Mcilvaine
Hot Topic
ACI Material Handling Gen 3

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Progression of ACI Technology

- Gen 1
  - Eductor
  - 0 - 3 PSI

- Gen 2
  - Zero clearance airlock
  - 3 - 6 PSI

- Gen 3
  - Continuous transport sys
  - 6 - 12 PSI

A collaborative technology approach driven to deliver meaningful solutions to convey new carbon products to help meet Hg limits
Progression of Technology

- Gen 1
- Gen 2
- Gen 3

What is Gen 1?

- **Eductor system**
  - Creates venturi – uses ~10-12 PSI to generate 2 PSI
  - Designed to pull negative on feeding device
  - Promotes PAC to flow downstream versus upstream
  - Used in conjunction with air source (PD blower, regen blower, or compressed air) and LIW feeder
Progression of Technology

Why an eductor for Gen 1?

- PAC is very fine (like smoke) and slips past a standard rotary airlock
- Eductor creates a venturi effect to solve this
- Works up to 2 PSI of downstream convey line pressure

Gen 1 PAC scenarios that fit this 2 PSI category:
- Lower Injection Rates (5-100 lbs/hr)
- Shorter Distances (less than 400 ft)
- Non-Resistant Splitting or No Splitting
Progression of Technology

◆ An evolving market…

- Finer particle size on PAC products
  - Increases mercury removal
  - Changes pneumatic conveying conditions.

- Increasing required injection rate.
  - Increase in convey line back pressure

- Increasing required conveyed distance.
  - Increase in convey line back pressure
Progression of Technology

- Gen 1
- Gen 2
- Gen 3

- What is Gen 2?
  - **Zero clearance airlock system**
  - Eliminates the venturi concept and the 2 PSI limit
  - Addresses the problem of the rotary airlock
  - Focus on the gap clearances within the airlock
  - Accomplishes 6 PSI back pressure
  - Longer Distance / Higher Rate
  - Resistive splitting
AC System Equipment Gen 2
For this site, pressures over eductor limit

Increase in injection rate required more energy to convey material into duct
This plot shows reality of varying back pressures for a given system.

If system is borderline, system failures may occur easily with upset conditions.
Progression of Technology

This plot shows how PAC types vary in regards to back pressure.

This plot shows how system configurations impact back pressures.
Progression of Technology

- Reliability…
  - Can we eliminate the zero clearance RAL maintenance?
Progression of Technology

- Gen 1
- Gen 2
- Gen 3

What is Gen 3?

- Continuous transport system
- Utilizes two weigh hoppers – one re-filling/one weighing
- Creates an “equalized pressure system”
- Zero differential across metering device
- All PD energy available to convey PAC – up to 12 PSI
- Relieve stress of $\Delta P \sim 6$ PSI across rotary airlock
- Improves reliability because $\Delta P \sim 0$ PSI across airlock
- Utilizes standard rotary airlocks
- Key – pressurize weigh hopper to equal the convey line
PAC System Equipment Gen 3
Guidelines for Choosing System

◆ Nol-Tec standards

● Gen 1: Eductor system
  • 2 PSI convey pressure
  • No splitting
  • 400 feet or less
  • 5-100 lbs/hr

● Gen 2: Zero clearance airlock
  • 6 PSI convey pressure
  • Variable splitting
  • Variable distance
  • Variable rate

● Gen 3: Continuous transport system
  • 12 PSI convey pressure
  • Variable splitting
  • Variable distance
  • Variable rate
Questions