

## Slip ring motor application in continuous casting meltshop EOT



### ABB industrial drives operate with slip-ring motors

CELSA, Compañía Española de Laminación S.L., located in Barcelona in Spain, has seven ABB industrial drives in the overhead travelling crane in the meltshop area. CELSA produces more than 1.2 million tons of steels annually. The company has diversified into corrugated products, smooth round and flat bars, and squared, angular and structural profiles. CELSA was founded in 1967.

The ABB industrial drives installed in the application were supplied by Grúas JASO, an OEM. The company, established in 1975 in Idiazabal in Spain, is a manufacturer of tower and EOT cranes and has long-standing experience in international markets.

The company is a member of the JASO Group, considered to be one of the leading groups in the industrial lifting machinery sector, with over 35 years of experience.

Grúas JASO has been working for top quality service and products for more than 25 years. The company has around 200 employees in its industrial cranes divisions and a turnover of EUR 45 million per year.

The CELSA application using the ABB industrial drives is an overhead travelling crane, with a lifting capacity of 250/50 tons and a span of 27 meters. The crane is situated in the meltshop area and used for transporting melted steel in a ladle from the furnace to the casting machine.

Rafael Iruin, commercial director of JASO, commenting on the advantages that were considered when choosing the drives for this crane said: "The fact that ABB industrial drives can operate slip-ring motors, in addition to its reduced volume and the built-in brake chopper, has significantly reduced the cost of mounting and installation of the frequency converters. Taken altogether, these were the reasons that made us put our money on ABB industrial drives".



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## Case Notes

The main hoist's capacity is 250 tons and the lifting height is 17 meters at a speed of seven meters per minute. It uses two 225 kW 8 pole slip-ring motors (encoder feedback) and two 315 kW ABB industrial drives with chopper and RTAC module. Planetary gearing mechanically connects the motor shafts. The emergency operation mode is implemented by bypassing the frequency converter and changing rotor resistance.

The auxiliary hoist has a capacity of 50 tons and a lifting height 20.5 meters. The speed is eight meters per minute. It uses an 88 kW 6 pole slip-ring motor.

The main trolley carries the main hoist. Trolley width is 11.05 meters with a maximum speed of 30 meters per minute. It uses two 18.5 kW 6 pole slip-ring motors. The motors are operated by 30 kW industrial drives with choppers. The emergency operation mode is implemented by bypassing the frequency converter and changing rotor resistance.

The auxiliary trolley carries the auxiliary hoist. It has a width of 2.40 meters and it travels 30 meters per minute. The trolley uses a 4.8 kW 6 pole slip-ring motor operated by a 7.5 kW industrial drive with internal chopper.

The gantry travels 60 meters per minute. Four 45 kW 6 pole induction motors are used. Two groups of two motors are each connected to one 110 kW industrial drive.

The air-conditioned electrical room is inside the gantry. Available space is limited. The compact size of the ABB industrial drives permitted the installation of 7 drives with total power of 1171 kVA on a wall with a width less than three meters.

During the process, in the case of a frequency converters fault, the crane is operated in the emergency mode, selected manually by switches and contactors. This mode means that the motors are operated by Direct On Line and adjustment of rotor resistances. This allows the melted steel to be lowered before its eventual cooling and solidification, which would result in a very critical process stop.



Electric room inside the gantry.

The rotor short-circuit during normal operation is done in a connection box 60 meters away from the stator (external cabling in the rotor circuit). With parameter tuning this kind of "difficult" motor model can also be handled with an ABB industrial drive.

### Solved problem

- In a "non-redundant" drive system, the melted steel would solidify if a fault occurred, resulting in a long and costly process stop

### Solution

- In the emergency mode (motors connected to traditional slip ring mode) the steel can be lowered before solidification. This is possible as ABB industrial drives can also operate slip-ring motors with cabling in the rotor circuit.
- ABB industrial drives are so compact that the whole system can be installed in an electrical room inside the gantry beam.

### Benefits

- The compact size of the ABB industrial drive
- Adjustability of the ABB industrial drive in emergency mode
- Internal brake choppers reduce the cost of mounting and installation



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