Performance Specifications

Sensors that measure any materials accurately

Transmission sensor	**Beta-ray**	Measurement range: 0 to 5,000 g/m^2 (*1) Source type: ^{147}Pm, ^{85}Kr, or ^{90}Sr (depending on measurement ranges)
	X-ray	Measurement range: 0 to 3,000 g/m^2 (*1) Source type: Tungsten target or titanium target (depending on measurement ranges)
	Infrared	Measurement range: 0 to 2,000 µm (*1)
Reflective sensor	**Optical Multi Layered & Coated Film Thickness Sensor**	Measurement range: 0.5 to 200 µm (*1)

*1: Measurement range is different depending on materials to be measured. For details, consult your local sales representative.

Frames installable in any places

O-frame	**Standard type**	Sheet width: 6 m or less (*2) Num. of sensors to be mounted: One sensor, or any one of the transmission sensors and Optical Multi Layered & Coated Film Thickness Sensor
	High-performance type	Sheet width: 6 m or less (*2) Num. of sensors to be mounted: Two sensors (transmission sensors only)
C-frame	**Standard type**	Sheet width: 1.2 m or less Num. of sensors to be mounted: One sensor (transmission sensors only)

*2: Contact us when a sheet width is more than 10 m.

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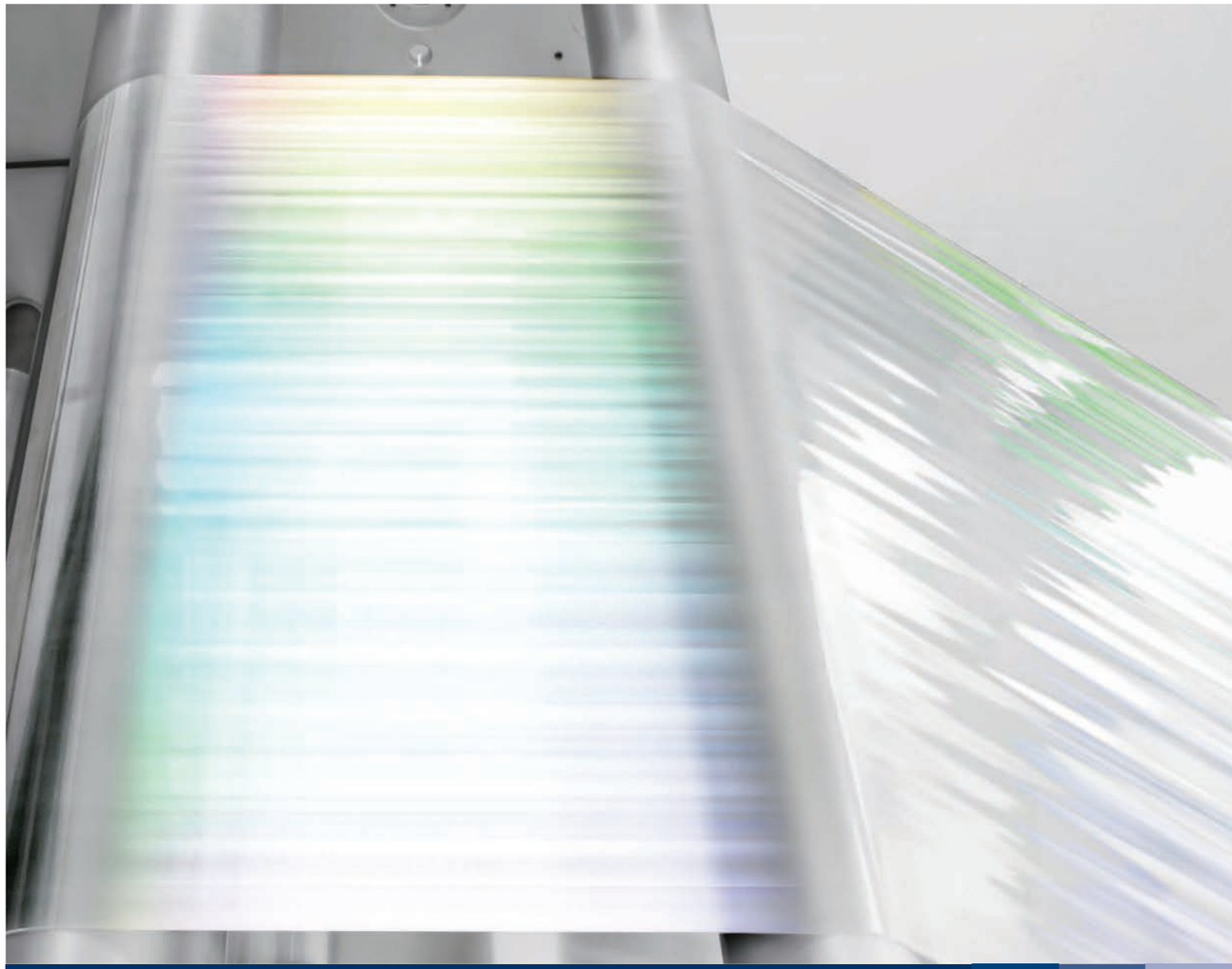


OpreX™ Quality Control System

WEBFREX NV

Online Thickness Gauge

Bulletin 14M05A00-01E

Online Thickness Gauge strongly supports
the innovative changes in customers' business
management, operation and services.

"Highly Accurate and Reliable Measurements"

"Optimum Control"

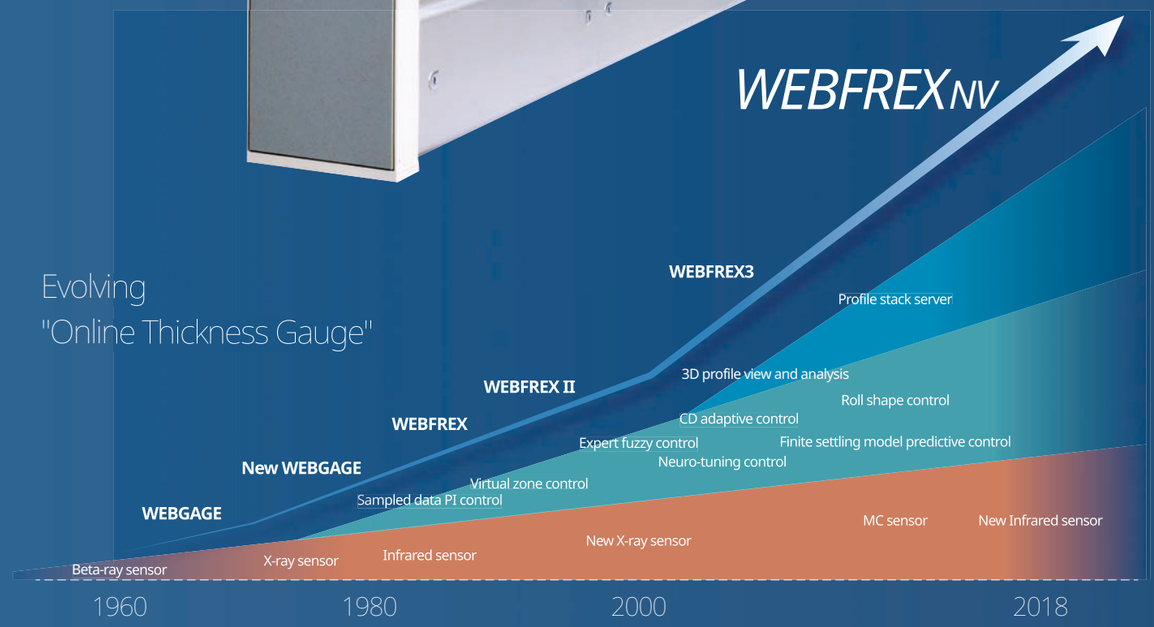
"Package for Quality and Production Managements"

"Achievements of more than 3500 system delivery and our rich experience"

"Leading-edge technologies"

"In-house development and in-house production"

"Supports you through entire system life cycle"



Online Thickness Gauge WEBFREX NV provides a flexible system appropriate for all kinds of sheets.

PA, PC, PE, PI, PO, PP, PS, PET, PVC, EVA, PTFE, PMMA, OP, EP,MLCC, Multi-layered film, Magnetic-tape, Non-woven, Print Circuit Board, Ceramic, Engineering Plastic, Battery, Paper, Tire, Adhesive tape, Carbon Sheet, Sandpaper, Cell phone, Coated paper, Pht Resist, Glass, Glass cloth, Photo film, Ink ribbon, Wall paper, etc.

Flexible system Construction and Scalability

- WEBFREX NV provides a flexible system appropriate for customer needs; a small-scale, a high-performance and a system that combines user systems.
- Can Expand the System after the initial implementation

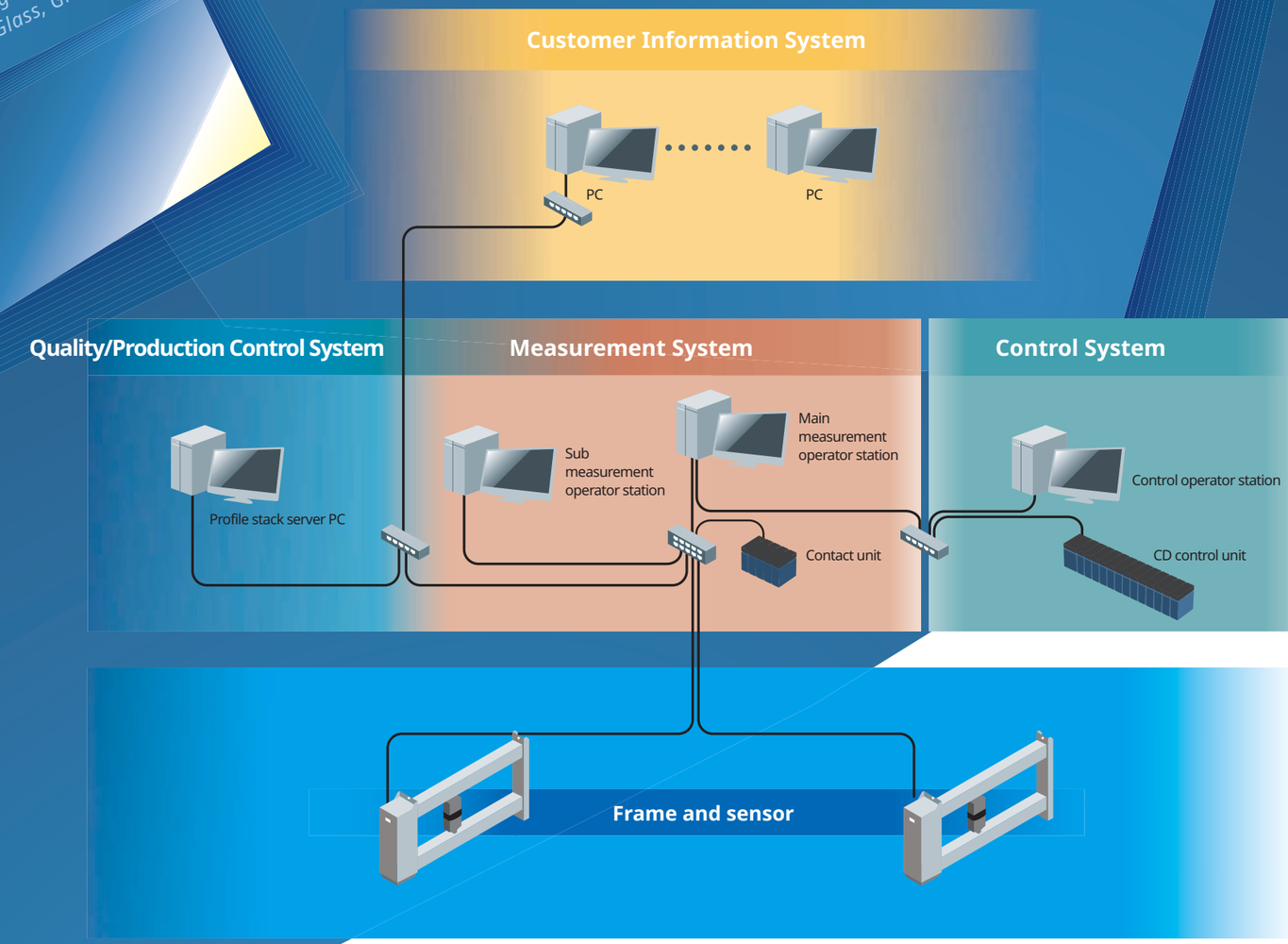
Quality Management Function

- A quality management package which stores and analyzes measured profiles for a long term is available.
- Helps the quality assurance process considerably.

Excellent Open Network

- Measurement, control quality/production control, and management information, all the systems are linked by network.
- It provides information suitable for production sites, which helps quick and appropriate decision-making.

Optimum System Configuration Suitable for your Application



Frames and Sensors Providing High Accuracy Measurement and Highly Reliable Design

Frame

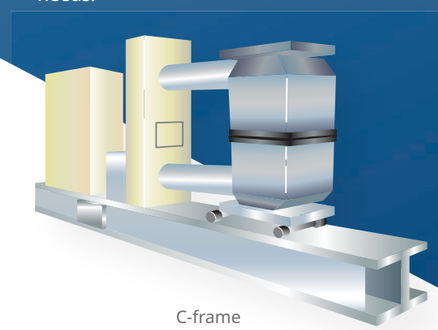
Latest intelligence in the highly stiff frames achieves high-speed and high accuracy measurement.

Highly Stiff and Durable Design

A highly stiff I-steel or monocoque structure used for the frames allows mounted sensors to measure with their maximum performance even under harsh installation environments.

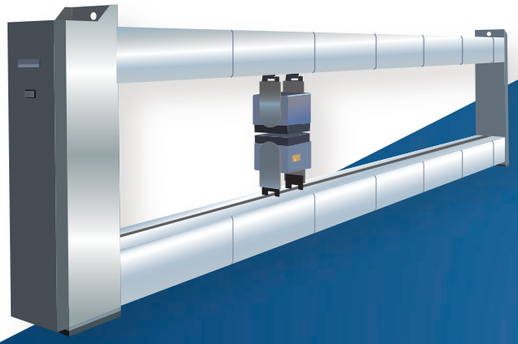
Frames Installable in any Installation Spaces

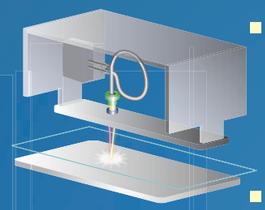
Various shapes of frames are available so that you can select the best one for your needs.



C-frame

O-frame





MC sensor

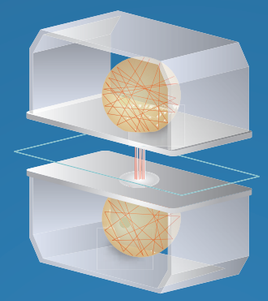
- Dispersing reflected light from interface between films to obtain reflectance spectrum allows simultaneous multi thickness layer measurement (Max of five layers).
- Most suitable not only for multi-layered films but also single-layer films.
- The sensor is unaffected by the fluctuation of quantity of the reflected light due to pass line position variation, which allows highly accurate and stable measurement.

WEBFREX NV

Sensors

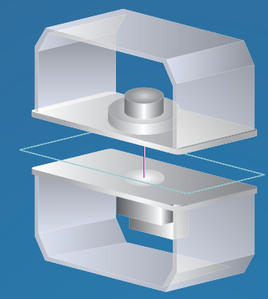
Select the best sensor for your needs.

Infrared Sensor



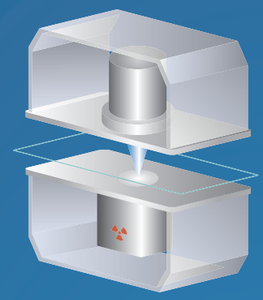
- Measures the sheet's thickness from infrared ray attenuation in transmitting through the object.
- Provides stable and highly accurate measurement for anisotropic or birefringent sheet or material with haze.
- Adopting dual integrating sphere reduces the influence of the pass line position variation to utmost.
- Round trip reflection of infrared ray inside the integrating sphere increases attenuation in transmission which allows high accuracy and stable measurement.

X-Ray Sensor



- Measures thickness from X-ray attenuation transmitted through measured objects.
- The bigger the atomic number, the more sensitive it becomes which is best for measuring ceramics and metal sheets.
- X-ray tube drive voltage can be selected between 5 to 25 kV depending on the measurement range.
- Adopting specially developed X-ray tube and technology obtained through Beta-ray sensor realizes highly accurate and stable measurement.

Beta-ray sensor



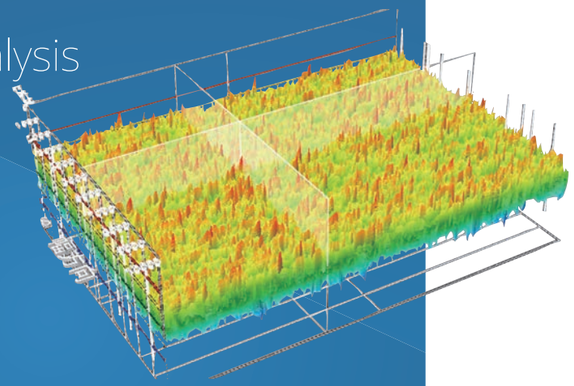
- Measures the sheet's thickness from beta-ray attenuation in transmitting through the object.
- Being less sensitive to materials, the beta-ray sensor can measure any measured objects.
- Selectable from three kinds of radioactive sources (^{147}Pm, ^{85}Kr, ^{90}Sr) depending on the measurement range.
- The air purge mechanism controls air fluctuation and the sensor automatically compensates for output fluctuations and performs computation to reduce the effect of noise. These provide highly accurate and stable measurement.

User Friendly Operator Station

Specifically designed Windows-based PC

Sub Measurement Operator Station allows operation and monitoring from different places and can be also used as a backup device.

3D Profile View and Analysis



- Illustrates a roll thickness distribution in a real-time 3D on a roll-by-roll basis.
- The display angle and size of the profile can be freely changed.
- Illustrates a thickness distribution in different colors for each standard value, which helps the quality to be intuitively understood.
- Visually displays the variations from the past to the present allowing you to predict what happens next.

Profile Stack Server

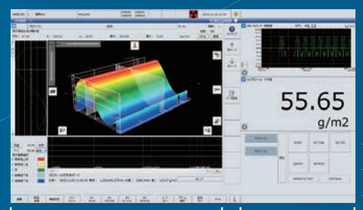
- Profile data of several lines can be stored on a roll-by-roll basis.
- Long-period profile data can be saved.
- Automatically outputs the stored data.

Easy-to-Use Operator Screens

Operation Screen

Flexibly Customizable Operation Screen

Wide Type Monitor



Main Display Area Gadget Display Area

Freely Configurable

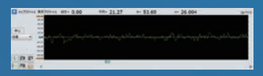
Square Type Monitor

Shows only the Main Display Area

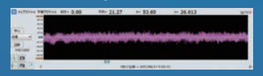
Main Display Area

You can create an operation screen appropriate for your needs by configuring any panels.

Profile Panel

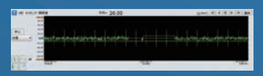


Overlay Profile Panel

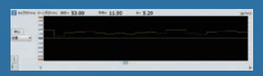


Bar Graph Panel

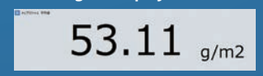
Trend Panel



Zone Profile Panel



Digital Display Panel

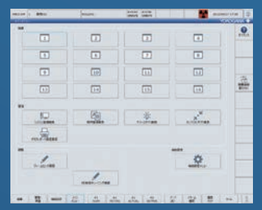


Gadget Display Area

Trend gadget, digital gadget and frame control gadget are displayed on a wider screen of the wide type monitor.

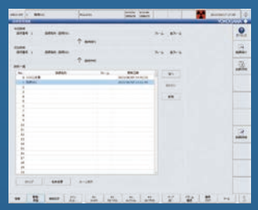
Main Menu Screen

Allows switching to desired screens with just a button.

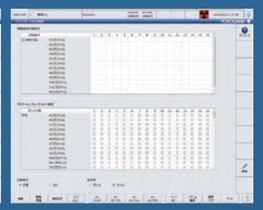


Management/Adjustment Screen

Assists managements of various grades and reports.



Grade Management Screen



Graph Report Setup Screen

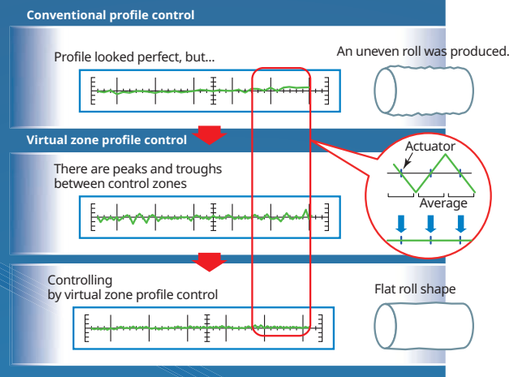
A variety of control functions to match the process characteristics

CD (Cross-machine Direction) Control

- Adjusts the lip opening at the T-die to obtain uniform thickness of products.
- Control methods appropriate for each process can be selected.
- Allows readiness and stability at the same time.

Virtual Zone Control

- For obtaining a uniform sheet thickness, virtual bolts are assumed between the existing bolts.
- The profile data on all the bolts including the virtual ones are objects for control.

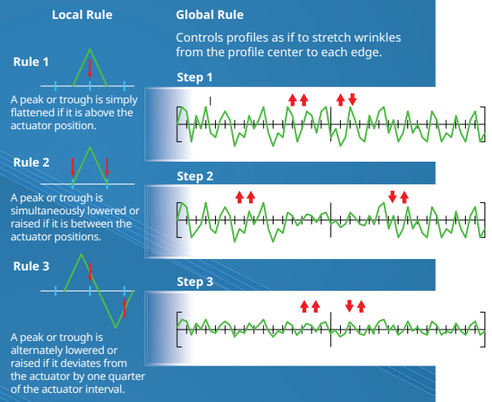


Sampled Data PI Control

- Most Suitable for Cast Machines
- A unique control algorithm was developed by adding YOKOGAWA's expertise to a general PI control.
- Output distribution calculation compensates for mutual interference between adjacent bolts.

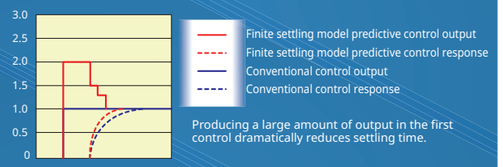
Expert Fuzzy Control

- Most Suitable for Biaxially Oriented Machines
- Expert fuzzy control reproduces manual operation of bolts performed by experienced operators



Finite Settling Model Predictive Control

- Suitable for machines with a long lag time.
- Dynamic manipulated output allows to settle down to target values within the shortest possible time.



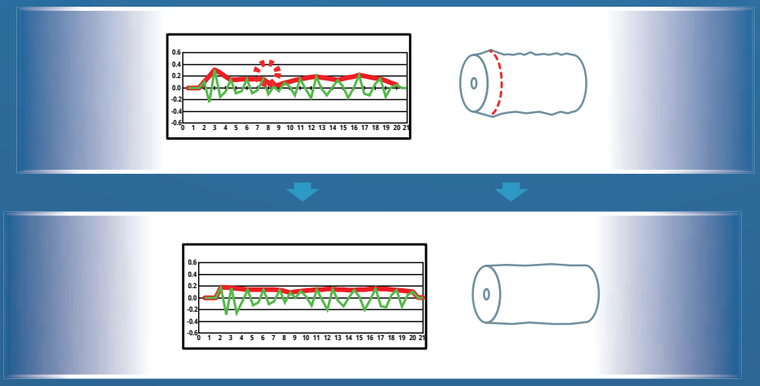
Producing a large amount of output in the first control dramatically reduces settling time.

CD Adaptive Control (Automatic Mapping Control)

- An algorithm that combines steepest descent method with neural network always maintains mappings at an optimum state without stopping control.
- Mappings=Positional correspondence between actuators (such as heat bolts) and measurement points on profiles.

Roll Shape Control

- This control reduces local stresses due to "bumps" on rolls.
- Prevents quality deterioration after winding.



Machine Direction (MD) control

- Can be selected from Sampled data PI control or finite time settling response calculation.