Q-LEVEL+ is a tool specifically developed to improve the steady-state condition of liquid steel flow into the mold by counteracting any mold level disturbances. It is well known that an unstable mold level may contribute to a number of quality issues, affecting both surface and internal quality. One of the main innovations of Q-LEVEL+ is the capability to analyze and process the level fluctuation due to a multitude of periodical disturbances, such as dynamic bulging, roll eccentricity or mold natural waves. Q-LEVEL+ is able to analyze the level behavior and can therefore anticipate the disturbance and take the proper preventative action, which guarantees a highly dynamic control of the process, as it can react faster - even in advance of quick variations in the parameters, thus guaranteeing higher stability for the mold level.

PROCESS

Q-LEVEL+ is comprised of three modules that each have a specific and dedicated functionality. The modules have the function of receiving control signals and process signals from the sensor; then, these signals are processed according to setup parameters from the PCS (Process Control Station). After processing, the system is able to counteract any mold level anomalies.

The three modules are:

- **Optimal Controller:** response speed;
- **Supervision and Control Strategies:** decides best strategy to keep mold level at target;
- **Filter System:** to counteract phenomena like dynamic bulging.

Q-LEVEL+ can be applied on all existing caster plants, utilizing both stopper rod or slide gate equipment controlled by eddy current or radioactive sensors.

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- FFT analysis of the level oscillation.
- Identification of a specific disturbance frequency that can be correlated to roll pitch, diameter and/or natural wave.
- Evaluation of the relevant disturbance amplitude.
- Counteraction by anticipating flow control correction acting on stopper rod / slide gate mechanism.

**PERFORMANCE ACHIEVEMENTS**

Q-LEVEL+ has been proven to reduce the standard deviation in mold level control by 72%, as shown in the chart above.