Technical Overview for Stereoscopic Mult-Width Gauge

Slitting Line Mult Measurement System

Global Gauge Corporation

Global Gauge Mission

We will consistently deliver the most advanced, accurate and reliable measurement systems to flat product producers throughout the world. We will continue to succeed because of our hard work, our innovative solutions and our intense commitment to solving our customers' problems.

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Revision History

Date	*Remarks*	*Revision*
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1.0 Application Information

1.2 Application Information

Application

Desired Unit of Measurement: Metric or Imperial
Material Thickness Range: Flexible, to be provided by customer
Material Width Range: Flexible, to be provided by customer
Number of Mults Range: Flexible, to be provided by customer
Mult Widths Range: Flexible, to be provided by customer
Mill Speed Range: Flexible, to be provided by customer

Utilities

Power: 120V, 60HZ, 10-15 amp

This proposed solution covers the furnishing of all services, labour, and material required with the design, fabrication, and delivery of a Stereoscopic Mult-Width Gauging System.

The system will be engineered, designed, and manufactured to meet the requirements as defined by the customer.

The Stereoscopic Mult-Width Gauge manufactured by Global Gauge for this application is a non-contact measurement system using state of the art digital GigE camera operating at high speed to measure the width of the material for each post-slit mult.

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2.0 Global Gauge Recommended System

The Stereoscopic Mult-Width Gauge manufactured by Global Gauge Corporation (GGC) for this application is a non-contact measurement system using state of the art digital GigE camera operating at high speed to measure the width of the material for each post-slit mult.

2.1 Overview of Proposed Solution

The primary purpose and objective of installing a Stereoscopic Mult-Width Gauging System at this location is to measure the width of each post-slit mult. First, a static measurement is taken. Then, as the coil is being processed, feedback from the dynamic width measurements is also provided by the system.

The proposed solution will identify and measure each individual mult after it has been processed through the customer's slitter. Prior to the measurement being taken, GGC will require the customer to input the incoming nominal thickness to optimize measurement accuracy. Once the various mult widths are measured throughout the coil, the system will store a report of the mult width data in an archiving and cataloging application to be included with the system. The solution proposed by Global Gauge eliminates the need for manual measurement thereby ensuring the safety of the operator.

Figure 1: Example of Mults on a Slitting line

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2.2 Measurement Philosophy

The measurement philosophy for measuring the width of the material using line scan cameras depends on the following factors:

- Using external illumination source to illuminate the roller table across the width.
- Ensuring the camera line of sight is in between two rolls or has contrast for determining edges.
- Operating the Line scan camera at high speed.

The following describe the sequence of steps for the required measurements of width:

1) As the material travels under the camera, the camera is continuously imaging the width, and the gauge software processes the acquired images to determine the precise location of the material edges both on the operator and drive side.

2) These edges are converted into physical locations on the roller table and width computed. This width and centerline deviation are displayed in real time on a user-friendly supplied HMI screen.

3) When the material finally leaves the camera line of sight or signal of coil completion, all the strip data will be archived for quality purposes.

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Figure 2 illustrates how raw data acquired is used to calculate the precise width of each individual mult:

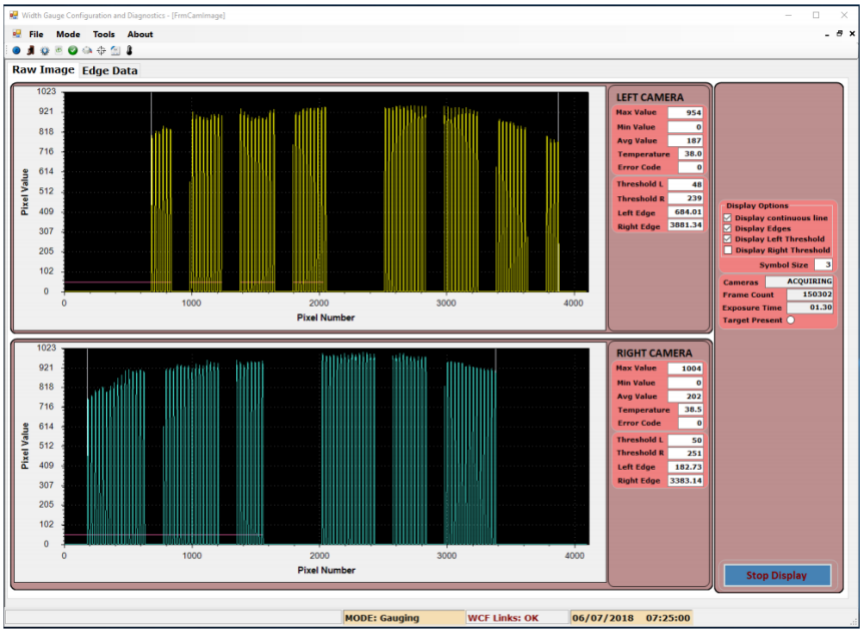

Figure 2: GGC Raw Mult Width Data

Figure 3 illustrates a sample HMI Screen for an existing GGC Width measurement system. The customer application designed for this project may closely resemble this HMI:

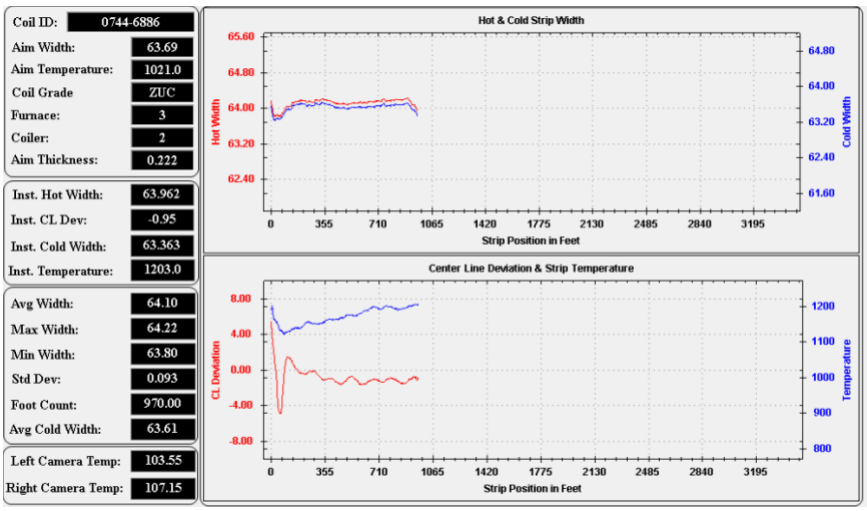

Figure 3: GGC Width Measurement System HMI

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2.3 System Block Diagram

The primary system components of the Global Gauge Width Gauge are the Electronics Power Console (EPC) and Stereoscopic-Camera Assembly (SCA). The EPC houses the Gauge PC and associated components. Figure 4 below illustrates the block diagram of the width gauge system.

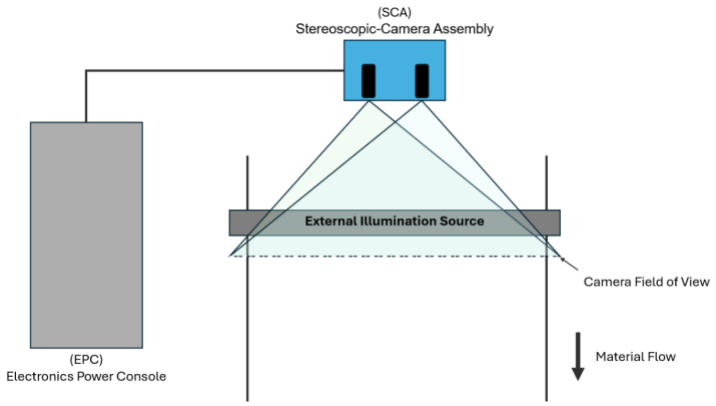

Figure 4: Width Gauge Basic Block Diagram

2.4 Calibration Light Box

A certified calibration light box will be provided for calibrating and verifying the camera calibration. The primary purpose of this light box is to align and calibrate the camera. The light box can also be used for verifying the camera alignment and calibration periodically.

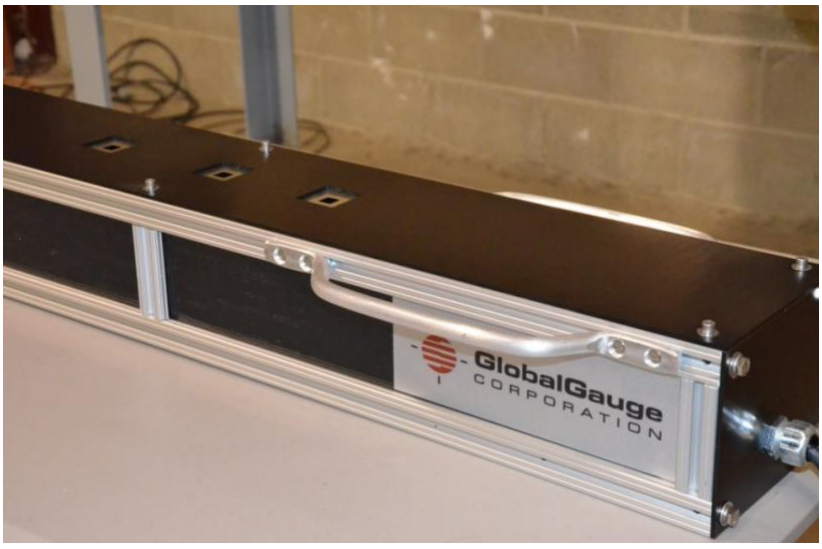

Figure 5: Calibration Light Box

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2.5 Operational Procedure

Per discussions with existing customer's personnel, we understand that the operational process for the width gauge is to be as follows (this process can be adjusted, as needed):

1) Customer sets up new coil
2) Customer scans new coil with scan gun
3) "Request measurement" button becomes available on GGC HMI, static measurements taken by GGC system while line is stationary
4) If measurements are all green/in-tolerance, line auto is now available
    a. If line auto is not available due to out of tolerance measurements, system will include a bypass option to proceed with measurement
5) When measurements are all green/in-tolerance, line auto is available and will run, system will continously measure mults

2.6 Performance Specifications

The Global Gauge Mult-Width Gauge will operate under the following specifications:

S.NO.	SPECIFICATION	SPECIFICATION VALUE
1	Number of cameras	Qty. 2 in stereoscopic arrangement
2	Type of cameras	Linescan Camera
3	Camera mounting height	TBD
4	Camera Interface	GIG E
5	Measurement Accuracy	Static: 0.005", 1σ Dynamic: 0.0010", 1σ
6	Mill Interface	Generic TCP/IP
7	Strip temperature range	Ambient
8	Software Package	Stereoscopic Width Gauge software

Standard I/O (can be adjusted and configured based on customer's needs/desires):

4 Digital Input	2 Analog Input
4 Digital Output	2 Analog Output

Customer Requirements:

- Provide Mounting Structure for Mult Width Gauge assembly.
- Provide all conduits/cable handling from Camera Assembly to EPC.
- Provide analog input for speed.
- Provide communications to GGC system via Generic TCP/IP.

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3.0 Scope of Supply

The following equipment would be provided under this project. All components are being provided to result in a fully functional Width Gauge System, including all interconnecting cables.

3.1 Stereoscopic Mult-Width Gauge

Stereoscopic Camera Assembly (SCA)
1 Unit, including but not limited to:

- Camera enclosure, sealed for camera protection.
- High Speed Digital Linescan Camera Assembly (GigE), including Lenses and Focus Bodies.
- Industrial Mount for Camera Alignment
- Optical Ports for Camera Imaging, including Optical Filters
- Warning Lamps as Required

Electronics Power Cabinet (EPC), Rittal, including:
1 Unit, including but not limited to:

- Industrial PC, Win10
- Flat Panel Monitor, Keyboard and mouse
- All necessary Software licenses to run the system
- GGC Width Gauge Software

Certified Calibration Light Box

- For calibrating the Mult-Width Gauge

Illumination Source – As Required

- LED Lights to illuminate the roller table across the width

3.2 System Cables as Required

- System cables from the EPCs to the camera assembly
- Cat 6 cables, up to 100m
- Local Power Cables, up to 25 m

3.3 Documentation

- Check out test certificates
- System drawings, Operator's and Maintenance Manuals, in standard GGC format

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3.4 Installation Supervision (Optional, Billed at Actual)

Gauge installation including but not limited to:

- Removal of old equipment
- Pulling cables
- Mounting SCA
- EPC placement

3.5 Commissioning (Billed at Actual)

- Complete commissioning of gauge after customer completes installations.
- Estimated at 3 8-hour days.

3.6 Training (Billed at Actual)

- On-site operator and maintenance training

Note that all designs meet or exceed all applicable Codes and Standards.

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4.0 Global Gauge Corporation – Key Contacts

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