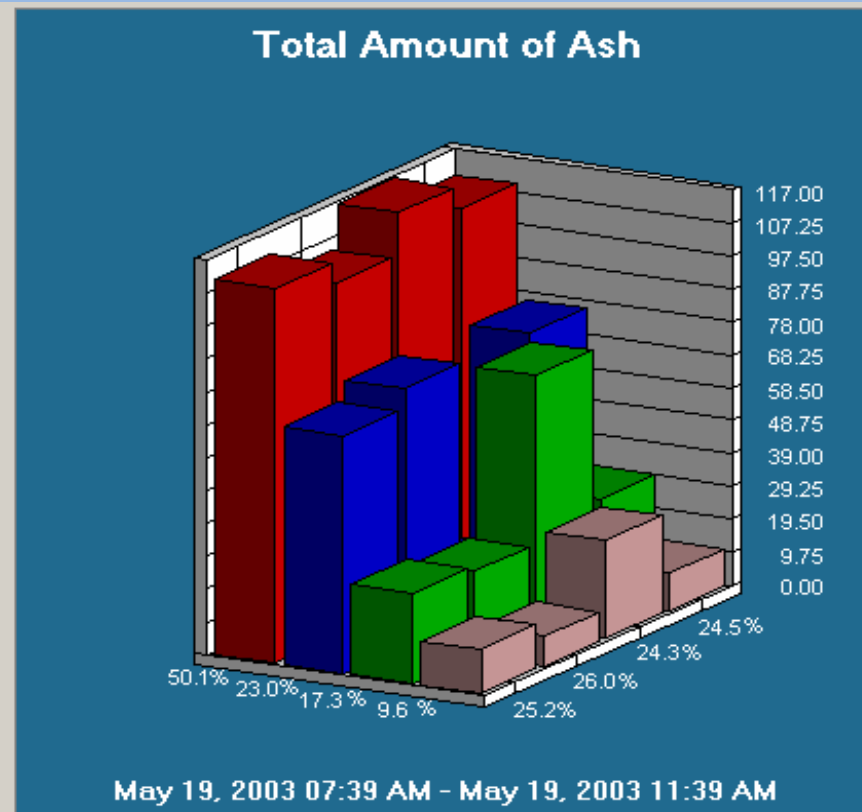
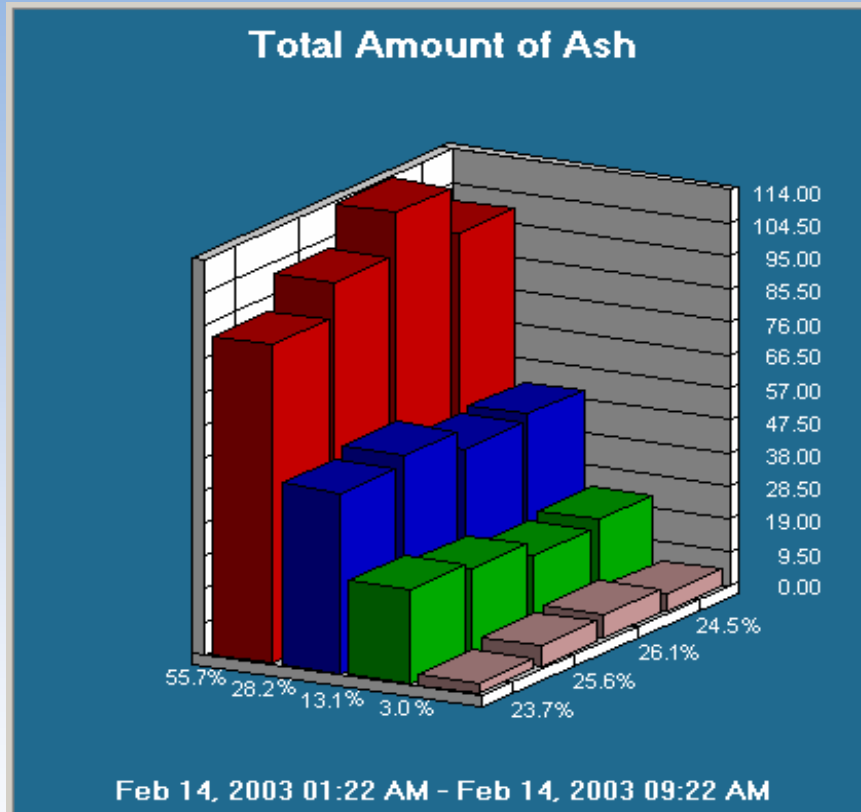


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TR Set Out



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Information Power

- Fill rate
- Empty rate
- Isolation hopper level
- Isolation hopper pressure



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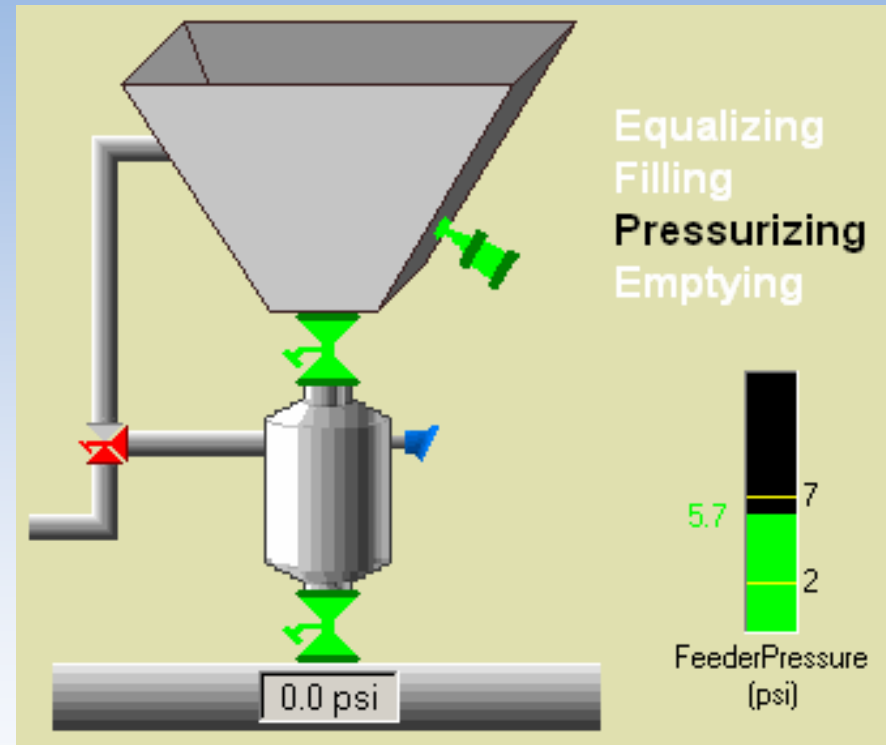
Information enables smart operation and troubleshooting



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Isolation Hopper Diagnostics

- Measure Level Inside Isolation Hopper
 - Identify slow fill and empty rates
- Measure Pressure Inside Isolation Hopper
 - Determine proper pressure is achieved in each phase of hopper dumping sequence
 - Pinpoint leaky gates



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