



# steel mill sensor and controls solutions



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### Product Features Overview

**Our sensors** are absolute and never require homing or calibrating in the event of a power loss and are built in the USA to meet global application needs.

**The resolvers** provide precision rotary position with sine and cosine outputs that are connected to a variety of interface modules, programmable limit switches or PLC cards. The position and velocity of the resolver are converted into analog, digital or serial output signals through the use of high resolution resolver to digital converters that range from 12 bit to 16 bit resolution.

Dual resolvers and precision geared single resolvers are available for multi-turn applications. Dual axis PLC cards and programmable limit switches can be used for synchronization of two rotating shafts. By separating the resolver from the interface electronics we are able to survive in areas where encoders and similar devices cannot. The resolver can be from 1000 to 3000 feet away from the interface device depending upon the device.

We offer special mill-duty packaging, heavy duty shafts and bearings, air purging and vortex air cooling along with stainless steel and other materials for environmental compatibility.

**Our linear displacement transducer line** utilizes advanced, proven magnetostrictive technology to provide highly precise and absolute position feedback down to .001" accuracy, resolution and repeatability. The selection of output interface devices is very similar to the rotary systems above.

We also package these sensors to survive in the most demanding and hostile environments. Our 950MD (mill-duty) housing, constructed of 304 stainless steel, has been used in steel mills throughout the world for over ten years with thousands of units in service at this time. We offer air purging, vortex air cooling and water cooled head jackets for LDT protection.

Our LDT, CATRAC and brake systems catalogs are excellent sources for additional information on applications in the steel mill industry.





# sensor & control solutions

No one in the industry understands the mechanical link between steel mill machines and sensors like **AMETEK APT**.

The reason is our commitment to get down on the plant floor and solve real problems with an impressive line of standard and special products designed for steel mill applications. No one else in our business can live up to that claim.

- We know what to measure for improved automation and efficiency
- We know where to measure for greatest accuracy and repeatability
- We know when to protect sensors in our unique mill-duty housings for long, maintenance-free life
- We know how to mount and interface our sensor packages for easy, fast, “seamless” installation
- We package our sensors to survive harsh environments

Add to that commitment, our five decades of application experience and state-of-the-art electronics, and you have Resolver- and Linear Displacement Transducer (LDT) packages that will meet the sensor challenges in your steel mill.

In addition to sensors, we also manufacture control products, such as Wagner hydraulic, electric and electro-thrust industrial brakes; replacements for Westinghouse brakes, CATRAC™ mill-duty cable and hose carriers, and liquid level control products — all designed to keep you running at top efficiency.

We can't show you everything in these next few pages. In one mill alone, we have installed more than 300 mill-duty product solutions. So, instead, we'll highlight some of the challenges you face everyday and describe smart sensor and control solutions that are at work in mills worldwide.

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## application notes

### ***Accurate Transfer Car Monitoring Can Increase Uptime 15%***

**The Challenge:** To find a replacement for lever arm limit switches to monitor transfer car positioning

Traditionally, lever arm positioning devices are used in this application, but they will break off when they make contact with loaded cars, causing downtime and maintenance expense for replacement. Or, when cars jump on the track they can miss the lever arm causing a missed signal, creating potential crash and safety problems. In addition, you are unable to continuously monitor car position, contributing to a loss of process control and flexibility.

**The Solution:** GEMCO 925 Cable Reel Measuring Systems

This cable reel system eliminates mechanical limit switch failure, replacement, and downtime. Subtle and unpredictable car movement does not affect accurate signal transmission. And continuous monitoring of the transfer car is possible. The cable reel system feeds its position information to a remotely located Programmable Limit Switch (PLS) that duplicated the signal of the lever arm. Installation is easy and interface to a host computer requires no program or logic modification.

*We have installed these systems worldwide and increased transfer car uptime by up to 15%.*



# raw material to iron

## The Challenges

Processing of raw materials is an area where profits can be earned through greater process and inventory control or lost in high maintenance and downtime. In this area, you face unique sensor and control challenges: ambient temperature and weather extremes; potential collisions, long mechanical travels; the accurate movement, stockpiling and blending of raw materials; potentially explosive conditions; and abrasive compounds.

## Smart Solutions

All AMETEK Automation and Process Technologies mill-duty smart solutions are application driven. Whether we use standard products or special engineered solutions, you can depend on five things: accuracy and repeatability, survivability, easy installation, and service. Here are a few examples in raw material to iron:

### 1 Ship Unloading Crane Position and Control

- Resolver-based, long travel, and boom positioning sensors
- Thruster Brakes

### 2 Stackers/Reclaimer Position and Control

- Resolver-based luff and slew packages in mill-duty housings that emulate encoder outputs or provide analog outputs
- CATRAC™ carriages and CATRAC™ turntables
- Explosion proof cam switches with optional internal resolver or provisions for your rotary sensor
- Explosion proof resolvers
- Brakes

### 3 Charge Car, Pusher/Leveler Car, Door Machine, Guide Machine, Quench Car Position and Control

- Resolver-based pusher bar and leveler bar position sensor in mill-duty housing
- Mill-duty Linear Displacement Transducer (LDT) for door removal mechanism

### 4 Skip Hoist Position and Control

- Dedicated Programmable Limit Switch (PLS) controls skip car cycle
- Resolver-based stockline winch and stock rod position encoders in mill-duty housings
- Mill-duty encoder packages for chute/distributor tilt and rotation
- 1746-1771 cards for A/B PLC

### 5 Mud Gun/Lance Position

- Resolver-based position and mud charged measurement encoder in mill-duty housing
- Cam switches with resolvers or encoders

### 6 Torpedo Car Filling

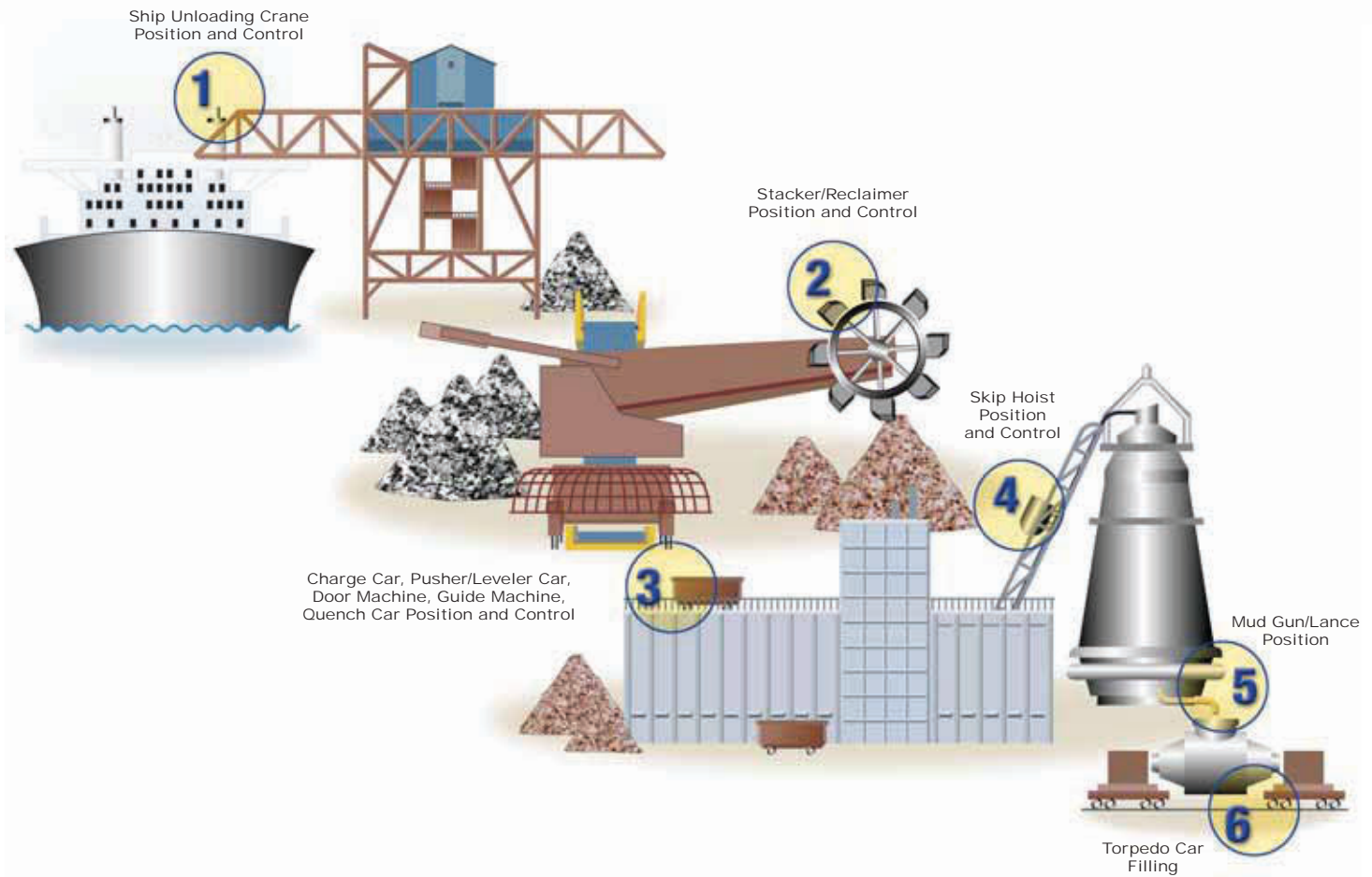
- Resolver-based position encoders for hot metal and slag tilt spouts

## More Mill-Duty Solutions:

### Control Products

In this primary area of the mill, AMETEK Automation and Process Technologies also offers mill-duty GEMCO hydraulic, electric and electro-thrust crane brake systems, CATRAC™ cable and hose carriers, and process hoist limit controls, stock rods, temperature measurement and bell bunder blending.

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## application notes

### **Reduce Cycle Time** **Greater Skip Hoist Control Reduces Cycle Time** **By Up To 10%**

The Challenge: To get more "heats" from a blast furnace

One way to meet this challenge is to fill the furnace faster by allowing the skip car to travel farther up the ramp before programmed slow-down. In the past, ramp slow-down has been determined by cam switches or encoders feeding a PLC. They work, but because of poor repeatability or long scan times, the skip car has to begin its slow down early in the cycle ... too early. It is a time-waster.

The Solution: GEMCO Series 1989 PLS dedicated skip car control device

With scan times in the 200 micro-seconds range and highly accurate continuous positioning outputs, you can drive the skip car farther up the ramp before slowdown is required. In a 1:45 second cycle, you can save 7 to 10%. The Series 1989 PLS also has a unique feature that continuously compensates for cable stretch, allowing you to maintain cycle time gains and avoid crashes.

*This is a proven smart solution at work in steel mills worldwide. Consult factory for application details.*

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# steel making

## The Challenges

In a phrase: **Only the strong survive.** The temperature in a basic oxygen furnace or an electric arc furnace can reach 3000°F (1634°C), and around the furnace it isn't much cooler. Hot carbon particles and dust coat everything mechanical and electrical, and fall from the ceiling like black snow. Molten metal splash is a concern, and in the electric arc process high electro-magnetic fields raise havoc with electronic devices.

## Smart Solutions

All AMETEK Automation and Process Technologies mill-duty smart solutions are application driven. Whether we use standard products or special engineered solutions, you can depend on five things: accuracy and repeatability, survivability, easy installation and service. Here are a few examples in steel making:

### 1 Re-ladle and Desulfurization Hot Metal Transfer Stations

- PLS – temperature sample lance
- Series 925 – cable drive for ladle car position and tilt slag off position
- CATRAC™

### 2 BOF Scrap Charge Car Position

- Resolver-based linear cable reel sensors monitor car position
- Scrap bucket tilt controls

### 3 Furnace Tilt Control

- Mill-duty rotating cam limit switches control position
- Resolver-based remote encoder 2120 packages or programmable limit switch systems (PLS) monitor/control position
- Mill-duty Linear Displacement Transducer (LDT) for hydraulically actuated tilt
- 1746/1771 Cards for A/B PLC
- 925 Linear Cable Reel Sensors

### 4 Ladle Crane/Scrap Charge Crane Control

### 5 Lance Position and Control

- Mill-duty rotating cam limit switches position rotary skew monitoring
- Multi-turn resolver systems monitor vertical lance movement, insertion depth, and over-travel limits
- 1746/1771 Cards for A/B PLC
- 2120 Module
- Electro-thrust brakes

### 6 Ladle Transfer Car Position

- Resolver-based position cable reel sensors

### 7 EAF Furnace Cover Position

- Vertical position mill-duty Linear Displacement Transducer (LDT) with programmable limit switch (PLS)
- Rotational position resolver-based encoder/programmable limit switch system (PLS)

### 8 Electrode Position/Velocity

- Linear cable reel sensors give vertical position and velocity data
- Rotational position resolver-based encoder or programmable limit switch (PLS)
- Mill-Duty Linear Displacement Transducer (LDT) for position & velocity feedback

### 9 Oxygen Lance Resolver-Based Positioning

- 2500 PLS
- 2120 Module

### 10 AOD Furnace Tilt Controls

- Resolvers, Series 1980
- Thruster brakes

### 11 Ladle DeGasser and Metalurgical Station

- CATRAC™ – Resolver transfer cars
- Electro-thrust brakes

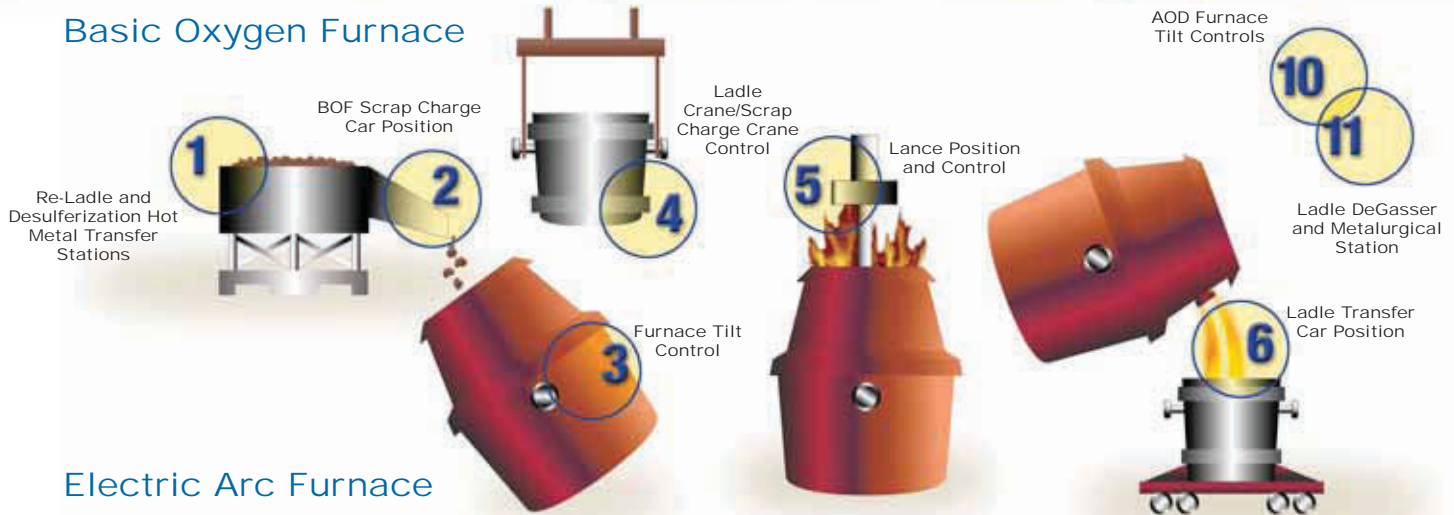
## More Mill-Duty Solutions

Control Products  
In this area of the mill, AMETEK Automation and Process Technologies also offers mill-duty GEMCO hydraulic, electric and electro-thrust brake systems, CATRAC™ cable and hose carriers.

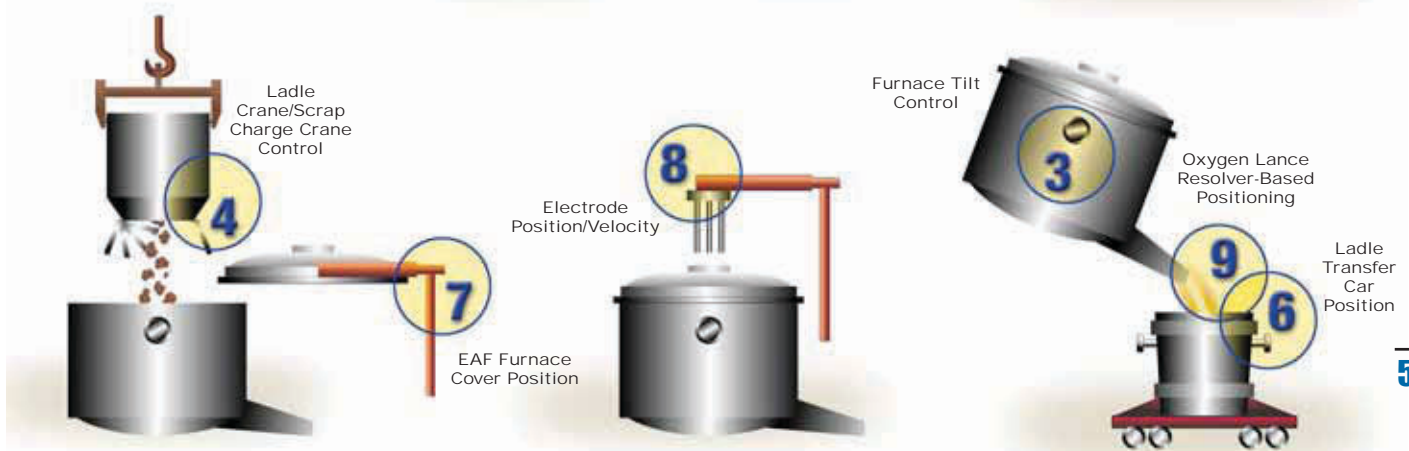
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## Basic Oxygen Furnace



## Electric Arc Furnace



# application notes

**More Efficient Burns**  
**Accurate EAF Electrode Positioning and Movement**  
**Maximizes Charge Burn and Eliminates Electrode Crash**

**The Challenge:** To improve carbide electrode positioning and descent rate accuracy during a charge burn

Most EAF furnace electrode positioning and descent mechanisms are controlled by an encoder attached to a complex drive, gear and chain assembly. These encoders monitor the drive mechanism-not the electrodes. You cannot effectively or repeatedly position the electrode or monitor its descent with this system. The results are less than efficient burns and potential electrode crashes into the charge.

**The Solution:** The Mill-Duty Series 925 Linear Cable Reel Sensor

This sensor can be mounted away from furnace hazards with the actuation cable attached directly to the electrode descent mechanism. As the electrodes descend, the cable pulls out to accurately record the linear movement. The sensor's assembly converts linear to rotary motion to turn its internal resolver. The electronic signal from the resolver, which is highly resistant to electrical noise, is sent via cable to our Series 2120 Resolver Module in a safe location. The module produces continuous digital position data accurate to 0.02" (0.5 mm) and a simultaneous analog output of electrode velocity.

*Consult factory for application details.*

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# continuous casting

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## The Challenges

Keep this massive mechanical process running non-stop. Your management and your customers are demanding more efficient production and closer near-net-shaped product. To get the job done, you are always working on the edge — dealing with ultra-high temperatures, extreme moisture saturation, and dangerous breakout conditions. You need real-time, accurate and dependable position information you can use to keep the process running.

## Smart Solutions

All AMETEK Automation and Process Technologies mill-duty smart solutions are application driven. Whether we use standard products or special engineered solutions, you can depend on five things: accuracy and repeatability, survivability, easy installation, and service. Here are a few examples in continuous casting:

### 1 Ladle Crane Position and Control

- Resolver-based long travel position sensors
- Resolver-based bridge and trolley position sensors
- Brakes
- CATRAC™

### 2 Ladle Turret Position

- Mill-duty rotating cam limit switches position turret
- Resolver-based encoders and programmable limit switches
- Ladle lift – programmable limited switch systems (PLS) Models 1989,2500 and 1995; Resolvers Models 925 and 1986

### 3 Ladle Slide Gate Control

- Linear Displacement Transducers (LDTs) in air-cooled, mill-duty housings

### 4 Tundish Car Position and Control

- Linear cable reel sensor monitors horizontal position
- Linear Displacement Transducers (LDTs) in mill-duty housings monitor height
- CATRACs™
- Electro-thrust brakes

### 5 Mold Width Monitoring and Control

- Portable mold width calibration device provides digital indication of width dimension accurate to 0.002" (0.05 mm)
- Resolver-based width measurement encoder packages
- Linear Displacement Transducers (LDTs) for narrow face position measurement
- Water cooled, mill-duty Linear Displacement Transducer (LDT) monitors lateral strand guide position
- Geared rotary limit switches

### 6 Spray Chamber Drive Roll Velocity (Cast Speed)

- Oil filled (to prevent water penetration) resolver-based encoder packages with remote electronic encoder module

### 7 Torch Cutoff Machine Position and Control

- 925 Cable Reel and resolver-based cutoff position sensors
- Mill-duty resolver-based torch traverse position and velocity sensors
- Resolver-based machine travel encoders measure slab length
- Air-cooled, Linear Displacement Transducers (LDTs) mounted on cutoff machine clamp mechanism give width measurements.

### 8 Slab Handling Cranes

- Brakes
- CATRAC™
- Cable Reels
- Cam limit switches
- Resolvers
- 2120
- 2500

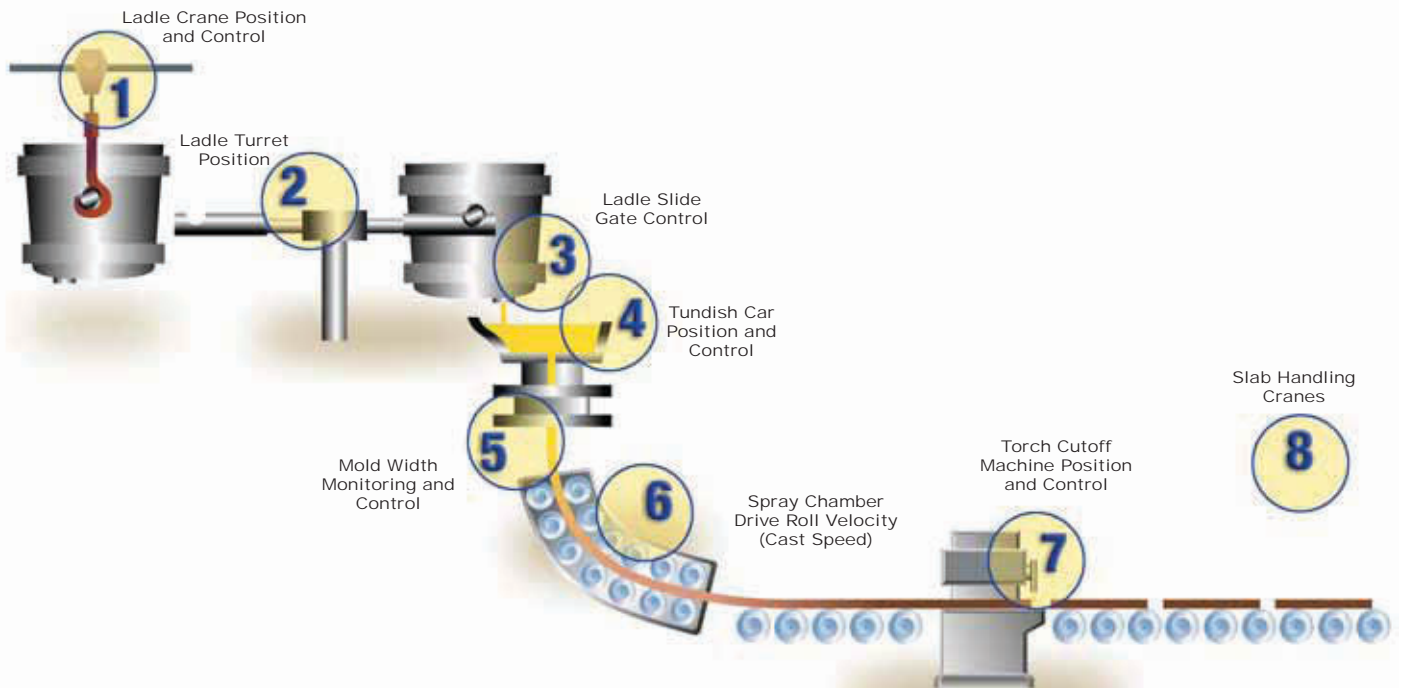
## More Mill-Duty Solutions

### Control Products

In this area of the mill, AMETEK Automation and Process Technologies offers mill-duty GEMCO hydraulic, electric, and electro-thrust brake systems, CATRAC™ cable and hose carriers, LDTs, resolvers, interface modules and B/W point level control of cooling water systems.



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## application notes

***Closer Tolerances / Reduced Scrap  
Significant Material Savings and Closer Near-Net-Shaped  
Product with Our Torch Cut-Off Monitoring System***

The Challenge: To take control of the torch cut-off machine operation, reduce waste, and produce closer near net shaped slab lengths. Generally, control, accuracy, and repeatability has been so poor in this important operation that additional slab length is programmed into the operation to ensure that the slabs produced are at least to customer specifications. The waste is significant. We have a better idea.

The Solution: We have air-cooled resolver or Linear Displacement Transducer (LDT) systems to take control of your torch cut-off operation.

In all cases, our systems can re-confirm the width of the slab as it enters the torch cut-off area and provide accurate slab length control by monitoring cut-off machine position and movement. In addition, our systems control torch start, stop, and rate of cut. The results are closer near net-shaped slabs and significant material savings.

*Consult factory for application details.*

*This is a good example of our ability to give you what you need, not necessarily what we have to sell.*



## The Challenges

In hot, cold, or bar shape rolling (single or multi-stand configurations), the process and automation challenges are considerable. The protection of mechanical systems and sensitive electronic monitoring and control devices from massive vibration, heat, quenching devices, machine backlash, and even physical damage inherent in high speed rolling is critical.

## Smart Solutions

All AMETEK Automation and Process Technologies mill-duty smart solutions are application driven. Whether we use standard products or special engineered solutions, you can depend on five things: accuracy and repeatability, survivability, easy installation, and service. Here are a few examples in rolling:

### 1 Walking Beam Furnace

- Resolver and mill-duty Linear Displacement Transducers (LDTs) for charger, walking beam and extractor lift and traverse positions
- CATRAC™

### 2 Coil Box

- Linear Displacement Transducer (LDT) for top bending roll frame position
- Resolver-based PLC encoders for cradle roll frame position

### 3 Side Guide Position

- Resolver-based rotary position encoders monitor screw actuator position
- Mill-duty Linear Displacement Transducers (LDTs) monitor actual side guide position

### 4 Work Roll/Backup Roll Position

- Resolver-based PLC encoder modules monitor screw down position
- Linear Displacement Transducers (LDTs) monitor roll position
- Profile measurement LDT
- CATRAC™

### 5 Looper Position

- Resolver-based looper arm position sensor

### 6 Automated Roll Change Mechanism

- Linear Displacement Transducer (LDT) monitors roll position during change-out
- CATRAC™

### 7 Down Coiler

- Resolver-based wrapper roll gap adjustment
- CATRAC™
- LDT with Mill-Duty Housing

## More Mill-Duty Solutions

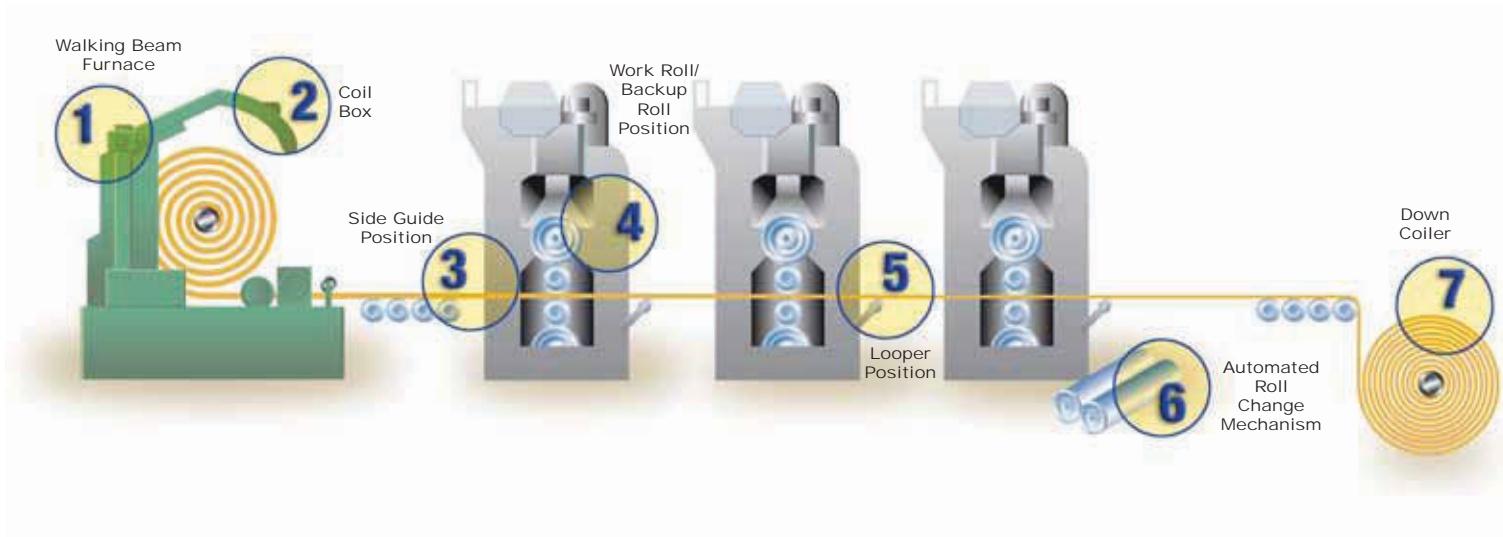
Medium/Large Section Rolling  
Mill-duty Linear Displacement Transducer (LDT) monitors position of forming rolls.

Flying Shear Control  
Resolver-based high speed Programmable Limit Switch (PLS) measures length and triggers shear. Similar applications also use LDTs with Quadrature or Analog output.

Control Products  
In this area of the mill, AMETEK Automation and Process Technologies also offers mill-duty GEMCO hydraulic, electric, and electro-thrust brake systems, CATRAC™ cable and hose carriers, LDTs, Resolvers and B/W point level control of cooling water systems.



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## application notes

### ***Faster Automation***

### ***Side Guide Automation Saves Setup Time and Improves Accuracy***

The Challenge: To replace encoders on roller or rail type side guides with a sensor system that is more rugged and accurate, allowing for greater reliability, control, and automation of the process

The Solution: Our highly accurate Resolver- or Linear Displacement Transducer (LDT)-based sensor packages in rugged mill-duty housings

These sensor packages are designed to produce reliable and accurate positioning data by reading the actual side guide position, not the drive mechanisms that actuate them. By ignoring machine backlash, we improve accuracy. The Linear Displacement Transducer's (LDT) mill-duty housing allows it to be mounted directly to the side guide itself, while protecting it from the heat, water, and mechanical damage inherent when this close to the rolling process. In addition, all of our systems are designed for easy installation and are compatible with your host computer.

*Consult factory for application details.*



# finishing and coating

## The Challenges

This is the **“value-add”** department of steel processing and involves a variety of operations from pickling, annealing, and tin or chrome plating; to galvanizing, slitting and shearing. In all these operations careful monitoring and positioning of material handling is extremely important to product quality. Add to this, temperature concerns and corrosive materials and you have formidable sensor and control challenges.

## Smart Solutions

All AMETEK Automation and Process Technologies mill-duty smart solutions are application driven. Whether we use standard products or special engineered solutions, you can depend on five things: accuracy and repeatability, survivability, easy installation, and service. Here are a few examples in finishing and coating:

### 1 Entry Coil Measurement and Position

- Resolver-based entry traverse position monitor
- Mill-duty Linear Displacement Transducer (LDT) for raise/lower position
- CATRAC™

### Accumulator/Loop Tower/Loop Car Position and Velocity

- 925 Resolver-based linear cable reel sensor monitors position and velocity
- Multi-turn dual resolver monitors loop car position and provides +/- analog output

### Side Trimmer/Slitter Position

- Resolver-based encoder system monitors trimmer/slitter lap and gap positions
- Mill-duty Linear Displacement Transducer (LDT) monitors actual blade position
- CATRAC™

### 4 Scrap Chopper Position and Control

- Resolver-based position control
- Resolver-based Programmable Limit Switch (PLS) system cycles chopper for even blade wear
- CATRAC™

### 5 Air Knife Position

- Resolver- and Linear Displacement Transducer (LDT) based air knife 3 and 4 axis positioning
- Model 955S or 956 BLOK

### 6 Shear Measurement and Control

- Resolver-based high speed Programmable Limit Switch (PLS) system measures length and triggers shear

### 7 Exit Coil Position

- Resolver-based coil car positioning
- Linear Displacement Transducer (LDT) monitors raise/lower position
- CATRAC™

## More Mill-Duty Solutions

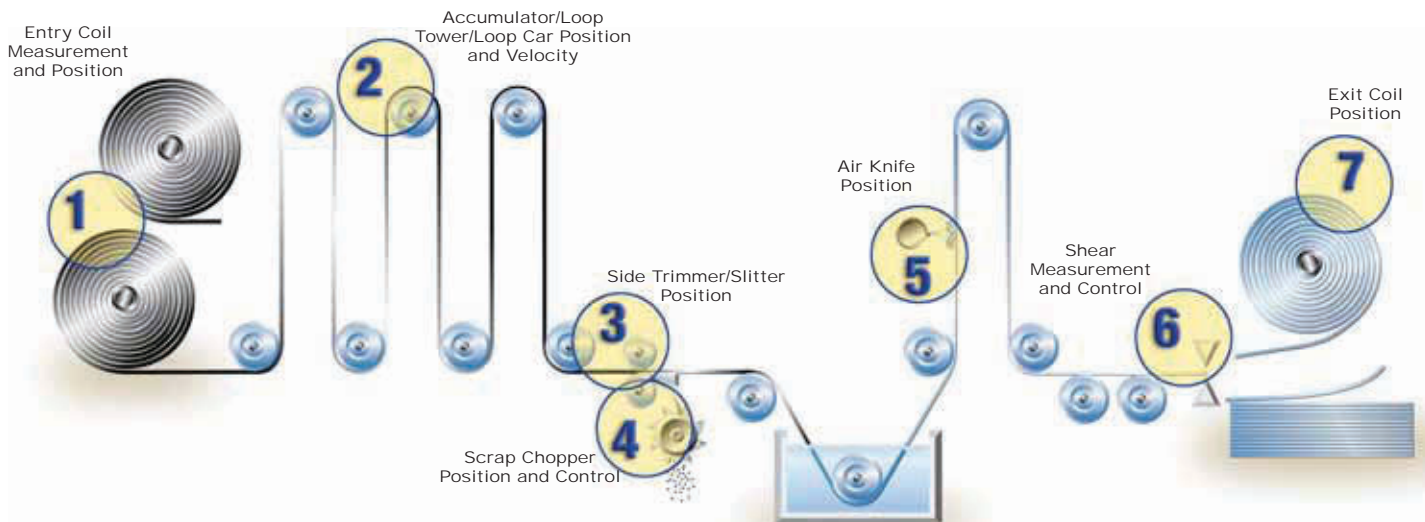
### Control Products

In this area of the mill, AMETEK Automation and Process Technologies also offers mill-duty GEMCO hydraulic, electric, and electro-thrust brake systems, CATRAC™ cable and hose carriers, and B/W point level and continuous liquid level control with EPA approved leak detection in below ground tanks.

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## application notes

**Reduced Down-Time**  
**Special Engineered Replacement Sensor Operates**  
**10 Times Longer Than OEM Supplied Sensor Package**

**The Challenge:** To improve encoder package survival near the pickling operation

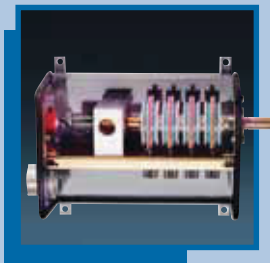
The original resolver/encoder packages supplied with the OEM's drive systems were not providing acceptable operational life due to corrosive liquid entering the sensor housing and destroying the sensor.

**The Solution:** A direct bolt-in replacement sensor for the original OEM supplied sensor package

The electrical characteristics of the OEM resolver and pulse encoder were analyzed to insure that our replacement was compatible. The sensor housing is built from stainless steel. Double shaft seals were used to stop the penetration of corrosive liquids. The results were dramatic. Our engineered sensor solution lasted 12 months before failure. The OEM sensor package lasted, on the average, 3 to 4 weeks before failure and replacement was necessary. But that's not the end of the story. When our sensor failed, we analyzed the failure and have redesigned the product for even longer life. This is just one example of a special engineered solution that is making a real impact in steel mill productivity.

*Consult factory for application details.*

# Mill-Duty Products



## 1980 Rotating Cam Limit Switch

- Micro-adjust cams provide easy adjustment at any shaft position
- 2 to 40 Circuits
- Wide range of gear ratios available from stock
- Available in NEMA 1, 12, 4, 7, 9 (IP 23, 55, 66) and mill-duty plate steel enclosures
- Custom cam switch/encoder packages combine continuous position output with hard contact over-travel limits



## PLC Encoder Modules and Programmable Limit Switches (PLS)

- Provides monitoring of resolver or Linear Displacement Transducers (LDTs) from a remote, safe location
- Converts sensor signal to compatible digital, analog, or limit switch outputs
- High-speed output update times improve control resolution and repeatability
- A/B SLC-500 and PLC-5 Cards (Resolver and LDT)



## 925 Mill-Duty Cable Reel Sensor

- Converts linear machine motion to rotary motion to turn rotary position or velocity sensors
- Provides absolute, incremental, analog, or cam switch outputs
- Outputs are electrically compatible with all existing control circuitry
- Stainless steel cable, large dual spring motors, and 12 gauge steel housings survive the mill environment
- Stroke Length to 100 Ft



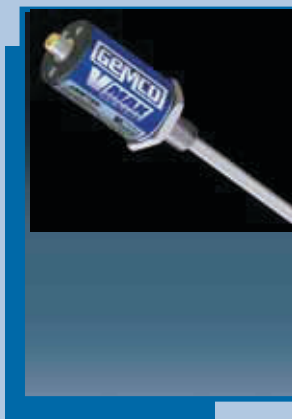
## 952 BlueOx Linear Displacement Transducer (LDT)

- Magnetostrictive LDT for high shock and vibration areas (toughest in the industry)
- Resolution to .001 inch
- Lengths up to 168" in 0.1" increments also available with:
  - Voltage, Current, Digital, PWM, Start/Stop & Quadrature Outputs
  - Quadrature output for direct interface to incremental input or counter cards
  - Resolutions up to 9999 pulses per inch
  - Burst mode makes sensor truly absolute



## 955 The Brik Low Profile Linear Displacement Transducer (LDT)

- Aluminum extruded channel provides easy mounting
- Low cost linear position sensor
- Lengths to 180 inches
- Green/red status LED indicator
- Analog, digital pulses & Quadrature outputs available



## 953 VMAX Linear Displacement Transducer

- Shock resistant to 1000Gs (lab tested)
- Vibration resistant to 30Gs (lab tested)
- SSI (Synchronous Serial Interface) 24, 25, or 26 Bit, Binary or Gray Code, Synchronous or Asynchronous Mode
- Analog outputs, 0-10 VDC, +/-10 VDC, 0-5 VDC, +/- 5 VDC, 4-20mA
- Digital output Start/Stop, Control Pulse, and Variable Pulse (PWM)
- Removable cartridge
- IP68 rating
- Stroke length to 300"
- Input power range is 7 to 30 VDC @ 1 watt typical
- Weather/contaminant resistant
- Programmable zero and span
- Diagnostic Tri-Color LED



## 950 MD Mill-Duty Linear Displacement Transducer (LDT)

- All 316 stainless steel construction
- Adjustable Trunnion and swivel ball mount standard
- Air purge fittings are standard on all units with Vortex coolers available for high temperature applications
- Custom water-cooled versions available
- Repeatable to  $\pm 0.001"$  ( $\pm 0.025$  mm)



## Resolver/Encoder Packages for GEC Gem 80 Drive Systems

- Direct bolt-in replacement for OEM supplied sensor package
- Designed for improved input shaft load resistance
- 316 stainless steel housing, dual shaft seals, and mill-duty cable connectors for high moisture/corrosive environments
- Outputs compatible with most Gem 80 drive systems
- Custom variations available



### 1986 Standard Resolver Packages

- Packages are direct bolt-in replacements for most English and metric size encoders
- Internal precision gear reducers for multi-turn applications
- Numerous standard ratios stocked with customs available
- Special resolvers compatible with most competitors' electronic modules are in stock

## Other Mill-Duty Products:



### GEMCO Industrial Brake Systems

- Hydraulic Brakes, AISE electric brakes
- Custom brakes engineered to requirement
- Self-adjustment feature available on electro-thrust brakes
- Competitive pricing and lead times



### CATRAC™ Cable and Hose Carriers

- Double welded, box beam, bolted construction
- Full line of standard sizes
- Special materials of construction and coatings available
- Custom designs are a specialty
- Available in nylon



### B/W Liquid Level Control

- Full line of point level controls — conductive and float
- State-of-the-art continuous level instruments and control
- EPA approved leak detection in below ground tanks

# When All Others Fail!

AMETEK Automation and Process Technologies markets, engineers and manufacture sensors and controls for demanding and harsh industrial environments. Products include GEMCO linear and rotary position sensors and controls, industrial brakes systems, CATRAC™ cable and hose carriers, B/W™ liquid level controls. AMETEK APT has more than 50 years of application experience and markets its products globally.

## positioning solutions for niche markets...

In addition to the products **AMETEK Automation & Process Technologies** provides the steel mill industry, we also offer positioning solutions to a wide variety of niche markets. Whether you're looking for rotary positioners, linear displacement transducers, resolvers, switches, brakes, or safety devices, **AMETEK APT** has a solution for your application. From PLC cards to mill-duty sensors, you'll find our products across a myriad of industries, including:

**Plastics** - Injection Molding and Extruding, Vibration and Spin Welding

**Mills** - Steel, Paper, and Lumber

**Machine Tools** - Robotics, Stamping, Transfer Presses, Casting, Conveying

**Nonwovens** - Diapers, Feminine Hygiene Products

**Textiles** - Looms and Weaving

**Chemical** - Liquid Level

**Food and Pharmaceutical** - Liquid Level and Packaging

### ■ Safety Devices, Switches, and Brakes

Some of our products are so well designed and versatile that they defy classification. From PLC cards to foot-switches to a broad selection of stopping and holding brakes, **AMETEK Automation and Process Technologies** has been solving production problems for years. Whether you are operating a crane or producing baby diapers, we have a wide assortment of **GEMCO** products to help optimize your processes.

### ■ Programmable Limit Switches

Whether your need is a dedicated, ultra-high speed control to manage the complexities of packaging, converting, or gluing applications, or something as slow-paced as controlling basic input/output and shut height on a stamping press, a **GEMCO** Programmable Limit Switch (PLS) has just the right stuff. With features specifically designed for these industries, our PLS product line offers world-class value for firms that need the speed, flexibility, or ease-of-use that **GEMCO** PLSs are known for.

### ■ Network Connectivity

The seamless passing of information from the production line to the people who need it requires smart processes. **GEMCO's** 'connected' products include a wide array of linear displacement transducers (LDT), resolvers, and PLSs that transparently make available vital process information without interrupting the flow of production. From **DeviceNet™** to **ControlNet™** we are the home of smart, rugged sensors that speak your language.

## We Are Your Solution to Factory Automation...

*DeviceNet™*



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