SymphonyAI Industrial - Cement Plant Asset Health Solutions

APM360™ for Process Health & Safety

Rotary Kiln Process Health Management

The rotary kiln in a cement plant is amongst the largest type of rotating machines erected and subjected to extreme temperatures, atmospheric conditions, varying loads and other operating conditions which affect its wear, alignment, life and overall asset health and safety. Failures include but are not limited to heavy gear vibration, gear box, sealing, shaft flexing, dust loss, unstable coatings, refractory loss, shell deformation, ring formation and leading to sub-optimal operations, safety risks or unplanned downtime. SymphonyAI Industrial's AI driven Predictive models covers overall machine health, real-time prescriptive monitoring, and predictive maintenance for critical kiln components like gearboxes, refractory lining, kiln deformation and seal failures. It leverages IIOT, AI & FMEA that provide anomaly detection with automated cause analysis and advisories to ensure increased reliability, uptime and peak performance of Rotary Kilns.

Cement Mill Safety and Environmental Guard

Predictive asset performance monitoring allows plant operations and maintenance personnel to proactively identify and address potential issues at an early stage thereby mitigating unplanned downtime or sudden break-downs. This has a strong relations with safety and leads to fewer injuries and OSHA incidents. In addition to safety improvement, injury reduction, SymphonyAI Industrial's AI driven digital twin provides operator guidance in managing efficient combustion in rotary kilns that minimizes NOX, CO_2 emissions, reduces thermal flare-ups thereby ensuring your plant maintains high standards of safety and environment practices.

Benefits

Safety
- 50% reduction in Incidents

Environment
- Reduced NOx emissions 5-10%

Cement Rotary Kiln Process Performance

Clinker production in a rotary kiln system is extremely energy intensive and uses up to 90% of the total thermal energy demand in a cement plant. Ability to capture the true impact of complex inter-dynamic relations between fuel, air, limestone feed with high combustion temperatures pose challenges to ensure efficient operations at all times leading to excess fuel usage, incomplete combustion and heat losses due to refractory wear. SymphonyAI Industrial's driven digital twin models complement plant operators complement plant operators to constantly monitor and improve kiln operation with real-time advisories to maintain high thermal efficiency and maintain CO_2 and NOx emissions within a tight control band. For a 400 TPH cement plant, energy efficiency gains can deliver up to $1 M annually.

Cement plant quality control in terms of Blaine (fineness) of material produced by vertical roller grinding mill (VRM) is not easy due to the fast changing dynamics. In addition, reliable online measurements of Blaine are not available thereby making control more often a guess work by operators.SymphonyAI Industrial has built digital twins for cement mill that provides online Blaine estimates with its AI-powered soft-sensing technology and uses these fast predictions to provide operator guidance to run plant optimally in terms of throughput & energy efficiency while meeting Blaine targets and maintaining mill stability.

Overall Outcomes & Business Value

- **Throughput > 4%**
- **Energy Efficiency > 5%**
- **Reduction in unplanned incidents 40-60%**
- **Impact up to $1M (350 TPH cement plant)**
- **Reduced Safety Incidents by 50%**
- **Environment: Reduced NOx emissions by 5%-10%**