

The Importance of Accurate & Reliable Metering of Alt Fuels

Schenck Process
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- Mechanical Engineer Degree with 32 years of Industry Experience
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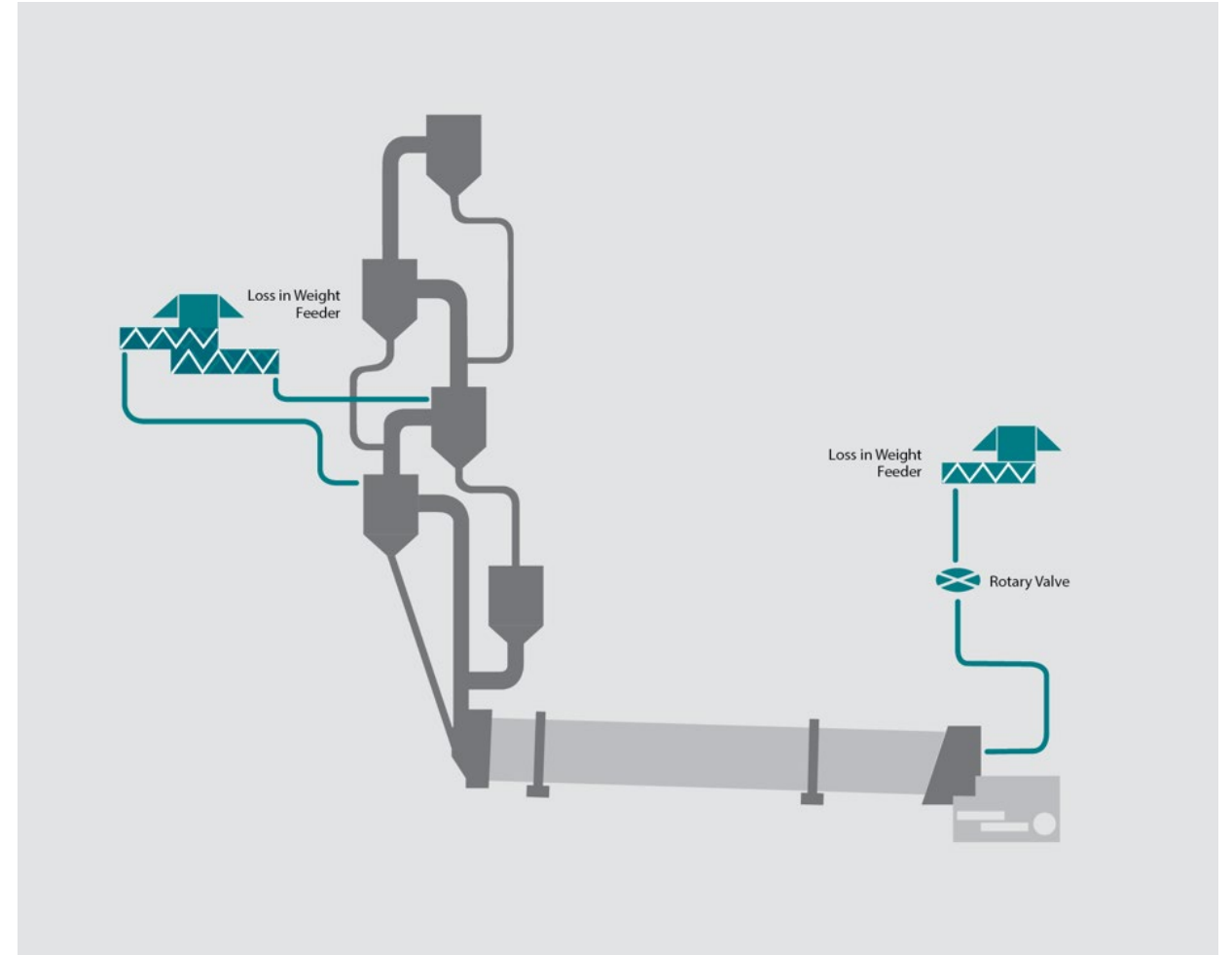
Considerations for AF Metering

Principles

- Weighing is very important for consistency and precision
- Try to meter material as close to the destination as possible
- Calibrations are important
- Varying density and varying particle size material make AF metering challenging
- Can not shear most materials with a shear gate on a belt like most other raw materials in a cement plant
- Dust control, explosion mitigation or suppression should be considered
- Fire protection should be considered
- Difficult to extract from hoppers of any size, keep AF moving and don't let set up

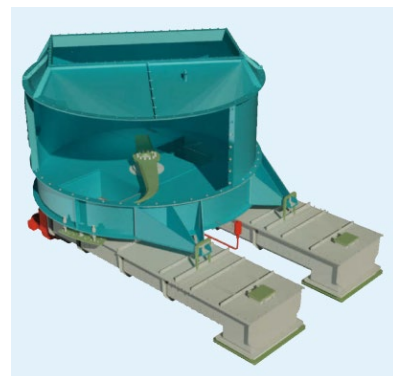
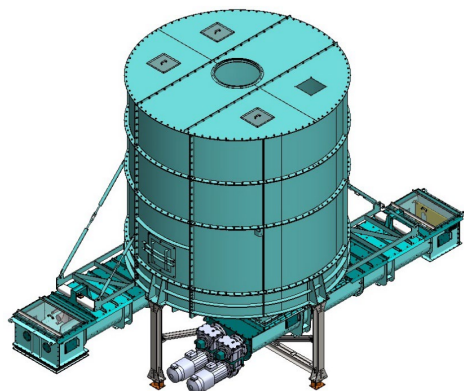
Accurate & Reliable Metering of AF

1. Available weigh feeder types on the market
2. Considerations for the Mainburner Feed
3. Considerations for the Calciner Feed

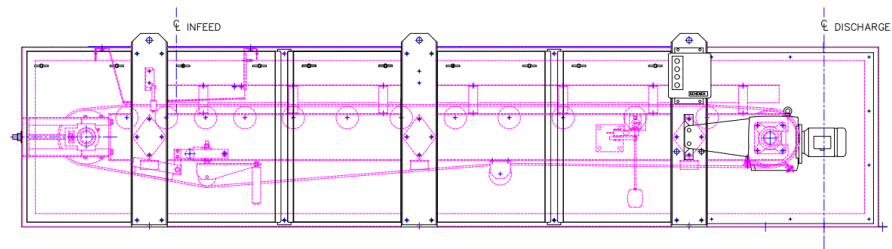


Loss in Weight - Screw Feeders

- Screw feeder controls volume output
- Weighing system monitors “loss of weight”
- Screw speed controlled for maintaining feed rate
- Usually, a buffer hopper on load cells to keep screws full and provide auto-calibrations
- Control room communicates to machine in tons/hr. (kg/hr. etc.)
- Limited by particle size materials that can move through screw design
- Consideration of material surging when using large screws at slow speeds
- Creates air lock when needed for calciner feed
- Dust tight and able to be protected from explosions

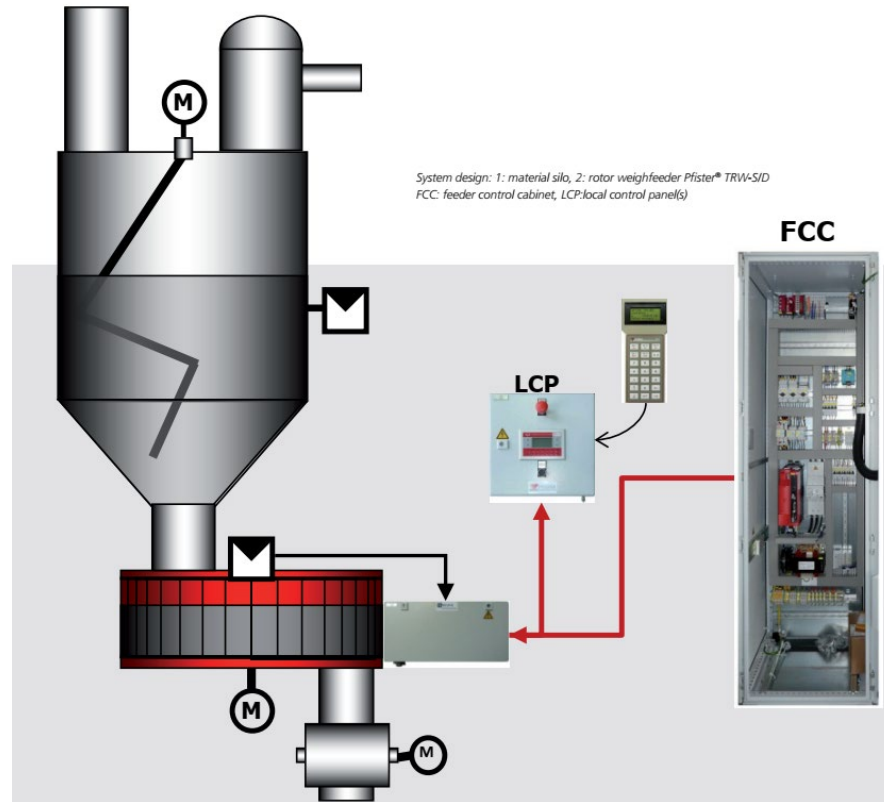


Weigh-Belt Feeders



- Belt feeder is weighing and providing a control signal to a pre-feeder device
- Unlike other materials in a cement plant, the AF material is not sheared with a shear gate
- Needs to be engineered for low density
- Can be very precise ($\pm 0.5\%$)
- Can add 2nd weigh decks as needed
- No limit to feed rate or particle size
- Economical

Rotor Weigh Feeders



- Pre-hopper / Buffer hopper
- Rotor feeder on bottom
- Rotor speed and weight are both measured for feed rate
- Rotor speed controls volume output
- Control room communicates to machine in tons/hr. (kg/hr. etc.)
- Limited by particle size materials that can move through rotor design
- Dust tight and able to be protected from explosions

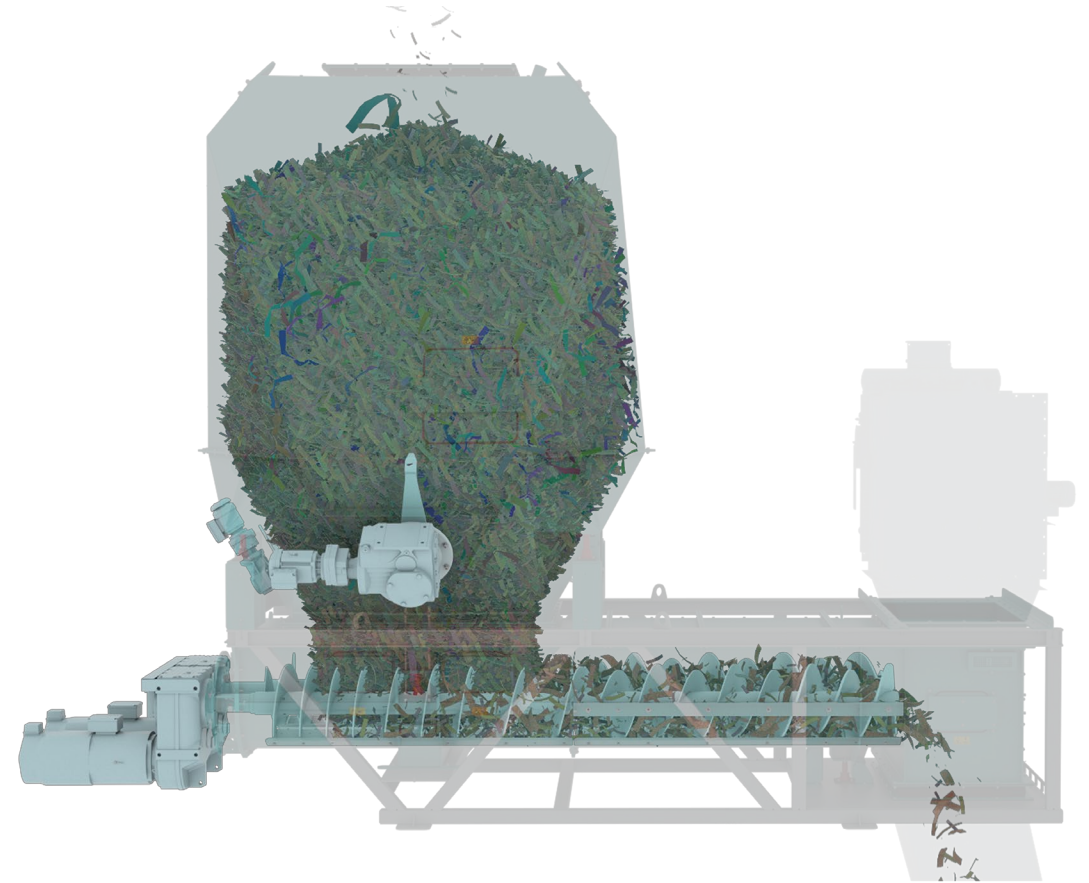
Volume vs. Weight Control

Volumetric Control

- Control volume only and adjust material feed based on temperature control
- Often used by power industry
- Good enough?

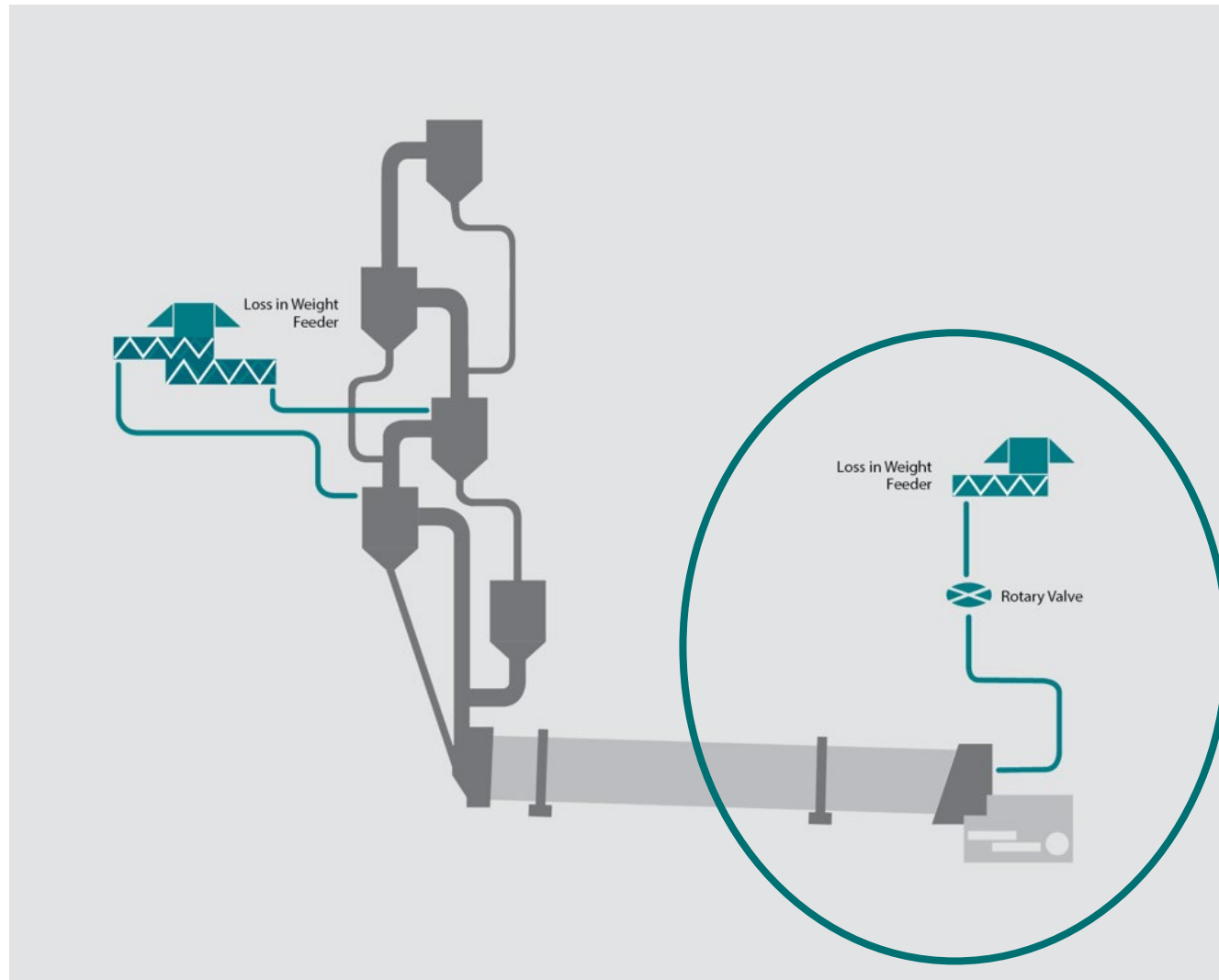
Gravimetric Control

- Control by weight/time (tons/hr. etc.)
- Can be used for inventory and totalizer data as well
- Allows for more precise control as density swings quickly in AF systems



Volumetric screw conveyor/feeder

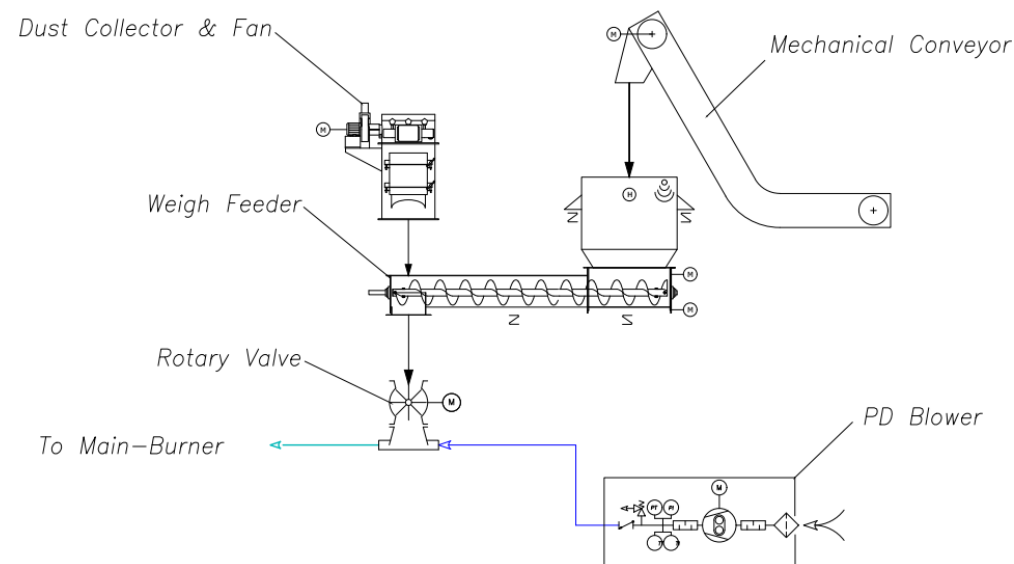
Main Burner Feeding



Main Burner Feeding

Always Pneumatic

- Multi-Channel burner OR Lance Type burner
- 4, 5 or 6 in. pipe (will dictate particle size)
- Pipe size and burner type limits particle size
- Conversation between burner mfg. and conveying system provider for air volumes
- Pressure limits on rotary valves and velocity limits at burner tip dictate particle distance of conveying system
- Systems often need to be installed in congested areas



Pipe Size	Max. Particle Size (In.)		Min. Bend Radius			
	3D	2D	In.	Ft.	In.	Ft.
4	0.8	1.33	60	5	80	6.7
5	1	1.67	75	6.3	100	8.3
6	1.2	2	90	7.5	120	10

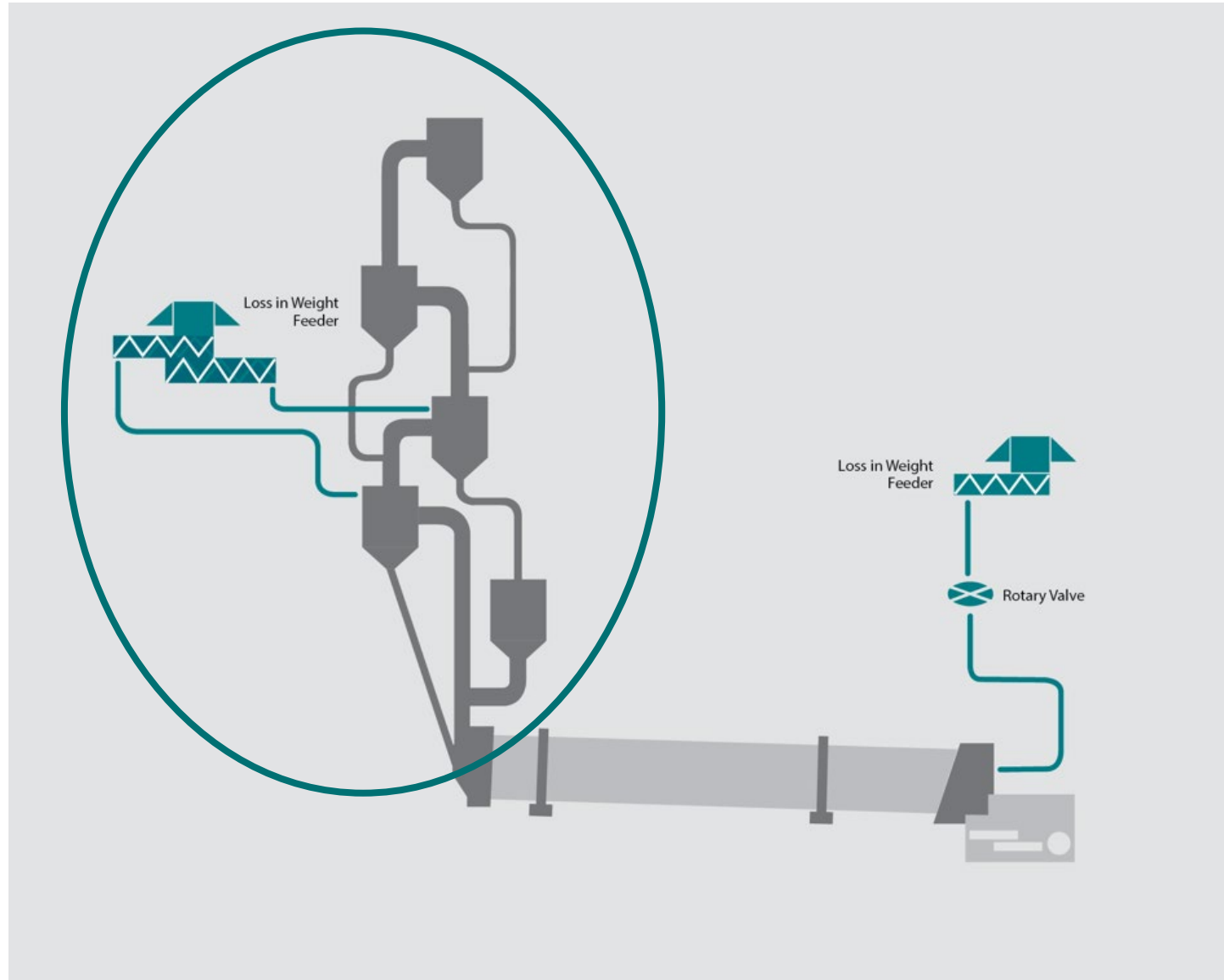
Main Burner Feeding

Pneumatic System Success

- Low material to air ratio (Dilute Phase) creates smoother stream and less possibility of plugging
- Enough velocity to prevent surging and clean out rotary valve
- Remove ferrous metals
- Protect from oversize materials
- Surges in = Surges out
 - Decrease material surges with feeder design and rotary valve design
- Gravimetric weight control



Calciner Feeding



Calciner or Pre-Heater Feeding

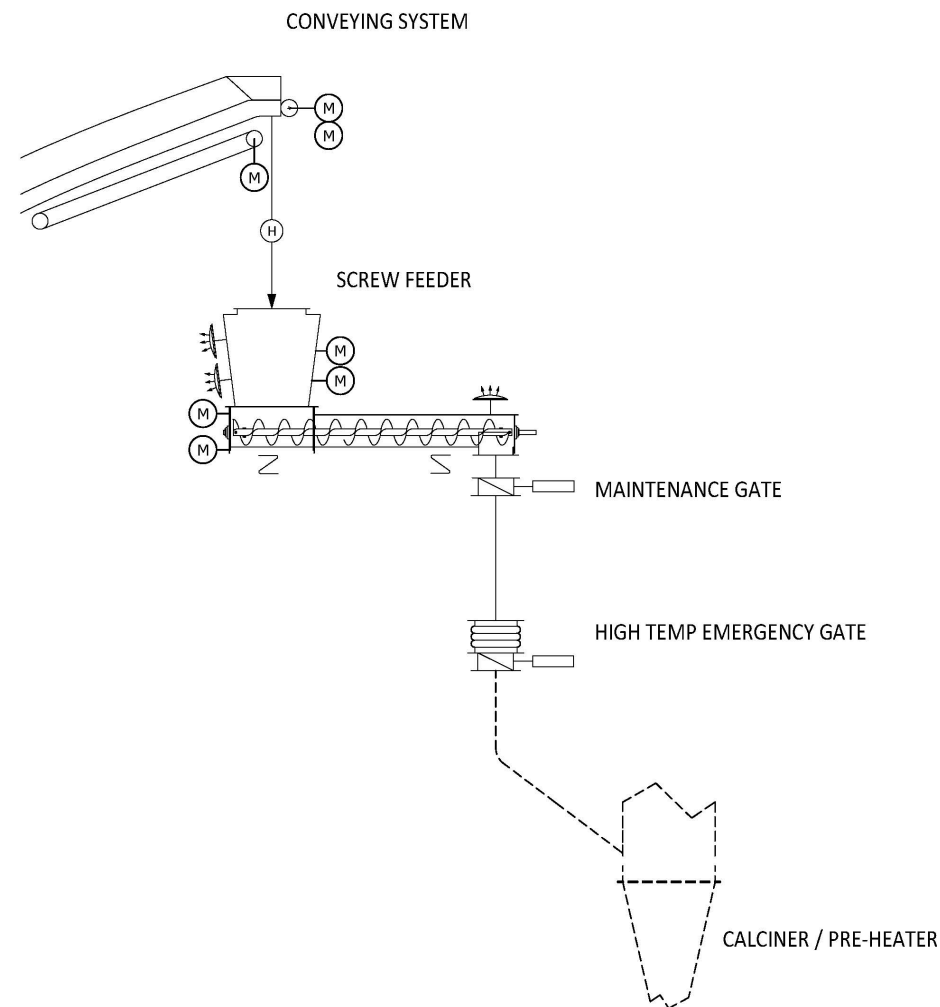
Gravity or Pneumatic Injection

- Particle size can be limited by equipment choice
- Does the calciner or pre-heater design require pneumatic injection?

Where to locate the feeder?

On the ground:

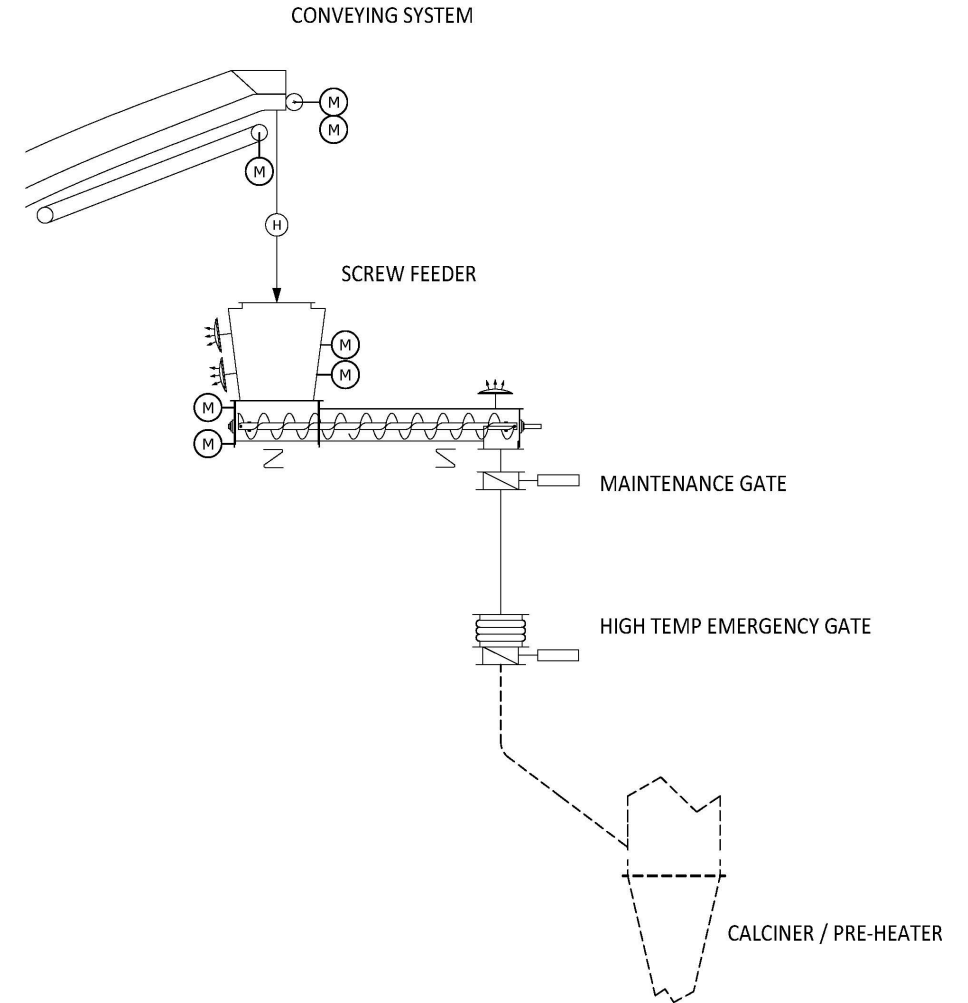
- Simpler maintenance
- More room is available
- Requires pneumatic injection or long mechanical conveying after the feeder that will result in delay after rate adjustments



Calciner or Pre-Heater Feeding (continued)

In the tower:

- Shortens distance from feeder to burning point
- Use screw feeder as airlock
- None or Less conveying air from pneumatic injection
- How would faster reaction time to feed rate changes affect the calciner process?



The Importance of Accurate & Reliable Metering of AF

- Provides the most accurate and stable weighing of AF going into the mainburner that you can afford
- Keeps the conveying system simple and eliminate high wear machines where possible.
- Keeps the metering and weighing device as close to the process as possible for fast reaction time to changes
- Keeps AF moving and keep buffer hoppers as small as possible
- Protects your system from metals and over size contaminants
- It's not IF it's WHEN a system will catch fire or have an explosion

Thank you!

Add my contact details and reach out with any additional questions



Ernesto Duran