Carmeuse Rotary Dryer Design For Improved Efficiency

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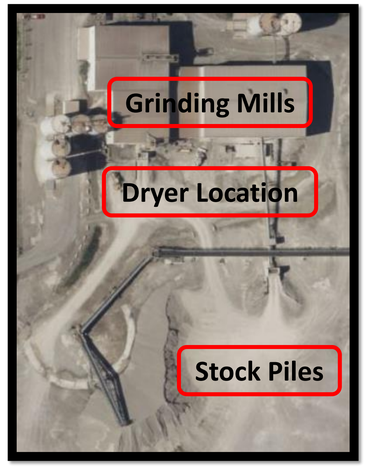
Project Background/ Process Flow

About Carmeuse:

- Started as a family-run business in Belgium more than 160 years ago.
- Committed to demonstrating care and respect for their people, their customers and the environment.

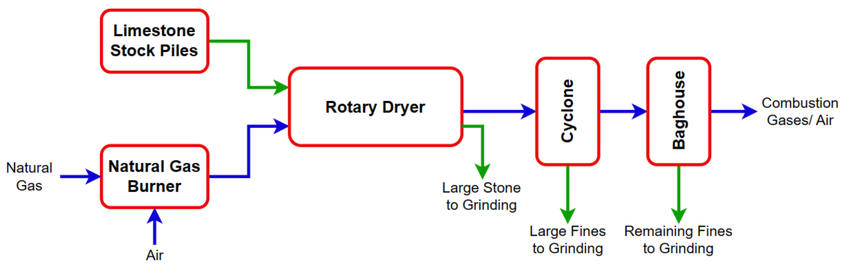
Carmeuse Products:

- Produce lime, limestone, and specialty lime products for a range of applications such as steelmaking, flue gas treatment, water treatment, agriculture, construction aggregates and more.



Carmeuse Portage, Indiana:

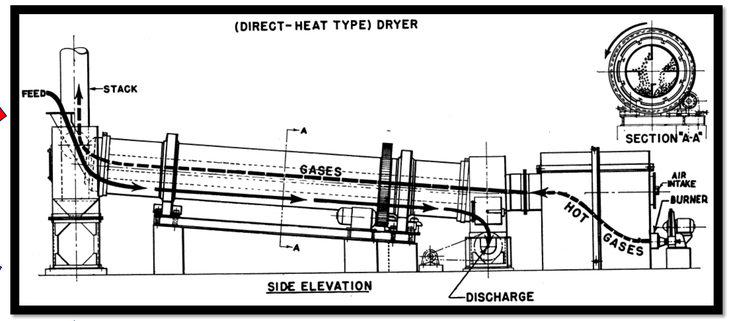
- 4 grinding mills (2, 80” Bradley Mills; 2, 73” Raymond Mills)
- Supplies building materials and flue gas treatment customers.
- Receive limestone from a quarry in northern Michigan.
- Limestone is stockpiled during summer and must be dried before grinding to maintain efficiency.
- Small stone contains more moisture than large stone and can freeze during the winter, causing process slowdowns entering the mill.
- **Each mill has an internal natural gas flash-dryer that they are looking to consolidate into one rotary dryer to improve energy and process efficiency. This would pre-dry the stone eliminating slowdowns entering the mill.**

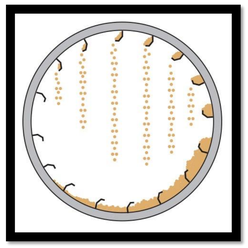


Equipment Specifications

Limestone Feed Composition
Up to 120 tons per hour limestone
~450,000 tons per year
Up to 50% small stone
Up to 15% moisture content

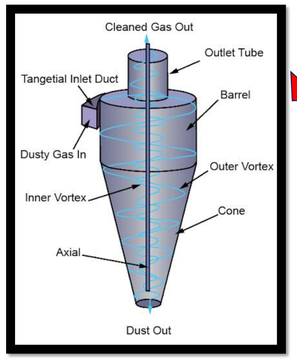
Natural Gas Feed
Up to 600,000 lbm/hr air
Up to 66,000 cubic feet ng/hr
Up to 525,000 BTU/ton
With a 349,000 BTU/ton avg.

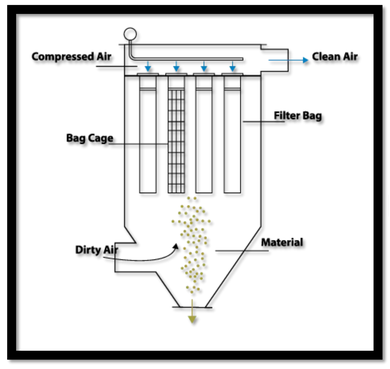




Dryer Specifications				
Diameter	Length	#Flights	Speed	Tilt
10 ft	60 ft	25	1. RPM	1.25 Degrees

Flights Specifications		
Residence Time	Depth	Design
60.5 minutes	1.2 ft	Single & Double Bend





Cyclone Specifications		
Size	Number	Efficiency
13.5 ft	2 in series	99%

Baghouse Specifications			
Cells	Floor Space	Bag Type	Efficiency
6	600 ft	polypropylene	99.5%

ID Fan Specifications		
Size	Air Flow	
600 hp	600,000 lbm/hr	150,000 SCFM

Costing and Conclusions

Equipment	Cost
Rotary Dryer	$ 1,500,000
Cyclone	$ 300,000
Baghouse	$ 1,200,000
ID Fan	$ 79,000
Combustion Fan	$ 10,600
Driver	$ 56,400
Hopper	$ 99,400
Conveyors	$ 338,000
Total Capital Investment	**$ 9,937,358**

****Operating Expenses based on 50% small stone feed****

Utility	Yearly Operating Cost	
	Current	Expected
Electricity	$ 290,000	$ 290,000
Natural Gas	$ 197,000	$ 550,000
Overall	$1,318,000	$1,318,000

Project Benefits:

- Increase small stone feed (12% to 50%) at savings of $4.80/ton
- Resulting in reduced downtime, decreased wear on grinding mills
- **And a total savings of $468,000/ year**
- **Requiring 25 years to recover capital (at 1.3%)**
- Required 70% small stone feed for recovery in 25 years at 7%