

Sales Application Note

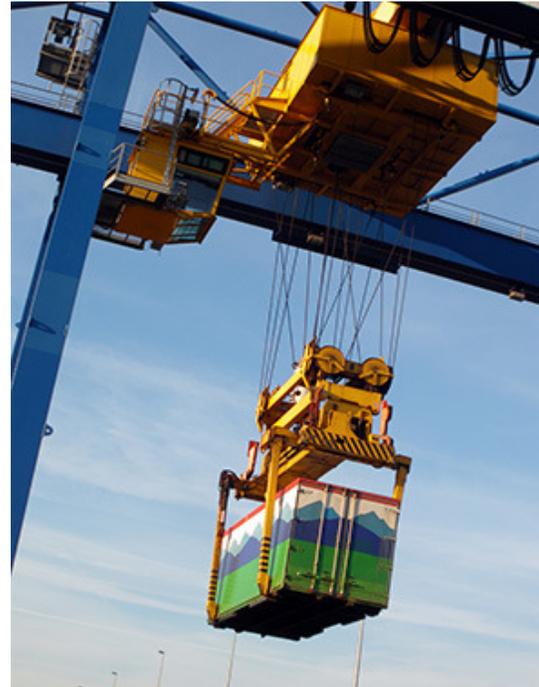
Overhead Cranes

APPLICATION

Overhead crane is a type of crane commonly found in industry. An overhead crane consists of parallel runways with a traveling bridge. A hoist, the lifting component of the crane, travels along the bridge.

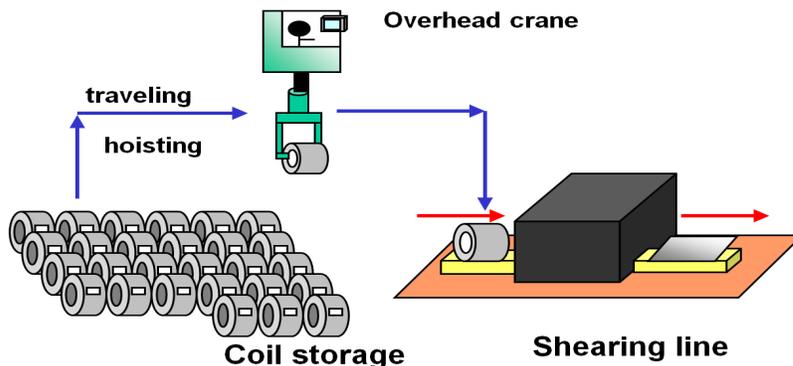
They are commonly used in the refinement of steel and other metals such as copper and aluminum. At every step of the manufacturing process, until it leaves a factory as a finished product, metal is handled by an overhead crane.

As other examples, they are also used in industries such as automobile industry to move raw material or paper mills for heavy cast iron paper drying drums maintenance.



APPLICATION REQUIREMENTS

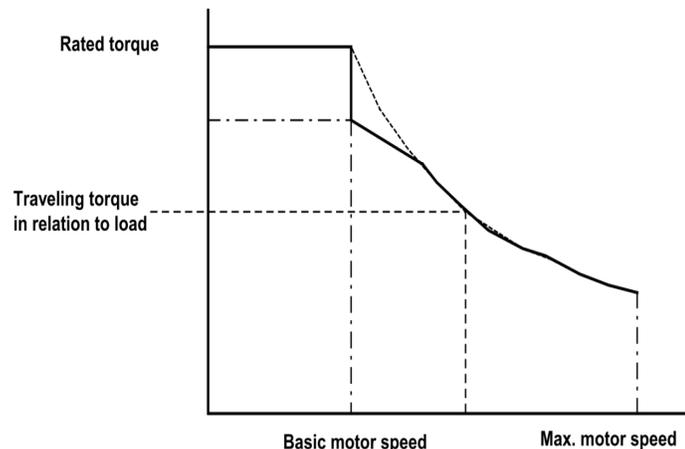
Overhead cranes have two independent movements which are called trolley (for horizontal movements) and hoist (for vertical movements). Travel and hoist movement can be performed independently or combined. Especially critical is the hoisting movement, inverter requires a strong overload capability for handling without problem load during acceleration and deceleration.



Application example: Steel sheet factory

In the other hand, a good speed control accuracy and speed response is needed in order to, especially at very low speed, control the load. Most of the cases, in order to get the best precision at positioning, speed loop needs to be closed by means of an encoder. Crane must have different speeds in order to move fast along the factory, or slowly to position the load. Also maximum speed may be limited depending on the hoist load.

Because load is moving upwards and downwards, motor is driving the load in up direction and braking the load in down direction. In case of braking condition, inverter which drives the motor must be able to burn the energy in a braking resistor. Also a regenerative unit is available in case that returning energy to the mains is needed.



FUJI ELECTRIC SOLUTION

Fuji Electric has a full range of frequency inverter's suitable for this application. Starting from the basic inverters, specially designed to move the load in vertical movements in open loop, such as FRENIC-Mini and FRENIC-Multi. And ending with the most performance inverters in the market called FRENIC-MEGA and FRENIC-VG, specially designed to move vertical loads in closed loop.



Depending on the requirements of overhead crane, and functions needed, different family of Fuji Electric products can be chosen. Different motor maps can be programmed in same inverter, in other words, an inverter can control up to four motors.

In case that a single movement is performed by more than one motor, Fuji Electric has a specific function called droop control. Droop control is balancing the load by modifying the speed of the motor. By means of this, inverter prevents that a motor is working against the other one.

ADVANTAGES OF FUJI ELECTRIC SOLUTION

- Full range from 0,4 kW up to 3 MW three phases 400 VAC power supply.
- 200% overload during 3 seconds and 150% during 1 minute.
- Built-in EMC filter up to 630 kW compliant to industry standards.
- Built-in braking circuit up to 160 kW.
- Excellent vector control with speed sensor.
- Powerful dynamic torque vector control for open loop applications.
- For big capacities, stack type topology is available.
- Adaptable speed depending on the load function (load adaptive control).
- Up to four motor maps can be selectable in same inverter. Same inverter can control up to four motors for different movements.
- Flux forcing function to pre-magnetize the motor.
- Braking control signal.
- Droop control function.
- Regenerative solution also available with an excellent efficiency and power factor.
- Compatible with most common field buses (T-link, SX and E-SX bus, PROFINET-IRT, PROFIBUS-DP, DeviceNet)
- Functional safety card certified according to safety standards.