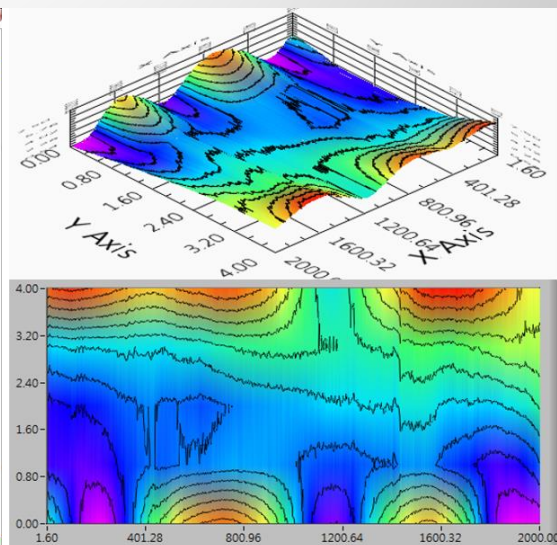
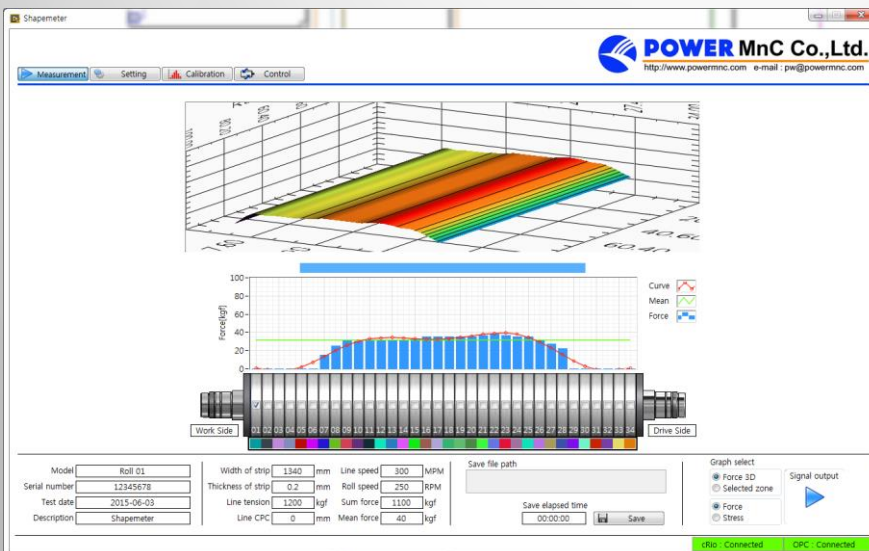
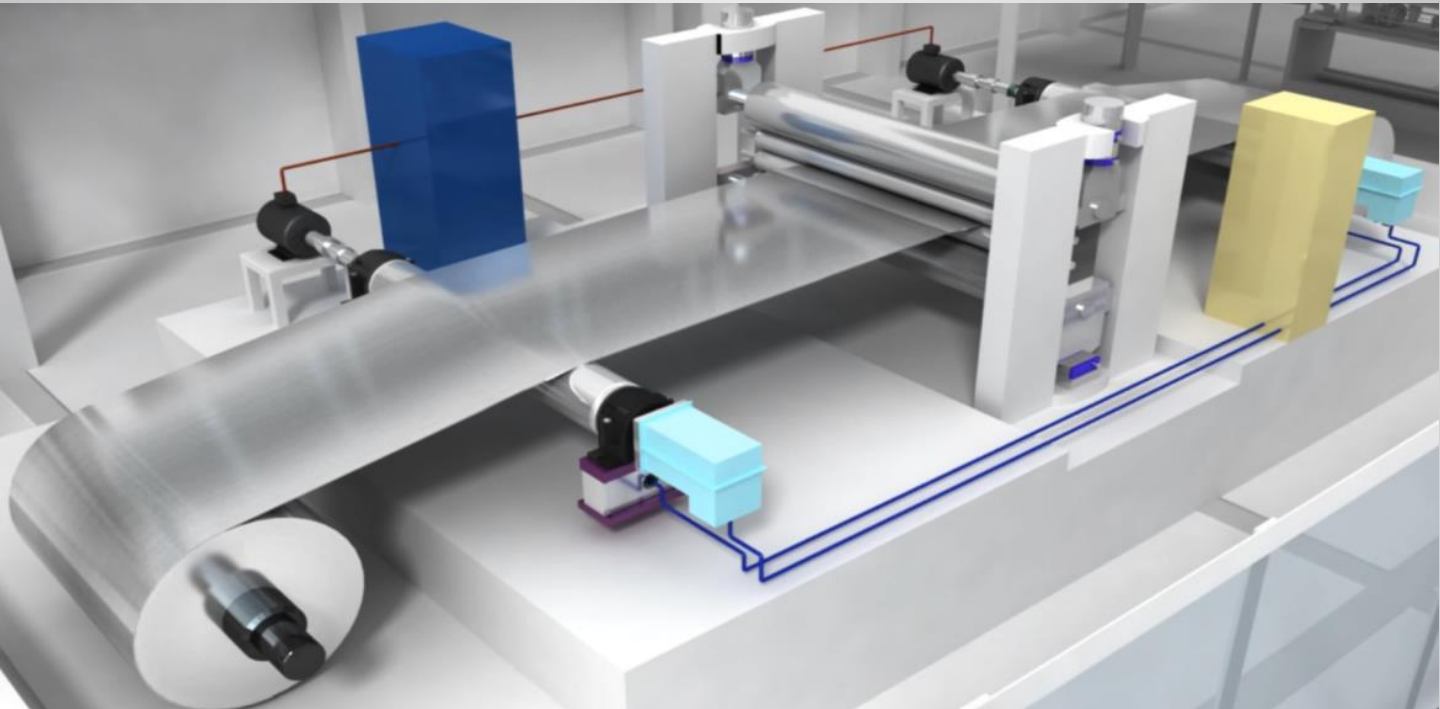


For The People, To the World

Shape-meter

for Rolling Mill with contact force sensor

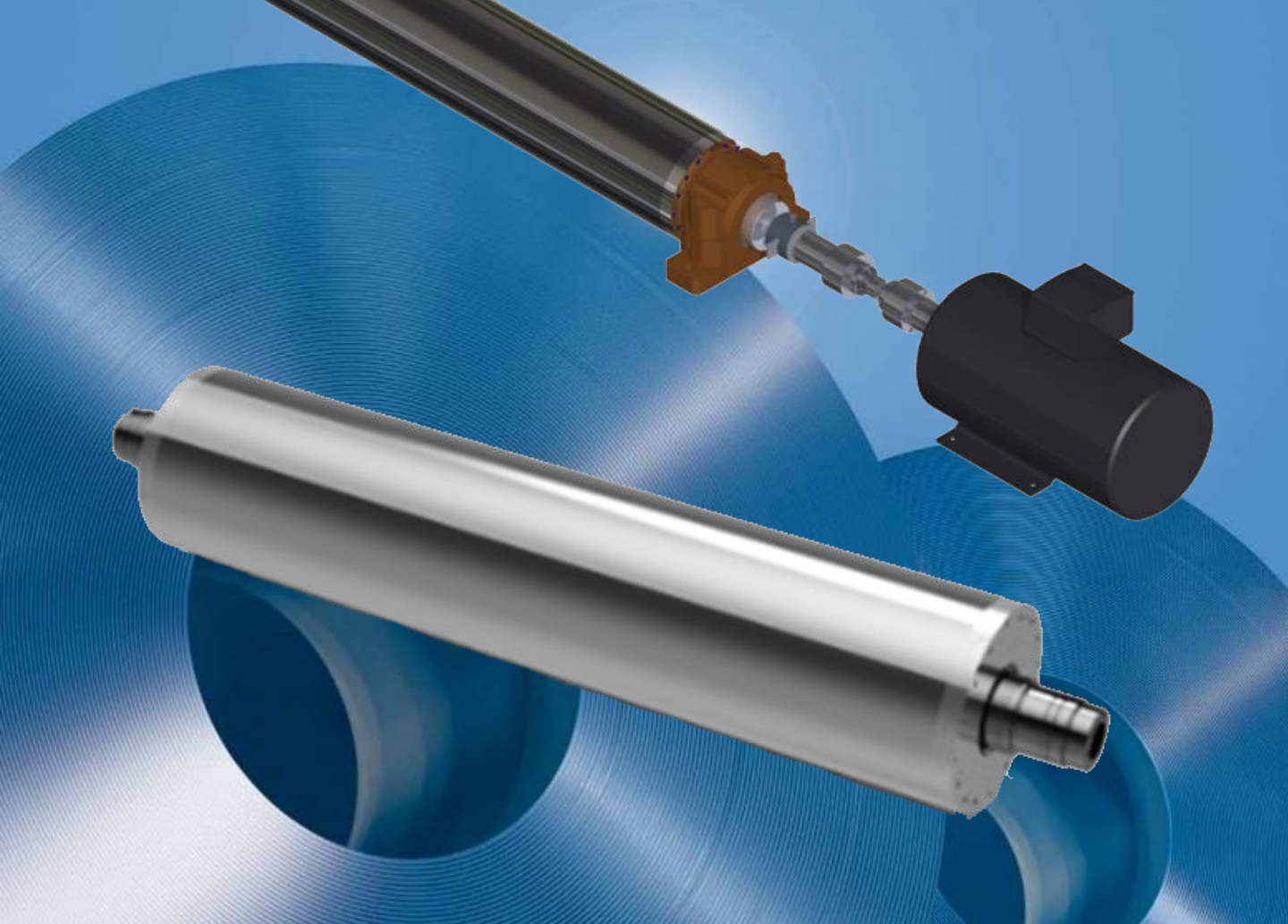


POWER

TEL : 82-51-557-5920
<http://www.powermnc.com>

FAX :82-51-557-5930
e-mail: pw@powermnc.com

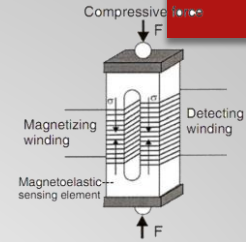
Shape-Meter System



Shape-meter System

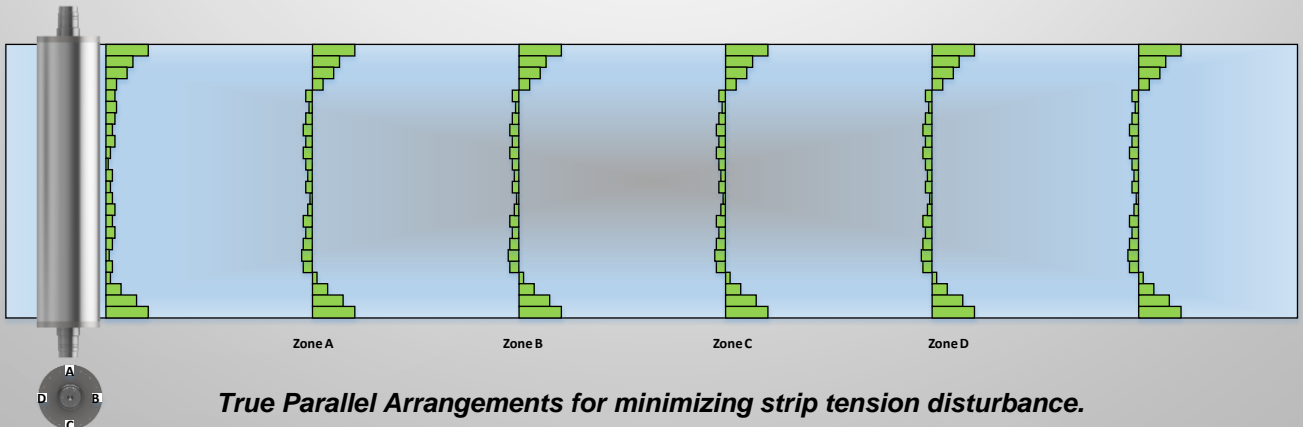
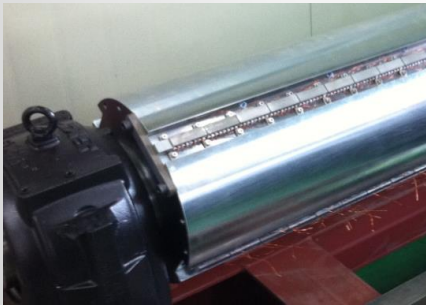
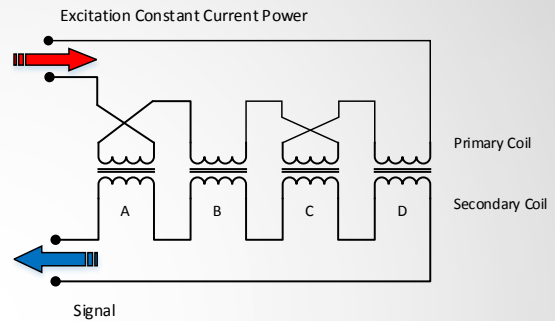
with direct contact force sensor

- ▶ **Measuring roll** has high reliable magneto-elastic force sensor in roller shaft every 90 deg. There are four snapshots of the flatness profile for every revolution. From Magneto-elastic force sensor, Shape-meter System can measure force distribution with width direction and then evaluate shape profile at online. Because of contact type force sensor, it can be measure at online with production.



TR Type Magneto-elastic Force Sensor

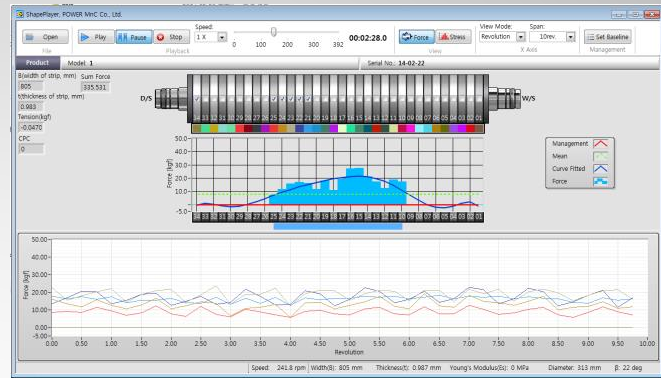
- ▶ High Overload capability force sensor.
- ▶ Long Term Stability and Harsh environment proven.
- ▶ Strong AC output direct from force sensor.
- ▶ True Parallel Flatness Measurement Sensor Arrangement



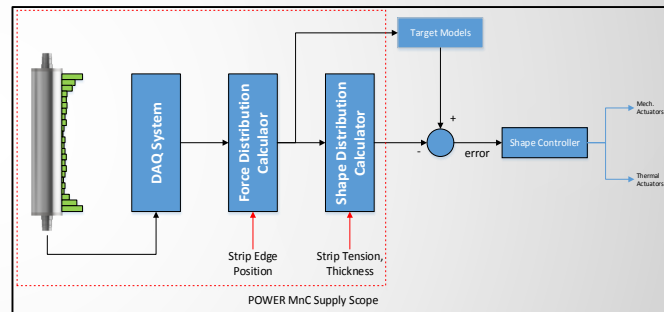
True Parallel Arrangements for minimizing strip tension disturbance.

Shape-meter System Components

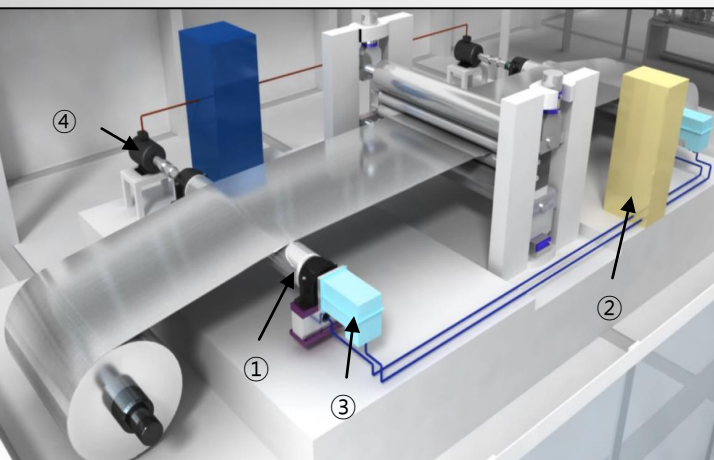
- ▶ Measurement Speed Range : 0.5 ~ 4,000 m/min.
- ▶ Measurement Frequency : 4 times per one rev.
- ▶ Sensitivity roll : 0.7 N or 0.03N (type dependent)
- ▶ Maximum No. of Zone : 65 zone.
- ▶ Measurement Computation Time : <5 ms.
- ▶ PC Based HMI by Labview.
- ▶ Minimum Wrap angle : 4 or 10 degree
- ▶ Long Term Stability.
- ▶ High reliability, accuracy(0.5 I-unit), insensitive to transient tension change, Long term stability.
- ▶ Direct force sensor can be installed up 65 zones that has a resolution of either 26mm, 52mm. Direct contact force will be related to elongation due to hook's law.
- ▶ Shape-meter System can give best service for achieving the best flatness products.



Shape-meter System Display



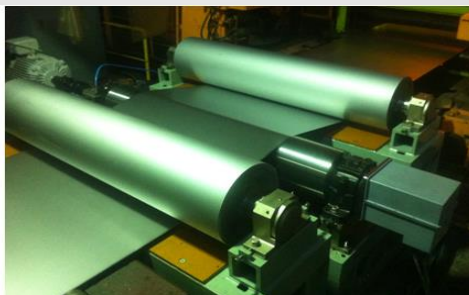
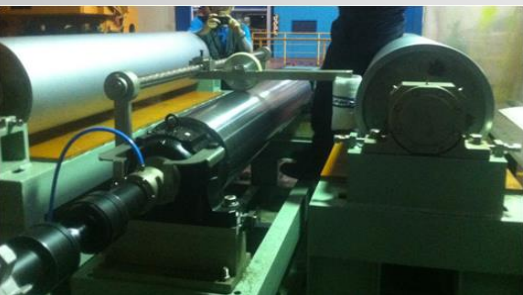
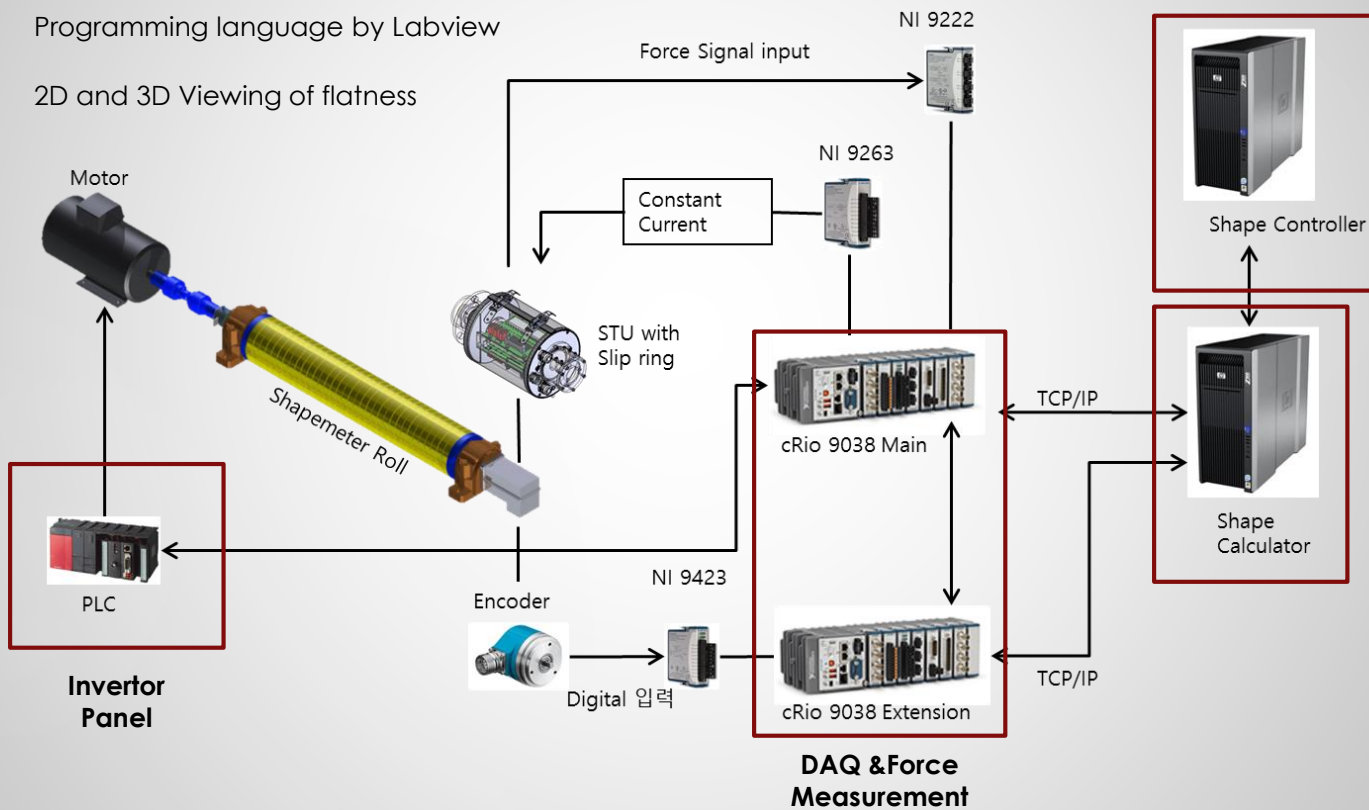
Shape-meter connection for mill controller



① Measuring Roll	Measuring Strip Force & Mounted Magnetic Load Cell
② Shape DAQ & Calculator	Data Acquisition & Shape Calculator Device.
③ Slip Ring Unit	Power & Sensor signal Transfer Device.
④ AC Sync. Motor & Inverter	Strip Speed Synchronizing Motor.

Shape Measurement DAQ & Calculator

- ▶ High Performance FPGA Based Computation System with high speed Data Acquisition.
- ▶ HMI of Flatness System, Graphical User Interface of configuration tool.
- ▶ OPC Server for transferring force distribution and flatness data via Ethernet.
- ▶ Distributed I/O. Profibus supported for Mill Controller.
- ▶ Flatness Logger for Coil Flatness record.
- ▶ Programming language by Labview
- ▶ 2D and 3D Viewing of flatness



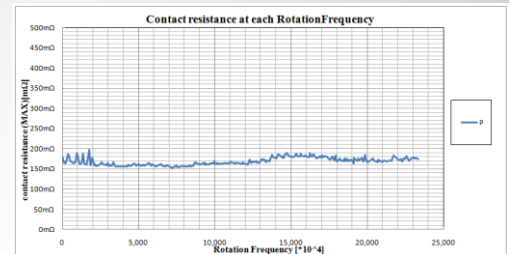
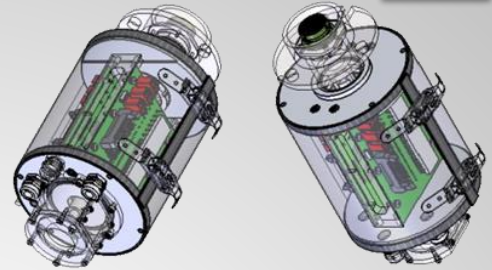
Shape-meter DAQ & Aux. Utility Specifications



FPGA Based DAQ & Calculator



Constant Current Power Supply



Slip Ring Unit

DAQ & Force Measurement Equipment

Part Name	Features
FPGA Main & Extension Contrller	NI cRio-9038 1.33 GHz Dual Core Controller 160T FPGA Input Power : 220 VAC
Analog to Digital Convertor	NI 9222 4 Channel AI 500kS/s 16bits
Digital to Analog Convertor	NI 9263 4 Channel AO 100kS/s 16bits
Digital Input	NI 9423 8 Channel Digital Input 30 V Sinking
Shape Calculator	Intel Quad-Core CPU RAM 16GB Ethernet Card

Aux. Utility Equipment

Part Name	Features
Slip Ring	Power : 8 Core, 2 A Signal : Max. 65 Channel Endurance : > 10 ⁹
Absolute Rotary Encoder	Input Power : 24 VDC Absolute 1024 resolutions
Signal Transmission Board	Input Power : +/- 15 VDC Maximum No. of Channel : 65
AC Sync. Motor System	Input Power : 380 VAC Motor : 37 kW AC Server Inverter
Constant Current Power Supply	Input Power : 100 ~ 240 VAC Output Power : 200 watt * 2 Channel Output Current : Max. 2 A _{rms} Operation Frequency : Max. 2 kHz

Shape-meter Specifications

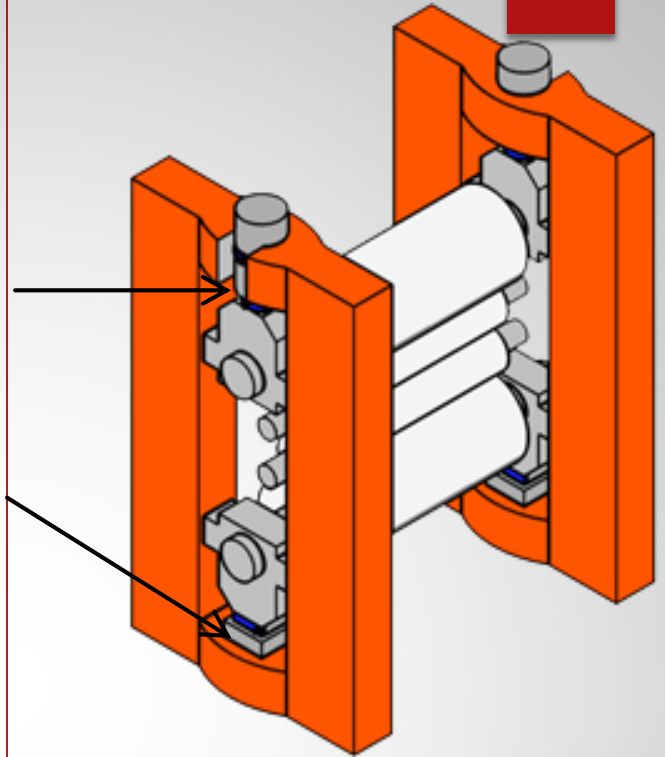
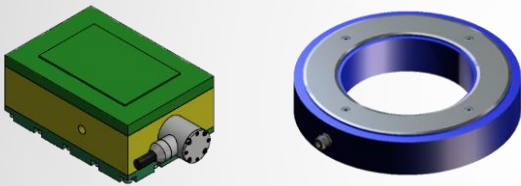
- It is designed as requirement of applications. Depend on tension force and surface coating, we can supply proper roller on site. Standard roll for normal application, Seamless roll for special applications, Foil roll for low tension applications.

Features	Standard Roll (Seamless Roll)	Foil Roll
Life Cycle	> 20 years	> 20 years
Strip Thickness Range	0.1 ~ 10 mm	0.005 ~ 0.5 mm
Typical Accuracy (Installation dependant)	0.5 I-Units	
Parallel Resolution	26 or 52 mm	52 mm
Minimum edge zone coverage for measurement	1 mm	
Measurement range, tension/zone	10 ~ 60,000 N	1 ~ 1,000 N
Maximum mechanical load, tension/zone	120,000 N	2,000 N
Dynamically measureable force change per zone	0.7 ~ 1 N	0.02 ~ 0.03 N
Max. No. of Zone	65 Zone	72 Zone
Maximum Strip temperature	260 °C	180 °C
Minimum wrap angle	4 degree	10 degree
Roll Diameter	313, 400 mm	200, 303 mm
Working Speed	Max. 4,000 m/min	
Measurement Frequency	4 times per one rev.	
Computation Time	< 5ms	
Operation Frequency	2 kHz	

Force Sensors for Rolling Mill

► Roll Force Sensor

- Heavy-Duty roll force load cell is high stability sensor.
- It is applied magneto-elastic force sensor.
- Sensing part has four hole to wind 1st and 2nd coil. 1st coil excitation magnetic field and 2nd coil catch magnetic flux. Output voltage response to mechanical stress.
- High S/N ratio.
- Overload capacity up to 700% of nominal load.
- 300% of nominal load without permanent change of data.



► Tension-meter

- It is used stainless steel for high corrosion resistivity. It has mechanically high performance for overload, shock and impact.
- Remarkably High spring constant, Wide measurement range, high reliability
- No drift, No recalibration, No Failures
- Magneto-elastic force technology

