

Measurement Solutions

FOR THE STEEL MILL INDUSTRY

- **Linear Position**
- **Rotary Position**
- **Cable & Hose Management**
- **Brakes**
- **Level**
- **Pressure**

The Products You Need for the Steel Mill Industry

Linear Displacement Transducer (LDT)

Series 953, 955, 956 & 957

- Magnetostrictive LDT for high shock and vibration areas (toughest in the industry)
- Resolution to 1 micron
- Lengths up from 1" to 300"
- Available with a host of outputs
 - Voltage, Current, Digital, PWM, Start/Stop, SSI and EtherNet/IP Outputs

APPLICATIONS: Charge Car, Furnace Tilt, Ladle Side Gate, Electrode Position, Tundish Car, Mold Width, Torch Cut-off, Walking Beam, Side Guide, Roll Position, Roll Change, Down Coiler, Coil Position, Side Trimmer, Air Knife



950MD Mill-Duty Housing

- Stainless Steel Mill Duty protective housing for Rod Style LDT's
- Simplified 2 point mounting and easy of replacement reduces downtime
- Lengths from 1" to 240"
- Air cooling ports to cool electronics

APPLICATIONS: Charge Car, Furnace Tilt, Ladle Side Gate, Electrode Position, Tundish Car, Mold Width, Torch Cut-off, Walking Beam, Side Guide, Roll Position



925 Mill-Duty Cable Reel Sensor

- Converts linear machine motion to rotary motion
- Provides absolute, incremental, analog, or cam switch outputs
- Stainless steel cable, large dual springs, and 12 gauge steel
- housings survive the mill environment
- Stroke Length to 100 feet

APPLICATIONS: Ladle, Tundish and Charge Car Position, Furnace Tilt, Electrode Position, Turret Position, Torch Cut-off, Slab Cranes, Loop Tower



1986 Series Resolver

- Precision resolvers with absolute position packages are direct bolt in replacements for most English and metric size Encoders
- Allows up to 14-Bit resolution
- Internal precision gear reducers for multi-turn applications
- Optional Mill Duty Housings available for extreme applications

APPLICATIONS: Crane Position & Control, Stacker/Reclaimer, Skip Hoist Position, Furnace Tilt, Electrode Position, Mold Width Monitoring, Slab Handling, Roll Position, Coil Box, Down Coiler, Side Guide Position, shear Measurement



1986 Mill Duty Resolver/Encoder Housing

- Designed with 1/4" (6.35mm) plate steel construction and jackshaft input to give an added layer of protection to Resolvers and Encoders
- Air purge fittings for positive pressure or cooling
- Vortex coolers or internal heaters for temperature extremes

APPLICATIONS: Stacker/Reclaimer, Skip Hoist Position, Furnace Tilt, Electrode Position, Mold Width Monitoring, Slab Handling, Roll Position, Coil Box, Down Coiler, Side Guide Position



1980 Rotary Cam Limit Switch

- Mechanical Rotary Limit Switch for up to 500 RPM
- NEMA 1, 4, 7, 9 and 12
- Up to 40 Circuits
- Contaminant and Explosion Proof
- Resolvers, Encoders and other Rotary Sensors Options available

APPLICATIONS: Mud Gun, Lance Position, Furnace Tilt, Lance Position, Ladle Crane Position



2000 / 2006 Rotary Limit Switch

- Mechanical Rotary Limit Switch for up to 500 RPM
- NEMA 1, 4, 7, 9 and 12
- Up to 4 Circuits
- Contaminant and Explosion Proof
- Resolvers, Encoders and other Rotary Sensors Options available

APPLICATIONS: Stacker Reclaimer, Crane Control



2500 Programmable Limit Switch (PLS's)

- High Speed Programmable Limit Switch - 100µS update
- 8 to 64 high speed outputs
- Resolver Input – Can be located up to 1,000 feet away

APPLICATIONS: Skip Hoist, Electrode Position, Cranes, Turret Position, Scrap Chopper



2120 PLC Interface Modules

- Provides monitoring of Resolver or Linear Displacement Transducer (LDT) from a remote, safe location
- Use as simple indicators of position or as a PLC interface module that converts sensor signal to compatible digital, analog, or limit switch outputs

APPLICATIONS: Skip Hoist, Furnace Tilt, Electrode Position, Roll Position, Turret Position, Mold Width



Catrac® Cable & Hose Carriers

- Designed to protect cables and hoses from abrasion, wear and twisting
- Steel, Stainless Steel and Nylon construction
- Nylon resists corrosion and is non-conductive
- Steel construction and withstand severe hydraulic loads

APPLICATIONS: Stacker/Reclaimer, Lance Position, Ladle Crane, Tundish Car, Cranes, Torch Cut-off, Walking Beam, Coil Box, Roll Position, Down Coiler

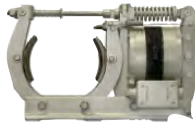


The Products You Need for the Steel Mill Industry

Gemco Industrial Brakes

- Electro-Thrust shoe, magnetic DC shoe, Solenoid AC shoe and Hydraulic shoe configurations
- AISE rated
- Non-Asbestos linings
- Made in the USA

APPLICATIONS: Overhead Cranes



IntelliPoint

- Line Powered and 2 wire options available
- Ignores changes in dielectric or conductivity
- Response time of less than one second
- Self Checking Autoverify™ Feature
- Full approvals for hazardous environments

APPLICATIONS: Bin and Container Measurement



The Point

- Line Powered and 2 wire options available
- Auto Calibration – simply install and apply power...that's it
- Response time of less than one second
- Self Checking Autoverify™ Feature
- Full approvals for hazardous environments

APPLICATIONS: Bin and Container Measurement



DR-7000 – Level Radar

- 2-wire intrinsically safe design ensures false echo rejection, even with agitators
- Allows level measurements in liquids, slurries, solids and granulars up to 131 ft
- High temperature and high pressure design

APPLICATIONS: BOF Scrap Change Car



DR-6300 – Non contact Radar for Solids

- Unique Drop Antenna design prevents build up in dusty applications
- ± 0.12 in. (± 3 mm) standard accuracy
- Measuring range up to 260ft (80m)

APPLICATIONS: Bin and Container Measurement, EAF Furnace Cover



Universal II & IV

- Accurate measurement within 0.25% of range ± 0.12 in. (± 3 mm) standard accuracy
- Measurement span from 1" (25mm) to 6ft (1829mm) with no dead zone
- Various probe types for a wide variety of applications

APPLICATIONS: Roll Tension Feedback



Electronic Pressure Measurement

Model 831 and IDT Transmitters

- 316 stainless steel construction
- Pressure ranges from 0 to 1 psig through 0 to 5000 psig
- Differential Pressure, Standard and Low Power models available
- Cable and connection options available
- Model 831 is CSA approved, explosion proof
- Model IDT has FM, ATEX, and IECEx approved for Intrinsically Safe operation

APPLICATIONS: Pressure measurement



Model 1981 Gauge

- 316L stainless steel with seamless bourdon tube
- High visibility yellow dial or luminescent dial options
- Accuracy: ± 0.5 of span
- Available in liquid filled or field fillable configurations

APPLICATIONS: Pressure measurement



Model 656 Liquid Filled Gauge

- 2-1/2 inch (63mm), 4 inch (100mm), or 6 inch (160mm) sizes
- 316 wetted parts with seamless bourdon tube
- Filling liquid: glycerin, silicone, mineral oil

APPLICATIONS: Ideal for pumps, compressors, and machine tools



Sta-Kool Cooling Element

- Designed for pressure measurement in extreme temperatures
- Laboratory tested—reduces 400° F process temperature down to 100° F
- Max. operating temperature of 750° F and max. pressure of 5,000 psi
- 316L stainless steel material
- 1/2-14 NPT male x 1/2-14 NPT female connection

APPLICATIONS: High Temperature Gauge Applications

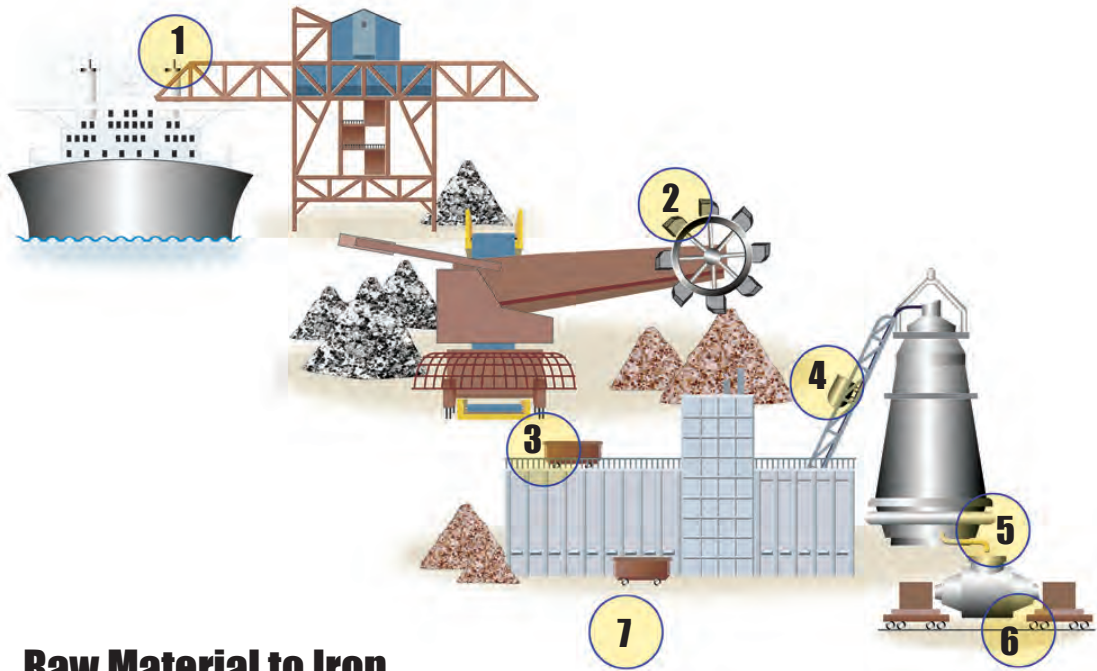


Diaphragm seals

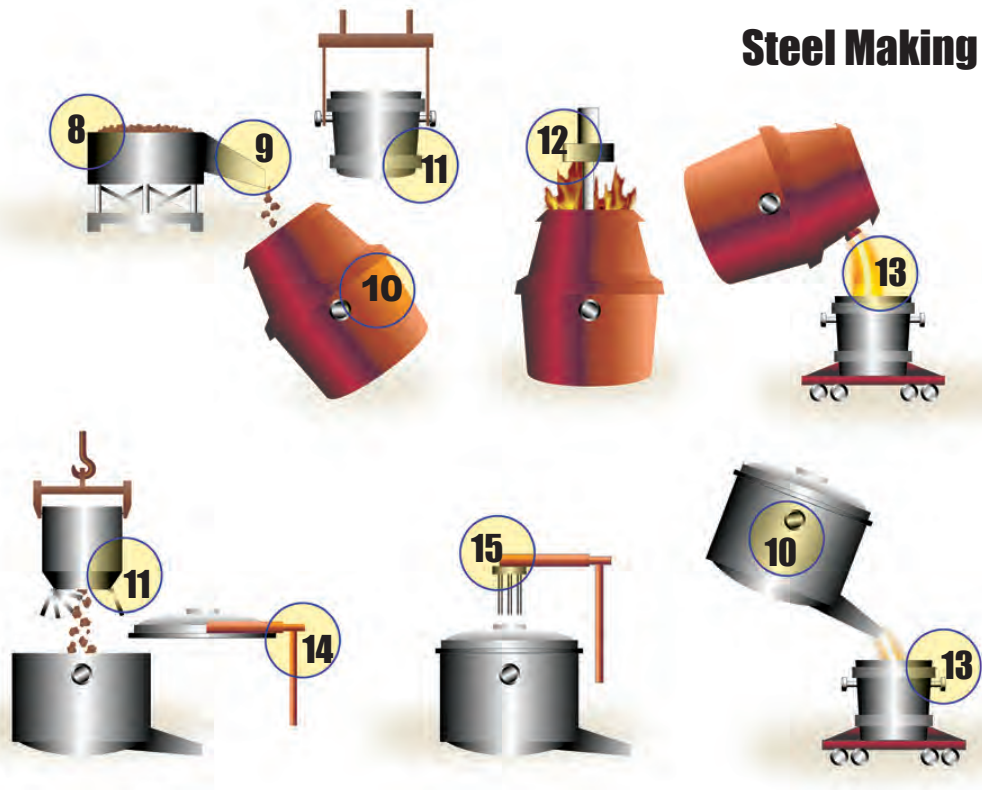
- Threaded, flanged, flow through, saddle mount and sanitary seals
- Available in over 20 different materials including 316L, Hastelloy, and Monel
- Factory mounts gauges before shipping

APPLICATIONS: Protects Pressure Gauges, Transmitters or switch





Raw Material to Iron



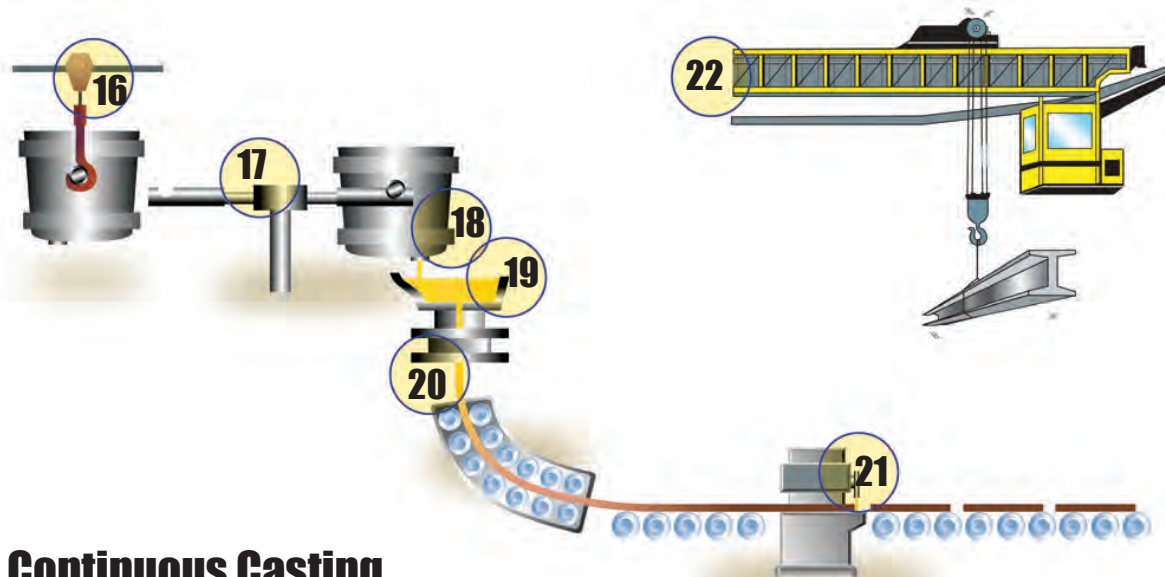
Steel Making

Raw Material to Iron

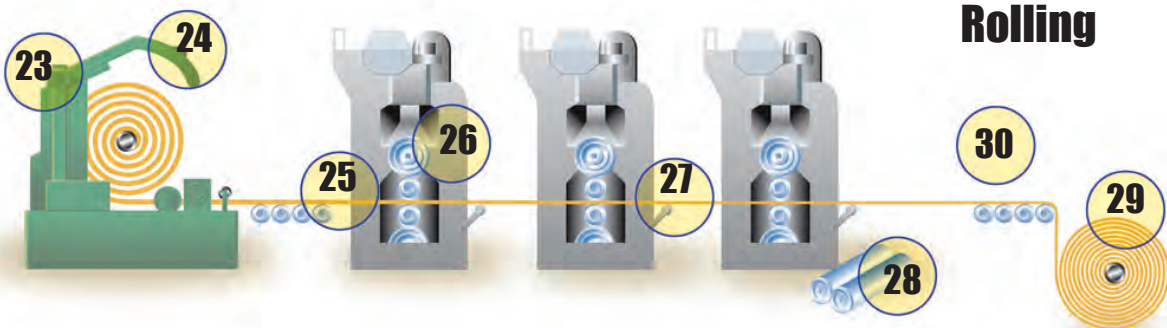
	APPLICATION	MEASUREMENT	AMETEK SOLUTION	
1	Ship Unloading Crane Position & Control	Long Travel and Boom Position Crane Brakes Over travel Limits	1986 Series Industrial Brakes 2006 Series	- Resolvers - Thruster Brakes - Geared Rotary Limit
2	Stacker / Reclaimer Position & Control	Luff & Slew Position Cable & Hose Management Brakes Explosion Proof Position Sensors	1986 Series CATRAC™ Industrial Brakes 2000 / 1986 Series	- Resolvers & Mill Duty Housings - Cable & Hose Carriers - Thruster Brakes - Explosion Proof Limit Switches & Resolvers
3	Charge Car / Quench Car	Pusher & Leveler Bar Door Removable Mechanism	1986 Series 950MD Series	- Resolvers & Mill Duty Housings - Mill Duty Protective Housing & LDT"
4	Skip Hoist Position & Control	Skip Car Cycle Stockline Winch & Stock Rod Chute Tilt & Rotation	2500 Series 1986 Series 1986 & 2120 Series	- Programmable Limit Switch - Resolvers & Mill Duty Housings - Resolvers that Emulate Encoders
5	Mud Gun / Lance Position	Mud Gun Lance Position	1986 Series 1980 Series	- Resolvers & Mill Duty Housings - Cam Switches with Resolvers or Encoders
6	Torpedo Car Filling	Hot Metal & Slag Tilt Spouts	1986 & 2120 Series	- Resolvers that Emulate Encoders
7	Bin & Container Measurement	Solids Level Measurement Overfill	DR6300 The Point™ / IntelliPoint™	- Non-Contact Radar for Solids - Capacitance Point Level

Steel Making

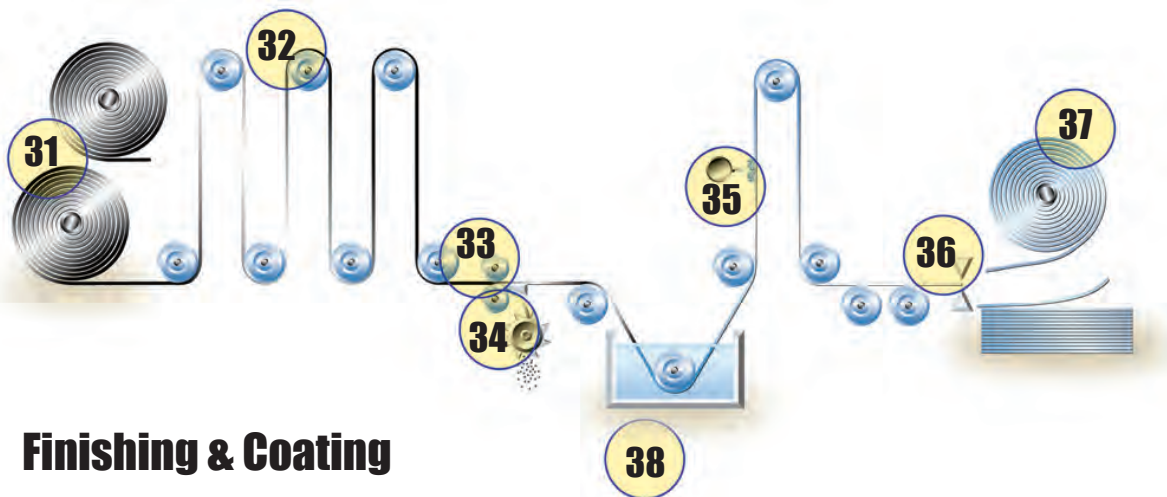
	APPLICATION	MEASUREMENT	AMETEK SOLUTION	
8	Re-ladle & Desulfurization Hot Metal Transfer Stations	Ladle Car Position Cable & Hose Management	925 Series CATRAC™	- Mill Duty Cable Reel Sensor - Cable & Hose Carriers"
9	BOF Scrap Charge Car Position	Charge Car Position Scrap Bucket Tilt Control Open Air Radar for Position	925 Series 950MD Series DR7000	- Mill Duty Cable Reel Sensor - Mill Duty Protective Housing & LDT - Open Air Radar
10	Furnace Tilt Control	Furnace Tilt - End Limits Furnace Tilt - Continuous Position	1980 Series 1986 & 2120 Series 925 Series 950MD Series	- Mill Duty Rotary Limit Switches - Resolvers that Emulate Encoders - Mill Duty Cable Reel Sensor - Mill Duty Protective Housing & LDT"
11	Ladle Crane / Scrap Charge Crane Control	Crane Position & Control	Industrial Brakes 2000 / 2006 Series	- Hydraulic & Electric Brakes - Geared Rotary Limit Switches"
12	Lance Position & Control	Skew Monitoring Vertical Lance Movement Brakes Cable & Hose Management	1980 Series 1986 Series 925 Series Industrial Brakes CATRAC™	- Mill Duty Rotary Limit Switches - Multi-turn Resolvers - Mill Duty Cable Reel Sensor - Hydraulic & Electric Brakes - Cable & Hose Carriers"
13	Ladle Transfer Car Position	Car Position	925 Series	- Mill Duty Cable Reel Sensor
14	EAF Furnace Cover Position	Vertical Position	950MD Series DR6300	- Mill Duty Protective Housing & LDT - Non contact radar for Solids"
15	Electrode Position / Velocity	Vertical Position Rotary Position	925 Series 950MD Series 1986 & 2500 Series	- Mill Duty Cable Reel Sensor - Mill Duty Protective Housing & LDT - Resolvers & Programmable Limit Switches



Continuous Casting



Rolling



Finishing & Coating

Continuous Casting

	APPLICATION	MEASUREMENT	AMETEK SOLUTION	
16	Ladle Crane Position & Control	Bridge & Trolley Position	1986 & 2500 Series Industrial Brakes CATRAC™	- Resolvers Based Long Travel Position Sensors - Hydraulic & Electric Brakes - Cable & Hose Carriers
17	Ladle Turret Position	Turret Position Ladle Lift	1980 Series 1986 & 2500 Series 925 Series	- Mill Duty Rotary Limit Switches - Resolvers & Programmable Limit Switches - Mill Duty Cable Reel Sensor
18	Ladle Side Gate Control	Side Gate Position	950MD Series	- Air - Cooled Mill Duty Protective Housing & LDT
19	Tundish Car Position & Control	Height & Horizontal Position	925 Series 950MD Series CATRAC™ Industrial Brakes	- Mill Duty Cable Reel Sensor - Mill Duty Protective Housing & LDT - Cable & Hose Carriers - Hydraulic & Electric Brakes"
20	Mold Width Monitoring	Narrow Face Position Measurement Lateral Strand Guide Position	1986 & 2120 Series 950MD Series 2000 / 2006 Series	- Resolvers that Emulate Encoders - Water Cooled Mill Duty Protective Housing & LDT - Geared Rotary Limit Switches
21	Torch Cutoff Machine	Cut off Position - Slab Length Torch Position Cable & Hose Management	950MD Series 925 Series CATRAC™	- Air Cooled Mill Duty Protective Housing & LDT - Mill Duty Cable Reel Sensor - Cable & Hose Carriers"
22	Slab Handling Cranes	Crane Position & Control	Industrial Brakes CATRAC™ 1986 & 2500 Series 925 Series 2000 / 2006 Series	- Hydraulic & Electric Brakes - Cable & Hose Carriers - Resolvers & Programmable Limit Switches - Mill Duty Cable Reel Sensor - Geared Rotary Limit Switches"

Rolling

23	Walking Beam Furnace	Lift & Traverse Position Cable & Hose Management	950MD Series CATRAC™	- Mill Duty Protective Housing & LDT - Cable & Hose Carriers
24	Coil Box	Luff & Slew Position Cable & Hose Management	1986 Series CATRAC™	- Resolvers & Mill Duty Housings - Cable & Hose Carriers
25	Side Guide	Screw Actuator Position Side Guide Position	1986 Series 950MD Series	- Resolvers & Mill Duty Housings - Mill Duty Protective Housing
26	Roll Position	Screw Down Position Roll Position Cable & Hose Management Pressure	1986 & 2120 Series 950MD Series CATRAC™ IDT / Model 831	- Resolvers that Display Modules - Mill Duty Protective Housing & LDT - Cable & Hose Carriers - Pressure Transmitters
27	Looper Position	Looper Arm	1986 Series	- Resolvers
28	Automated Roll Change	Roll Position During Change-Out Cable & Hose Management Pressure	953 VMax™ Series CATRAC™ IDT / Model 831	- Linear Displacement Transducers - Cable & Hose Carriers - Pressure Transmitters
29	Down Coiler	Wrapper Roll Gap Adjustment Cable & Hose Management Linear Position Feedback	1986 Series CATRAC™ 950MD Series	- Resolvers & Mill Duty Housings - Cable & Hose Carriers - Mill Duty Protective Housing & LDT
30	Roll Tension	Tension Feedback	Universal II™	- Capacitance Position Sensor

Finishing & Coating

31	Entry Coil Measurement & Position	Traverse Position Monitoring Raise / Lower Position Cable & Hose Management	1986 Series 950MD Series CATRAC™	- Resolvers - Mill Duty Protective Housing & LDT - Cable & Hose Carriers
32	Accumulator / Loop Tower / Loop Car Position	Loop Tower - Position & Velocity Loop Car Position Roll Tension Feedback	925 Series 1986 Series Universal II™	- Mill Duty Cable Reel Sensor - Dual Resolvers - Capacitance Position Sensor"
33	Side Trimmer	Trimmer / Slitter Lap & Gap Position Blade Position Cable & Hose Management	1986 & 2120 Series 950MD Series CATRAC™	- Resolvers that Emulate Encoders - Mill Duty Protective Housing & LDT - Cable & Hose Carriers
34	Scrap Chopper	Position Control Blade Wear Cable & Hose Management	1986 Series 2500 Series CATRAC™	- Resolvers - Programmable Limit Switch - Cable & Hose Carriers
35	Air Knife	3 & 4 Axis Positioning	955 / 956 Series	- Linear Transducers
36	Shear Measurement & Control	Measure Length & Trigger Shear	1986 & 2500 Series	- Resolvers & Programmable Limit Switches
37	Exit Coil Position	Coil Car Position Coil Car - Raise / Lower Cable & Hose Management	1986 Series 953 VMax™ Series CATRAC™	- Resolvers - Linear Displacement Transducers - Cable & Hose Carriers
38	Coating, Galvanizing & Finishing	Coil Car Position Coil Car - Raise / Lower Cable & Hose Management	IDT / Model 88 Model 1981 / 656	- Pressure Transducers / Transmitters - Pressure Gauges

The Steel Mill industries are a major global market for AMETEK. Our Linear, Rotary, Level and Pressure sensors have met the extreme environments found in the Mills for over 50 years. AMETEK has a wide selection of products and technology offerings, and the expertise to apply them, affording AMETEK the unique position to provide the best possible solution to meet the requirements specific to the Steel Mill Industries.



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