



Energy Conservation

Projects 2003 - 04

Shree Digvijay Cement Ltd.



RE-ENGINEERING

AT

ATOX COAL MILL



RE-ENGINEERING at COAL MILL FAN - 350 Kw

Background:

- ❖ **Higher Power Consumption as flow control by inlet damper.**
- ❖ **Poor speed regulation limitation due to motor LRS**
- ❖ **Frequent breakdown in single stage gearbox of Fan drive.**

1. Replacement of LRS of Coal Mill exhaust fan with LRR.

- **Motor rpm reduced from 1480 to 1230.**
- **Wear & tear of rotating parts reduced – better life of motor bearings expected.**



2. Eliminated the speed reduction gearbox in between motor & fan impeller.

- **Eliminated maintenance / replacement cost of gear box completely.**

3. Eliminated damper in the gas flow circuit.

- **Reduced pressure drop and low power consumption.**

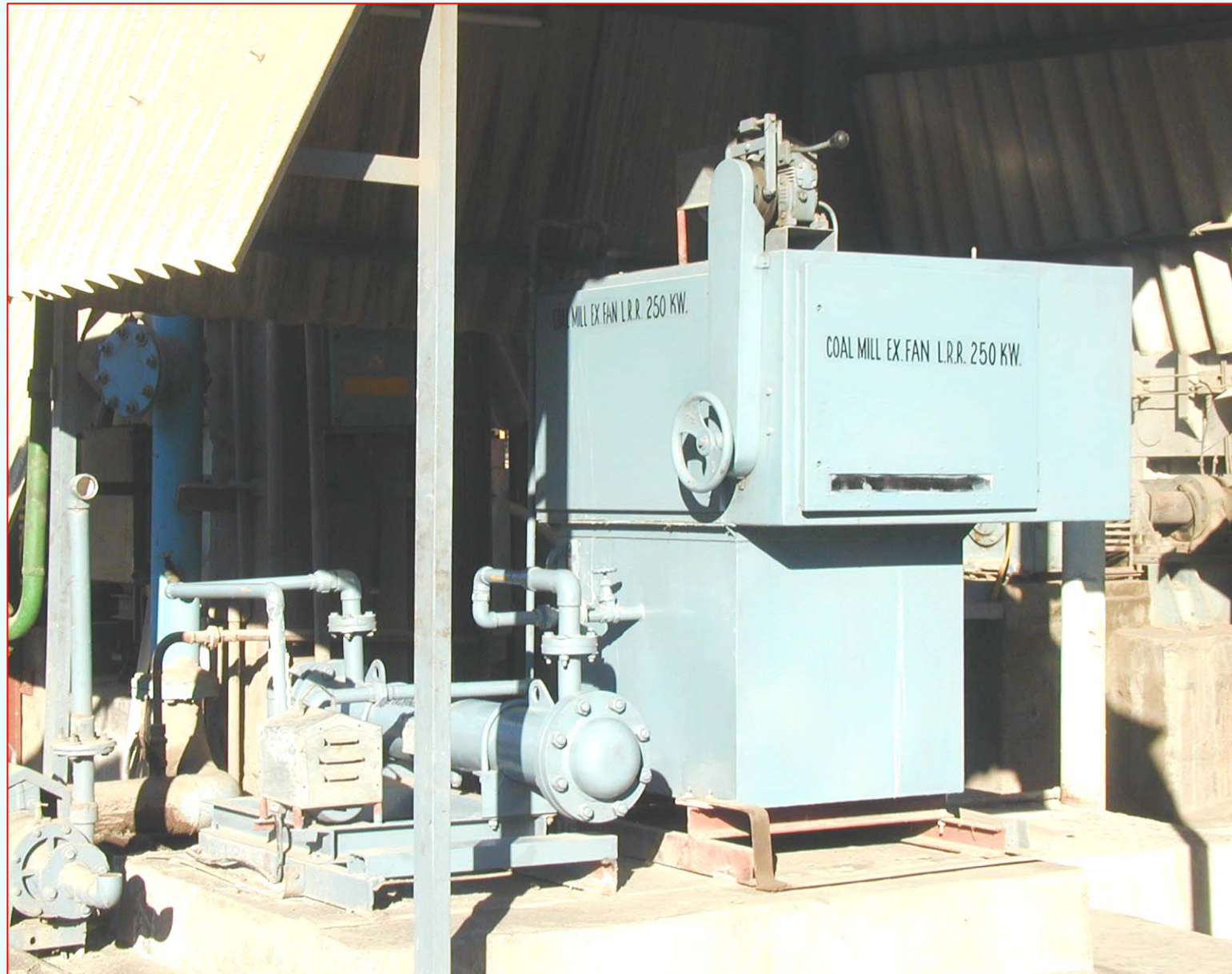
COST OF MODIFICATION → Rs. 2.0 Lacs.

ANNUAL SAVING → Rs. 3.5 Lacs

After removal of Gear box from Drive



New LRR which installed in place of LRS





MODIFICATION IN
PRODUCT CYCLONES
OF RAW MILL



MODIFICATION AT THE BOTTOM OF SIX CYCLONE

PROBLEM & LOSSES:

There are six cyclones installed in the raw mill product separator system.

Under each cyclone there are pair of rotary air locks.

There is heavy negative pressure inside the cyclones and rotary air locks can't ensure full sealing for long.

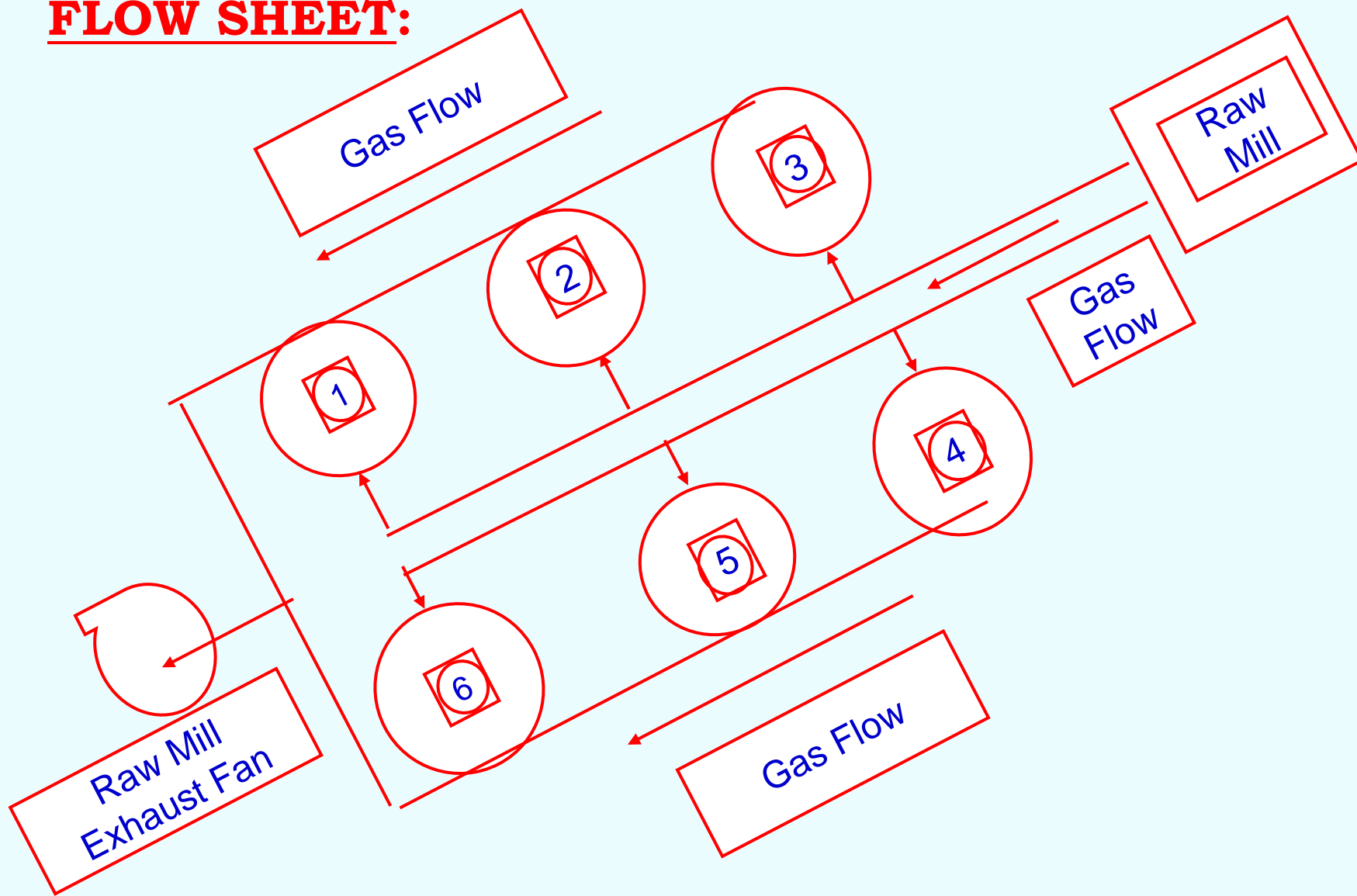
The rotary air locks blades & body wear out quite fast and false air entry sets in through the gaps.

The rotary air locks' body and rotor are re-built & re-machined during every shutdown with the view to reduce air gaps to bare minimum.

The repair charges inclusive of welding & machining, dismantling, reassembly etc cost **Rs.50,000 per air lock per attempt.**



FLOW SHEET:





UBE RAW MILL SIX CYCLONE LAYOUT

EX FAN SIDE

16033

6

16033N VVVF DRIVE

16039

1

16039N VVVF DRIVE

16032

5

16032N VVVF DRIVE

16037

2

16035N VVVF DRIVE

16030

4

16035

3

COLONY SIDE

OLD PLANT SIDE

RAWMILL SIDE

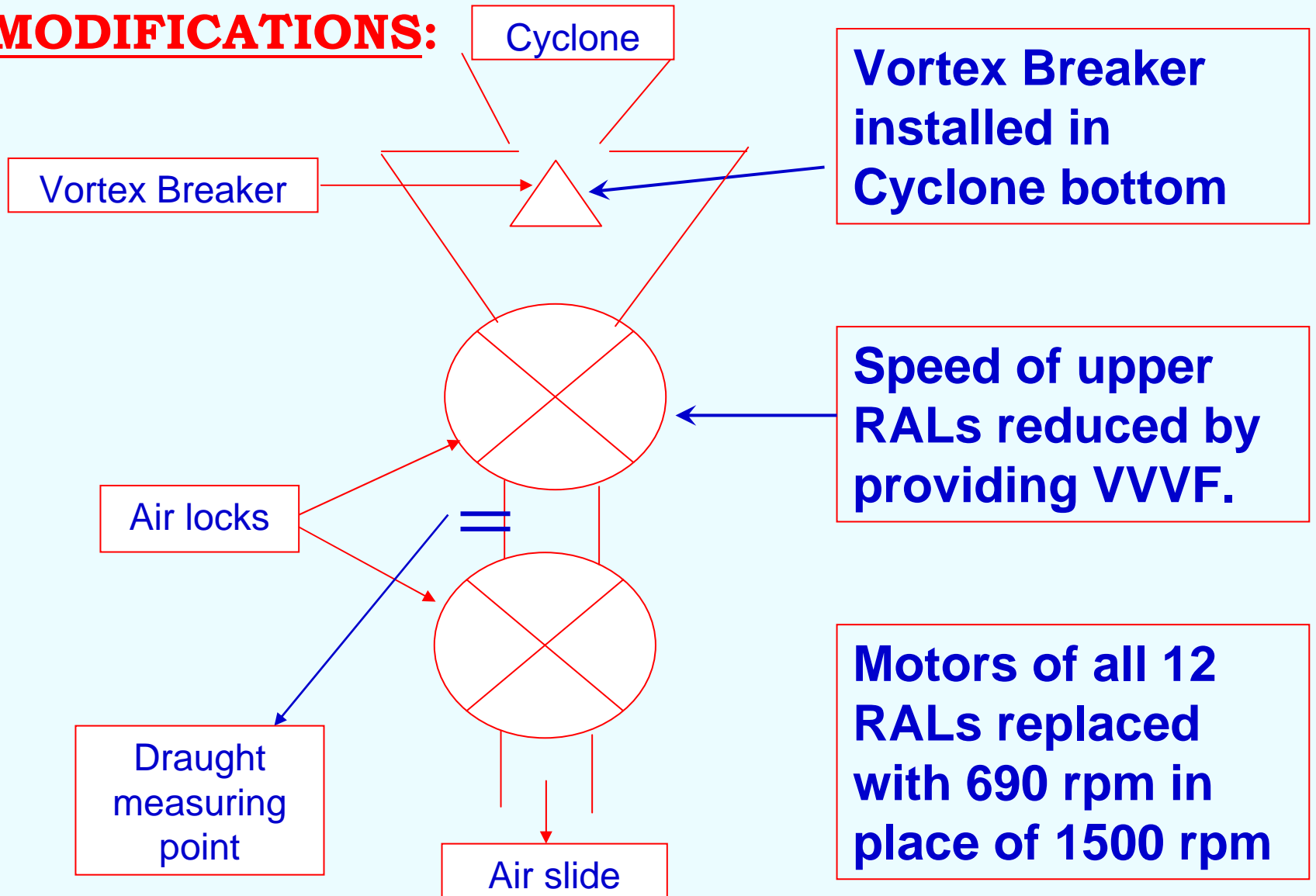
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**MODIFICATIONS DONE:**

- ❖ **Vortex breaker installed at the bottom of cyclones.**
- ❖ **All six top rotary air lock drives of 2.2 kW, 1470 rpm are replaced with 0.55 kW, 690 rpm motors.**
- ❖ **VVVF drive provided on all the six top air locks.**
 - **One VVVF drive panel operates two top rotary feeder drives of the first pair of cyclones.**
 - **Another VVVF drive panel operates four top rotary feeder drives of the balance cyclones.**
- ❖ **All six bottom rotary air lock drives of 2.2 kW, 1470 rpm are replaced with 0.55 kW, 690 rpm motors.**



MODIFICATIONS:

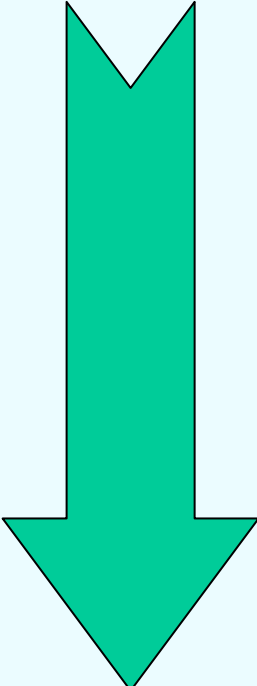


Vortex Breaker installed in Cyclone bottom

Speed of upper RALs reduced by providing VVVF.

Motors of all 12 RALs replaced with 690 rpm in place of 1500 rpm

**DRAUGHT MEASUREMENT IN BETWEEN PAIR OF
ROTARY AIR LOCKS UNDER EACH CYCLONE:**

Cyclone Nos.	Before Speed Control (mmWG)	After Speed Control (mmWG)	Draught reduction mmWG
1	740	25 - 54	
2	658	29 - 40	
3	650	179 - 267	
4	600	216 - 229	
5	720	297	
6	710	110	



Contd ...

RESULTS: (at same feed rate of 245 t/hr)

	<u>Before</u> <u>Speed control</u>	<u>After</u> <u>Speed control</u>
Fan inlet draught	1201 mmWG	1050 mmWG
Mill outlet draught	1108 mmWG	950 mmWG
Mill inlet draught	165 mmWG	162 mmWG
% False air entering in Circuit	8.7	2.9
Fan RPM	965	915
Fan power	1848 kW	1730 kW



Contd ...

SAVING ACHIEVED :

❖ Power reduction on account of reduction in False air ingress	118 kWH
❖ Power reduction by change of motor & VVVF installation	6 kWH
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	Total... 124 kWH
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This is equivalent to saving of Rs. 25 Lacs per annum

Saving by avoiding maintenance repair of rotary air locks during yearly shutdown = Rs. 3.0 Lacs

Total saving = Rs. 28 Lacs per annum

Un-quantified savings include reduction in dust loading & subsequent benefits in raw mill fan, ESP etc as a result of improved cyclone efficiency.

DIGVIJAY



Thanks