GlobalGauge CORPORATION

TECHNICAL OVERVIEW

Interstand Centerline Deviation System

Real-time strip steering measurement built on Eagle Eye HM3100 vision hardware

Hot strip and plate mills | Non-contact optical measurement | Mono-camera assembly 51005027

Made in America. Respected Worldwide.

What the system measures

A vision-based gauge that reports lateral strip position, stand by stand, in real time.

The Interstand Centerline Deviation System measures how far the rolled product sits from the intended mill centerline as it passes between finishing stands. One mono-camera assembly is mounted above the pass line at each measuring position. Factory-calibrated cameras resolve both strip edges from every frame, and the system reports a centerline deviation value to the operator and to the mill control system continuously through the material.

100 / s
Measurements per position at the typical camera frame rate

4K
Area-scan resolution, 3840 x 2160, one camera per position

6
Measuring positions in a typical finishing train, entry plus five gaps

0
External illuminators required. The strip is self-luminous

NON-CONTACT AND PASSIVE

Nothing enters the pass line and nothing touches the product. The measurement uses the strip's own thermal emission through an optical filter, so there are no illuminators to fail in the mill environment.

EVERY FRAME IS ARCHIVED

Measurements are written to a SQL database and images are archived to disk, so a steering event can be reconstructed frame by frame after the fact, at any position in the train.

Factory calibration is performed at Global Gauge under controlled conditions and remains valid indefinitely unless the assembly is physically damaged.

Why centerline deviation matters

Precise steering protects the strip, the rolls and the rolling schedule.

PREVENT COBBLES

Poor steering leads to cobbles. A cobble stops production, ties up a crew and can damage equipment well beyond the stand where it started.

MITIGATE TAIL WHIP

Bad steering can whip the tail between the last stands hard enough to bruise a work roll, which forces an unplanned roll change.

REDUCE DOWNTIME

Cobbles and bruised rolls drive roll changes. When the roll shop is already behind, that lost time compounds across the schedule.

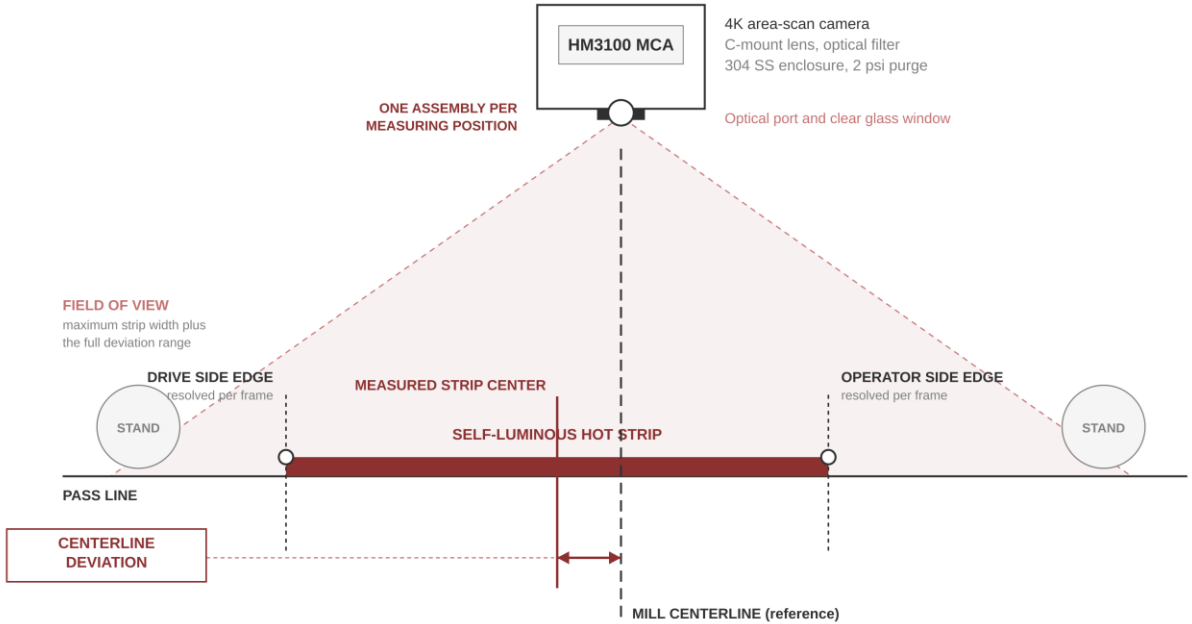
FIND ROOT CAUSE

Deviation data over time exposes where steering problems originate and flags wearing guides, loopers and side guards before they fail.

Manual steering corrections are only as good as the information the operator has. This system replaces judgement from a pulpit window with a measured number at every stand.

How the measurement works

A passive optical measurement that uses the strip's own emission at rolling temperature.



Deviation = ((drive side edge + operator side edge) / 2) minus mill centerline

From frame to reported value

Five stages, executed on every frame, independently for each measuring position.

1 PRE-PROCESS

Frame normalisation, filtering and intensity equalisation prepare the raw monochrome image for edge work.

2 DETECT EDGES

The drive side and operator side edges of the material are located and scored for quality and confidence.

3 CALIBRATE

Known geometry and the stored factory calibration map pixel positions to real world positions.

4 FILTER

System-specific filtering and correction factors are applied, including thermal correction where configured.

5 OUTPUT

Centerline deviation, a measurement quality rating and alarm states are published and archived.

INPUTS THE SYSTEM CAN ACCEPT	OUTPUTS THE SYSTEM PUBLISHES	WHERE THE DATA GOES
Material ID • Roll speed • Material temperature • Nominal thickness • Nominal width • Looper height	Centerline deviation • Measurement quality rating • Alarm states on configurable conditions	IOBridge for the mill interface • SQL database for measurements • local disk for archived images

INDEPENDENT PROCESSING PER POSITION

Each measuring position runs its own instance of the measurement service. An instance can be stopped, restarted or reconfigured without interrupting any other position in the train, so a single camera issue never takes the system down.

Operating envelope

Typical values for a hot strip application. The system is configured to the mill, not the other way around.

PARAMETER	TYPICAL VALUE	PARAMETER	TYPICAL VALUE
Camera	4K area-scan, 3840 x 2160, free-run	Strip temperature	1400 F to 2300 F
Measurement rate	One measurement per frame, about 100 per second	Strip width	To the maximum width of the mill
Field of view	Maximum strip width plus the full deviation range	Material thickness	Typically 0.070 in. to 1.000 in.
Reported units	Inches or millimetres, configurable	Mill speed	To approximately 3000 fpm
Enclosure	304 stainless, NEMA rated, positive pressure	Ambient at camera	0 C to 55 C with purge in service
Camera network	Copper Ethernet, 1 GbE, 90 m maximum	Instrument air	Filtered dry air at 2 psi at each position

WHAT SETS ACCURACY

Accuracy follows the optical geometry at each position: standoff, angle and the field of view the lens has to cover. These are fixed at the field survey before the lens is selected.

WHAT HOLDS IT

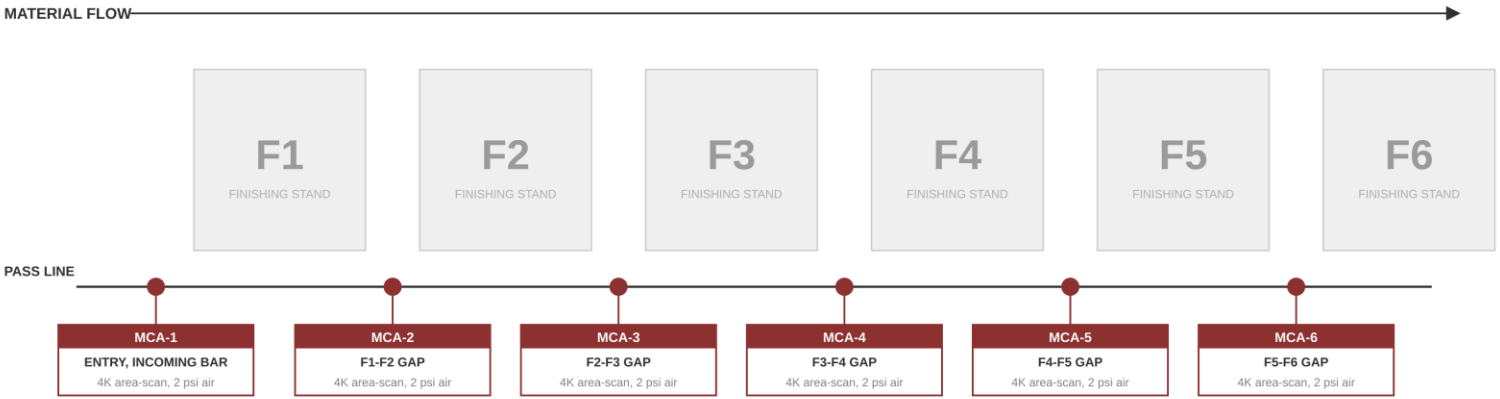
Calibration is performed at Global Gauge on a calibration rig. Nothing about normal operation moves it. A monthly calibration check confirms it and can normalise without a full recalibration.

WHAT PROTECTS IT

A positive-pressure enclosure keeps the window clean and the internals dry. An optional reference light detects and corrects small changes in camera alignment automatically.

Where the assemblies go

One position at the entry and one in each interstand gap to be monitored.



Six positions shown. Systems are configured to the number of interstand gaps to be monitored; shared equipment is sized once for the ultimate count.

THE ENTRY POSITION EARNS ITS PLACE

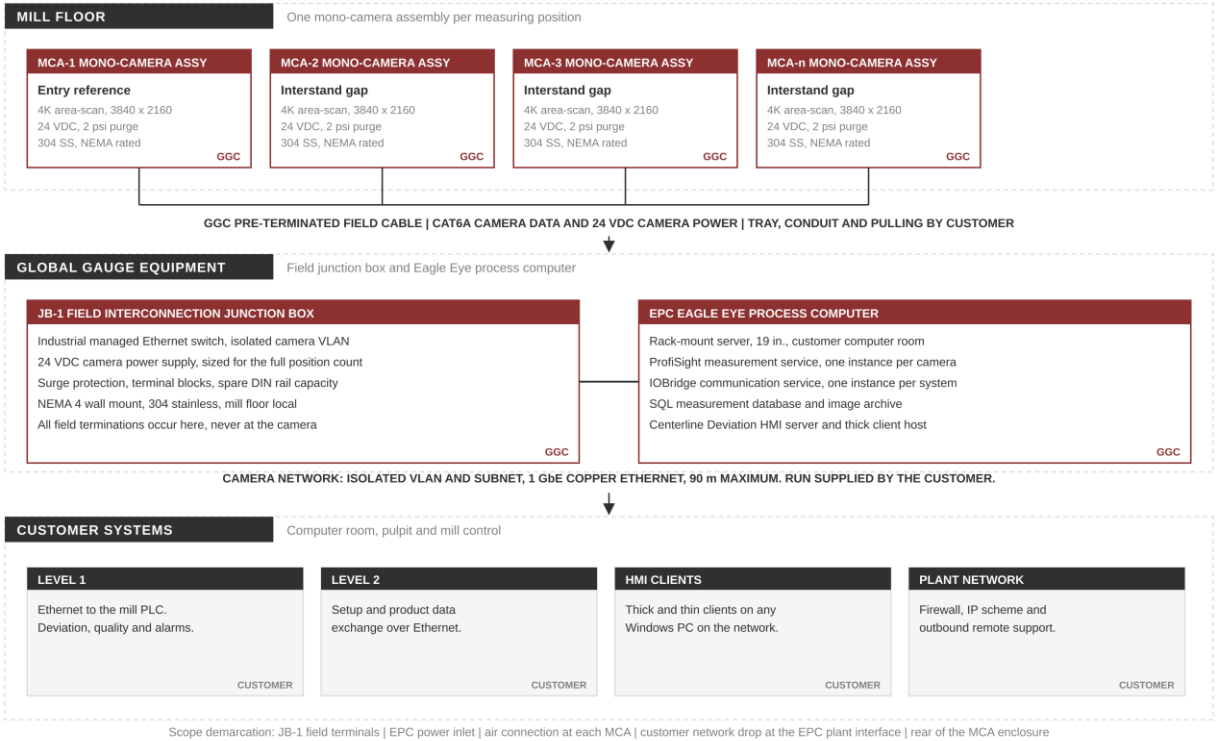
An assembly at the mill entry images the incoming bar and provides a measured entry centerline reference. Without it, deviation at each stand is reported against a nominal mill centerline rather than against where the bar actually entered.

PARTIAL BUILDS ARE NORMAL

Many mills start with the first two or three gaps, where cobble risk is highest, and add positions later. The junction box and server are sized once for the ultimate count so expansion never means replacing shared equipment.

System architecture

Three zones: the mill floor, the Global Gauge equipment, and the customer computer room and pulpit.



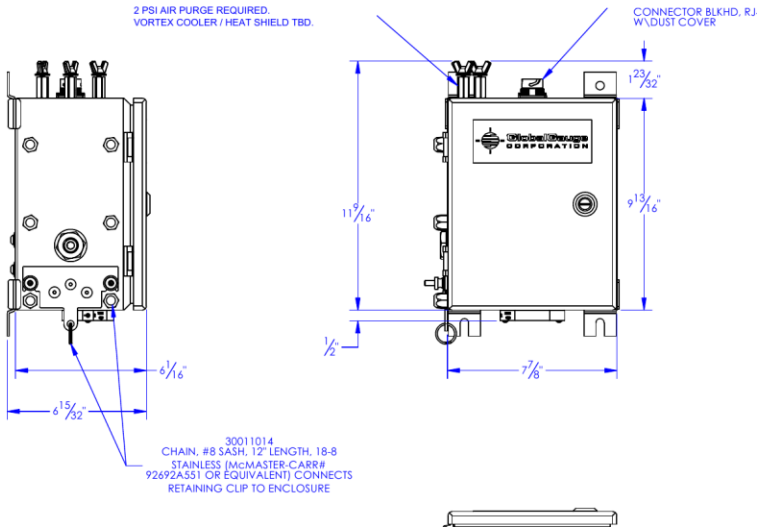
01

Eagle Eye HM3100 hardware

The mono-camera assembly, the field junction box and the process computer. Mechanical basis: Global Gauge assembly drawing 51005027.

The HM3100 mono-camera assembly

One sealed, purged assembly per measuring position. Nothing is field-terminated at the camera.



Extract from Global Gauge drawing 51005027, general arrangement. Dimensions are for reference only.

CAMERA

4K area-scan, 3840 x 2160, free-run acquisition, GigE over the field cable.

ENCLOSURE

8 in. x 10 in. x 6 in., 304 stainless, NEMA rated, wall-mount bracket set.

OPTICAL PORT

Fixed 2 in. filter holder with clear optical glass window, 50 mm diameter.

PURGE

Filtered dry instrument air at 2 psi holds positive pressure and purges the window.

CONNECTION

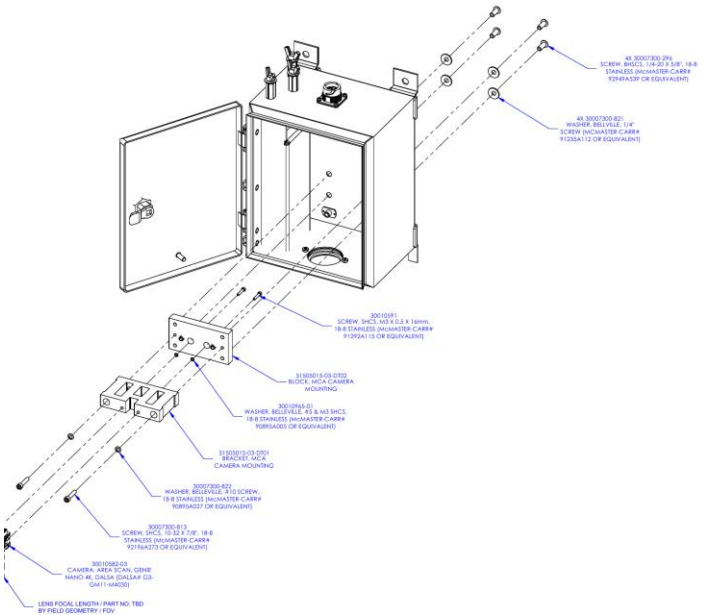
One RJ45 bulkhead connector with dust cap. One cable carries data and 24 VDC power.

ALIGNMENT

A reference line is engraved along the surface centerline to speed field setup.

Inside the assembly

Camera, lens, mounting block and bracket are built up and optically set at the Global Gauge facility.



Extract from Global Gauge drawing 51005027, camera and mount detail.

ASSEMBLED AND SET UP BEFORE SHIPMENT

The camera, lens, mounting block and bracket are assembled and the optical setup is completed at our facility. The assembly arrives ready to mount, which keeps optical work off the mill floor and out of the outage window.

BUILT FOR THE ENVIRONMENT

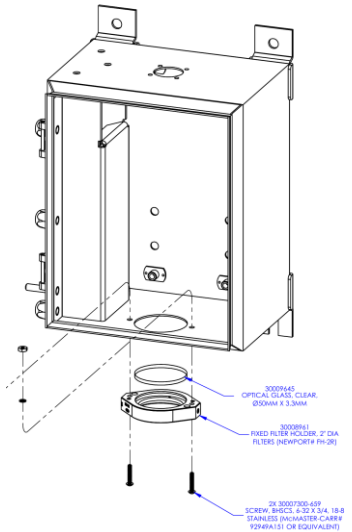
Stainless hardware throughout. A cold air shield keeps incoming purge air off the camera body. A sorbent strip access panel manages moisture. An optional vortex cooler and heat shield can be fitted where the survey shows ambient above the enclosure rating.

LENS SELECTED TO THE POSITION

Focal length is chosen against the measured standoff and the field of view at each position, which is why the survey precedes release.

The optical path

A filtered, sealed window is the only opening between the camera and the mill.



Extract from drawing 51005027, optical port detail.

CLEAR OPTICAL GLASS

A 50 mm diameter by 3.3 mm clear optical glass window seals the port. It is a consumable that can be replaced in the field without disturbing the camera or the calibration.

FIXED FILTER HOLDER

A fixed 2 in. diameter filter holder carries the optical filter that selects the emission band of the hot strip and rejects ambient mill light.

PURGED WINDOW

Purge air exits across the window, so scale and steam are pushed away rather than settling on the glass. Loss of purge fouls the window and voids the enclosure ingress rating.

WHY A PASSIVE MEASUREMENT SURVIVES BETTER

- There is no illuminator over the pass line to burn out, foul or realign.
- The signal is the strip itself, so it does not fade with lamp age.
- Filtering rejects ambient mill light, including neighbouring stands and torch work.
- The only field-serviceable optical item is the window, and it is a five minute change.
- Edge quality is scored on every frame, so a degrading window shows up in the data before it costs a measurement.

Surviving the mill environment

Positive pressure, managed moisture and optional active cooling.

POSITIVE PRESSURE PURGE

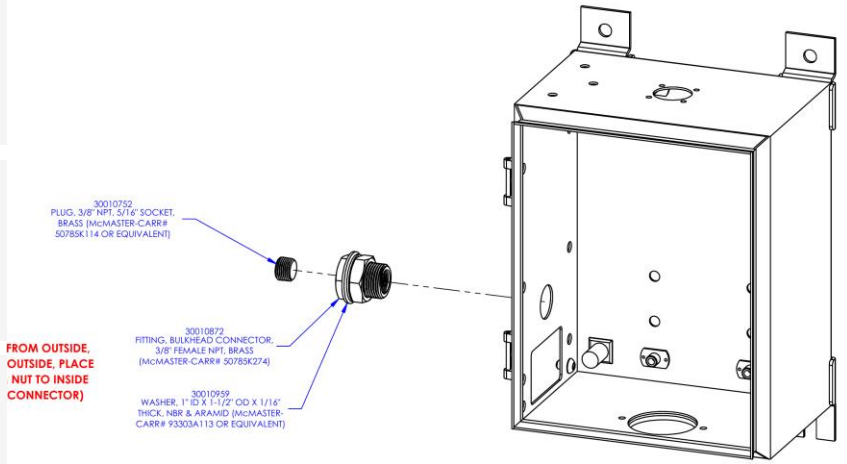
Filtered dry instrument air at 2 psi enters through a 3/8 in. NPT brass bulkhead fitting and holds the enclosure above ambient pressure, so mill atmosphere never migrates in.

MOISTURE MANAGEMENT

A sorbent strip access panel lets a technician change the moisture absorber without opening the camera compartment or breaking the optical setup.

ACTIVE COOLING WHERE NEEDED

Where the field survey shows ambient above the enclosure rating, a vortex cooler and heat shield can be fitted. A cold air shield keeps that incoming air off the camera body.



Extract from Global Gauge drawing 51005027, air bulkhead connector detail.

Instrument air is a customer utility and it is not optional. Loss of purge voids the enclosure ingress rating and will foul the optics, so air is proven at every position before an enclosure is opened on site.

HM3100 principal components

Carried from Global Gauge assembly drawing 51005027. Quantities are per one assembly.

PART NUMBER	DESCRIPTION	QTY
30010582-03	Camera, area scan, Genie Nano 4K (Teledyne DALSA G3-GM11-M4030)	1
30010583	Lens, C-mount. Focal length selected against final field geometry and field of view	1
51505015-03	Assembly, MCA camera mount, centerline deviation, with bracket and block	1
51505011-06	Enclosure, mono MCA, 8 in. x 10 in. x 6 in., 304 stainless	1
30010855	Bracket set, wall mount enclosure, 316 stainless, with fasteners	1
30008961	Fixed filter holder, 2 in. diameter filters	1
30009645	Optical glass, clear, 50 mm diameter x 3.3 mm	1
30010125-01	Connector bulkhead, RJ45 Cat6, with dust cap and fasteners	1
30010872	Fitting, bulkhead connector, 3/8 in. female NPT, brass, for the air purge	1
51505313-01	Assembly, MCA cold air shield	1
51505325	Assembly, MCA sorbent strip access panel	1

OPTIONAL, NOT IN BASE SCOPE

Vortex cooler with heat shield (51505314-01) and hot surface warning labels, fitted where the survey requires it.

STAINLESS THROUGHOUT

Fasteners, brackets, chains and hardware are 18-8 or 316 stainless. Nothing in the assembly is a corrosion path.

Optional reference light

A fixed optical reference that lets the system police its own alignment.

A reference light can be installed within the field of view at a known, fixed position. The gauge watches it continuously and uses it to separate real strip movement from small changes in the camera itself.

CORRECTS DRIFT

Small shifts or rotations of the assembly, from mill vibration or a nudged mount, are detected against the reference and corrected dynamically. No re-centering and no calibration offset are required.

ALARMS ON MISALIGNMENT

If a camera has moved far enough that correction is no longer trustworthy, the system raises an alarm rather than quietly reporting a wrong number. Maintenance gets told, not the operator.

PRESERVES CALIBRATION

Because drift is handled optically instead of by re-calibrating, the factory calibration stays valid indefinitely unless the assembly is physically damaged.

THE PROBLEM IT SOLVES

Any camera fixed to mill steel will move a little over years of service. Without a reference, the usual remedy is periodic re-centering, which quietly consumes the accuracy the factory calibration was supposed to guarantee and gives no warning when the movement becomes significant. The reference light turns that slow, invisible problem into either an automatic correction or an explicit alarm. For a system that is expected to run for a decade between calibrations, it is the difference between trusting the number and hoping it is still right.

Field junction box

One box on the mill floor gathers every camera. Delivered once, built for the ultimate position count.

SIZED FOR THE FULL SYSTEM

The camera power supply, the managed switch and the terminal capacity are sized for the ultimate position count plus a spare port, whatever the initial order covers.

24 VDC CAMERA POWER

A single power supply in the box feeds every camera over the same pre-terminated cable that carries the data, so there is no separate power run to any position.

ALL TERMINATIONS HAPPEN HERE

Every field termination is made at the junction box. Pre-terminated Global Gauge cable is never cut or re-terminated in the field.

SURGE AND SPARE CAPACITY

Surge protection and terminal blocks are fitted, with spare DIN rail left for the positions that are provisioned but not yet connected.

ISOLATED CAMERA VLAN

The managed switch carries the camera network on its own VLAN and subnet. It does not carry plant traffic.

NEMA 4, 304 STAINLESS

Wall-mount enclosure rated for the mill floor. The customer provides a dedicated fused 110 VAC circuit to the box.

DROP	SERVES	CABLE	CONTENT PER RUN	STATUS
1 to n	Ordered positions	Pre-terminated, GGC supply	Cat6A data and 24 VDC power	Connected
n+1	Future positions	Pre-terminated, ordered later	As above	Provisioned
Spare	Spare port	Not applicable	Spare port and terminals	Provisioned

Eagle Eye process computer

A rack-mount server in the customer computer room, presented on separate network interfaces.

INTERFACE	CARRIES	NOTES
NIC 1 Camera	Camera data on a dedicated VLAN and subnet	Not bridged to the plant network. Camera discovery is UDP based and does not route.
NIC 2 Level 1	Ethernet to the mill PLC	Deviation, quality rating and alarm states. Point list agreed at kickoff.
NIC 3 Level 2	Setup and product data exchange	Material ID, nominal width and thickness, speed, temperature.
NIC 4 Plant	HMI clients and outbound remote support	Subject to customer firewall rules and security approval.
NIC 5 Spare	Spare, or a dedicated HMI network	Used where the customer prefers HMI traffic segregated from the plant network.

WHAT IT RUNS

One measurement service instance per camera, one communication service, the SQL database and the HMI server. All start automatically at boot as Windows services.

WHAT IT HOLDS

Storage is provisioned for a defined retention window of high-definition image and measurement data, typically around two weeks, sized to the customer requirement before build.

WHAT IT NEEDS

A climate-controlled location with rack space, HVAC and grounding, and a dedicated fused 110 VAC circuit. A UPS is recommended, and an air conditioner if the room is unconditioned.

Remote support is outbound HTTPS or VPN only. No inbound ports are opened, and the tunnel is subject to customer security approval.

Cabling, network and grounding

A small set of rules that keep a vision system stable in a mill.

1 PRE-TERMINATED FIELD CABLE

All Global Gauge field cable is pre-terminated to length. Field terminations occur at the junction box only. Cable is never cut or re-terminated at a camera.

2 COPPER, 90 METRES MAXIMUM

Camera runs are copper Cat6A Ethernet, limited to 90 m. No fiber or media conversion is in scope. Run lengths are confirmed at the field survey.

3 ONE VLAN, ONE SUBNET

Cameras and the server camera interface share a single VLAN and subnet because camera discovery is UDP based and will not route. The server does not bridge that network to the plant.

4 SINGLE POINT GROUND

The system is grounded at one point, at the process computer. Cable shields are grounded at the server end only, so no ground loop is created down the length of the mill.

5 ONE CABLE PER POSITION

A single pre-terminated cable to each position carries both camera data and 24 VDC camera power. There is no separate power run over the pass line.

6 CUSTOMER TRAY AND PULLING

Conduit, cable tray, cable pulling and the junction box to computer room run are customer scope. Global Gauge supplies the cable that lands on the junction box terminals.

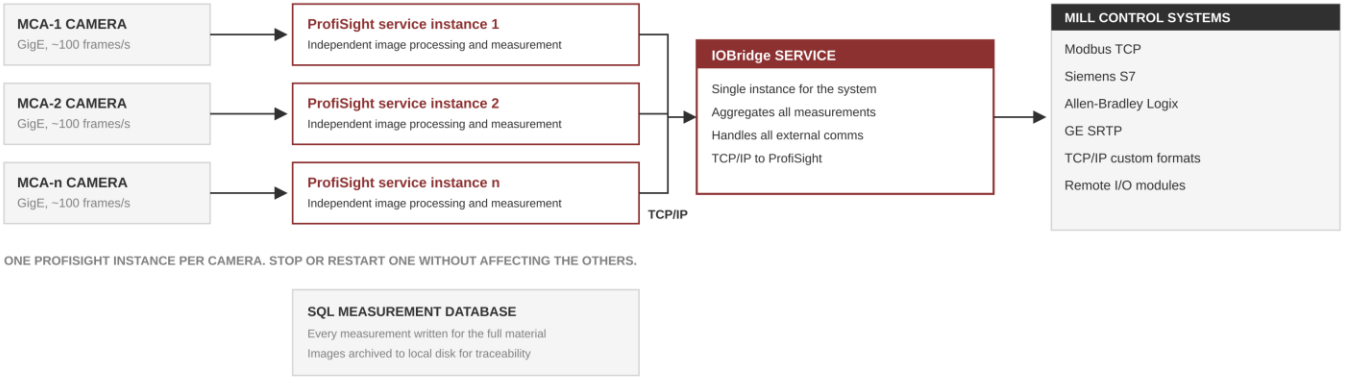
02

Centerline Deviation software

The measurement engine, the communication service and four purpose-built interfaces for operators, engineers and technicians.

Software architecture

Background services do the work. Four interfaces expose it to the people who need it.



All services launch automatically at system boot and run continuously as Windows services.

The measurement engine

One service instance per camera, running continuously from the moment the system is powered.

ONE INSTANCE PER POSITION

Each camera is paired with its own dedicated service instance. Processing is parallel and independent, and one instance can be stopped or restarted without affecting the others.

CONTINUOUS, NOT TRIGGERED

The service runs at the camera frame rate, typically 100 frames per second. Every frame produces one complete measurement. There is no external trigger to configure or maintain.

CONFIGURED IN ONE PLACE

Calibration constants, regions of interest, filter parameters and alarm thresholds are all set through the technician utility tool. There are no configuration files to hand-edit.

DIAGNOSABLE AFTER THE FACT

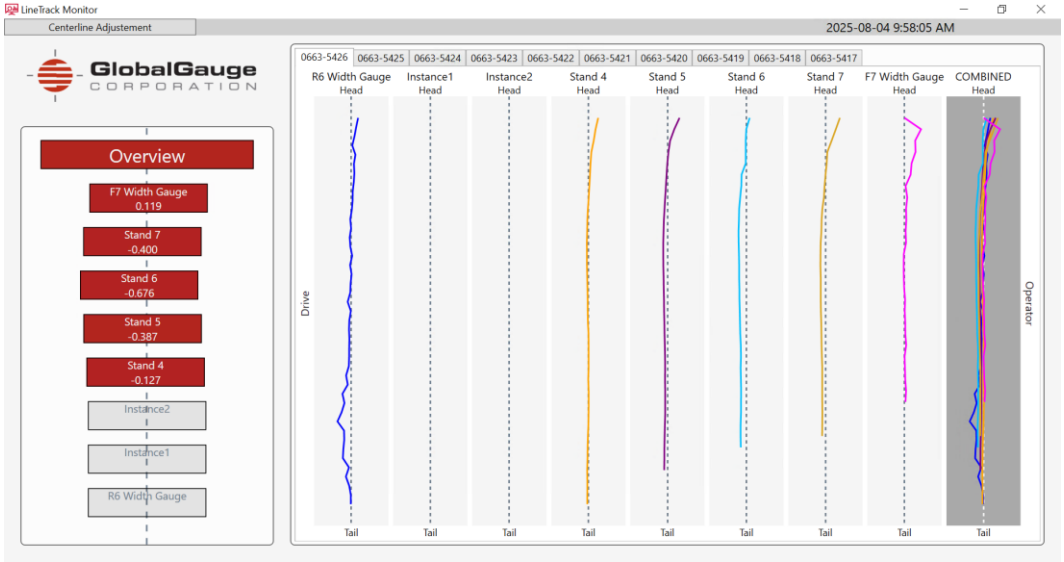
Diagnostic and operational logs are written locally alongside the archived images, so a support engineer can reconstruct what the system saw during any event.

COMMUNICATION PATH	PROTOCOL	PURPOSE
To the communication service	TCP/IP, two-way	Publishing measurements, receiving setup data from the mill
To the interfaces	REST over HTTP	Live values, images, archived data and parameter access
To storage	SQL and local disk	Measurement records to the database, frames to the archive

Services launch automatically at system boot. In normal operation the system requires no intervention from the operator beyond watching the trace.

Operator interface: live monitoring

The screen the operator steers from. Read-only by design, with one deliberate exception.



Live vertical traces across every measuring position, current material and previous material.

VERTICAL TRACES

Centerline deviation plotted down the length of the material, one trace per position, head at the top and tail at the bottom, with the previous material shown alongside for comparison.

DEVIATION OVERVIEW

A column of shifting indicators, one per position, moves left and right in real time with the measured deviation. It reads at a glance from across the pulpit.

RUNS ANYWHERE

Install on any Windows PC on the network. Multiple instances run in parallel, so operators, the roll shop and process engineering can all watch the same system at once.

The operator interface is read-only apart from the Zero Centerline function. There is no configuration exposed at the pulpit and nothing an operator can change that affects the measurement.

Per-position status and live image

Select any position to see its health and what the camera is seeing right now.

Selected position: statuses across the top, live values at left, live camera image at right.

EDGE LINES SHOW CONFIDENCE

Detected edges are drawn on the live image. The lines run white where edge quality is high and shift toward red where quality is questionable or movement is erratic, so a degrading measurement is visible before it becomes a wrong number.

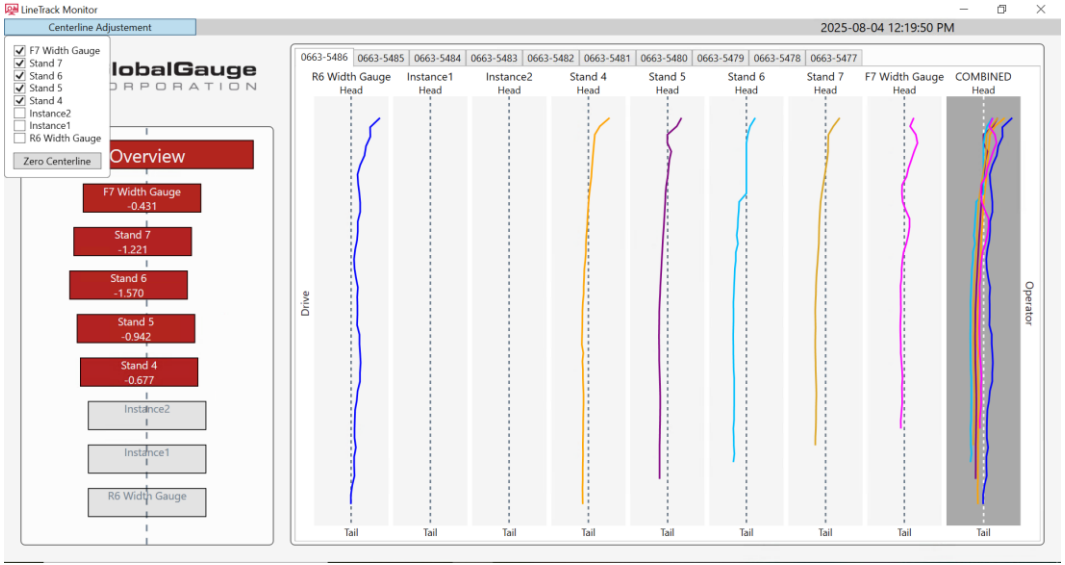
LIVE VALUES AT A GLANCE

Operation mode, material ID, measured centerline deviation, gauged length from the head, strip speed and the start time for the current or most recent material.

STATUS	GREEN	RED
System connected	Connection to the service is healthy	No active connection
System healthy	Operational, no fatal errors	A system error has occurred
Comms connected	Plant communication healthy	Plant communication not established
Camera connected	Camera connection is healthy	No healthy camera connection
Camera acquiring	Actively acquiring frames	Not currently acquiring frames
I/O connected	I/O device connected and healthy	I/O device not initialised

Zero Centerline

The one operator control, and what it actually does.



Centerline Adjustment menu with per-position selection and the Zero Centerline command.

WHAT IT DOES

Applies an offset to the measured deviation of every selected position so that the current strip position is treated as the new zero. The live reading becomes zero and subsequent deviation is reported relative to it.

WHY IT EXISTS

It realigns the system to where the material is actually running without touching a camera and without a recalibration. Positions are selected individually, so a single stand can be rezeroed on its own.

Worth being clear with operations: this changes the reference, not the measurement. Use it when the mill centerline and the practical running line genuinely differ, not to make an inconvenient reading go away.

Archive Viewer

One material as seen by one position, down to the individual frame.

Left: assembled material image, frame row intensity plot and summary panel. Right: the measurements tab, width and centerline deviation over the length of the material.

ORGANISED BY MATERIAL

All archived data is grouped by material, bar, coil or plate, and filtered by ID or age. Selecting a material loads its complete record for the chosen position.

DOWN TO THE FRAME

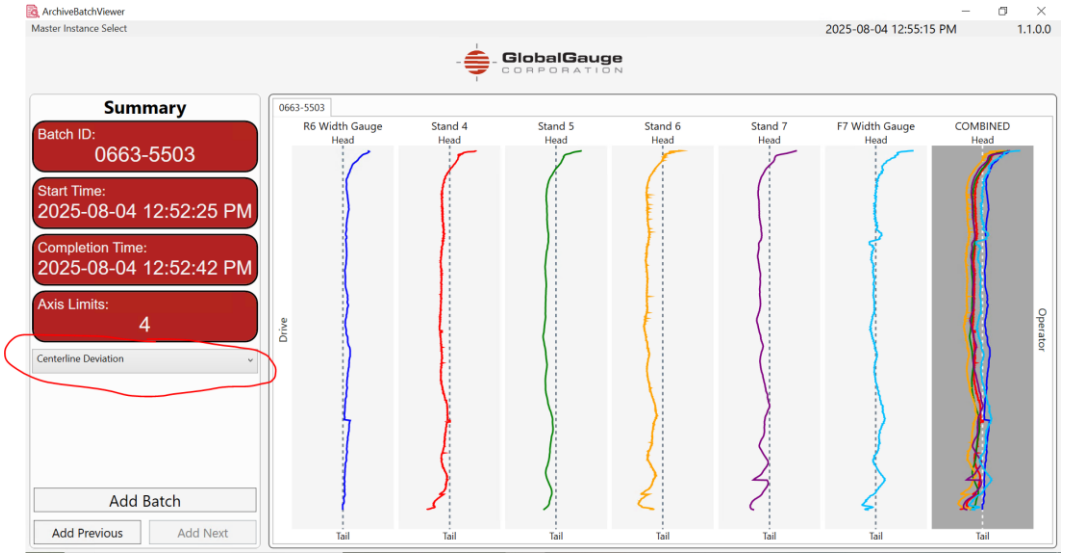
Click or scrub the assembled image to select any frame and see its raw, pre-processed or processed view, its metadata, and the measurements that frame produced.

SUMMARY AND DETAIL

Material summaries give average width, average centerline deviation, length, and start and completion times. The measurements tab plots the full record for the material.

Archive Batch Viewer

The same material across every position, aligned so drift through the train is visible.



One material, traces from every measuring position aligned by position along the length.

SYNCHRONISED TRACES

Traces from all positions are aligned by position along the material, so a steering problem can be followed from the stand where it starts to the stand where it shows.

DEVIATION OR WIDTH

A single control switches the display between centerline deviation and material width, using the same archived record.

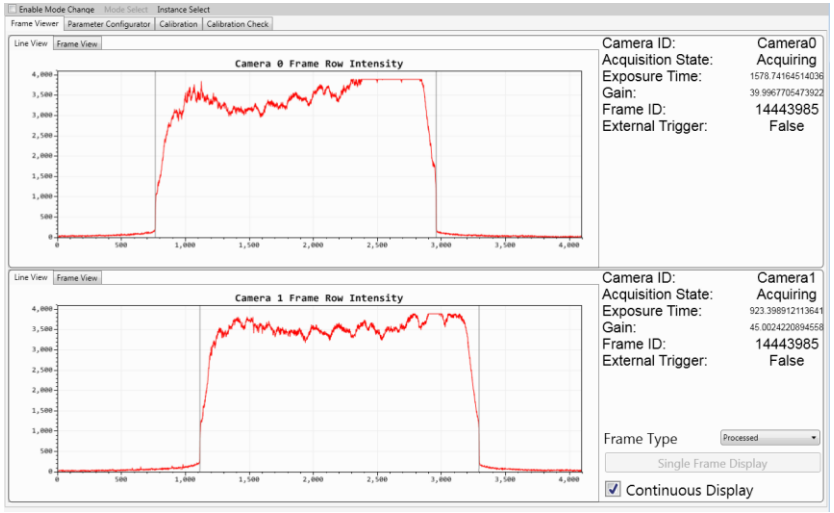
COMPARE MATERIALS

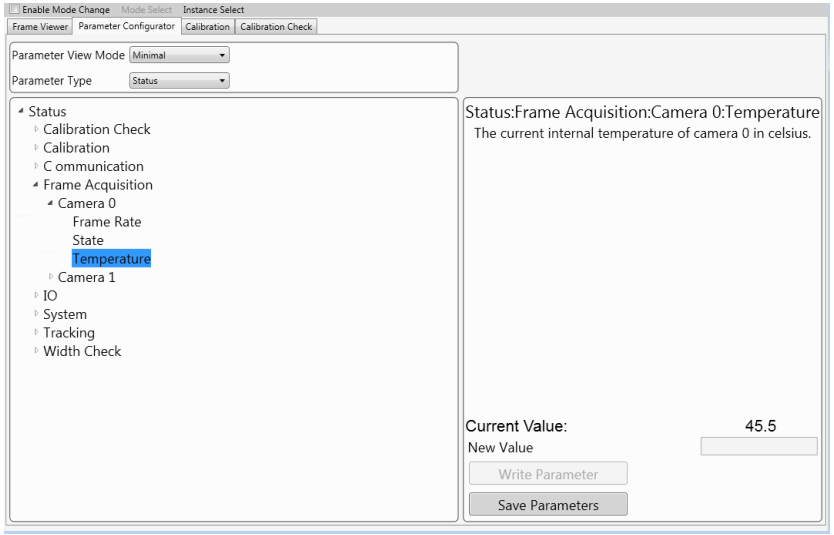
Additional materials open as tabs, and previous or next material can be added directly, so a run of coils can be compared without leaving the tool.

This is the view that turns a set of per-stand numbers into a diagnosis. Consistent deviation building from one gap onward points at a specific stand, guide or looper, and it points there with data rather than opinion.

Technician utility tool

Frame analysis, parameter configuration, calibration and calibration check in one application.





Left: frame viewer, live row intensity plots and camera metadata for both views. Right: parameter configurator, tree view with descriptions and live values.

FRAME VIEWER

Raw, pre-processed or processed frames, as a row intensity plot or a 2D image, single shot or continuous, with live camera metadata.

PARAMETER CONFIGURATOR

Configuration and status parameters in a filtered tree view. Minimal, extensive and complete views keep everyday work simple.

CALIBRATION TABS

Perform and inspect a calibration, or run and analyse a calibration check, with the plots that prove the result.

Operation modes

Six modes. In normal service the system moves between two of them by itself.

MODE	DESCRIPTION	WHEN IT IS USED
Standby	The default mode after successful initialisation on startup	Normal resting state. The system is ready and waiting for material
Gauging	Active while material is being measured during runtime	Entered automatically from standby when material is present
Calibration check	Validates the calibration and measurements of the system	Selected manually for the routine verification procedure
Calibration	Performs a full system calibration	Selected manually at commissioning, or on Global Gauge recommendation
Idle	Held out of measurement without shutting the services down	Used during maintenance work at a position
Invalid	Error state after failed initialisation or a fault	Not used in normal operation. Indicates the system needs attention

THE ONE THING TO REMEMBER

After any calibration or calibration check procedure, return the operation mode to standby. The system will not resume automatic gauging until it is there.

RESTARTING THE SYSTEM

Stop the measurement services and the communication service, then start them again. Avoid the restart command, which does not always allow adequate downtime.

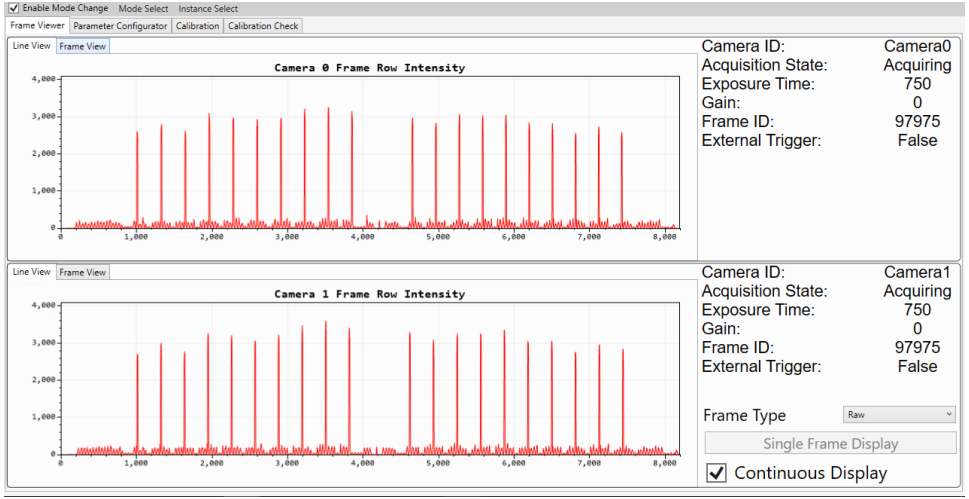
03

Calibration, integration and delivery

How accuracy is established and proven, how the system talks to the mill, and what each party supplies.

Calibration

Performed at Global Gauge under controlled conditions, on a rig built for the purpose.



Left: the calibration box, a precision light source with a known window pattern. Right: confirming every window appears as a distinct spike on each view.

WHY AT THE FACTORY

Calibration needs precise camera positioning and box alignment. A field rig can replicate it, but doing it before shipment keeps the work out of the mill outage.

TWO STAGES, ONE MAPPING

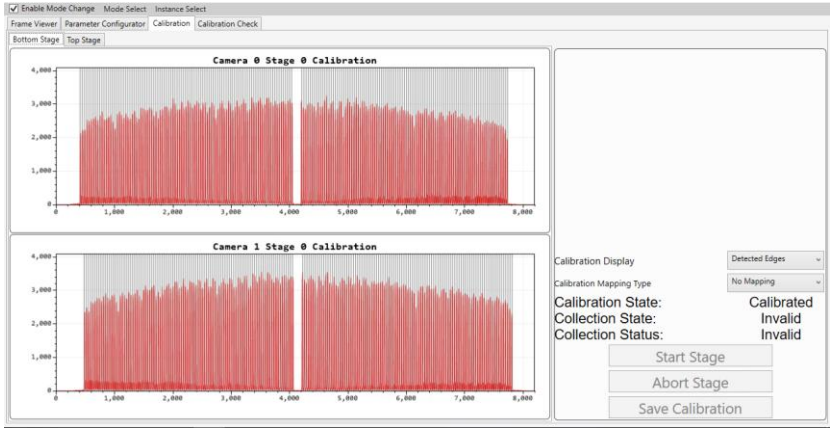
The box is imaged at a lower and an upper position. The two stages together map pixel position to real world position across the full working height.

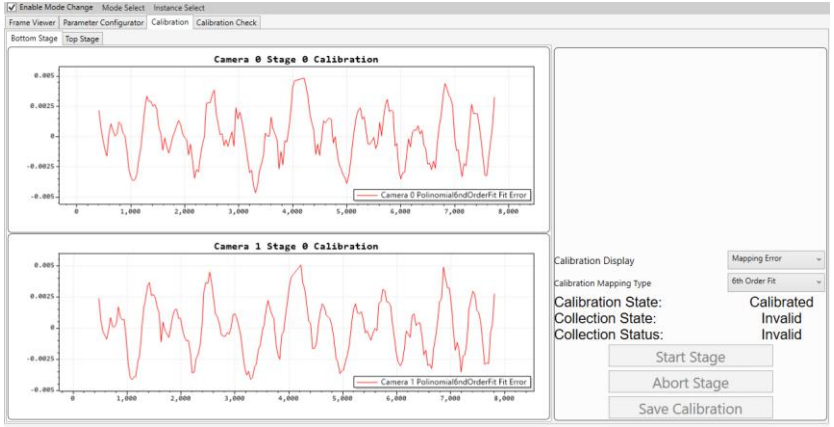
VERIFIED BEFORE SAVING

Every window must appear as a distinct spike on each view before the calibration is run. The result is inspected and only then saved.

Proving the calibration

Three views, and one plot that tells you whether the result is good enough.





Left: detected edges, every calibration window resolved as a distinct spike. Right: mapping error, the difference between true and mapped edge position.

DETECTED EDGES

Pixel intensity plots for the frames used to obtain the calibration, with vertical lines drawn where edges were found. Confirms the box was seen correctly at both stages.

CALIBRATION MAPPING

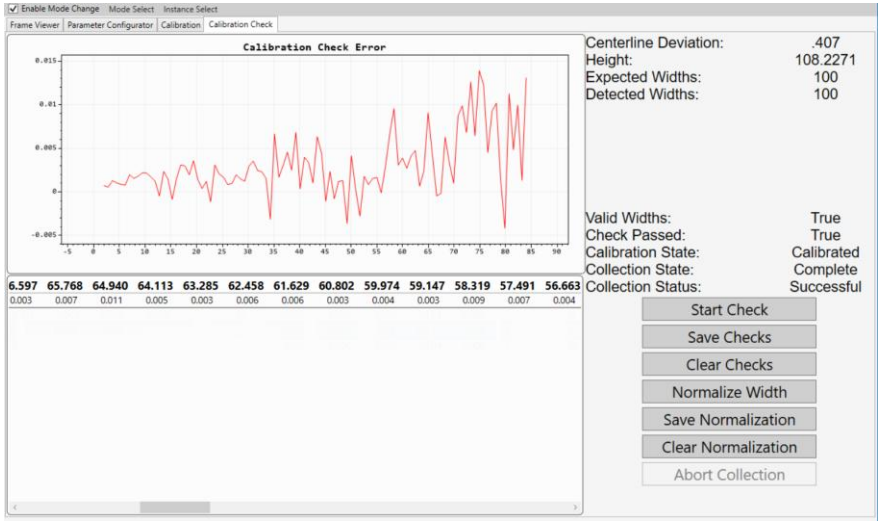
Edge world position plotted against pixel, with the continuous mapping drawn over it. Two nearly straight lines lying on each other is a good calibration. Anything else is not.

MAPPING ERROR

The difference between true and mapped edge position. This is the best measure of calibration quality: the largest magnitude on the plot should be smaller than the target gauge accuracy.

Calibration check

A routine verification, roughly monthly, that confirms the system without recalibrating it.



Calibration check results: measured error against actual width, with every check from the session listed below.

The check passes when every measured error falls inside the configured tolerance. Checks are saved as timestamped records, so the file is the audit trail.

1 SET THE MODE

Switch the operation mode to calibration check in the utility tool.

2 POSITION THE BOX

Place and align the powered calibration box, confirming every window appears on the intensity plot.

3 RUN THE CHECK

Start the check and wait for collection to complete. Results appear on the width error plot.

4 NORMALISE IF NEEDED

If the check fails, normalise to apply a linear scale and offset, then save the normalisation.

5 SAVE AND RETURN

Save the checks to the data directory as a timestamped record, then return the mode to standby.

Mill integration

One communication service handles every external interface for the whole system.

INTERFACE	DIRECTION	CONTENT	SUPPLIED BY
Level 1 to the mill PLC	Outbound	Centerline deviation, measurement quality rating, alarm states, system health	Global Gauge point list, customer PLC logic
Level 2 setup and product data	Inbound	Material ID, nominal width and thickness, roll speed, material temperature, looper height	Global Gauge interface software, customer send
Remote I/O	Both	Discrete control signals in, alarm and status outputs out	Global Gauge, where remote I/O is ordered
HMI clients	Outbound	Live and archived data to thick and thin clients on the plant network	Global Gauge software, customer client hardware

PROTOCOLS SUPPORTED

Modbus TCP • Siemens S7 • Allen-Bradley Logix • GE SRTP • TCP/IP in custom formats. The protocol and point list are agreed at kickoff and fixed before the interface is built.

WHAT THE MILL GETS BACK

Beyond the deviation value itself, the system reports its own operational health, so the mill control system knows whether a reading should be trusted rather than only what the reading is.

Each position reports its own centerline deviation. A relative-to-entry calculation, comparing each stand against the measured entry reference, is normally performed in the customer Level 2 system, and Global Gauge can quote it as an option.

Scope of supply

A typical split. The project drawing package governs on any specific order.

SUPPLIED BY GLOBAL GAUGE

- Mono-camera assemblies with camera, optics and enclosure, one per ordered position, plus spares
- Enclosure air purge and cooling manifold, 304 stainless, NEMA rated
- Field junction box: managed Ethernet switch, 24 VDC camera power supply, surge protection and terminals, built for the ultimate position count
- Pre-terminated field cable, camera to junction box
- Eagle Eye process computer with the measurement, communication and HMI software
- Level 1 and Level 2 Ethernet interfaces and the point list
- Installation supervision, startup, commissioning and training
- Operation and maintenance manuals and the full drawing set

SUPPLIED BY THE CUSTOMER

- Dedicated fused 110 VAC circuits to the junction box and to the process computer, with a UPS recommended
- A climate-controlled computer room location with rack space, HVAC and grounding
- Mounting supports, platforms and access at each camera position
- Conduit, cable tray and cable pulling, field to computer room
- Camera network cable, junction box to computer room, copper Ethernet
- Filtered dry instrument air at 2 psi to every position, with headers, filtration, regulation and isolation
- Plant Ethernet drops, IP scheme, switch ports and firewall rules
- Mill PLC logic, thin client hardware, permits, lockout and mill downtime

Anything not listed as Global Gauge supply is by the customer. The site prerequisite list is the subset that has to be complete before Global Gauge mobilises.

Where our scope ends

Five defined points. Everything on the Global Gauge side of them is our responsibility.

D1	**FIELD TERMINALS AT THE JUNCTION BOX** Global Gauge pre-terminated cable lands on the junction box terminals. The customer camera network run continues from there.
D2	**PROCESS COMPUTER POWER INLET** The customer dedicated 110 VAC circuit terminates at the process computer inlet.
D3	**AIR CONNECTION AT EACH ASSEMBLY** The customer air drop terminates at the bulkhead fitting on each camera enclosure.
D4	**PLANT NETWORK DROP** The customer network drop terminates at the plant interface on the process computer.
D5	**REAR OF THE CAMERA ENCLOSURE** Customer mounting steel carries the camera assembly at the rear of the enclosure. This is the mechanical take-over point.

D5 is the one to settle first on any project. Agreeing exactly where customer steel stops and the assembly begins avoids the most common late change.

Site readiness

The first three gate mobilisation. All six sit on the critical path to commissioning.

1 MOUNTING SUPPORTS

Supports, platforms, access and final mounting details complete at every ordered position.

2 INSTRUMENT AIR

Filtered dry air at 2 psi at every position, proven before any enclosure is opened.

3 POWER

Dedicated fused 110 VAC circuits to the junction box and to the process computer.

4 COMPUTER ROOM

A climate-controlled location with rack space, HVAC and grounding for a 19 in. rack-mount server.

5 CABLE AND NETWORK

Conduit, tray, cable pulling and the junction box to computer room run. Copper Ethernet, 90 m maximum.

6 SITE ACCESS

Permits, lockout, safety interlocks, mill downtime and contractor badging for the commissioning crew.

A written prerequisite list with required-by dates is issued within two weeks of kickoff, so planners have it early.

From order to commissioning

The delivery clock starts at drawing approval, not at order placement.

1 DRAWINGS

The project drawing package is issued for review. Written approval starts the delivery clock.

2 FIELD SURVEY

A survey at every position fixes elevations, optical angles, standoff and cable run lengths, and the lens selection follows from it.

3 BUILD AND TEST

Assemblies are built, optically set up and factory calibrated. Typical lead time is 16 to 20 weeks from order and full drawing approval.

4 INSTALL

Customer site work completes, then Global Gauge supervises installation, commissions the system and trains the crews.

STEP	ACTIVITY	OWNER
1	Mounting supports, platforms and access complete at every position	Customer
2	Air headers, drops and regulation to 2 psi complete, and air proven	Customer
3	Conduit, tray and the junction box to computer room network run complete	Customer
4	Camera assemblies installed, field cable landed, process computer commissioned	Global Gauge supervision, customer craft
5	Startup, plus operator and maintenance training. Optical setup is already complete	Global Gauge

Physical installation, rigging, lockout and mill downtime remain with the customer. Global Gauge supervises, commissions and trains.

Growing the system, and keeping it running

Shared equipment is sized once. Support is designed around remote access.

WHEN POSITIONS ARE ADDED LATER	WHAT IS ALREADY IN PLACE
Additional mono-camera assemblies	Junction box switch ports, 24 VDC capacity, gland plate and terminals provisioned for the full count
Additional pre-terminated field cable runs	Process computer sized and space claimed for the full camera input count
Mounting supports and 2 psi air at the new positions	Camera network, computer room and plant interfaces, all unchanged
Software configuration for the added inputs	No new junction box, no new server, no new network scope

WARRANTY

Two years from commissioning, provided commissioning occurs within six months of shipment. If commissioning runs later, warranty starts at the shipment date, so the outage window is worth planning early.

REMOTE SUPPORT

Outbound HTTPS or VPN only, with no inbound ports opened. Used for diagnostics, software updates and ongoing support, and subject to customer security approval.

TRAINING AND DOCUMENTATION

Operator and maintenance training on site at startup, plus operation and maintenance manuals and the complete system drawing set in Global Gauge format.

ROUTINE MAINTENANCE IS SHORT

A monthly calibration check, an occasional window clean or replacement, and a periodic sorbent strip change. Calibration itself is not a routine task and is repeated only on Global Gauge recommendation.

GlobalGauge CORPORATION

Interstand Centerline Deviation System

Twenty-five years of measurement systems for flat product producers worldwide.

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