

*VIBRATION MONITORING
FOR THE
STEEL
INDUSTRY*



**WHEN RELIABILITY MATTERS
CONNECT TO CONFIDENCE**

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.

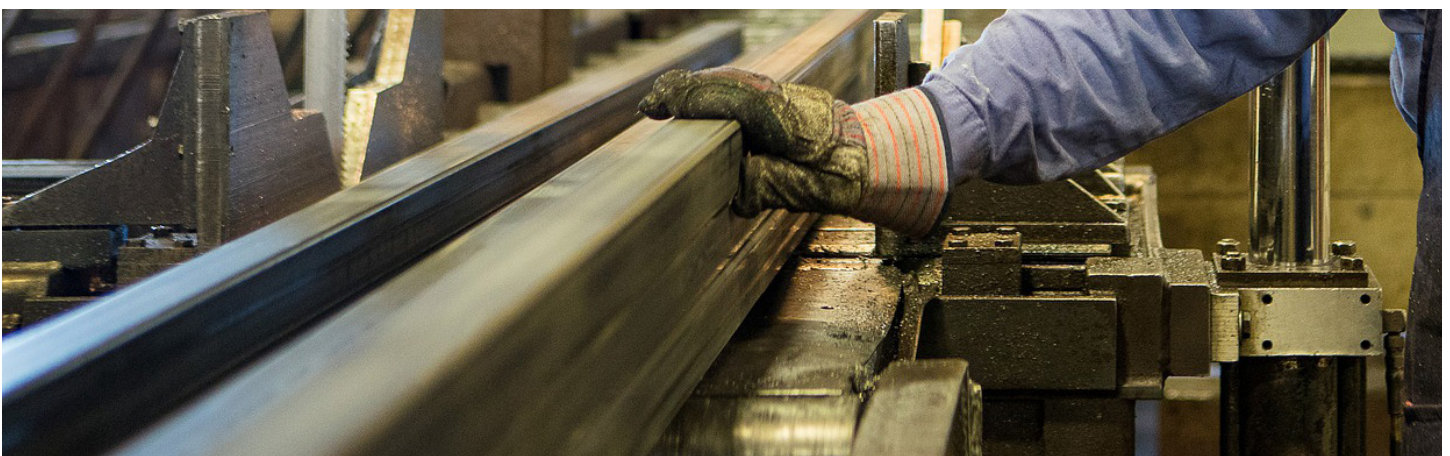
Permanent Monitoring is the preferred method for a lot of these processes, both for repeatability as well as human safety concerns for hard-to-reach places and hot, caustic environments.

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%

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%

Scan to View our Complete Line of Industrial Accelerometers:



Dual Output Vibration & Temperature Offerings:

TA200 SERIES



Dual Output Sensors,
Temperature & Acceleration

Options:
25 mV/g and 10 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



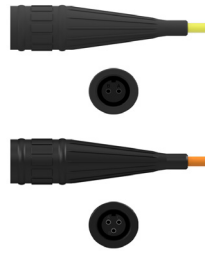
PPS Molded Standard MIL Connector

A2Y & A3Y



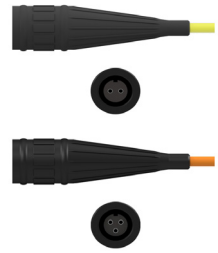
Nylon Molded Right Angle Connector

V2N & V3N



Molded Nylon Viton® Boot

V2R & V3R



Molded PPS Viton® Boot

CB111



FEP Jacketed Cable

CB206



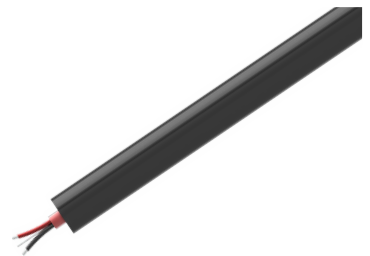
Armored Cable

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



Premium Switch Box with IEPE bias indicator light and convenient flip down panel for wiring

Available in single axis, dual input & output, and triaxial input & output configurations

Minimum 4 sensor inputs

Maximum 48 sensor inputs

SB200 SERIES



Legacy Switch Box Series

Available in single axis and dual input & output configurations

Minimum 4 sensor inputs

Maximum 48 sensor inputs

MX200 & MX300 SERIES



Enclosed BNC Connection Boxes

Available in single axis, dual input & output, and triaxial input & output configurations

Minimum 1 sensor input

Maximum 12 sensor inputs

CR202 SERIES



Cable Reduction Box for consolidating cables and reducing costs

Single axis 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