YASKAWA G7 drive -300kW for EMS (electromagnetic Stirrer) application in Visvesvaraya Iron and Steel Plant (VISL), for Mould electromagnetic stirrer (M-EMS) which is used in continuous casting mills for production of alloy steels and special graded steels.

Visvesvaraya Iron and Steel Plant (VISL), is a unit of Steel Authority of India Limited (SAIL), which was started as the Mysore iron works in 1928 by Sir M Visvesvaraya. It is located at Bhadravathi Karnataka.

VISL is producing Alloy and Special Steels since 1966 and has kept pace with the developments by quickly adopting newer technologies to meet the requirements of the day and has always remained in the forefront as quality steel producer in the country.

Yaskawa drives and motion control division provides total automation system solution with G7 3-level control method low voltage drive with VIPA PLC–HMI for the existing two numbers of M-EMS in continuous casting mill section.

**Challenges:**

VISL has the specific requirement for producing the special alloys and clean steel. Electromagnetic stirrer is the process by which also there were looking for the microstructure and the composition homogenization of the cast product. The chemical composition, solidification conditions and the nature of the liquid steel flow in the mould affects the surface quality and the inner structure of the cast product. Mould electromagnetic stirring (M-EMS) technique promotes the formation of an equalized crystallise zone in the strand. It causes the refinement of the solidification structure, improvement in the quality of the surface, sub surface and the inner structure of the cast product.
In the previous systems they had the provision for the producing only one kind of the graded steel and there were also trying to upgrade the existing systems such that they have flexibility in production of different types of graded steels.

One more requirement was the total automation solution with the protection feature starting from input transformer, drives, EMS coils, water cooling systems for coils and leakage currents.

**Solution & Benefits:**

YASKAWA G7 3-level control low voltage drive was best suitable for this application to meet there application requirement and also for the total automation of the process we have integrated the VIPA-PLC-HMI to the system. Unlike conventional drives, the G7 creates a variable output by switching in 3-level control method to approach the sine wave output voltage. It provides the solution to problems like motor insulation damage to surge voltage, and electrolytic corrosion of motor bearings due to shaft voltage.

By controlling the required output frequency and the current to be delivered to the coils form the G7 drives through HMI which was installed near EMS coil (approx. 35mts) we are able to stir the hot metal mould in the M-EMS coils to achieve the required grading of the steel.

**Results:**

Yaskawa provided the solution to VSIL for continuous casting mill section and now started taking production for iron billets, with different grades steel and they are able to produce clean steel to their customers. The total system provided runs with smooth operation along with increase in the productivity and quality of the product.

VSIL management was happy with the robustness, quality of drives and also project execution which was carried by Radiant system-authorised Yaskawa partner for Karnataka along with YASKAWA-VIPA team members.

**G7 drive with 3-level control method was first general purpose drive to use 3-level control method, to approach sinewave output voltage. It provides the solution to problem like motor insulation damage to surge voltage, electrolytic corrosion of bearing due to shaft voltage and also inbuilt 12 pulse input convertor configuration for harmonic reduction.**