Over the past seven years, Russula, an engineering company specialized in automation projects for rolling mills, has installed over twenty IBA data acquisition systems for leading steel producers. The IBA measurement and diagnosis system is used to assist in commissioning rolling mills. The IBA system helps minimize production downtimes during commissioning and afterwards. Maintenance is supported as the system predicts equipment failures and assists in developing suitable preventive maintenance programmes.

A data acquisition system provides many advantages during the process of automating and maintaining an industrial facility. The IBA PDA system is designed to capture and record signals from the entire industrial process, which makes it possible to monitor in real time the status of the process, keep track and store signal data for days, months or even years.

A typical rolling mill process is controlled by a series of networked PLCs forming a distributed control system. Each PLC is allocated to receive signals from different parts of the rolling mill. The IBA data acquisition system produces a single record for all the process signals and allows the user to visualize what is happening in the entire process. This aids in diagnosing problems and failures as well as compare the process signals of one product to previous recorded historical data of the same product.

**Tension control, loop control and shear cut control**

In particular, the rolling mill process is complex because it is a semi-continuous process with a large number of sensors and actuators. There are critical areas in the rolling mill process, such as material tracking, loop control and tension control, which are difficult to analyze without the help of a fast data acquisition system. In the case of high speed sections of the process such as the shear, pinch roll and the laying head for rod mills, it is absolutely essential to have a system to monitor and record at high speeds.

Many rolling mills use meters on the desk to monitor stand tension and adjust speed to correct the tension control. In many installations, Russula has put an IBA system in the rolling mill pulpit showing the stand loads as the bar enters. When a bar is being stretched or pushed between stands, the operator can see the load change as the head passes into the next stand. This enables the operator to change the R-factor for tension adjustment. The IBA system is easier to use than a meter because the operator can see historically where the level was, not just where it is.

To analyze the tension control between stands the system uses speed references and actual speeds to know if the speed drops, load levels to observe tension along the bar, R-factors and all the signals to track the bar for correct tension control. For analysis of the loop control, the actual height, deviation from the setpoint, R-factor, speed references, actual speeds, integral and proportional corrections are used. Shear cut control is managed using the current during the cut, actual position, speed reference, head and tail cut length and presence of the bar.
Minimizing downtime in the commissioning phase

The IBA system helps to minimize downtime in commissioning rolling mills. The installation and start-up of a new control system often provides many unpredicted problems which may extend the time until start-up of a process. The more information the start-up team has to review and diagnose the cause of a problem, the faster the team can commission the new system and start the production process. The IBA PDA tool receives data and collects the data history from the critical signals of the process. The IBA Analyzer allows the team to visualize the signals, create historical reports and anticipate possible failures that might occur. Having an IBA system installed during the start-up of a rolling mill can reduce the commissioning time by at least 50% compared to the situation without such system.

Russula has frequently used IBA’s remote access over the past seven years to help troubleshooting process issues at its clients’ rolling mills located all over the world. IBA enables remote access to a client’s real-time signals database making it possible to diagnose failures and perform troubleshooting and remote maintenance activities.

Figure 2. Analysis of tension control between stands