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## Increasing Throughput in Furnace Operations Iron Ore Mining and Processing

### Situation

Our client, the largest producer of iron ore pellets in North America, sought to partner with Implementation Engineers to improve their furnace operations. Their goal was to increase furnace throughput from 235 tons per hour to 250 tons per hour without negatively impacting secondary metrics such as pellet crush strength and Q factor (fines). The increased throughput was required to meet ongoing strong market demand.

### Approach

Implementation Engineers utilized a variety of analytical and implementation tools and methods to identify the reasons for throughput variability and put appropriate systems and metrics in place to maintain the requisite level of throughput. Our approach utilized the following tools:

- Process maps of the operation's current process to identify key points of variability as well as process inputs, outputs and noise.
- An analysis of current and historical data to determine cause-and-effect relationships between process variables.
- A measurement systems analysis to assess measurement capability.
- Designed experiments to determine the optimum process settings to achieve the desired process throughput.

### Results

#### Implemented Improvements

- Identified the balling-drum pellet quality as the root cause of the sub-optimal furnace throughput.
- Identified moisture, bentonite and throughput as the critical variables for balling-drum pellet quality.



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- Installed on-line moisture-measurement capability at the balling drum to enable optimum balling-drum operation.
  - Determined the optimum balling-drum settings with respect to moisture, bentonite and throughput to enable the furnaces to run at the desired throughput.
  - Trained the operators to operate the balling drums at the optimum settings.
  - Furnace throughput increased from **235 tons per hour to 250 tons per hour with an estimated annualized financial benefit of \$3.9 million.**