Turning insight into action.
Improving Equipment Availability and Reliability Through the PI System

Presented by R.R. Mehta, General Manager – Instrumentation & Tech Services, UltraTech Cement Ltd., India
Agenda

• Aditya Birla Group - Overview
• UltraTech Cement Ltd - Overview
• PI System at UltraTech Cement Ltd
• PI Server Architecture at Aditya Cement
• Various Application being used at Aditya Cement
• Performance calculations
• Performance data comparison with other units
• Conclusion & future plan
Who We Are

• India’s first truly multinational corporation with revenues of US $ 29.2 bn
• 100 state-of-the-art manufacturing units and sectoral services in over 27 countries across 6 continents.
• Over 60 per cent revenues flow from operations outside India.
• Anchored by a workforce of 130,000 employees belonging to over 30 different nationalities.
• Voted the Best Employer in India and among the top 20 in Asia by the Hewitt-Economic Times and the Hewitt-Wall Street Journal Study 2007.
• Adjudged Asia Pacific Top Company for Leaders 2009 by Hewitt – Fortune
Our Businesses

- Acrylic Fibres
- Agri Business
- Carbon Black
- Cement
- Chemicals
- Financial Services
- Insulators
- IT / ITES
- Metals
- Mining
- Pulp & Fibre
- Retail
- Telecom
- Textiles & Apparels
- Trading
Our Businesses

• **Globally**
  - A metals powerhouse, with the world’s largest aluminum rolling company
  - No. 1 in viscose staple fibre
  - Fourth largest producer of insulators
  - Eleventh largest producer of cement
  - Among the world’s top 15 BPO companies
  - Among the best energy efficient fertilizer plants

• **India**
  - A premier branded garments player
  - Second largest player in viscose filament yarn
  - Second largest in Chlor – alkali sector
  - Second largest producer of cement
  - Among India’s top 4 BPO companies
  - Among the top five mobile telephony players
  - A leading player in Life Insurance and Asset Management
  - Among the top three super-market chains in the retail business
Key Companies
Key Brands
Our Valued Customers

- Agfa-Gevaert
- Anheuser-Busch
- Ashtrom
- Bayer AG
- Benetton
- Bridgestone
- Cadbury
- Carrier
- Citibank
- Coca-Cola
- Colgate Palmolive
- Crown Cork & Seal
- Dockers
- DuPont
- Ford
- Fujifilm
- Geabtt
- General Electric
- General Motors
- Glaxo SmithKline
- Goodyear
- Haldia Petrochemicals
- Henkel
- Honda
- IFFCO
- JC Penny
- Kimberly Clarke
- Kodak
- Konica
- LG
- Lotte Aluminum
- Marks & Spencer
- Michelin
- Mitsubishi
- Morgan Stanley
- Nestle
- Nissan
- Pepsi
- Pirelli
- Proctor & Gamble
- Ralph Lauren
- Rexam
- Ryerson Tull
- Sandler
- Sara Lee
- Schneider
- Scullers
- Siemens
- Suzlon
- Target
- Tata Chemicals
- Tetra Pak
- ThyssenKrupp
- Toyota
- Unilever
- 3M
UltraTech Cement Ltd.

- 51.8 million TPA of gray cement across 22 plants. (Largest Cement producing company in India)
- 0.55 million TPA of white cement.
- 504MW of captive thermal plants.
- 13.6 million cubic meters of ready-mix concrete across 70 plants
- Gray Cement, White Cement, RMC
- ETA Star – 3 MTPA of cement across 1 Integrated Plant + 4 grinding units in UAE, Bangladesh and Bahrain
- Serving market at India, UAE, other south Asian countries
- Sites across India
  - 12 integrated Plants
  - 11 Grinding units
  - 6 Bulk Terminals
  - 70 RMC units
Cement Process

- Mining
- Crushing
- Stacking & Reclaiming
- Raw Meal Milling
- Clinkerisation
- Coal Grinding
- Clinker Grinding
- Packing
- Delivery Rack
- Delivery Truck

XRF
Types of Cement

- LIMESTONE
- CRUSHED LS
- RAW MEAL
- CLINKER
- GYPSUM
- FLYASH
- OPC: ORDINARY PORTLAND
- PPC: POZZALANA PORTLAND
- PSC: PORTLAND SLAG
PI Server Installations at UltraTech Cement Units

- 11 integrated plants
- 10 grinding units
- All PI Server accessible from any location
- PI Server installed at new sites locations at KCW & 4 grinding units
### PI System Architecture Main Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 100k tags configured different site.</td>
<td>More than 100 concurrent users.</td>
</tr>
<tr>
<td>Connectivity with different plant system (SCADA or DCS) for each peripheral PI System</td>
<td>PI OPC Interface, PI Modbus Interface, etc.</td>
</tr>
<tr>
<td>more than 1k calculated tags using PI Performance Equation, PI Totalizer and PI ACE</td>
<td>PI ProcessBook and PI DataLink</td>
</tr>
<tr>
<td>Web Portal .NET developed, integrated with PI System via PI SDK</td>
<td></td>
</tr>
</tbody>
</table>
PI System Architecture at UltraTech Cement Ltd.
Aditya Cement Works Shambhupura

First Unit to use PI System in Cement
Plant Maintenance Management

- Asset Management
- Planned and Unplanned Downtimes
- User reports Management
- Key Performance Indicators
- Event Log Management
- Maintenance Alerts
- Measurements & Relevant Parameters
- Reports
PI System Applications Used at UltraTech Cement

**PI ProcessBook**

- 35 Standard Updated PI ProcessBook Screens Posted on web portal
- 175 Users can access PI System client application at AC.
- Various Production and Equipment Run Hour reports
- Logging of Quality parameters on PI Server

**PI DataLink, Miniview**

Application installed at users PC for monitoring of critical parameters

**PI SMS prom, Auto email to respective individual on critical events with archiving & Time Stamp**
PFCC Cooler Status monitoring
Performance Calculations

- Logging of Quality parameters on PI Server
- Generation of various log sheet for operation
- Logging of Quality lab parameters
- Run Hours and Batch Counters report
- Bag Counter and Dispatch report
- Equipment condition monitoring
- Daily power and output analysis
- Shift Operator Performance report
Example 1: Condition Monitoring
Example 2: Condition Monitoring

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>PI Tag No</th>
<th>Descriptor</th>
<th>Eng Unit</th>
<th>Alarm 1</th>
<th>Alarm 2</th>
<th>Trip</th>
<th>Time of best achieved</th>
<th>Best achieved 1</th>
<th>Best achieved 2</th>
<th>Best achieved 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ACS KN TEMPERATURE KLIN ROLLER1 1</td>
<td>KLIN ROLLER BEARING STATION 1 TEMP-1</td>
<td>GC</td>
<td>55</td>
<td>63</td>
<td>13-Jan-10</td>
<td>14:12:39</td>
<td>41.5</td>
<td>45.8</td>
<td>47.1</td>
</tr>
<tr>
<td>2</td>
<td>ACS KN TEMPERATURE KLIN ROLLER1 2</td>
<td>KLIN ROLLER BEARING STATION 1 TEMP-2</td>
<td>GC</td>
<td>55</td>
<td>63</td>
<td>14-Jan-10</td>
<td>11:39:56</td>
<td>31.7</td>
<td>43.1</td>
<td>44.1</td>
</tr>
<tr>
<td>3</td>
<td>ACS KN TEMPERATURE KLIN ROLLER1 3</td>
<td>KLIN ROLLER BEARING STATION 1 TEMP-3</td>
<td>GC</td>
<td>55</td>
<td>63</td>
<td>14-Jan-10</td>
<td>11:39:56</td>
<td>33.3</td>
<td>43.2</td>
<td>48.8</td>
</tr>
<tr>
<td>4</td>
<td>ACS KN TEMPERATURE KLIN ROLLER1 4</td>
<td>KLIN ROLLER BEARING STATION 1 TEMP-4</td>
<td>GC</td>
<td>55</td>
<td>63</td>
<td>14-Jan-10</td>
<td>11:39:56</td>
<td>34.9</td>
<td>43.7</td>
<td>48.4</td>
</tr>
</tbody>
</table>

**Klin main drive & Girth gear**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>PI Tag No</th>
<th>Descriptor</th>
<th>Eng Unit</th>
<th>Alarm 1</th>
<th>Alarm 2</th>
<th>Trip</th>
<th>Time of best achieved</th>
<th>Best achieved 1</th>
<th>Best achieved 2</th>
<th>Best achieved 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>ACS KN TEMPERATURE KN301 MTR DE BRG</td>
<td>KLIN MTR 301 DE BRG</td>
<td>GC</td>
<td>75</td>
<td>95</td>
<td>08-Jan-10</td>
<td>07:31:48</td>
<td>40.5</td>
<td>49.3</td>
<td>49.4</td>
</tr>
<tr>
<td>6</td>
<td>ACS KN TEMPERATURE KN301 MTR NOE BRG</td>
<td>KLIN MOTOR 301 NOE BRG TEMPERATURE</td>
<td>GC</td>
<td>85</td>
<td>95</td>
<td>14-Jan-10</td>
<td>03:09:28</td>
<td>40.2</td>
<td>62.1</td>
<td>62.3</td>
</tr>
<tr>
<td>7</td>
<td>ACS KN TEMPERATURE KN301 GB 1</td>
<td>KLIN GEAR BOX TEMPERATURE -1</td>
<td>GC</td>
<td>75</td>
<td>90</td>
<td>10-Jan-10</td>
<td>05:24:30</td>
<td>52.2</td>
<td>60.1</td>
<td>57.8</td>
</tr>
<tr>
<td>8</td>
<td>ACS KN TEMPERATURE KN301 GB 2</td>
<td>KLIN GEAR BOX TEMPERATURE -2</td>
<td>GC</td>
<td>75</td>
<td>90</td>
<td>07-Aug-10</td>
<td>15:19:43</td>
<td>47.6</td>
<td>46.3</td>
<td>44.0</td>
</tr>
<tr>
<td>9</td>
<td>ACS KN TEMPERATURE KN301 GB 3</td>
<td>KLIN GEAR BOX TEMPERATURE -3</td>
<td>GC</td>
<td>75</td>
<td>90</td>
<td>14-Jan-10</td>
<td>11:39:56</td>
<td>58.5</td>
<td>62.0</td>
<td>61.9</td>
</tr>
<tr>
<td>10</td>
<td>ACS KN TEMPERATURE KN301 GB 4</td>
<td>KLIN GEAR BOX TEMPERATURE -4</td>
<td>GC</td>
<td>75</td>
<td>90</td>
<td>14-Jan-10</td>
<td>11:39:56</td>
<td>55.7</td>
<td>64.6</td>
<td>64.9</td>
</tr>
</tbody>
</table>

**Legend:**
- **Better**
- **Alarm 1**
- **Alarm 2**
- **Trip**
Example 3: Quality Parameters Monitoring

- Burning Zone temp distribution on Max clinker production day 5 Aug 2010
- Helps while maintaining BZ temp for optimized production
### Example 4: Shift Operator Performance Report

- Report rewards for the performance of the operator and sets new targets.

<table>
<thead>
<tr>
<th>Date</th>
<th>Shift</th>
<th>Name of Operator</th>
<th>Rate Achieved (TPH)</th>
<th>Power (%voh/MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>OPC</td>
<td>PPC</td>
</tr>
<tr>
<td>08-Jun-10</td>
<td>A</td>
<td>Mr. Ashish Sharma</td>
<td>247</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Mr. Deependra Pal Singh</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Mr. Ghanshyam Mantri</td>
<td>261</td>
<td>253</td>
</tr>
<tr>
<td>09-Jun-10</td>
<td>A</td>
<td>Mr. Ashish Sharma</td>
<td>242</td>
<td>271</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Mr. Deependra Pal Singh</td>
<td>208</td>
<td>269</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Mr. Ghanshyam Mantri</td>
<td>251</td>
<td>260</td>
</tr>
<tr>
<td>10-Jun-10</td>
<td>A</td>
<td>Mr. Ashish Sharma &amp; Mr. Gurban Jain</td>
<td>247</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Mr. Deependra Pal Singh &amp; Mr. Mukesb Chaglot</td>
<td>255</td>
<td>257</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Mr. Ghanshyam Mantri &amp; Mr. Vinay Ditta</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>11-Jun-10</td>
<td>A</td>
<td>Mr. S. Sinstances &amp; Mr. Gurban Jain</td>
<td>261</td>
<td>259</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Mr. R. Kalra &amp; Mr. Mukesb Chaglot</td>
<td>283</td>
<td>267</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Mr. Ashish Sharma &amp; Mr. Deependra Pal Singh</td>
<td>283</td>
<td>283</td>
</tr>
</tbody>
</table>
### Example 5: Packing Plant Bag Counter Report

- **10 Nos of PI Tags + PI DataLink features makes the report available on a single click, by entering date in a cell, history data can be called.**
Example 6: Manual Discharged Bag Counter Report

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Line 2 Packer Number</th>
<th>Yesterday</th>
<th>Today</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2PK801</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>2PK802</td>
<td>64</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>2PK803</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>2PK804</td>
<td>31</td>
<td>27</td>
</tr>
<tr>
<td>5</td>
<td>2PK851</td>
<td>118</td>
<td>61</td>
</tr>
<tr>
<td>6</td>
<td>2PK852</td>
<td>246</td>
<td>83</td>
</tr>
<tr>
<td>7</td>
<td>2PK853</td>
<td>32</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>2PK854</td>
<td>187</td>
<td>60</td>
</tr>
</tbody>
</table>

Total ( No. of Bags ) 689 241

- Helps while maintaining and achieving six-sigma level
- History data can be called by altering date Excel formula
Case Study 1: Idle Running of Compressors

Analyzing parameters:
- Compressor running hours average taken for one month
- Header compressed air pressure average taken for one month

Observations:
- 5 Compressor running for more than 23 hrs average
- Average comp. Air pressure found to be above 6.0 kg/cm²

Action:
- 1 compressor taken in auto start and stop in PLC to maintain header pressure of 5.5 kg/cm²

Benefit:
- 100-125 Running Hrs saved in a month
Case Study 2: Kiln Feed Consistency

Analyzing parameters:

- Clinker output rate found to be highest in July’10 (5078 TPD)
- Team constituted to find out the reasons for such a high degree of consistency

Observations:

- Feed increased gradually, Raw-mix designed for imported coal at PC firing
- Process and Quality data collected from PI System to analyzing the performance
- PI System used for analyzing the data and studying correlation.
Case Study 2: Kiln Feed Consistency

- Conclusions

  Kiln feed tend to have variations if the control of operation goes beyond the adjustment levels of the operator.
  
  Liquid content to be maintain at a average of 29.46 % with std deviation of 0.145.
  
  Consistency in burning zone temp will result in high degree of kiln feed consistency.
  
  Kiln Coal to be maintain at a average of 6.687 TPH with std deviation of 0.187.
Case Study 2: Kiln Feed Consistency

161 days non stop operation

FY 08-09
Case Study 2: Kiln Feed Consistency

61 days non stop operation
Case Study 3: Improving Equipment Availability and Reliability

**Occurrence**: Unexpected behavior after plant shutdown

**Observation**: COOLER EXHAUST FAN BEARING TEMPERATURE HIGH

**BEFORE**

**AFTER**

**Analyzing Parameters**: Through PI System data was used to analyse the situation
Case Study 3: Improving Equipment Availability and Reliability

<table>
<thead>
<tr>
<th>Possible Reason 1:</th>
<th>Fan Balancing problem – No (Vibration Normal).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible Reason 2:</td>
<td>Lubrication system problem – No.</td>
</tr>
<tr>
<td>Possible Reason 3:</td>
<td>External Cooling (Water &amp; Air) – Not Effective.</td>
</tr>
<tr>
<td>Possible Reason 4:</td>
<td>Cooler Exhaust Temperature High – No.</td>
</tr>
</tbody>
</table>

**WHAT WAS THE ACTUAL REASON FOR TEMPERATURE RISE?**

PI System data was used to study the system.
Case Study 3: Improving Equipment Availability and Reliability

**NEXT STEP:** Data Analysis through PI ProcessBook

**Conclusion:** Though PI system only it was possible to analyze the system and overcome the problem. Additional air flow in system, due to damper opening up to 70% was causing process disturbances.
Case Study 3: Improving Equipment Availability and Reliability

**RESULT:** DATA ANALYSIS THROUGH PI ProcessBook

After calculation at Present gas temperature 250 C – 260 c the calculated gas density is 0.67 Kg/m³, which ultimately increases the mass of gas.
# Case Study 3: Improving Equipment Availability and Reliability

RESULT: Data Analysis Through PI ProcessBook

<table>
<thead>
<tr>
<th>DATE</th>
<th>8/9/10 TO 10/9/10</th>
<th>10/9/10 TO 11/9/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIME</td>
<td>11AM TO 7PM</td>
<td>10PM TO 12 PM</td>
</tr>
<tr>
<td>CURRENT</td>
<td>431</td>
<td>340</td>
</tr>
<tr>
<td>RPM</td>
<td>411</td>
<td>352</td>
</tr>
<tr>
<td>DE TEMP.</td>
<td>84 (with external cooling)</td>
<td>72</td>
</tr>
<tr>
<td>NDE TEMP.</td>
<td>89.9 (with external cooling)</td>
<td>74</td>
</tr>
<tr>
<td>GAS TEMP.</td>
<td>270</td>
<td>259</td>
</tr>
<tr>
<td>PID OPERATION</td>
<td>MANUAL</td>
<td>AUTO</td>
</tr>
<tr>
<td>EXT. COOLING</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>SET POINT (RPM)</td>
<td>70%</td>
<td>60.3%</td>
</tr>
</tbody>
</table>

Advantage: Through PI System data it was possible to study the **“System as a whole”**
Improvement Cases at Aditya Cement

Numbers

Kaizens

FY 11 To date=1755
Savings 1 Millions $
Results and Performance Data

KILN I  Ever Highest Clinker TPD 5079 in July 10, Previous best was 5018 in the month July '07(with 100% Pet Coke).

KILN I Lowest Power Consumption  24.20 Kwh/Mat, Previous best was 27.06 Kwh/Mat in the month July ’07(with 100% Pet Coke).

KILN II Highest TPD 9657 with >10000 TPD for 17 days. Jan11 (OEM Guarantee 8000 TPD)

RAW MILL-II Ever Highest Monthly TPH: 581.8, Previous best was 572.83 TPH in the month June ’10

RAW MILL-II Ever Lowest Power Consumption 19.56 Kwh/T of Material
## Performance data comparison with other units

<table>
<thead>
<tr>
<th>SI No</th>
<th><strong>Index</strong></th>
<th><strong>Best in the World</strong></th>
<th><strong>Best in the Group</strong></th>
<th><strong>Lowest in the Group</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td><strong>Equipment Performance - Kiln</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Thermal Energy</td>
<td>kcal/kg of clinker (Based on fine coal)</td>
<td>APCW</td>
<td>NJFD</td>
</tr>
<tr>
<td>b.</td>
<td>Electrical Energy</td>
<td>kWh / tonne of clinker</td>
<td>APCW</td>
<td>ACW-I</td>
</tr>
<tr>
<td>c.</td>
<td>Specific Output</td>
<td>(Actual MT of Clinker*24/Running hrs)/ Kiln Int. Volume; TPD/m3</td>
<td>HCW</td>
<td>ACW-I</td>
</tr>
<tr>
<td>d.</td>
<td>Burning Zone Load</td>
<td>Gcal/m2h</td>
<td>APCW</td>
<td>ACW-I</td>
</tr>
<tr>
<td>e.</td>
<td>Cooler Grate Load</td>
<td>TPD/m2</td>
<td>HCW</td>
<td>NJFD</td>
</tr>
<tr>
<td>f.</td>
<td>Mean Time between Stops</td>
<td>Actual Running hrs/(No. of Total Stops &gt; 5 mins.)</td>
<td>VC I</td>
<td>GCW-II</td>
</tr>
<tr>
<td>g.</td>
<td>Kiln Dust</td>
<td>mg/Nm3</td>
<td>GCW I</td>
<td>RC - II</td>
</tr>
<tr>
<td>h.</td>
<td>Cooler Dust</td>
<td>mg/Nm3</td>
<td>GS</td>
<td>RC - II</td>
</tr>
<tr>
<td>i.</td>
<td>CO2/tonne of Clinker (Raw Material &amp; Fuel)</td>
<td>tonne</td>
<td>ACW II</td>
<td>NJFD</td>
</tr>
<tr>
<td>j.</td>
<td>CO2/tonne of Cement (Raw Material &amp; Fuel)</td>
<td>tonne</td>
<td>GC</td>
<td>NJFD</td>
</tr>
<tr>
<td>k.</td>
<td>Clinker in Cement</td>
<td>%</td>
<td>GC</td>
<td>NJFD</td>
</tr>
<tr>
<td>l.</td>
<td>Overall Equipment Effectiveness</td>
<td>(Actual Specific Output/Median)* (Running hrs/hrs in a year)</td>
<td>GCW-I, HCW and RC-I</td>
<td>NJFD</td>
</tr>
<tr>
<td>m.</td>
<td>Refractory Consumption</td>
<td>Average Value (5 yrs)/Clinker production</td>
<td>VC</td>
<td>APCW</td>
</tr>
</tbody>
</table>
## Performance data comparison with other units

### 1. Overall Rating

<table>
<thead>
<tr>
<th>Star Ranking</th>
<th>2007-08</th>
<th>2008-09</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Star</td>
<td>AC, VC, GC, GS, GCW, HCW and APCW</td>
<td>AC, VC, GS, GC, GCW, HCW and APCW</td>
</tr>
<tr>
<td>3 Star</td>
<td>RC and ACW</td>
<td>RC, ACW and NJFD</td>
</tr>
</tbody>
</table>

### 2. Energy Efficiency Rating

<table>
<thead>
<tr>
<th>Star Ranking</th>
<th>2007-08</th>
<th>2008-09</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Star</td>
<td>AC, VC and GC</td>
<td>VC</td>
</tr>
<tr>
<td>4 Star</td>
<td>GS, RC, GCW, HCW, ACW II, APCW</td>
<td>AC, GC, GCW, HCW, APCW, GS, RC and ACW</td>
</tr>
<tr>
<td>3 Star</td>
<td>ACW I and NJFD</td>
<td>NJFD</td>
</tr>
</tbody>
</table>

### 3. Kiln Reliability Rating (Mean Time between Stops)

<table>
<thead>
<tr>
<th>Star Ranking</th>
<th>2007-08</th>
<th>2008-09</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Star</td>
<td>AC and VC I/II/III</td>
<td>VC-I</td>
</tr>
<tr>
<td>4 Star</td>
<td>GC, ACW, HCW and APCW</td>
<td>AC, VC II/III, GS, GC, RC and ACW</td>
</tr>
<tr>
<td>3 Star</td>
<td>GS, RC I/II/III and GCW I/II</td>
<td>GCW-I, HCW and APCW</td>
</tr>
</tbody>
</table>
Conclusions

A PI System for data acquisition is the **first step towards a fully integrated PLANT MANAGEMENT SYSTEM**

Integrated solutions can be rapid go-live and allow full scalability for a complete information system throughout the company supplying data at plant level as well as management level and allowing full benchmarking capabilities.

Through data management it is possible to thoroughly customize & adapt the most diverse business requirements (generation technology, processes, company, business, organization, geography, etc...) providing an integrated and homogeneous view.

Ultimately the business was able to drive through difficult economic recession phase.
Future Plan

3 NOS MAGA CEMENT PROJECTS AND 5 GRINDING UNITS ANOUNCED RECENTLY ANNOUNCED

RC IV at Rajshree cement, Karnataka

GCR 2 at Grasim Cement Raipur

KARUR at Tamilnadu

ALL NEW PROJECTS TO HAVE INTEGRATED INFORMATION SYSTEMS FROM DAY 1
Turning insight into action.
Thank you

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