

APPLICATION BULLETIN

BACKGROUND/ CHALLENGE

A global iron ore producer needed a cutting edge solution to reduce the cost per ton of their refined ore. The major expense in iron ore processing is the cost per ton of water consumption. By eliminating the wet washing process that consists of a series of hydro-cyclones with a high volume of water usage the processing cost per ton can be significantly reduced.

Mined iron ore consists of a high percentage of contaminants, such as quartz, silica, silt, clay, and alumina that must be reduced to improve the quality of the iron ore. Many of these contaminants are harder than the iron ore itself and after the crushing and grinding process, they remain as large particles. Dry air classification can remove these contaminants and refine the total iron (Fe) in the processed ore more economically than wet washing. Dry processing offers exponential savings over the wet washing process by reducing water and energy costs.



Iron ore beneficiation consists of crushing, grinding and dry classification of the raw material prior to magnetic separation which increases the Fe concentration of the product. This beneficiation process has been proven on both hematite and magnetite where total Fe concentration and magnetic Fe concentration can be enriched allowing producers to sell their refined ore at higher prices.

STURTEVANT® PERFORMANCE

After the iron ore producer consulted with Sturtevant engineers regarding material characteristics and goals, it was determined that the high-throughput operation required three 26-foot Whirlwind® Air Classifiers per production line that could remove beneficiated Fe fines at 120-mesh, 200-mesh and 325-mesh after the fine grinding stage. The refined iron from the air classifier was conveyed to the next stage of the beneficiation process: the magnetic separator rolls. When the beneficiation process was complete, the iron concentration contained in excess of 70% total Fe. To handle the abrasive nature of the iron ore special steel liners were used to ensure the long-life of the air classifiers.

EQUIPMENT RECOMMENDATIONS

WHIRLWIND® AIR CLASSIFIER

MODEL	HP	AIR FLOW VENT (CFM)	IRON ORE FEED RATE (TPH)	APPROXIMATE WEIGHT		HEIGHT		DIAMETER		MIN. CLEARANCE	
				(LBS)	(KG)	(FT)	(MM)	(FT)	(MM)	(FT)	(MM)
16'	100 - 150	675 - 1,350	160	31,000	14061	24' 5"	7442	16' 5"	5004	6' 3"	1905
18'	250 - 300	1,000 - 2,000	250	50,000	22680	27' 7"	8407	18' 5"	5613	8' 9"	2667
20'	350 - 400	1,500 - 3,000	380	68,000	30844	30' 9"	9373	20' 5"	6223	9' 0"	2743
22'	450 - 500	2,000 - 4,000	570	87,000	39463	33' 0"	10058	22' 5"	6833	9' 0"	2743
24'	600 - 700	2,500 - 5,000	750	117,000	53070	35' 10'	10922	24' 5"	7442	10' 9"	3277
26'	600 - 800	3,000 - 6,000	1000	125,000	56700	38' 9"	11811	26' 5"	8052	10' 9"	3277

Measurements are for general reference only. Please consult dimensional drawings for exact measurements.

Smaller sizes are available, for a complete list see the Whirlwind® Air Classifier Product Bulletin.

SUMMARY

Since air classification with the Whirlwind® is a dry process and does not require water, hydro-cyclones, pumps, piping or wastewater treatment equipment, the iron ore manufacturer realized an immediate capital investment savings and avoided the complexities associated with a wet wash system. The operation experienced precise separation which increased the Fe concentration of the product thereby allowing them to demand higher prices for their iron ore.