# CII National Award for Environmental Best Practices Award– 2021

## UltraTech Cement Limited

**Unit : Ratnagiri Cement Works**

**Presenters:-** **1) Mr. Neeraj Khare (Assistant General Manager)**

**2) Mr. Balaji H. (Assistant Manager)**

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# Unit Introduction

- Ratnagiri is a port city on the Arabian Sea coast, southwestern part of Maharashtra. Ratnagiri Cement Works (RCW) was established in 1982 and became a part of Aditya Birla Group in 2006.
- At Ratnagiri we have Cement Manufacturing at Main Plant situated in MIDC Area & Clinker unloading at Bhagwati Bundar Jetty, 6 km from Main plant

| Plant Capacity | | |
|---|---|---|
| **RTN** | **Cement** | **0.48 MMTPA** |

- RTN Produces two Cement Grades i.e. OPC 43 & PPC (also have a license to mfg. OPC 53 Grade).
- Sales are mainly to Ratnagiri, Sindhudurg & some parts of Kolhapur, Sangli, Satara & Navi Mumbai.
- Power to RTN is wheeled from ACW i.e. 75%-85% Power is wheeled since Apr 2018 & valid up to Jan 2021.
- Reportable Accident free 15 years completed in June 2020 and same continues.
- Project implementation/ - Clinker Silos (37500 MT x 2 Nos.) Project completed 31/03/2015.
- Single source of fly- ash supplies from JSW, Jaigad and Single source of Gypsum supplies from local trader

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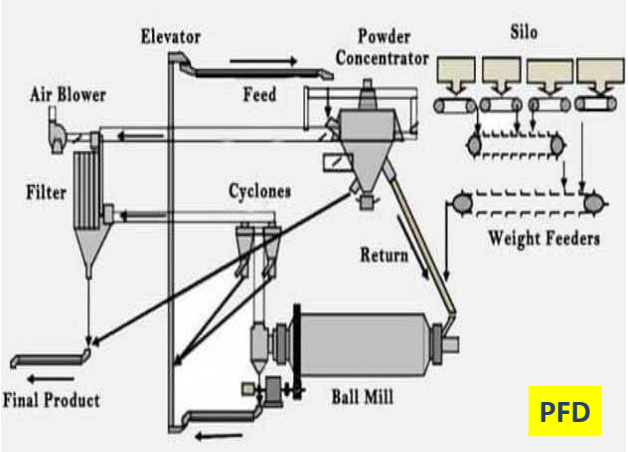
## Project Details

**Project Title:-**Substitution of dry fly ash with pond ash to achieve 34 % addition in Portland Pozzolana Cement manufacturing

**Details of Project:-**




- The clinker, limestone and gypsum are weighed and mixed in a proportion by the belt weigher, The material is then ground in a ball mill and the weighed fly ash will be further Mixed in the Separator.
- Separator fines are sent to final product and rejected material sent to mill inlet for regrinding.
- During these processes, the dust laden gas vented from the mill will be sent to dust collector for collection of fines and the separated gas discharged into the atmosphere by the mill vent fan. The collected fine powder will be directly sent into the cement silo.

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## Technology Road Map for emission reduction in Grinding Cement Plants

| | |
|---|---|
| 1 | Improving Clinker conversion factor by blended cement |
| 2 | Optimization/Reduction of Specific Power Consumption up to Clinkerisation |
| 3 | Optimization/Reduction of Specific Power Consumption up to Cement Grinding. |
| 4 | Recirculating Waste Heat usage venting from stack to grinding |
| 5 | Introducing Composite Cement in market (PPC+PSC) |
| 6 | Increasing use of Alternate raw materials |

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## BRIEF DESCRIPTION OF THE PROCESS

- **Trigger of the project-** To manufacture cement, Raw material contributes 25 % to 27 % of cement manufacturing cost. Considering achieving 34 % Fly ash addition in PPC,conducted brainstorming with all operational and maintenance team.

**Ideas Generated through brain storming:-**

- ❖ Tarpaulin covering for inward trucks
- ❖ Lump removal arrangement on weighfeedeer belt
- ❖ To increase the sizes & inclination of chutes and diverting gates.
- ❖ Drying arrangement in ball mill
- ❖ To opt Ball mill for utilizing pond ash due to availability of hot gases and high drying capacity
- ❖ To store pond ash nearby cement mill area & providing separate feeding system to Ball Mill.

**Keeping in view of cost, environment & infrastructure the following ideas are prioritized :-**

- **Uniqueness of the project:-**This arrangement is unique in nature to utilize the Mill Waste heat into the Mill itself and possible because in our case I/L draught is on higher side ( i.e. 30 mmwg). Comparing to other ball mills around 15- 20 mmwg.
- **Date of commencement of project:-**20.04.2021, As per the project charter created, the project timeline was inline with initial planned dates.

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## Challenges faced

- ❖ Great challenge to consume this environmental hazard (Pondash) in PPC production to the maximum permissible quantity despite its operational constraints and low reactivity.
- ❖ Poor Availability of Dry Fly Ash is always a concern due to no Power demand.
- ❖ Overall dry fly ash cost is high compare to Pond Fly ash

**Major Constraints for Pondash Utilization were:-**

- High moisture (20–28%) in pondash.
- Low mill outlet temperature.
- Diaphragm Choking resulting in less productivity.
- Coating Formation in mill outlet due to water condensation issue.
- Receipts of pond ash containing lumps,stones,dry grass and wooden logs.
- Mill inlet chute jamming.
- No drying capacity of pondash moisture in ball mills.
- Jamming of discharge chutes and diverting gates.

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## Converting Challenges in to opportunities

To overcome the Challenges and problems SWOT analysis done and identified the targeted areas

| Strengths | Weaknesses |
|---|---|
| Good Quality of Flyash<br>Sufficient Clinker Storage during Monsoon<br>Less Handling of finished product.<br>Readily availability feeding circuit.<br>Pond ash availability within 60 kms. | To reduce the moisture heat will be required<br>Clinker Transportation through Congested area.<br>Power availability on MSEB and Awarpur cement.<br>Old Technology Equipments. |
| **Opportunity** | **Threats** |
| 100% PPC Production.<br>Abundant Availability of Pond ash.<br>Scope for further increase in Pond ash.<br>Installing Pond ash Dryer. | Single Source of Fly-ash & Gypsum.<br>Increasing Raw material cost.<br>Environmental Issues<br>Condensation in mill circuit |

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## Converting Challenges in to opportunities

| Sl.No | Problem | Mitigation Plan |
|---|---|---|
| 1 | **To achieve hot air requirement for Pond ash drying:-** | To increase the Pond Ash addition and to fulfil the heat requirement for grinding, The concept of partial hot air recirculation introduced means the air, which is directed through the Bag Filter, is being vented through the stack at a temperature of ~70°C. Rather than directing the entire vent air to the stack, a certain amount of air recirculated back to Mill inlet by connecting duct. |
| 2 | **Frequent jamming of discharge chutes.** | Chute size Increased, changed the orientation and provided polymer liners to avoid jamming. |
| 3 | **Frequent jamming of diverting gates.** | The gate was modified and accordingly the opening size increased. |
| 4 | **Foreign material in pond ash** | Provided screen to segregates lumps, stones, dry grass and wooden logs. |
| 5 | **Optimizing Mill fan air flow** | Earlier 12,000-12500 NM3/HR of air was venting through chimney. For sustaining the Mill O/L Temperature, 75% of the Mill fan airflow is being recirculating across the Mill. Venting quantity reduced to 3125 Nm3/Hr. |
| 6 | **Raw Material Temperature** | Monitoring Clinker temperature at extraction gate and extracting Accordingly |
| 7 | **Mill Outlet Temperature** | The Mill Outlet temperature optimized from 70oC to 80 - 85oC |

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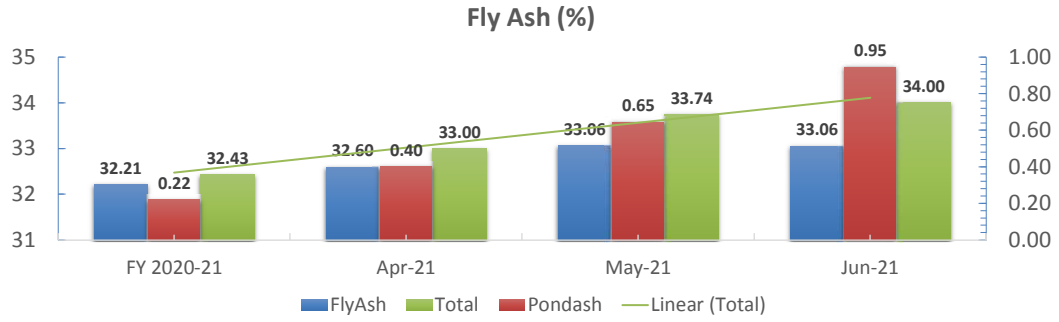
# Results

Hot air duct installed (in-house fabricated) from Mill Vent fan outlet to Ball Mill inlet hence getting 70 Deg. At Inlet which also helps to reduce stack emission and to utilise waste heat in process

- Mill Gr. Temp . increased by 5+ deg. with optimise draught 15 mmwg.
- Utilisation of Pond ash approx. 1.5 %.
- Mill throughput increased from 71 to 72.5 due to increased gr. Efficiency at Mill outlet temperature.

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# Saving Calculation

**Projected Saving:-**

**Total saving /year : 58.00 Lacs (Only 2% increase )**

**Saving achieved till date-Rs 19.88 Lacs**

- Dry Fly Ash :Rs. 503 /Ton
- Wet Fly ash : Rs 110/Ton including handling cost
- Difference of fly ash : Rs. 393/ Ton
- Avg. PPC Production/ month : 10000 T
- 2% wet fly ash increased/month : 200 T
- Cost saving / month : 0.78 Lacs(After reducing fuel cost).
- Avg. Production/ year : 253000 T
- 2% wet fly ash increased/ year : 5060 T
- Total Savings @ 2 % :-19.88 lacs.

**Total investment:- 1.72 Lacs**

**Actual Saving achieved from May 21 to June 21:- 0.68 Lacs**

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# Intangible Benefits

- With Installation of Hot air recirculation duct, The gases venting our recirculated to mill inlet, Hence dust emission from stack reduced from 25 mg/nm3 to 15 mg/Nm3.
- Preservation of natural resource for sustainability by reducing clinker usage.
- Avoided the unplanned stoppage due to jamming of mill inlet Chute
- Motivation level of peoples developed due to involvement in project in house modification.
- Awareness and learning of all employees improved.

**Stack Emission Levels in Mg/Nm3**


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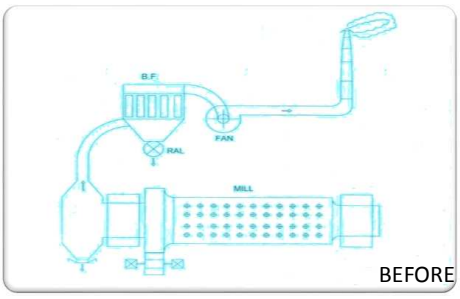
# Replication potential of project within sector

**Replication Potential :-**

- The project can be implemented in ball mill circuit where temperature shortfall for pond ash feeding.
- The project can be also replicated where hot dust laden gases venting through chimney resulting in Stack dust emission reduction.
- We have shared these idea to our cluster units for implementation.
- Idea shared in KAP portal for sharing with other units of UTCL.

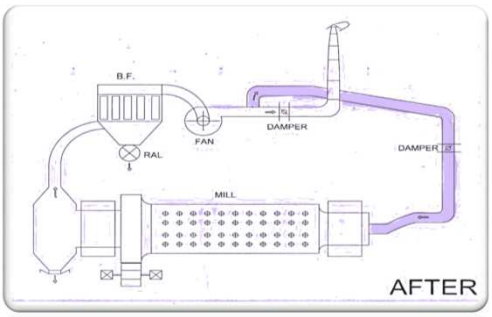


BEFORE

Before

After

**Hot Air Duct Installation**



AFTER

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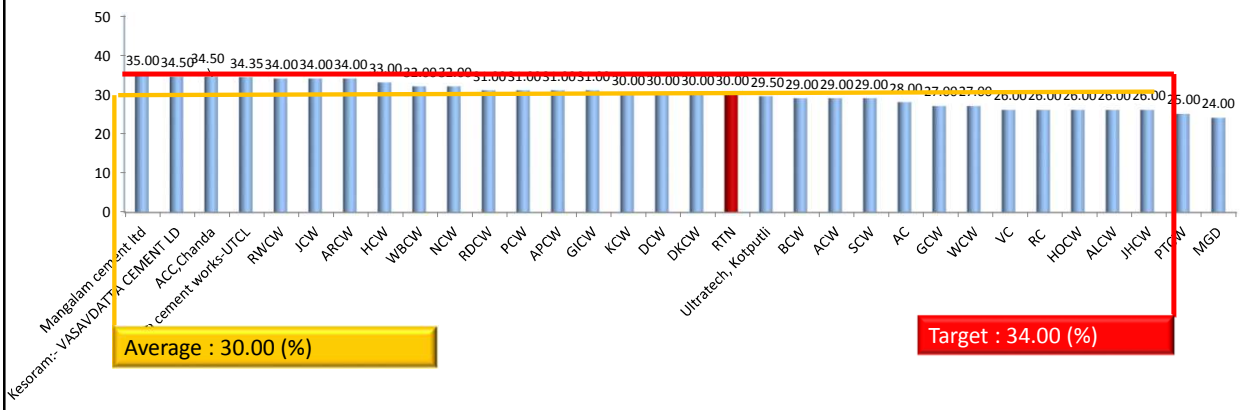
## Achieving national benchmarks/Standards

Flyash addition % FY 2020-21.




**Benchmarking study conducted to achieve targeted flyash addition in PPC.**

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## Future Benchmark…….

**Present Status**

| | |
|---|---|
| **PPC Grinding with Fly Ash** | **: No Fuel Consumption** |
| **PPC Grinding with FA & Up to 2.0% PA** | **: No Fuel Consumption** |

**Next Target is to Achieve mixing of 5 % Pond ash along with Fly ash with out using fuel for generating Hot Gas.**

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## Way Forward

- Enhancing pond ash consumption up to 35% in PPC.
- To continue with climate change mitigation by manufacturing Green cement.
- Replication and implementation of this case study in our group units-Jaffarabad cement/Identical units.


"LET US USE GREEN CEMENT"
SAVE EARTH, SAVE LIFE.


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## Major learnings from the project implementation.

**Talent Development**

- Improved the data collection & analysis ability
- Improved the knowledge for the technology selection criteria for future projects
- Got an idea Current Indian cement industry scenario & challenge to reduce GHG

**Health, Safety & Environment**

- Energy, water efficient & safe cement plant of tomorrow

**Value drivers of Business**

- Timely project completion

**Sustainability**

- Road map for reduction of emissions for present & future norms.

**Employee Relations**

- Developed more interaction with my team and their competencies enhanced

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# Environmental Target & Performance

**Management performance indicator (MPI) of the plant**

- To Monitor, Control, Maintain and Sustain the Emissions level well below the Statutory Norms.
- To Develop Green belt in the Plant, Colony, Mines and Surrounding Villages.
- To Conserve the Natural Resources.

| S. N. | Parameters | Unit | Target | 2020-21 |
|---|---|---|---|---|
| 1. | Stack Emissions Level | | | |
| | Cement mill | mg/Nm$^3$ | 30 | 16 |
| | Packing Plant | | 30 | 18 |
| 2. | Ambient Air Quality | | | |
| | $PM_{10}$ | µgm/m$^3$ | 60 | 49 |
| | $PM_{2.5}$ | | 40 | 32 |
| 3. | Work zone Fugitive Dust (SPM) | µgm/m$^3$ | 5000 | 1213 |
| 4. | Personal Dust Monitoring | mg/m$^3$ | 10 | <5.0 |
| 5. | Ambient Noise Level | dB(A) | Day Time – 75<br>Night Time – 70 | 60<br>56 |
| 6. | Recycle / Reuse Water | % | 100% reuse (Zero discharge) | 7200 KL<br>Water intake from MIDC Only |
| 7. | Total Saplings Planted | Nos. | 50 | 65 |

***Environmental Budget in last 3 years***

| Sl.No | Financial Years | Rs in Lacs |
|---|---|---|
| 1 | 2018-19 | 62.11 |
| 2 | 2019-20 | 56.15 |
| 3 | 2020-21 | 65.18 |

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