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Cementing Sustainability

A journey towards Net Zero Energy & Emissions, with cloud enabled MV drives.

20th Green Cementech-2024

CEMENT MANUFACTURERS ASSOCIATION
CII Confederation of Indian Industry

Nishant Sinha

24-05-24

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Medium Voltage Drive at a glance (In Indian Cement industry)

~ 900* + Installations .

- Kiln main drive
- Roller Press-HPGR
- VRM
- Coal Mill
- Raw Mill Fan
- Preheater Fan
- Bag house Fan
- Cooler ESP fan
- Cement Mill Fan
- Coal Mill Fan
- Conveyors

Attributes

- Energy Saving
- Robust operations
- Compact /Less footprint
- Easy installation and commissioning
- Proven track record
- Quick service Flexibility
- Reduced maintenance

* Estimate based on a tentative data of internal win and loss.

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Current challenges in Indian Cement Industry

Energy Consumption
Cement production is an energy-intensive process, requiring significant power to run kilns, mills, fans and other equipment.

Carbon Footprint Reduction
Lowering emissions , net zero energy & emission

Process Variability
Cement manufacturing involves complex processes that are susceptible to fluctuations in raw materials, environmental conditions, and equipment performance.

Product Quality
Maintaining consistent product quality is crucial, as variations can impact the strength, durability, and performance of the final cement product.

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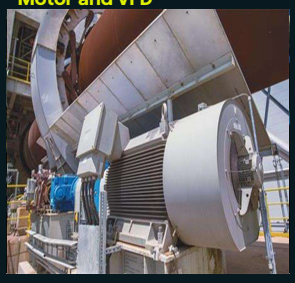
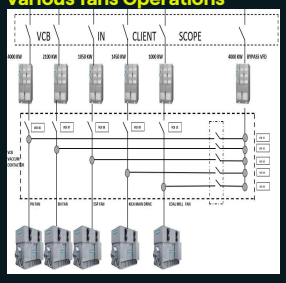
Our endeavors

DC to MV AC solution for Kiln Motor and VFD



- Better process control
- Optimized Kiln operation.
- Energy savings and high efficiency
- Reduced CO2 footprint.
- Less Mechanical stress.
- Less Maintenance
- Reduced downtime.

Bypass MVD solution for various fans Operations



- High uptime of system
- Spare optimization.
- Reduction in planed downtime.
- Continuous energy saving

Cloud enabled medium voltage drives

- Digital transformation
- Further optimizing operations
- New avenues of energy savings and sustainability.
- From preventive to predictive.
- Support Data driven decisions.

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Integrating Medium voltage drives with Cloud Analytics

01 Connection module
Connects networked drive with the secured cloud-based analytics

02 Data collection
Gather medium voltage drive data from across the cement production facilities.

03 Cloud-based Analytics
Leverage cloud computing power to analyze the collected data and uncover valuable insights.

04 Actionable Insights
Translate the analytics into concrete recommendations for process optimization and energy efficiency improvements.

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Embracing Industry 4.0: Digitalization and Automation
Leveraging Cloud enabled Medium Voltage Drive Data

Process Insights

Medium voltage drive data can provide valuable insights into equipment performance, energy consumption, and process parameters, enabling data-driven decision making.

Predictive Maintenance

By analyzing drive data, cement manufacturers can predict potential equipment failures and plan proactive maintenance, reducing unplanned downtime.

Energy Optimization

Identifying energy-intensive processes and optimizing drive settings can lead to significant energy savings and improved sustainability.

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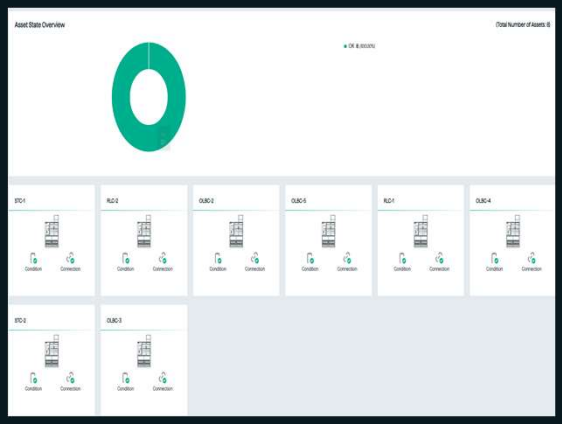
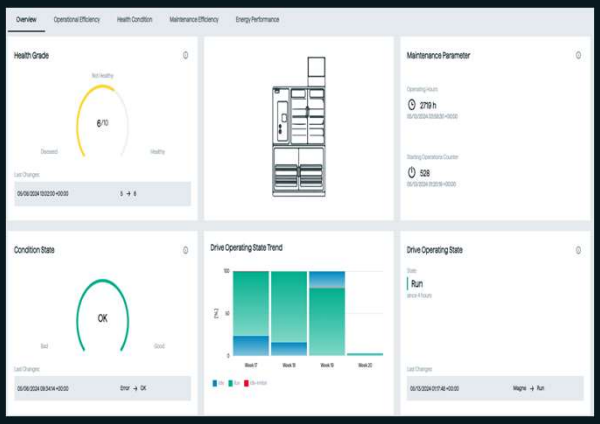
A used case of benefit.

Conveyor for material handling

Total 8x MV drives in conveyor system



Overview of individual MV Drive



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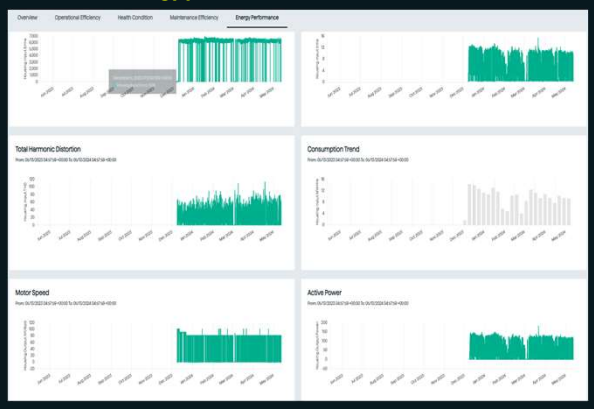
A used case of benefit.

Conveyor for material handling

Operational Transparency

Energy performance of MV Drive



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A used case of benefit.

Conveyor for material handling

Data analytics by expert

assetid	RUN - Full load	RUN - No load	Non RUN states	Total monitored time
cHiVZDUuQVNTRVQuMzAwMzY	24 days 13:39:59.064000 = 589.6664066666666 Hrs	0 days 07:15:39.617000 = 7.261004722222221 Hrs	6 days 03:03:51.396000 = 147.0642766666666664 Hrs	30 days 23:59:30.077000 = 743.9916880555555
cHiVZDUuQVNTRVQuMzAwMzQ	21 days 12:20:01.206000 = 516.3336683333333 Hrs	1 days 08:08:15.363000 = 32.13760083333333 Hrs	8 days 03:31:13.226000 = 195.5203405555555555 Hrs	30 days 23:59:29.796000 = 743.9916097222222
cHiVZDUuQVNTRVQuMzAwMzI	21 days 10:56:00.407000 = 514.9334463888889 Hrs	1 days 12:23:39.298000 = 36.39424944444444444 Hrs	8 days 00:39:52.168000 = 192.6644911111111111 Hrs	30 days 23:59:31.873000 = 743.9921869444445
cHiVZDUuQVNTRVQuMzAwMzc	20 days 14:42:29.150000 = 494.7080972222222 Hrs	0 days 04:55:56.255000 = 4.932293055555556 Hrs	10 days 04:21:04.577000 = 244.3512713888889 Hrs	30 days 23:59:29.982000 = 743.9916616666666
cHiVZDUuQVNTRVQuMzAwMzU	19 days 18:14:34.310000 = 474.2428638888889 Hrs	1 days 04:39:42.169000 = 28.661715111111111 Hrs	10 days 01:05:13.628000 = 241.0871188888889 Hrs	30 days 23:59:30.107000 = 743.9916963888888
cHiVZDUuQVNTRVQuMzAwMzM	4 days 05:01:05.939000 = 101.0183163888889 Hrs	0 days 06:34:06.997000 = 6.568610277777777 Hrs	26 days 12:24:46.737000 = 636.4129825 Hrs	30 days 23:59:59.673000 = 743.9999091666666
cHiVZDUuQVNTRVQuMzAwMzE	0 days 18:42:21.860000 = 18.70607222222222 Hrs	0 days 00:54:56.392000 = 0.9156644444444444 Hrs	30 days 04:22:11.168000 = 724.3697688888889 Hrs	30 days 23:59:29.420000 = 743.9915055555556
cHiVZDUuQVNTRVQuMzAwMzg	23 days 21:39:09.571000 = 573.6526588111111 Hrs	0 days 10:09:56.500000 = 10.165694444444444 Hrs	6 days 16:10:23.630000 = 160.1732305555555561 Hrs	30 days 23:59:29.701000 = 743.9915838111111

assetid	RUN - Full load	RUN - No load	Non RUN states	Total monitored time
cHiVZDUuQVNTRVQuMzAwMzY	24 days 23:29:24.438000 = 599.4901216666666667 Hrs	0 days 07:23:40.611000 = 7.394614166666667 Hrs	3 days 06:22:25.120000 = 78.37364444444444 Hrs	28 days 13:15:30.169000 = 685.2583802777779 Hrs
cHiVZDUuQVNTRVQuMzAwMzQ	20 days 08:22:56.183000 = 488.3822730555556 Hrs	1 days 21:57:39.117000 = 45.960865833333333 Hrs	6 days 07:04:55.114000 = 151.0819761111111 Hrs	28 days 13:25:30.414000 = 685.425115 Hrs
cHiVZDUuQVNTRVQuMzAwMzI	20 days 09:41:54.226000 = 489.6983961111111 Hrs	1 days 22:59:33.877000 = 46.99274361111116 Hrs	6 days 04:49:31.919000 = 148.8255330555555555 Hrs	28 days 13:31:00.022000 = 685.5166727777778 Hrs
cHiVZDUuQVNTRVQuMzAwMzc	19 days 14:52:45.307000 = 470.8568908333333334 Hrs	0 days 04:30:25.988000 = 4.507218888888889 Hrs	8 days 18:17:48.779000 = 210.2968827777778 Hrs	28 days 13:41:59.973000 = 685.6999992 Hrs
cHiVZDUuQVNTRVQuMzAwMzU	18 days 09:04:14.232000 = 441.07062 Hrs	1 days 06:34:44.612000 = 30.57905888888888 Hrs	8 days 22:13:01.144000 = 214.2169844444444445 Hrs	28 days 13:41:59.988000 = 685.6666633333333 Hrs
cHiVZDUuQVNTRVQuMzAwMzM	1 days 16:32:02.294000 = 39.53397055555555 Hrs	0 days 02:27:00.608000 = 2.450168888888889 Hrs	26 days 19:59:56.969000 = 643.9991580555555 Hrs	28 days 13:58:59.871000 = 685.9832974999999 Hrs
cHiVZDUuQVNTRVQuMzAwMzE	0 days 01:42:02.338000 = 1.700649444444444 Hrs	0 days 00:22:37.273000 = 0.3770202777777775 Hrs	28 days 12:02:21.087000 = 684.0391908333332 Hrs	28 days 14:07:00.698000 = 686.1168805555555 Hrs
cHiVZDUuQVNTRVQuMzAwMzg	24 days 09:59:44.672000 = 585.9957422222221 Hrs	0 days 13:21:20.594000 = 13.35572055555555 Hrs	3 days 14:56:24.581000 = 86.9401613888889 Hrs	28 days 14:17:29.847000 = 686.2916241666667 Hrs

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A used case of benefit.

Conveyor for material handling

Summery of Data driven insights
(Based on 2 months data)

- Total No Load* running hours of 8x MVD /Motor = **280 hrs.**
- Each Motor Power = **320 kW.**
- No load factor = **30 %.**
- No Load Power/motor = **96 kW**
- Total No load** running power of motor = **96 x 8 = 768 kW**

- Total energy consumed at no load state of 8x Motors and MV drive = **280 x 96 = 26880 kWh**
- Total amount INR (@INR 7.0 /unit) = **26880 x 7 = INR 188,160**
- Per Annum savings = **INR 1,128,960**

Note :- * No Load = Conveyor running under no material transportation .

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Conclusion & Key Takeaways

Medium voltage drives are a game-changer for cement operations, enabling greater energy efficiency, emissions reduction, and the integration of Industry 4.0 technologies. By leveraging cloud-enabled medium voltage drives, cement plants can unlock a sustainable future and move towards net zero energy and emissions.

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Coming up next .....

*** Artificial Intelligence and Cement Plant Operations (AI Kiln / AI Mill) Day-2 0955Hrs**

*** Experience The Virtual Reality (VR) at out Booth No. 27-28**

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Thank you

Nishant Sinha
MV Drives Business Development
Innomotics India Private Limited

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HV Motor Retrofits
Modern approach towards replacement of Existing Motor

Why Retrofits?

To increase plant operating efficiency & higher reliability with low operating cost thus helping sustainable green environment

Upgradation
- DC and slipring motors to modern age AC Squirrel cage Induction motors
- Energy Savings along with reduction in carbon footprint with HIGH Efficiency design
- Lowering operational cost and plant higher uptime

Failures
- Reduce failures thereby increasing operational reliability and higher uptime
- Reduction in recurring faults which is critical for process industries

Spares
- Standby System for existing install base
- Interchangeability across plant and locations for similar application

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HV Motor Retrofits
Modern approach towards replacement of Existing Motor

How we do it ? / Step by Step Approach towards Retrofits

Electrical Selection 1
Finalization of electricals with bases on specification

Mechanical Suitability 2
Suitability of motor without changing interfaces like foundation, Coupling etc.

Site Suitability 3
Check for space constraints with respect to all touch points

Designing a Solution 4
Design and offer best solution for customer based on expertise

Finalize the Deliverables 5
Discuss solution with customer, amend the offer if required and MOU

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Retrofitting of DC Motor by SIMOTICS H-Compact AC motor for Kiln Main Drive at North India

Customer Challenge

Customer Challenges / Demands :
- Higher maintenance and operating costs
- Frequent failures in armature/ commutator
- Challenge in spares availability
- Matching the existing motor critical mounting & shaft dimensions

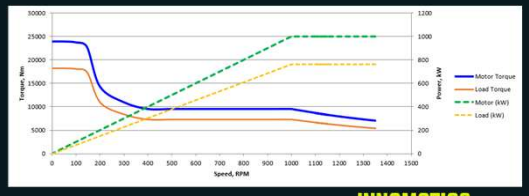
Solution

How we did it !
- Compact and smaller footprint
- High Efficiency (97.6%) with TEFC IC 416 design
- No change in existing concrete foundation
- All critical dimensions are matched with special baseplate
- Provided full coupling between Motor → Gearbox
- Witnessing of type test with kiln overload duty cycle

Impact Created

Value add to Customer
- Less maintenance & operating cost
- Annual energy saving of **~ 534,000 units**,
- Annual operating cost reduction **INR ~2,200,000/-**
- Annual CO2 emission reduction **~ 422 tons** providing sustainable environment
- Less inventory, keeping common spare motor across 3 units in northern region
- Motor capable for future kiln output capacity → **40%**

Old Motor	Installed Motor
Rating : 1000kW/1000RPM/630V	Rating : 1000kW/6P/690V/60°C
Application : Kiln Main Drive	Application : Kiln Main Drive
Frame : DCFS630, IC86W	Frame : 500, TEFC IC416



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Retrofitting of DC Motor by SIMOTICS H-Compact AC motor for Kiln Main Drive at South India

Customer Challenge

Customer Challenges / Demands:
- Present DC system completed 30+ years of operation
- Challenge in spares availability
- Higher maintenance and operating costs
- Matching the existing motor critical mounting & shaft dia.

Old Motor	Installed Motor
Rating: 475kW/840V/1000rpm	Rating : 600kW/690V/6P/60°C
Application : Kiln Main Drive	Application : Kiln Main Drive
Frame : DC FS630, IC86W	Frame : 450, TEFC IC416

Solution

How we did it !
- Compact and smaller footprint
- High Efficiency (97.6%) with TEFC IC 416 design
- No change in existing concrete foundation
- All critical fixing and shaft dimensions are matched
- Witnessing of type test with kiln overload duty cycle @AMTC

Impact Created

Value add to Customer
- Less maintenance & operating cost
- Annual energy saving of ~ **144,800 units,**
- Annual operating cost reduction **INR ~615,000/-**
- Annual CO_2 emission reduction ~ **114 tons** providing sustainable environment
- Motor capable for future kiln output capacity → **35%**

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So Far MV Motors Retrofits by Siemens India

***130+ Installations In all sectors across India**

3 Overseas Installations

35+ Happy Customers

20+ Installations in Cement plants

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