Bulk Solids Samplers

Sentry Equipment Corp
Objectives

• Review Sentry bulk solids samplers
  – Model Review
  – Where to apply
  – Where not to apply
• Application overview
Bulk Solids Samplers Video
Bulk Solids Basics

- Where to sample from
  - Gravity
    - Bins, hoppers or chutes
  - Pressure/Vacuum Conveying
    - Dense phase conveying
    - Dilute phase conveying
  - Air slides
Bulks Solids Sampler
Standard Features

• Material contact components constructed of 304SS or better

• Standard Seals
  – Glass Filled Teflon® seals on former Gustafson products
    – Pure Teflon® available for food or sanitary applications at no extra cost
  – EP on ISOLOK® samplers
    – However, many other elastomers are available
Bulks Solids Sampler
Standard Features (cont)

• Oil-less Air cylinders
• TEFC Gear motors
• One piece machined and highly polished augers
  – Provides structural integrity and easy release of product
• White nitrile mounting gasket
• 4-way explosion proof solenoid valve
• Air filter, regulator and pressure gage
Bulks Solids Sampler Attachments and Options

- Sample container accessory Kits
- Multiple sample collection devices
- Custom mounting adapters
- Pre-mount spool sections
- Sample tube purge
- Sampler Enclosures

- Sampler Heaters
- SEVERAL optional materials of construction and seal choices
- Several coating options for wear and corrosion resistance
- Extended sample tube lengths for larger chute sizes and hoppers
  - Up to 600mm in length
Mounting Adapters

- Sentry manufactures several different types of mounting adapters that are used to connect the sampler to the process.
- ISOLOK® and model B1 units connect via tri-clamp.
- All other bulk solids units have a variety of adaptors suited for many installations.
Pre-mount Spool Piece

- Used when vertical line sizes are larger than 100mm OD
- Typically used in pneumatic conveying applications
  - Models PR, R and RX
- Can also be used in gravity drop applications
  - Models PR, R and RX
Examples – Pre-mount Spool Piece
Concentric Pre-mount

- Used when vertical line sizes are 100mm OD and under
- Creates an expansion which allows for sample tube extension
- Typically used in pneumatic conveying applications
  - Models PR, R and RX
- Can also be used in gravity drop applications
  - Models PR, R and RX
Eccentric Pre-mount

- Used when horizontal line sizes are 100mm OD and under.
- Only used in pneumatic conveying applications
  - Models PR, R and RX
Example – Eccentric Pre-mount
Weld on or bolt on mounting adapters

- Used primarily for hoppers or bins
Adapter Wrap

Horizontal flow style
Adapter Wrap – Vertical Flow

Used with RX-45

Used with RX-90
Examples – Adapter Wrap
Tri-clover Weld Ferrule

- Used on ISOLOK® and Model B1 models
- Kits come complete with gasket, clamp, close coupled ferrule and closure with lanyard
Examples – Tri-clamp
Air Slide Mounting

- Typically used in cement applications
- Penetrate through the bottom of the air slide and membrane
- Incorporates a purge ring to keep powder from migrating between sampler tube and housing
Sentry Bulk Solids Samplers

- Point Style Sampler Models
  - A, B1, PR, R & RPG, SAK, SAE, SAH

- Strip Style Sampler Models
  - D2, MG, RB & RX

- Cross Cut Style Samplers
  - SA & GA
Point Samplers
Point Samplers

- Takes a sample from a point in the material stream
- Used when conducting chemical analysis or when material is homogenous
ISOLOK®

ISOLOK SERIES
SAK 18CC/SAH 50CC/SAE 100CC
DRY POWDER SAMPLER WITH
NON-PRESSURE/VACUUM STYLE
PLUNGER SEALS - 2" TRI CLAMP MOUNT

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Industrial ISOLOK® Samplers

- Process temperature – -40°F to 550°F (-40°C to 288°C)
- Available seals include epdm, viton®, filled Teflon®, Kalrez®, Buna-N, Halar®, Urethane, etc., etc., etc.
- Standard material of construction is 316 ss
  - Optional materials: Hastelloy®, Titanium, AL6XN®, Carpenter-20, Ferralium, Monel, Kynar®, Zirconium, Nickel, Incoloy®, Inconel®, 17-4 PH, 400 series stainless, virtually any machinable material
- Angle drilled purge ports direct purge to either side of the sample annulus to assure total sample discharge
ISOLOK® Bulk Solids Samplers

- SAK – 16 cc (pressure seals) - 18 cc per sample stroke
- SAH – 45 cc (pressure seals) - 50 cc per sample stroke
- SAE – 90 cc (pressure seals) - 100 cc per sample stroke
- Flush or extended Nose (packed or free falling material)
- Batch or Composite Sampling
- Process pressure – Vac to 200 psig (14 barg)
- Process temperature – up to 550°F (288°C)
- Material types – dry & flowable (powders, pellets, grains, etc.)
- Material size – up to ¾ in. (19 mm) diameter (SAE model)
- Installation – bins, hoppers, conveyors, chutes
ISOLOK® Body Configurations

Flush Nose

Extended Nose

Angle drilling for purge
ISOLOK® Seal Configurations

- “Floppy” seals for gravity drop applications
- Pressure seals
- Width of seal reduces inside dimension of annulus therefore reducing the sample volume
ISOLOK® Flush Nose

• Used on hoppers and bins where there is accumulated or slow moving of material
ISOLOK® Extended Nose

- Used in vertical drop chutes where material is in free fall
- The extended nose provides a means to stop the material and fill up a fixed volume of sample
- When the plunger extends, all old or stagnant material is pushed back into the process and the plunger dwells extended to capture fresh sample
Model SAK

- 18 cc per cycle (using non-pressure “floppy” seals)
- 16 cc per cycle (using pressure seals)
  - Thicker seals reduces the overall volume of the sample annulus
- Compact design
  - Installation envelope approximately 250mm long by 250mm high
- Process connection via 2” tri-clamp
- Maximum particle size is 9mm
Model SAH

- 50 cc per cycle (using non-pressure “floppy” seals)
- 45 cc per cycle (using pressure seals)
  - Thicker seals reduces the overall volume of the sample annulus
- Compact design
  - Installation envelope approximately 350mm long by 350mm high
- Process connection via 2.5” tri-clamp
- Maximum particle size is 16mm
Model SAE

- 100 cc per cycle (using non-pressure “floppy” seals)
- 90 cc per cycle (using pressure seals)
  - Thicker seals reduces the overall volume of the sample annulus
- Compact design
  - Installation envelope approximately 480mm long by 400mm high
- Process connection via 3” tri-clamp
- Maximum particle size is 19mm
Where to Apply

- Gravity drop chutes, bins, hoppers, screw conveyors, air slides, fluid bed dryers, vacuum receivers
- Friable materials
- Materials with low melt temperature
  - I.e. Toner powder
- Most materials
  - Even TiO2 when material is moving and sampler incorporates a purge function
Where Not to Apply

- Pneumatic convey lines
- Variable gravity flow with no product next to chute wall
- Customer requires strip or cross-cut sample
Model A

- Screw conveyor sampler uses a slide gate with an adaptor to take the sample
- A pneumatic actuated cylinder opens the slide gate over a hole positioned in the conveyor or chute to remove sample
- Used to sample grains, free flowing powders, pellets
Model A

- Recommended Product Size
  - 1-1/2 “ (38mm) standard unit
    - 65 mesh to 13mm material
  - 3” (76mm) standard unit
    - 65 mesh to 25mm material  (Note: Finer material may leak by slide)

- Standard Temperature Range:
  - -34 degrees C to +71 degrees C
Model A

- Most common issues
  - Product caught between slide and main body
  - Tension on slide gate too tight
  - Installations where product size is less than 65 mesh
  - Air pressure to air cylinder insufficient (minimum 60 psi)
  - Solenoid 4-way valve restrictors clogged or not adjusted properly
  - Mounting plate does not match customer’s screw trough
Model B1

- Sample from vertical and sloping chutes, gravity lines, and hoppers
- Tube fixed in stays in the product stream
- Design available to meet 3A section 81-00
- Designed for sampling milk and pharmaceutical powders
Model B1
Model B1 - Manual
Model PR

- Most common model for pneumatic convey lines
- Designed for free flowing materials
- Fixed volume collected in the sample tube and discharges into the container when retracted
- Internal Teflon sealing rings isolate line pressure (max pressure is 4 bar)
Model R

- Pneumatic conveying sampler for non-free flowing materials
- Fixed volume collected in the sample tube
- In the retracted position an auger drives the product to the discharge opening
- Internal Teflon sealing rings isolate line pressure (max pressure is 4 bar)
Control timing is critical to assure gear meshing.
Model RPG - Automatic

- Designed for automatic strip sampling from spouts, hoppers, transfer chutes or end of conveyor belts
- Collects a fixed volume of sample from gravity applications
- Pneumatic cylinder extends the sample tube and into the product stream sample cup is down
- Rotary actuator rotates the tube and sample cup is in the up position
- Tube retracts, rotates and drops sample into container
Point Samplers – where to Apply

- **Free flowing materials Gravity chute or hopper**
  - model B1, PR, R, RPG, SAK, SAE, SAH

- **Non Free flowing materials- gravity chute or hopper**
  - Models B1 and R, SAK, SAE, SAH

- **Free flowing materials – pneumatic convey**
  - Model PR

- **Non free flowing materials – pneumatic convey**
  - Model R
Strip Samplers
Strip Samplers

- Takes a sample from a narrow portion of the stream
- Used in situations where product segregation exists
Model RB

- Strip sampling from dilute phase pneumatic conveying systems (up to 15 psig), transfer chutes, bins and hoppers
- Pneumatic cylinder extends the sample tube and auger into the process stream
- Auger is rotating while the tube is extending and retracting
- Pressure is not isolated from the collection container when sampling
Model D2

- Strip sampling of free flowing and non free flowing products in a gravity chute or hopper
- Sample tube remains in line and rotates to expose aperture to remove sample
- Close tolerance auger draws material to the discharge point
Model RX

- Strip sampling from dilute phase pneumatic conveying systems (both pressure and vacuum), bins and hoppers
- Samples free-flowing powders, granules, pellets, grain and seed
- Pneumatic cylinder extends sample tube into product flow
- Product is continuously discharged while sample tube is extending
- Line pressure is not isolated
Model RX - 45
Model RX - 90
Model RX-90 with Nose Piece

Radius Nose Piece
Model MG

- Strip sampling of free flowing products from a gravity chute
- Sample tube remains in line and rotates to expose an aperture remove sample
Model MG – Electric Actuated
Model MG – Air Actuated
Strip Samplers – Where to Apply

- Free flowing materials Gravity chute or hopper
  - Model D2, MG, RB & RX
- Non Free flowing materials- gravity chute or hopper
  - Models D2 & RB
- Free flowing materials – pneumatic convey or air-slide
  - Model RX
  - Sample container will be exposed to line pressure while product is being taken
- Non free flowing materials – pneumatic convey or air-slide
  - Model RB
  - Sample container will be exposed to line pressure while Product is being taken
Cross Cut Samplers
Cross Cut Samplers

- Takes a cross-section of the entire product stream
- Provides the most representative sample, but requires a lot of headroom
Model SA

- Crosscut samplers for gravity chutes, vertical or angular spouts, etc.
- Intended to sample grain, coal, plastics, chemicals, seeds, flour, sand, etc.
- A lot of moving parts and could be higher maintenance
- Pneumatic rotary actuator actuates the sampler pelican
Conveyor Belt Sampler
DS-3 SAMPLING TECHNIQUE

- Conic Sweep Sampling Action – “Pitch and pour”
- The drive shaft of the rotary scoop is on a 45° angle, causing the arm to sweep a conic pattern.
- Simple Sampling Technique
- Each 360° rotation of the arm provides 12-16 cu. in. of sample. Brake motor stops forward
- movement of the arm at top of the arc, discharging sample into integral hopper.
Typical belt sampler
Belt Sampler Features and Benefits

• Automates the process of sampling from moving conveyor belt to provide a safe, effective, clean and consistent means of sample collection

• Flexible mounting location
  – Can be mounted anywhere along the conveyor instead of in the crowded head pulley belt discharge

• Overall height is less than 610mm
  – Fits where low headroom is a requirement
Model DS-3 Standard Features

• Sample arm speed is adjustable to suit belt speeds up to 274 mpm
• Ease of installation
• Minimal wear items
  – Low cost of ownership
• Scoop moves 10% faster than speed of and in same direction as product flow on belt
  – Reducing wear and overall size of the unit
Model DS-3 Options

- Left or right side discharge
- Sample cabinet
- Sample bucket size
  - 30-40 cm³
  - Custom designs available
- Explosion proof
Model IC

- Designed to collect dry material samples to avoid cross contamination
- Available in 8, 16, and 24 collection positions
- Controlled by a PLC and interfaces with the sampler controller
- Offered with standard TEFC or explosion proof motors
Controls
Controls

- Controls for the bulk solids samplers are generally the same as automatic liquid samplers.
- We highly recommend that Sentry supplies controls for samplers that include motors or two actuators.
- Samplers Sentry should supply controls for are:
  - B1, R, D2, RPG, RB, MG and IC cabinet