Upgrading of VRM & Ball Mills with LVT Classifier

By MT Rao

Part of Your Success

CLASSIFIER FOR VERTICAL MILL AND BALL MILL

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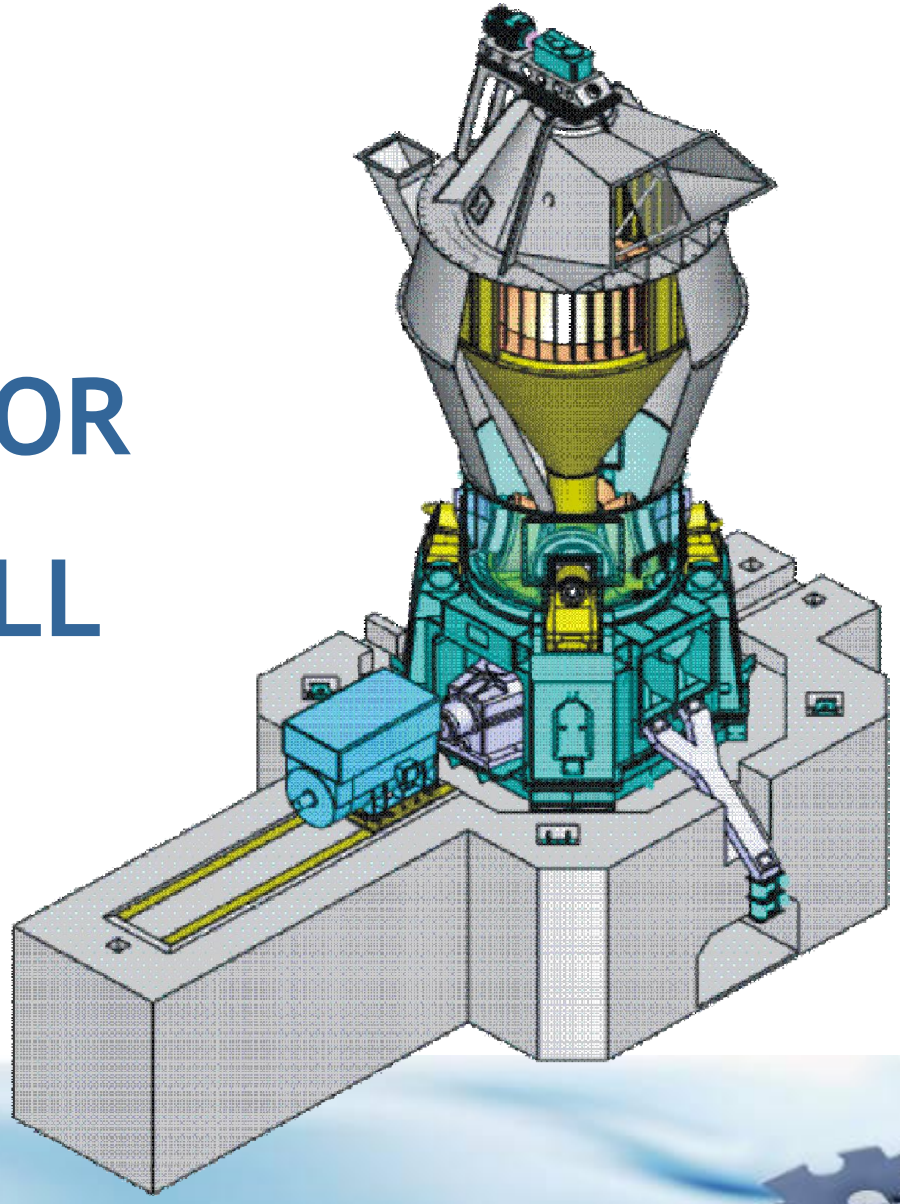
References of LV Technology

Year	Client	Country	Product
2009	TPI	Thailand	Coal Mill
2009	Chinfon	Vietnam	Kiln Upgrade, Raw Mill, Cement Mill, Coal Mill
2008	Bodoquena	Brazil	Kiln Upgrade
2008	Votorantim	Brazil	Coal Mill
2008	Holcim Malaysia	Malaysia	Classifier
2008	IJACI Cement	Brazil	Engineering
2008	Mustehkam Cement	Pakistan	Engineering, Raw Mill, Cement Mill
2008	APIAI	Brazil	Plant upgrade
2008	Achinsk Cement	Russia	Coal Mill
2007	Basel Cement	Kazakhstan	Coal Mill, Cooler

CLASSIFIER FOR VERTICAL MILL



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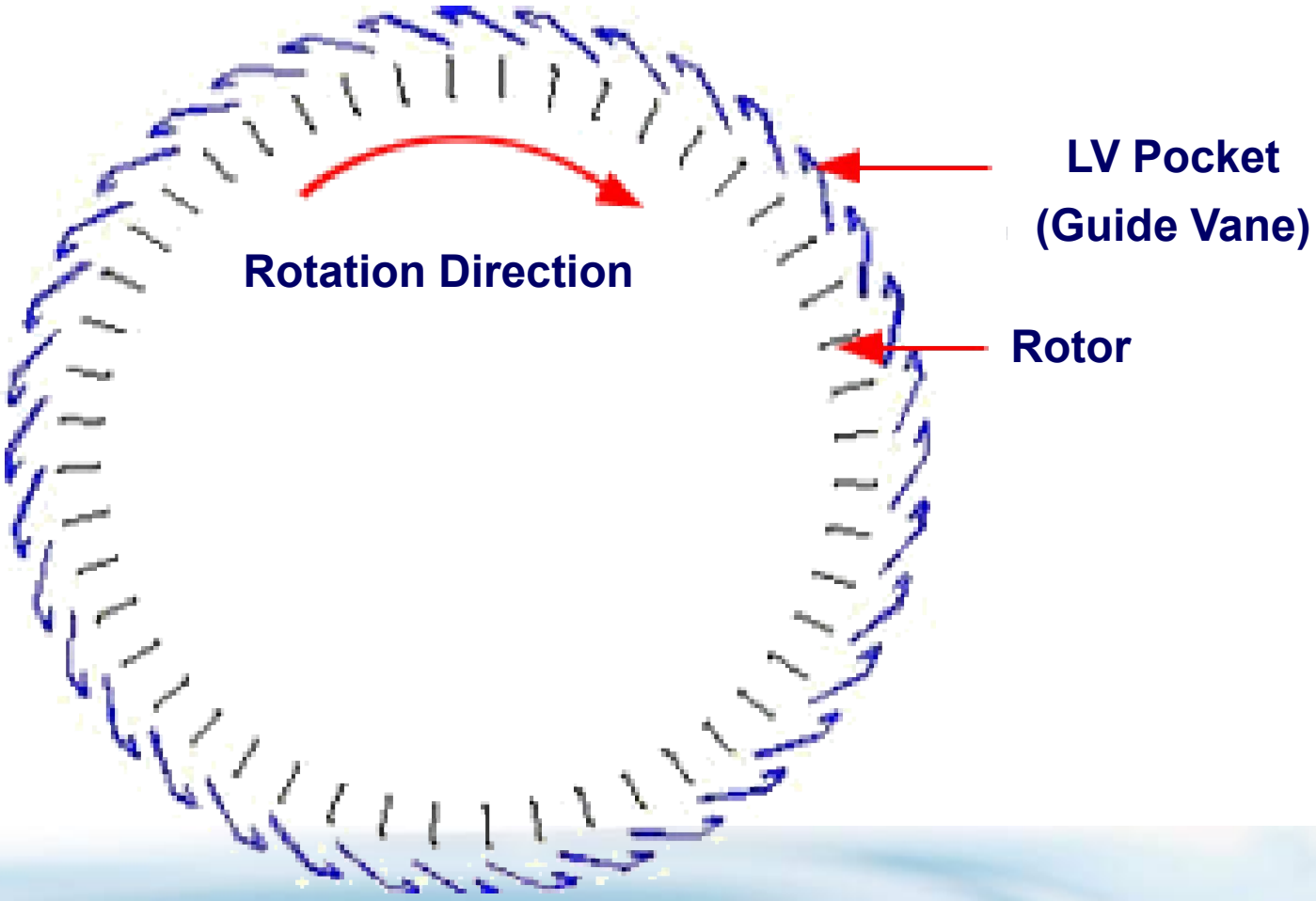
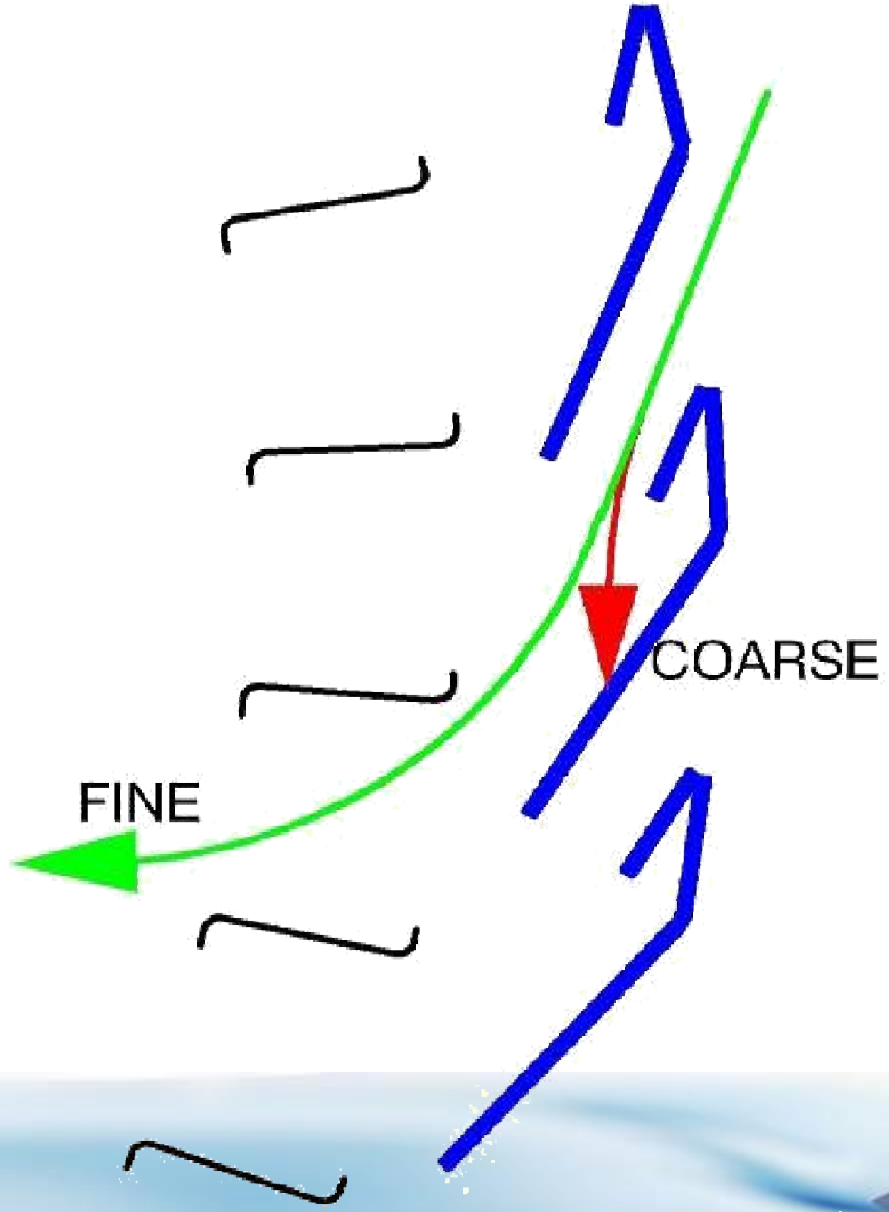
LV Classifier for Vertical Mill

Guide Vane and Rotor

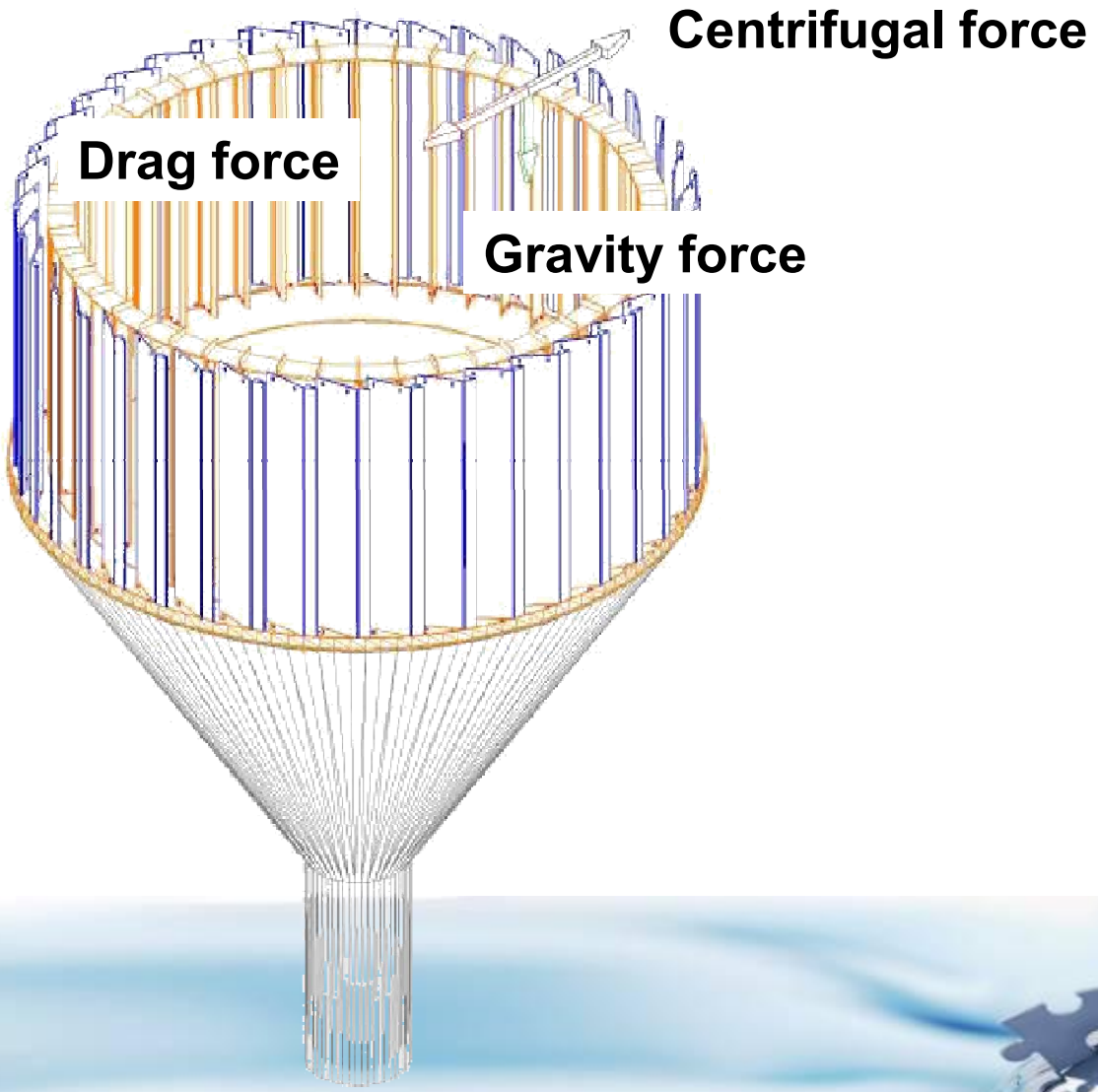


LV Pocket



LV Pocket

Force involve in LV Classifier



Concept of LV Classifier

The concept of the classifier is to improve the gas and material flow in vertical mills by:

- Unique design of guide vanes - LV pocket
- Unique design of rotor
- The design of the grit funnel

Concept of LV Classifier

The concept is based on the idea:

- Allow more material to be directed to the classifier by optimising the gas speed

- Avoid fines returning to the grinding table and excessive internal material circulation in the mill body by installation of the LV Pocket

- Decreases the pressure loss in the mill body and separator. An effect of the reduction of internal material circulation

Benefits of LV Classifier

High efficiency in any good classifier means

NO COARSE IN FINES

In the LV Classifier our aims also is to have

NO FINES IN COARSE

Vertical Roller Mills:

Increased production	12 - 30 %
Saving in power consumption of both mill and fan	1.5 - 3.0 kWh/t
Vibration level decreasing	
Cement strength increases	

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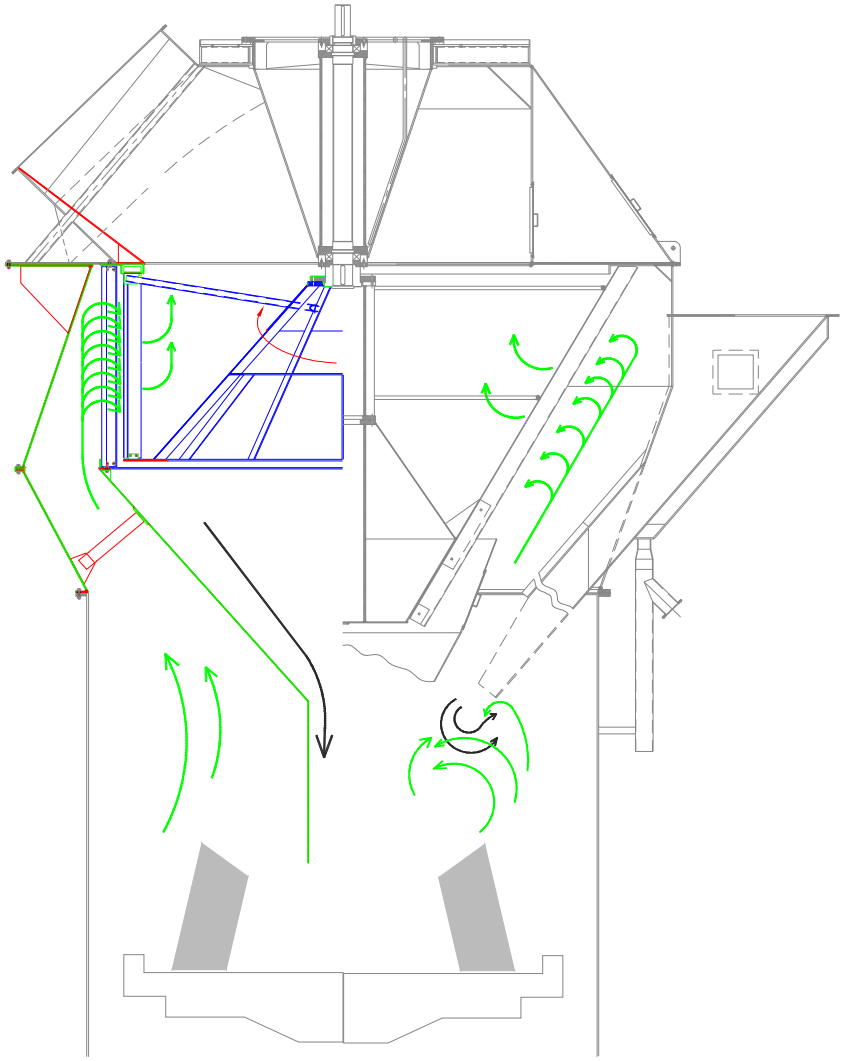
Before and After Modifications

MODIFICATION BY LV

EXISTING



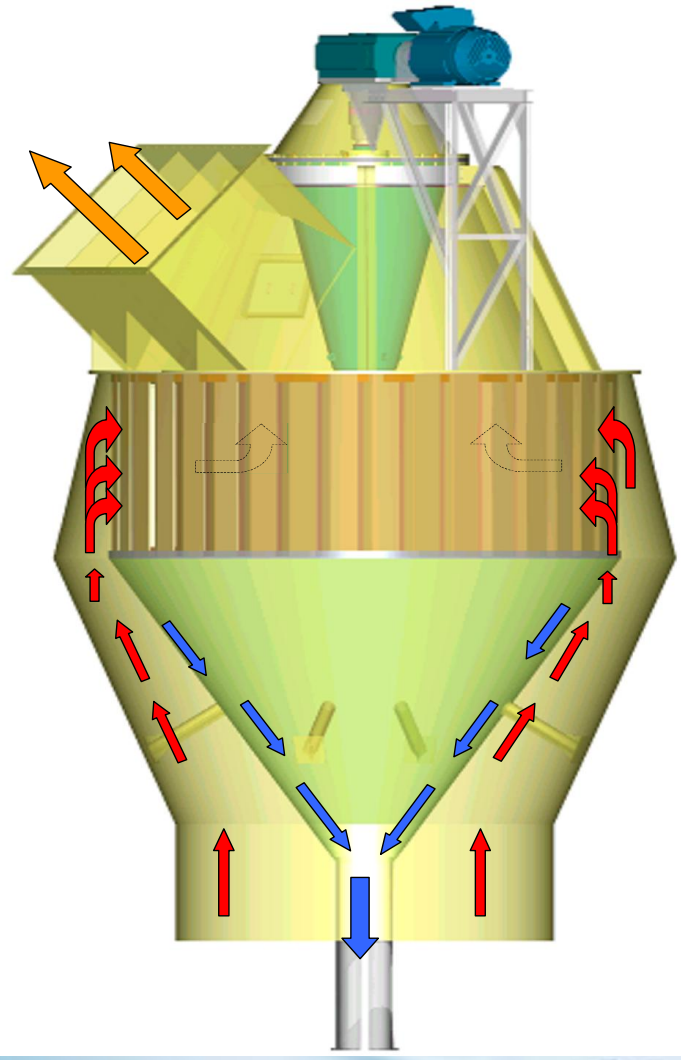
Actual Result for LM Mill

Mill		Fuller LM 50.4		LM 63.4	
		Before	After	Before	After
Classifier		LJKS	LVT	LSKS	LVT
Production	MTPH	300	300	617	709
Mill power	KWh	3100	3100	4875	4960
Fan power	KWh	3200	1900	6355	5175
ΔP mill	Mmwg	800	750	850	750
Vibration	Mm/.s	8-10	3-5	8-10	5-7
Residue	% > 90 μ	18	15	12	12
	% > 200 μ	1.5	1.5		
Spec. energy					
Mill + Fan	kWh/MT	21.0	16.7	18.2	14.3
Savings	kWh/MT		4.3		3.9
Increased Production	%	-	0	-	15

Actual Result for Polysius Mill

Polysius 51 - 26		Before	After
Capacity	MTPH	225	275
Residue	% > 90 μ	16	22
	% > 200 μ	5.0	4.0
Mill Power	kWh	2470	2600
Fan Power	kWh	2150	1800
Exit Grain load	gm/m3	360	510
Mill ΔP	mmwg	735	720
External Recir.	Percent	45	30
Spec. Pwr Cons.	kWh/MT	20.5	16.0
Power Savings	kWh/MT		4.5
Increased Production	%		22

CLASSIFIER FOR BALL MILL



Concept of Classifier for Ball Mill

LVT started to design new Classifier for ball mills in the beginning of 2001.

The concept and construction are very unique applying new technology.

The basic concepts are;

1. Material feed at Separator bottom
2. No bucket elevator system for new grinding plant
3. Fluidizing bed

Concept of Classifier for Ball Mill

(1) Material feed at Separator bottom

Separator feed material should be fed into separator bottom, not into Separator top as usual, and material should goes up into Separator zone from bottom.

This makes possible to get uniform material distribution into whole area of Separator.

Separator rotor and stator can work having same dust concentration in all area. Dust load can be selected higher comparing conventional one accordingly.

This is very unique concept and important point for Separator design.

Concept of Classifier for Ball Mill

(2) Fluidizing bed

Fluidizing bed is applied at Separator bottom.

This arrangement make possible to get shortest bottom casing (cylindrical portion) of Separator with good mixing effect between gas and material in shorter distance.

This fluidizing bed is also designed to separate grit coming from ball mill outlet, such as fraction of steel ball, lump materials, etc. taking out completely from mill circuit.

Concept of Classifier for Ball Mill

(2) Fluidizing bed

This fluidizing bed is also for avoiding build-up material problem as emergency case, by improving aeration properties for feed material at bed bottom, when excess material comes down to bottom of Separator.

It is not requested to clean and to take out built-up dust from the bottom Separator for stopping mill operation. Introducing circulation process gas to top of fluidizing bed area is enough to carry-up dust completely outside of separator.

Air volume and delivery pressure of fluidizing bed fan should be lower as possible.

Concept of Classifier for Ball Mill

(2) Fluidizing bed

(Remarks)

This Separator for coal mill does not equip fluidizing bed to avoid material build-up. Hot gas is introduced directly into bottom of separator.

Some of air swept ball mills for raw material grinding have no fluidizing bed in order to introduce mill outlet gas into Separator bottom. This depends on layout.

Concept of Classifier for Ball Mill

(3) No bucket elevator system for new grinding plant

Arrangement of Separator bottom feed contributes also reducing the bucket elevator height for mill outlet.

As for the new mill planning, it makes possible to delete bucket elevator using for outlet of mill.

Mill outlet material is fed directly into Separator bottom without using bucket elevator, by extending Separator lower casing to the level of mill outlet.

When bucket elevator is deleted, ball mill building becomes very simple and lower construction.

Concept of Classifier for Ball Mill

(3) No bucket elevator system for new grinding plant

(Remarks)

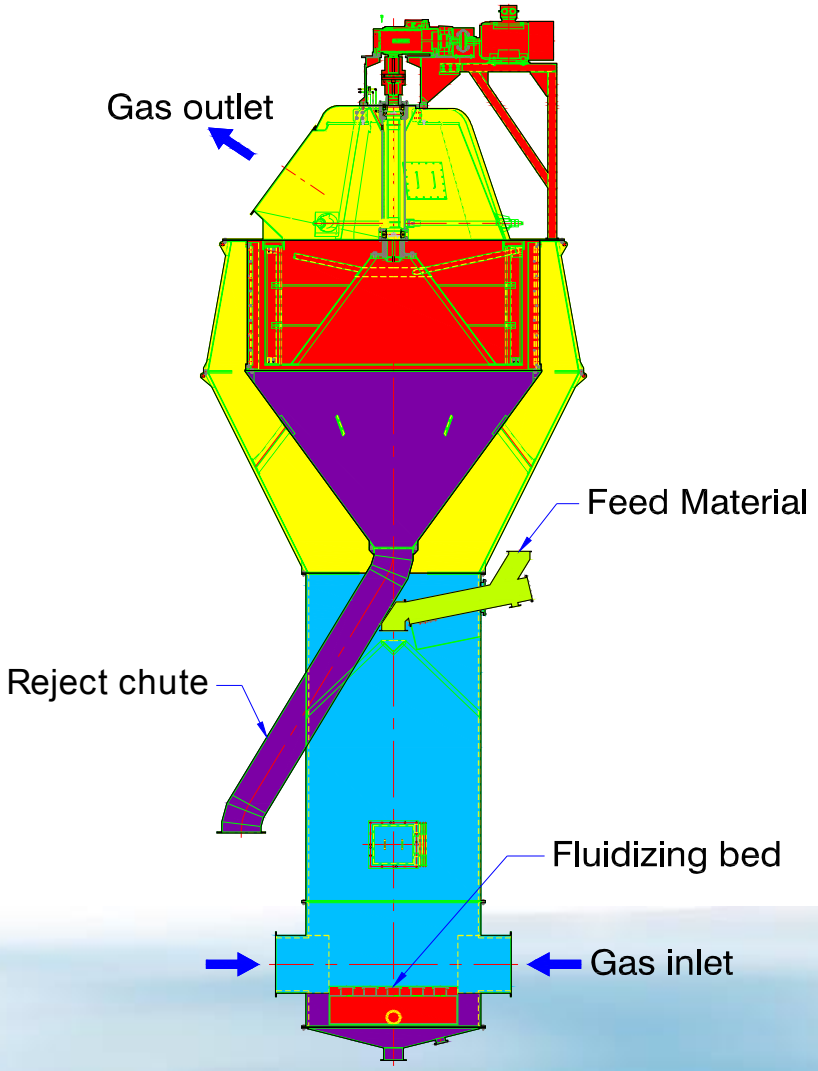
LVT applied this type “no bucket elevator plant” for;

*Cement mill for CEMCO / Canada and
* Pozzolane mills / Myanmar, already.

We call this new concept Separator,

“LV Classifier for Ball Mills with fluidizing bed”.

Concept of Classifier for Ball Mill



1. Bottom feed
2. Fluidizing bed
3. Lower BE height

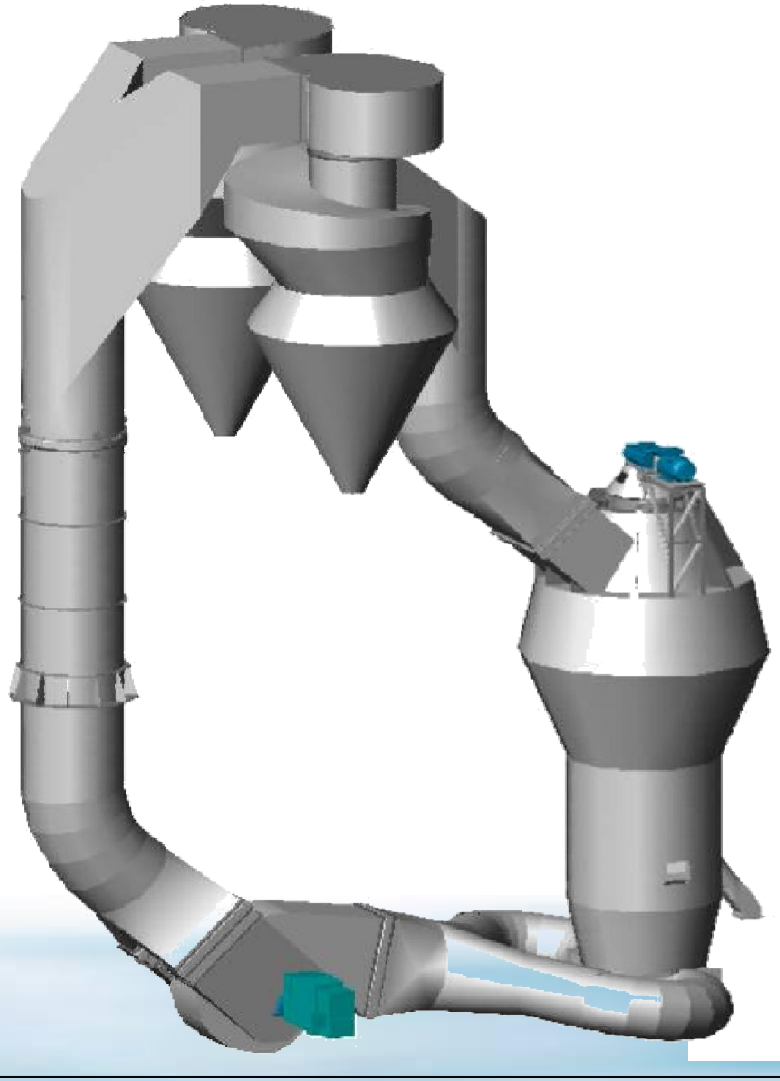
Concept of Classifier for Ball Mill

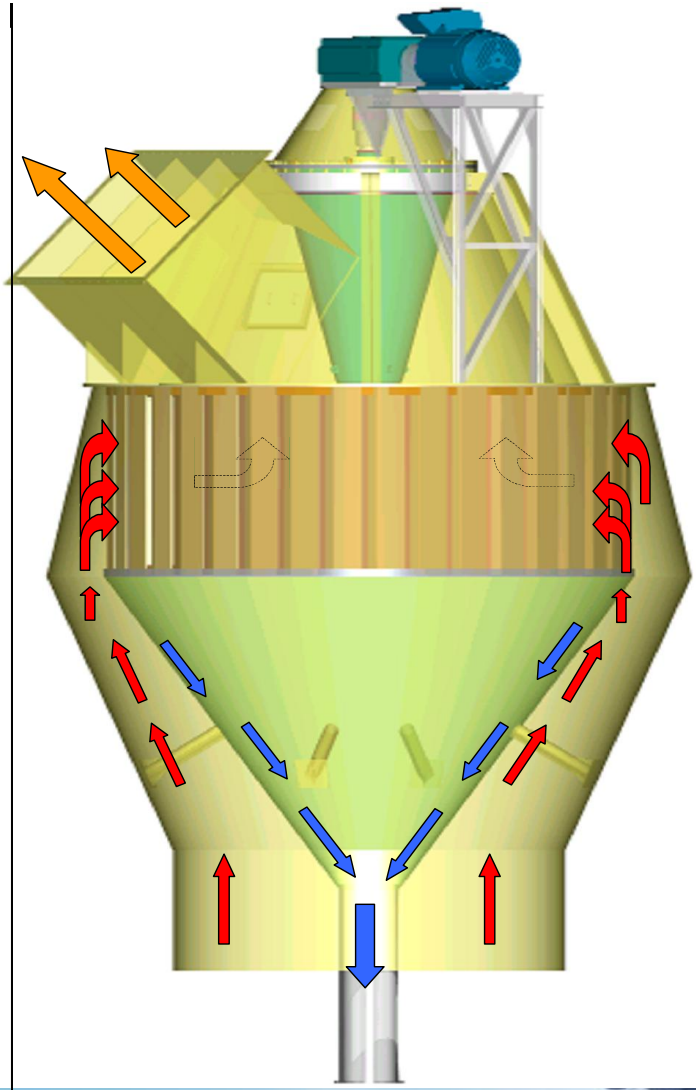
Total number of references of LV Classifiers for ball mills

(January 2006)

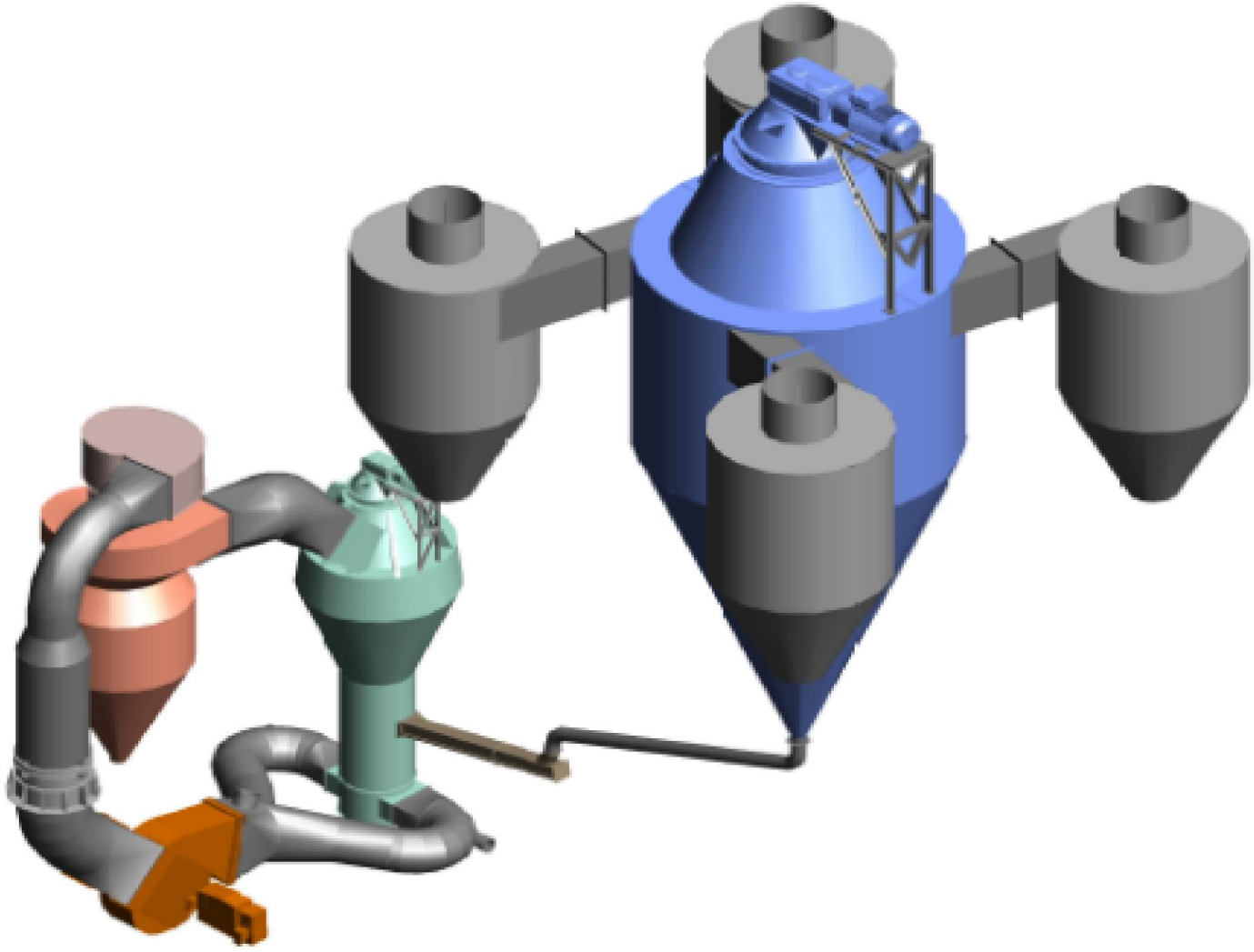
Category of ball mill	*No. of sets*	*Modification or new*	*Apply of fluidizing bed*	*Remarks*
Raw mill	11 sets (13%)	Modification	With and without fluidizing bed	
Cement mill	35 sets (42%)	Modification	With fluidizing bed	Including slag
Coal mill	33 sets (39%)	Modification	Without FB	Coal & Petcoke
Others * Fly ash * Lime * Pozzolane	3 sets 1 sets 2 sets (6%)	* New plant * Modification * New plant	With fluidizing bed	Without BE
Grand total	84 sets (100%)			

Concept of Classifier for Ball Mill





Small LV Classifier to the existing seperator



Benefits of Small Classifier

- Low investment cost
- Downtime less than 1 day
- Increased productivity
- Less power consumption
- Flexible operation

L.V. Technology Public Company Limited

If you have any questions please !!

Thank You