USING AI AND IP TO CONTROL TOCB MOVEMENT

Tata Steel's new image processing and AI-based system for the billet cooling process has reduced production outages and resulted in considerable savings for the company.

THE CONTEXT

Hot steel billets are cooled on a Turn Over Cooling Bed (TOCB) after they are cast. They are rotated 90 degrees to ensure uniform cooling on all sides and also to maintain their shape. The billets' movement is facilitated by hydraulic cylinders while limit switches and sensors placed under the TOCB detect and control their position. However, hot scale often falls on these limit switches, resulting in failures and production stoppages. It is also difficult to maintain the sensors and cables because of the high temperature in the steel mill.

THE INNOVATION

The Tata Steel team substituted the sensors under the TOCB with a video image processing and artificial intelligence (AI) system. This new system uses a high-resolution machine-vision, high dynamic-range camera along with an industrial computer with a high-speed graphics processing unit (GPU) to detect and track objects and also to provide the necessary output analysis to automatically control the TOCB.

KEY CHALLENGE

TO ACCURATELY DETECT OBJECTS IN DIFFERENT ENVIRONMENTS
The entire project's success or failure hinged on this ability. The team resolved it by using a background elimination technique along with a colour, shape and edge detection method to reference and target the objects.

TO TRACK THE OBJECT AND BUILD THE COMPLETE LOGIC SEQUENCE FOR CONTROLLING THE TOCB AS PER THE PREVAILING SYSTEM
The team used an intelligent register-based programme to overcome this challenge.

THE IMPACT

Tata Steel's new AI-based system has significantly improved the availability of the caster by reducing unplanned outages. With savings of

₹5 CR

per billet caster.

With three billet casters in the LD1 shop, the new system has the potential to improve Tata Steel's revenues by over

₹15 CR