



HITACHI MEDIUM VOLTAGE DRIVES FOR CEMENT INDUSTRY - KILN APPLICATION

ABOUT HITACHI MEDIUM VOLTAGE VFD SYSTEM

With a vision of “To be recognized as the most trusted Power Electronics Company by supplying superior products and services”, Hitachi Hi-Rel Power Electronics Private Limited has garnered a significant level of trust in Indian power electronics market segment wherein it serves the entire gamut of Industries.

Variable Frequency Drive (VFD) is a type of adjustable speed drive used in electro-mechanical drive systems to control AC motor speed and torque by varying motor input frequency and voltage. VFDs are used in applications ranging from small appliances to the largest of mine mill drives and compressors.

Hitachi Medium Voltage Drives (Variable Frequency Drives – VFDs) represent the most energy efficient means of process control and reflect the best in process control. Hitachi has a proven & rich experience in manufacturing & supplying drives & automation products with complete customized solutions serving various Industries i.e. Power, Steel & Metal, Cement, Oil & Gas, Mining, Sugar, Pulp & Paper, Water & Waste Water, Rubber, Plastic, etc.

ABOUT KILN APPLICATION

Cement production line include three main steps: preparation of cement raw materials, clinker production, and finished cement production. As a core cement equipment of clinker production, cement kiln is applicable for various materials, such as limestone, clay, dolomite, bauxite, etc.

Cement kilns are used for the pyro processing stage of manufacture of Portland and other types of hydraulic cement, in which calcium carbonate reacts with silica-bearing minerals to form a mixture of calcium silicates. Over a billion tonnes of cement are made per year, and cement kilns are the heart of this production process.

As for the type, there are many types of cement kiln, we can classify cement kiln as follows:

By structure

- Shaft kiln: machinery shaft kiln and ordinary shaft kiln
- Cement rotary kiln: wet process rotary kiln and dry process rotary kiln

By cement meal preparation technology

- Wet process cement kiln: the cement raw material is grinded with water powder into raw slurry (33-40% water) and then fed into the wet process rotary kiln and burn into cement clinker.
- Dry process cement kiln: the cement raw materials are dried, ground, and calcined into the cement clinker in the dry process rotary kiln.

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In modern cement plants, mainly rotary kilns are widely used. Cement rotary kiln is a horizontal cement kiln that can do the rotational motion.

CHALLENGE/ISSUES (What are the issues the customer used to face?)

The most important problems that appear during the use of the rotary kiln, the starting torque required in cement kiln applications can be much higher than the steady state torque required to rotate the kiln. The starting torque required for this particular application reaches approximately 200% of the motor's rated torque to overcome system inertia.

The wear of the gear teeth creates a backlash effect that results in a non-continuous rotation of the transmission, leading to rapid and unpredictable regenerative operation of the motor, as well as machinery vibration.

DC motors and drives are used because of their excellent torque speed characteristics, but maintenance of DC motors are big challenges. It's time consuming activity increases the downtime.

In addition, rotary kiln is very energy intensive. Most of the energy used is consumed by electric motors, many of these motors continue to run at full speed regardless of actual requirements, thereby wasting enormous amounts of energy.

NEED FOR THE SOLUTION (What is the need for utilizing Hitachi Product?)

- For smoother start and operation of kiln
- To reduce mechanical jerk during start up
- To avoid voltage dip in input supply during motor start up
- To maintain speed accuracy throughout and during load changes
- To upsurge productivity by increasing Kiln speed
- To enhance the life of motors
- To reduce unstable and unreliable operation
- To reduce losses of energy consumption
- To stop frequent maintenance of motors
- To stop production downtime

HITACHI SOLUTION (How it helps in solving the Challenges/Issues?)

It's highly important to have variable frequency drives for the Kiln application in cement plant to provide optimized process control and save energy.

Hitachi Medium Voltage Variable Frequency Drive offers;

- **Starting high torque** - AC Variable frequency drive (VFD) can develop 200-250% torque at low speed to overcome load inertia.
- **Increase productivity** - The VFD can operate the motor above 50Hz which can increase the Kiln speed thereby increasing the productivity.
- **Speed accuracy during load change** - Reference speed behaviour can be improved during load changes as per the process requirements.
- **Smooth start and stop control** - VFDs provide controlled torque and speed to the kiln, which prolongs the life of the mechanical system and reduces maintenance and operating costs. Since the electric motor is controlled by a VFD, the motor will gradually start accelerating and reach the

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required speed. Accordingly, the speed during stoppage can be reduced smoothly which helps in controlling and stopping the process without any adverse effect to other parameters.

- **Energy saving** - Variable frequency drive controls the speed of motor by supplying the required power, thereby saving good amount of energy.
- **System Reliability** – VFD offers safety features such as short circuit protection and safety torque off (STO) functionality. Selecting a drive with these features can eliminate the need for electrical components, such as motor circuit breakers and contactors, reducing the number of components and therefore costs. Reducing the number of electrical components also increases system reliability and reduces the risk of system downtime.

BENEFITS OF USING HITACHI MV DRIVE IN KILN APPLICATION

- **Higher Torque at low speed** - The Hitachi VFD can generate 200-250% of the torque required at low speeds to overcome Kiln inertia.
- **Operation at higher speed than rated speed** - Hitachi VFD allows motors to be operated above 75Hz which increases the Kiln rotation and ultimately increase productivity.
- **Excellent speed accuracy** - Hitachi VFD delivers excellent speed accuracy throughout operation.
- **Lower investment** - Low capital cost on equipment, spare parts and maintenance.
- **Enhanced Functionality** - VFD provides a very useful speed, current, kW and other useful signal feedback to help in improving process control.
- **Low Maintenance** - The maintenance of AC VFD and motor is less as compared to DC VFD and motor. Reducing the number of electrical components also increases system reliability and reduces the risk of system downtime.

HITACHI MEDIUM VOLTAGE DRIVES FOR KILN APPLICATION

HIVECTOL-HVI-E Series Medium Voltage Multi-Level Drives

Range: Up to 14,700 kVA (3.3 kV to 11 kV)

- **Patented Design - Increases Reliability**
 - Pre-Charging (Reduces charging inrush current of the transformer to less than its rated current)
 - Cyclic Switching of the Cells (Achieves equal utilization of each cell at any operating speed)
- **State-of-the-Art Technology**
- **Tailored to your Specific Application Requirements**
- **Long Term Technical Services and Spares Support**
- **Suitable for Indian Ambient Condition**
- **Input Harmonics Meets IEEE - 519 - 1992**
- **Output Waveform - Motor Friendly**
- **Best for High Starting Torque**
- **High Efficiency (Typical 97% efficiency including input Dry type transformer)**
- **Auto Restart**
- **User Friendly**
- **Easy to Maintain**



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ABOUT HITACHI HI-REL POWER ELECTRONICS PRIVATE LIMITED

Founded & established in 1983 as Hi-Rel Electronics Pvt. Ltd., which later on in year 2015 had become the 100% subsidiary company of Hitachi, Japan which is one of the Global fortune 500 companies with a new name as Hitachi Hi-Rel Power Electronics Private Limited, which is being recognized as one of the pioneers in power electronics domain. Hitachi Hi-Rel, today, is a leading manufacturer of Industrial UPS, IT & Infra UPS, Medium & Low Voltage Variable Frequency Drives, Grid Tied Solar Inverters, Air Compressors and Railway Inverters.

Hitachi Hi-Rel has state-of-the art manufacturing facility at Sanand near Ahmedabad in Gujarat-India. Hitachi Hi-Rel is helping a wide array of industries and organizations to meet the mission critical demands through technologically superior, low polluting and innovative products Solutions and continue to offer world class power electronics products, value added services & customized solutions.

With a vision of “To be recognized as the most trusted Power Electronics Company by supplying superior products and services”, Hitachi Hi-Rel has garnered a significant level of trust in Indian power electronics market segment wherein it serves the entire gamut of Industries, particularly in mission critical applications for Refineries, Petro-Chemicals, Power Generation, Steel & Metals, and Process Industries as well as Critical Data Processing Applications. Besides offering greater energy efficiency & lower carbon footprint, each of the company product streams bears the hallmark of excellence with company accreditations. Hitachi Hi-Rel is an ISO 9001:2015, ISO 14001:2015 & ISO 45001:2008 certified company having export house status. Hitachi Hi-Rel sales network & service infrastructure expands out to the world & with this network, we have made strong inroad in Global markets like South East Asia, Middle East, Africa and Brazil. Also, with a presence of strategically located skilled service engineers in India helps us to score high in terms of customer expectations on service deliverables & uptime of the product.

With expertise, experience and an efficient product line, Hitachi Hi-Rel will always try to be your power electronics partner. When you choose to do business with Hitachi Hi-Rel, you are partnering with a company who cares.

FOR MORE INFORMATION

To know more about Hitachi Hi-Rel Power Electronics Private Limited and its offered products and solutions, please visit www.hitachi-hirel.com

You may also share your requirements at <https://www.hitachi-hirel.com/inquiry> to receive the phone call or Hitachi product information email from our authorized sales representative of your region.

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