VIBRATION MONITORING FOR THE

STEEL

INDUSTRY

WHEN RELIABILITY MATTERS CONNECT TO CONFIDENCE

CTC
CONNECTION TECHNOLOGY CENTER, INC.

A steel mill undergoes some of the harshest conditions when creating and processing steel. The machines are put through brutal conditions, including hot temperatures, dangerous chemicals and toxins, and heavy usage. As a result, Vibration Monitoring is critical to ensure operational uptime, human safety, product efficacy, and machine longevity.

Common machinery found within steel mills includes:

- Blast furnaces
- Rolling mills
- Quench boxes
- CCM (Continuous Casting Machine)
- Straightening machines
- Loopers
- Girders
- Conveyors
- Motors
- Heaters
- Boilers
- Pumps
- Pipelines
- Cranes

Common failures within a steel mill include:

- Improper lubrication of machinery
- Roll bearing failures
- Hydraulic pump failures

There are several **challenges of monitoring** within a steel mill, including:

- Hot temperatures
- Safety concerns
- Toxic chemicals and gases
- Limited accessibility
- What needs to be continuously monitored?
- Selecting the proper equipment for harsh environments

Due to the diversity of processes in steel manufacturing, CTC recommends tailoring your vibration monitoring hardware to the specific process and environment. **Permanent Monitoring** is the preferred method for a lot of these processes, both for repeatability as well as human safety concerns for hard-to-reach places and hot, caustic environments.

The first consideration is whether or not Process Monitoring or Dynamic Vibration Analysis is right for your condition monitoring program:

Process Monitoring requires 4-20 mA loop power sensors, which will provide the overall vibration level of the machine so that it can be trended and alarmed using the plant DCS, PLC, or SCADA system. Process monitoring will require permanently mounted loop power sensors that output a 4-20 mA signal proportional to velocity or acceleration. Process monitoring will provide an overall understanding of machine health, but cannot provide the same level of detailed, diagnostic data as Dynamic Vibration Analysis.

Dynamic Vibration Analysis allows for trended data and machine health diagnostics. However, Dynamic Vibration Sensors can be paired with CTC's SC300 Series Signal Conditioners to create a hybrid approach for both Process Monitoring and Dynamic Analysis. A Signal Conditioner converts the signal from a dynamic sensor into a 4-20 mA output, so it can be trended and alarmed using the plant DCS, PLC, or SCADA system but also used for more in-depth predictive maintenance.

Regardless of whether or not a signal conditioner is the right choice for your program, **CTC has a variety of accelerometers for use in steel industry applications**.

Standard Accelerometer Offerings (for environments up to 250 °F):

AC102 & AC104

Multipurpose
Accelerometer,
2 Pin Connector,
100 mV/g,
±10%
±80 g, Dynamic Range

AC292 & AC294

Premium Compact
Accelerometer,
2 Pin Connector,
100 mV/g,
±5%
±80 g, Dynamic Range

UEB332 & UEA332

Dynamic Vibration IEPE
Ultrasound Sensor,
1/4-28 Mounting,
2 Pin mini-MIL Connector,
100 mV/g,
±10%
±50 g, Peak

AC133 & AC134

Low Frequency
Accelerometer,
2 Pin Connector,
500 mV/g,
±10%
±50 g, Peak

High Temperature IEPE Offerings (for environments up to 325 °F):

AC207 & AC208

High Temperature IEPE
Accelerometer,
2 Pin Connector,
100 mV/g,
±10%

TXEA331-HT

High Temperature Triaxial
Accelerometer,
Side Exit 4 Pin Mini-MIL
Connector,
100 mV/g,
±5%

Scan to View our Complete Line of Industrial Accelerometers:

Triaxial Sensor Offerings:

TREA330

Premium Miniature Industrial
Triaxial Accelerometer,
4 Pin Mini-MIL Connector,
100 mV/g, ±5%

TREA331

Low Cost Miniature Triaxial
Accelerometer,
4-Pin Mini-MIL Connector,
100 mV/g, ±15%

Dual Output Vibration & Temperature Offerings:

TA200 SERIES

Dual Output Sensors,
Temperature & Acceleration

Options:
25 mV/g and10 mV/°C
100 mV/g and 10 mV/°C
500 mV/g and 10 mV/°C

TR100 SERIES

RTD Sensors,
Temperature & Acceleration

Options:
100 mV/g and 10 mV/°C
500 mV/g and 10 mV/°C

VT200 SERIES

Dual Output Piezo Velocity Sensors,
Velocity & Temperature

Options:
100 mV/in/sec and 10 mV/°C

Signal Conditioners & Enclosures:

SC300

USB configurable Signal Conditioners offered in single band vibration or dual band vibration output options.

All SC300 Series Signal Conditioners come equipped with an optional temperature output, which can be utilized with CTC TA200 Series Dual Output Vibration and Temperature Sensors.

SCE210/410

Nema 4X, stainless steel enclosure for up to eight SC300 Signal Conditioners.

SCD100

Nema 4X, Fiberglass Vibration Protection & Relay System for up to four SC300 Signal Conditioners, with option to include switch relay or display only, and optional stack light

Recommended Cabling & Connector Offerings:

For the steel industry, CTC recommends choosing rugged cabling and connectors for optimal chemical compatibility and heat resistance.

Our **Viton™ Boot Series** (**V Series**) **Connectors** are available in both single axis, dual output, and triaxial compatible options. V Series Connectors offer the best chemical resistance, an IP69 connection, and high heat resistance.

Our **A Series Connectors** are also a great option for steel industry applications, with a variety of material options. CTC recommends PPS or Nylon A Series Connectors for chemical resistance purposes.

A2R & A3R

PPS Molded Standard MIL Connector

A2Y & A3Y

Nylon Molded Right Angle Connector

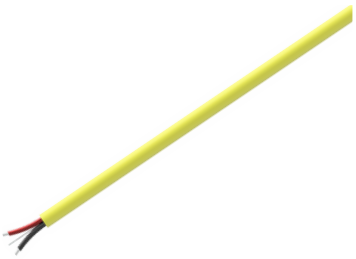
V2N & V3N

Molded Nylon Viton™ Boot

V2R & V3R

Molded PPS Viton™ Boot

CB111



FEP Jacketed Cable

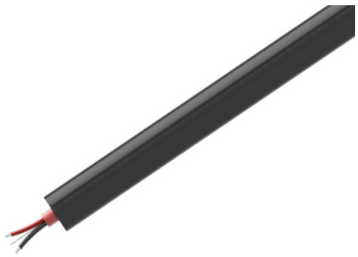
CB206

Armored Cable

CB602

FEP Heavy Duty Stainless Steel Armored Jacketed Cable

CB502



FEP Jacket with Hydraulic Hose Outer Armor

Junction Box Offerings:

Junction Boxes can be used for local measurements or the transmission of data to online vibration monitoring systems. Junction Boxes can also be used for cable reduction purposes or for switched outputs during manual route data collection of the vibration signals. Due to the harsh environments present in steel manufacturing, stainless steel Junction Boxes are recommended.

JB200 SERIES	SB200 SERIES	MX200 & MX300 SERIES	CR202 SERIES
			
Premium Switch Box with IEPE bias indicator light and convenient flip down panel for wiring	Legacy Switch Box Series	Enclosed BNC Connection Boxes	Cable Reduction Box for consolidating cables and reducing costs
Available in single axis, dual input & output, and triaxial input & output configurations	Available in single axis and dual input & output configurations	Available in single axis, dual input & output, and triaxial input & output configurations	Single axis sensor inputs
Minimum 4 sensor inputs Maximum 48 sensor inputs	Minimum 4 sensor inputs Maximum 48 sensor inputs	Minimum 1 sensor input Maximum 12 sensor inputs	Minimum 8 sensor inputs Maximum 16 sensor inputs

Loop Power Sensor Offerings for Process Monitoring:

LP200 SERIES

4-20 mA Output Proportional to Vibration in Velocity

LP300 SERIES

4-20 mA Output Proportional to Vibration in Acceleration

Relay & Protection Equipment for Use with Loop Power Sensors:

CTC's **PMX1500** is a 1-4 channel fiberglass enclosure with display and relay or display only. These enclosures are designed for loop power sensor input, and the relays can trigger alarm or shutdown. Available with optional stack light.

Predictive Maintenance for Fluid Film Bearings:

Many large motors, generators, and gear boxes will incorporate fluid film bearings to support their rotating shafts. These shafts require monitoring, which can be done through the use of X and Y radial proximity probes.

CTC's **PRO Line Proximity Probes** are non-contact eddy current sensors that measure the vibration of the shaft relative to the case of the machine, and the location (gap) of the shaft in the bearing. CTC offers FFv™ 5 mm, 8 mm, 11 mm, and 25 mm probes in both standard and armor jacketed cables. Compatible drivers and extension cables available for all systems.

FFv™ 5 mm Proximity Probe Set

8 mm Proximity Probe Set

11 mm Proximity Probe Set

25 mm Proximity Probe Set

CTC offers a wide variety of driver output options as well as driver calibration materials, including:

- 4140 Steel
- 1045 Stainless Steel
- 17-4 Stainless Steel
- 420 Stainless Steel
- 304 Stainless Steel
- 316 Stainless Steel
- 360 Brass Alloy
- AL7075-T6