GLOBAL GAUGE CORPORATION

Eagle Eye Hot Mill Vision Systems

Complete Mill Coverage: Roughing Mill Through Finishing Mill Exit

HM-3100 MCA **HM-3200 SCA**

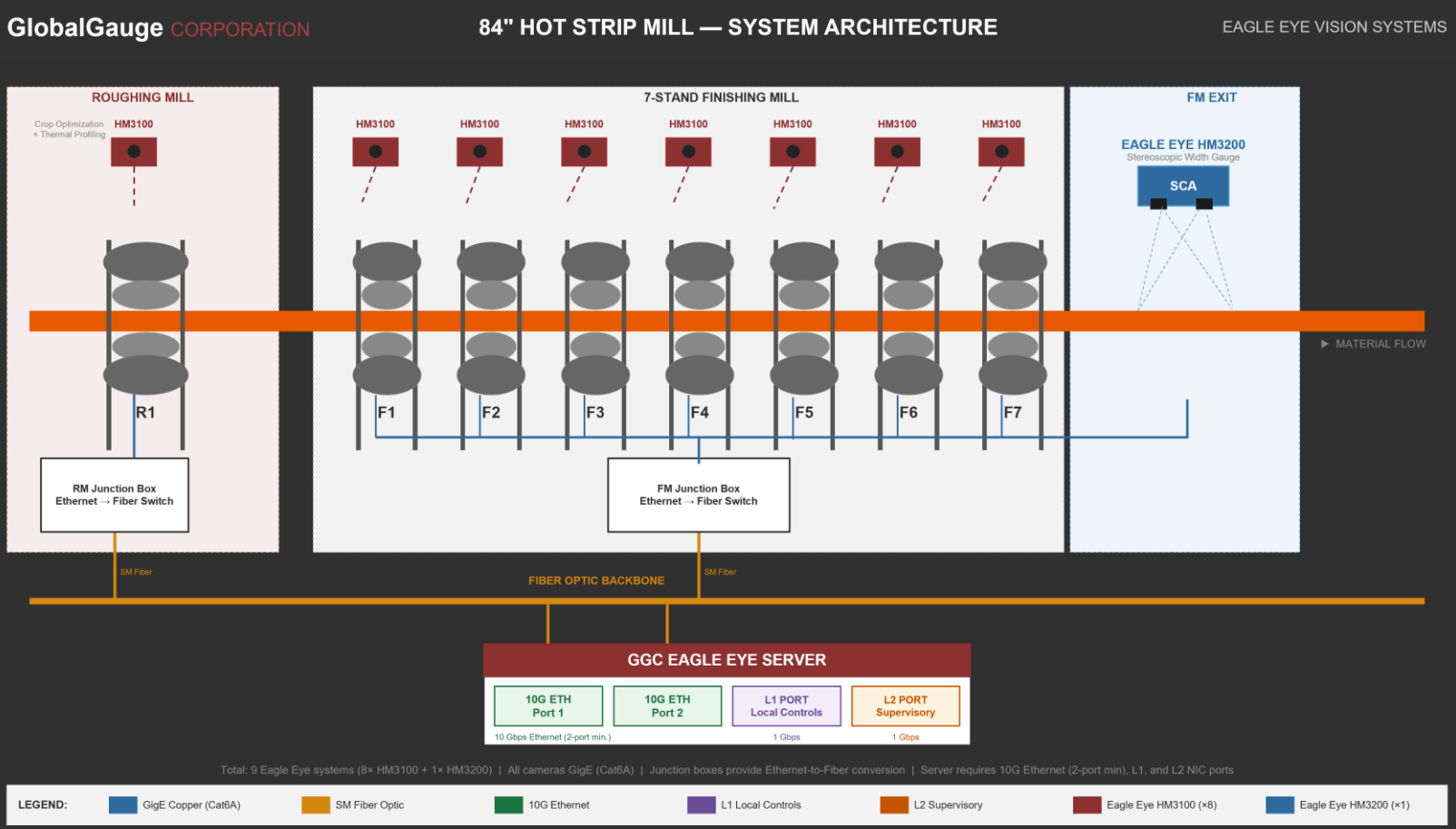
Technical Product Overview | Hot Strip Mill Applications

Made in America | Respected Worldwide

www.globalgauge.com

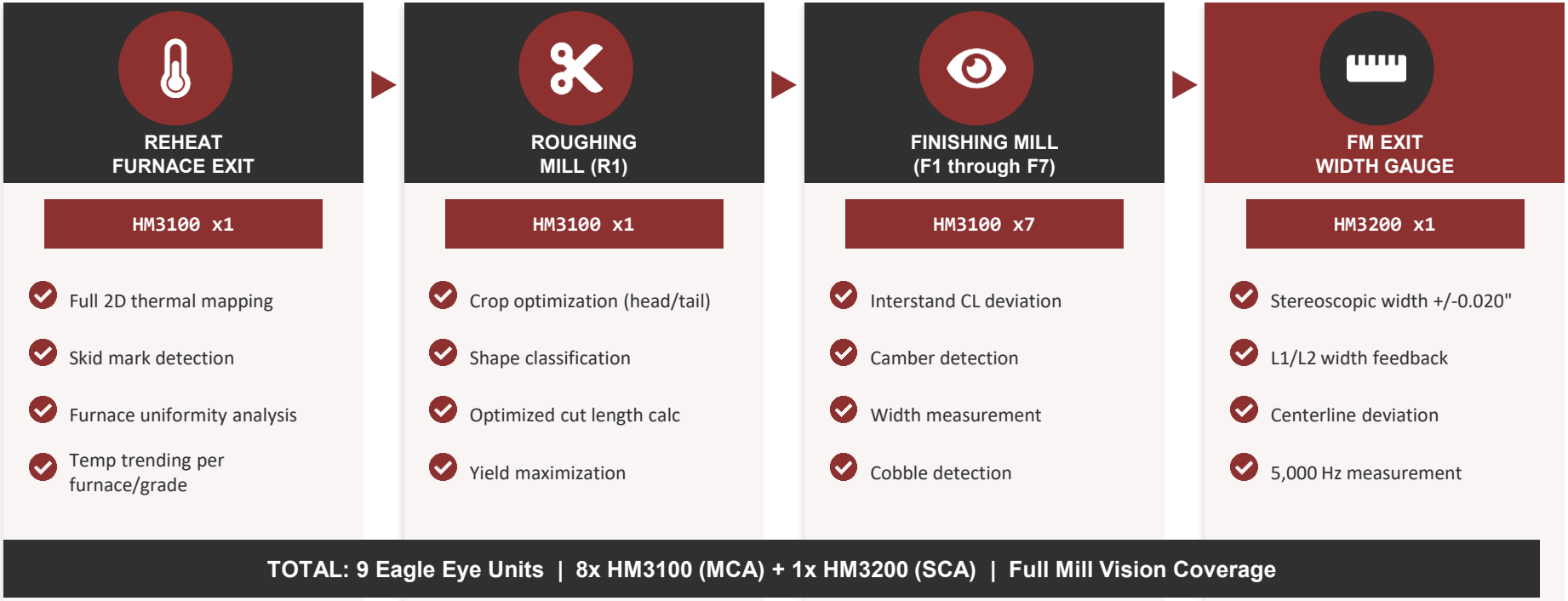
Hot Strip Mill | System Architecture

9 Eagle Eye units providing full mill coverage from roughing mill through finishing mill exit



Hot Mill Process Flow | Eagle Eye Coverage

Vision measurement at every critical point from reheat furnace exit to coiler

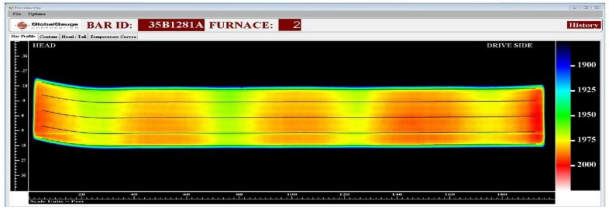


Eagle Eye HM3100 | Hot Mill Data Sheet

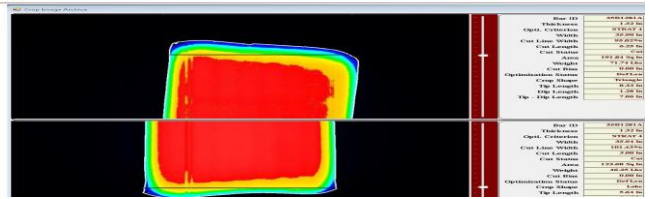
Mono-Camera Assembly (MCA) | SKU: HM-3100 | Roughing Mill + Interstand Applications

Parameter	Specification
Configuration	Single camera, Mono-Camera Assembly (MCA)
Camera Type	Industrial GigE digital linescan
Enclosure	Ruggedized, water-cooled, sealed optics, air purge
Temp Accuracy	+/- 2-3 C via Planck's radiation law (near-IR band)
Temp Principle	Pixel intensity ~0.8% signal change per degree C at 1100-1250 C
Width	Real-time edge detection, vision-based
CL Deviation	Millisecond-level response to centerline changes
Speed	Image correlation method
Crop Optimization	Head/tail shape detection: fish tail, tongue, lobe, triangle
L1/L2 Comms	OPC UA, Modbus TCP, EthernetIP
Connectivity	GigE Cat6A to Junction Box, SM Fiber trunk to server
Software	LineTrack Monitor, PlanViewMap, Crop Image Archive

Roughing Mill Application



PlanViewMap: Full-bar 2D thermal profile with temperature color scale



Crop Image Archive: head/tail thermal shape with cut length optimization

Detectable Conditions

- Blocked/malfunctioning burners
- Descaler spray issues
- Skid mark severity
- Furnace zone non-uniformity
- Asymmetric thermal gradients (camber prediction)
- Hook temperature at head/tail

HM3100 | Interstand Centerline Deviation System

7 Eagle Eye HM3100 units across the finishing mill (F1 through F7), mounted upstream of each stand

Interstand Vision Capabilities

Strip Presence & Tracking

Head/tail detection at each stand with millisecond response

Width Measurement

Real-time edge detection between stands for width trending

Centerline Deviation

Feed-forward and feed-back input for finishing stand cylinder adjustments

Camber Detection

Trending of strip camber through the finishing train

Cobble Detection

Real-time anomaly detection to minimize downtime

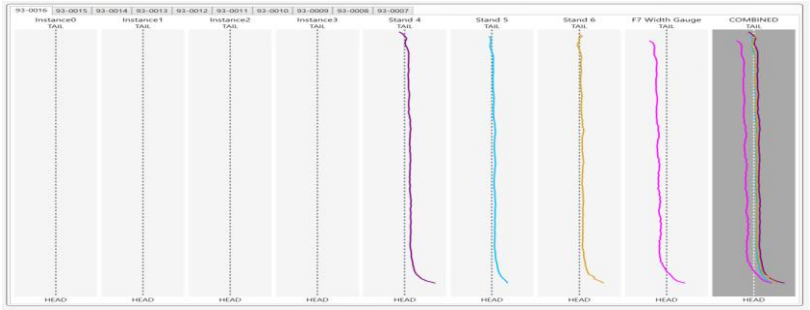
Speed Estimation

Image correlation method for strip speed between stands

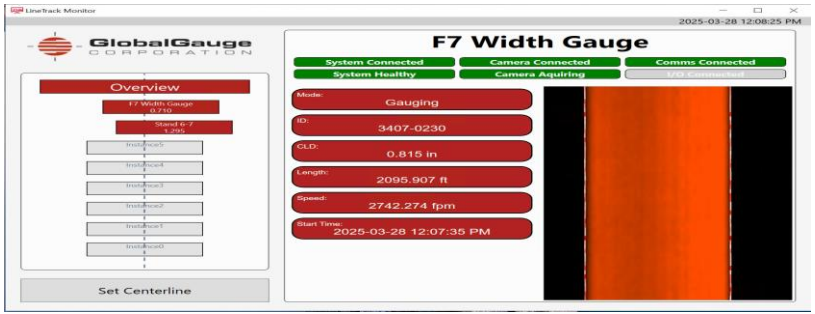
Temperature Monitoring

Interstand thermal monitoring for process optimization

LineTrack Monitor Software



Multi-stand deviation view: individual and combined CL tracking, head to tail



Instance view: real-time width, CLD, speed, live camera image per gauge

Proven Results: Pinches reduced > 75% | Holes & gall reduced > 75% | Positive operator acceptance | Bearing failure prediction

Eagle Eye HM3200 | Hot Mill Width Gauge Data Sheet

Stereoscopic Width Gauge (SCA) | SKU: HM-3200 | FM Exit Application

Parameter	Specification
Measurement Type	Non-contact, vision-based stereoscopic
Width Accuracy	+/- 0.020" (+/- 0.50 mm)
Width Deviation	+/- from target or absolute (selectable)
Centerline Deviation	+/- from centerline
Measurement Frequency	100 Hz to 5,000 Hz
Camera Technology	Dual GigE digital linescan cameras
Width Calculation	GGC WG Software with dynamic sub-pixel interpolation
Temp Compensation	Software included
Exposure Time	10 usec to 10 msec, Auto or Manual
Enclosure	Sealed, water-cooled, air purge
Illumination	High-intensity LED backlight bar below SCA
EPC	NEMA-rated, climate-controlled, GigE to server

System Components

SCA (Stereoscopic Camera Assembly)

Dual GigE cameras in sealed, water-cooled enclosure positioned above strip at FM exit

External Illumination

High-intensity LED bar below SCA for consistent backlighting in hot mill environment

EPC (Electronics Power Console)

NEMA enclosure: power, network switches, signal conditioning, integrated cooling

Stereoscopic Advantage

Stereoscopic geometry provides edge-to-edge width measurement independent of strip height variation, delivering accuracy unaffected by flatness changes at full line speed.

Key Applications

- FM exit width gauge for direct L1/L2 feedback
- Precision width control to reduce overrolling
- Width deviation + centerline deviation output
- Per-coil historical data archiving

HM3100 | Thermal Gradient Imaging Deep Dive

Blocked Burners

Cold spots on slab reveal furnace burners that are blocked, misaligned, or failing

Descaler Spray

Clogged or misaligned nozzles create localized cooling patterns visible in thermal map

Skid Marks

Walking beam cold stripes quantified; severity measured for process optimization

Furnace Zones

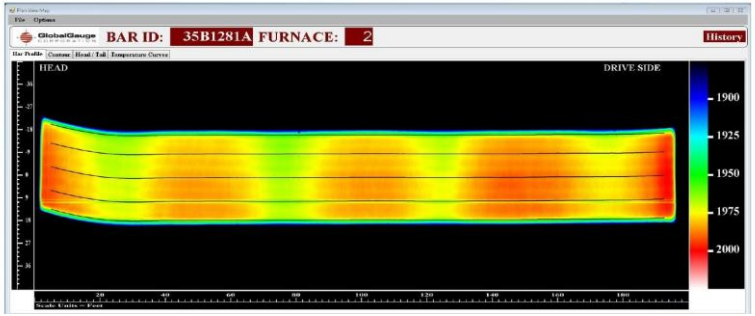
Identify soak zone non-uniformity across width and length; tune settings, reduce fuel

Camber Prediction

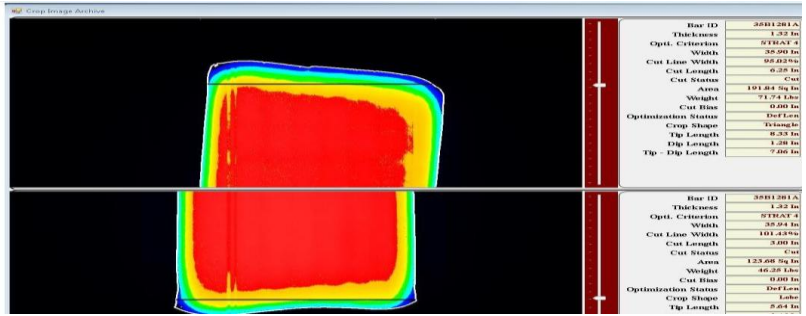
Asymmetric edge-to-edge thermal gradients predict downstream camber and flatness issues

Throughput

Verify target temperature across full slab area; increase furnace throughput with confidence



PlanViewMap: Full-bar thermal profile (BAR ID, furnace, temperature scale)



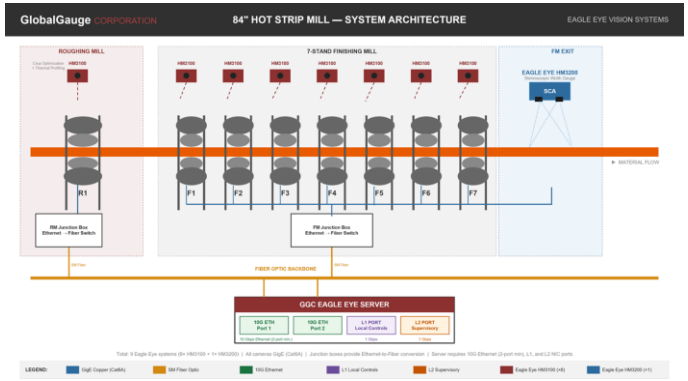
Crop Image Archive: head and tail thermal maps with shape classification and cut data

Measurement Principle: No Thermal Cameras Required

At reheat furnace exit temperatures (1100-1250 C), radiated energy in the near-IR band falls on the steep Wien's law side of the Planck curve, yielding ~0.8% signal change per degree C. This enables +/- 2-3 C accuracy from standard industrial line-scan cameras at a fraction of the cost of IR systems.

Network Architecture & Eagle Eye Server

Interface	Speed	Medium	Connection
Camera to JB	1 Gbps	Cat6A Shielded	Each HM3100/HM3200 to local Junction Box
JB to Server	10 Gbps	SM Fiber Optic	RM and FM Junction Box trunks to server room
10G ETH Port 1	10 Gbps	SFP+ Fiber	RM Junction Box aggregation
10G ETH Port 2	10 Gbps	SFP+ Fiber	FM Junction Box aggregation (7x HM3100 + HM3200)
L1 Port	1 Gbps	Copper RJ45	PLC / Drive Systems (local controls)
L2 Port	1 Gbps	Copper RJ45	Level 2 Process Computer (supervisory)



84" HSM architecture: R1 HM3100 + F1-F7 HM3100s + FM Exit HM3200, fiber backbone, centralized Eagle Eye Server

GGC Eagle Eye Server

- Multi-instance processing (1 per camera)
- Centralized data archiving (coil-based)
- Web-based remote access
- OPC UA + Modbus TCP to L1/L2
- Historical trending and yield analysis
- PlanViewMap thermal profile viewer
- CSV export for third-party tools

Software Suite

LineTrack Monitor

Real-time width, speed, bar length, live camera per instance

PlanViewMap

Full-bar 2D thermal viewer with temperature color scale

Crop Image Archive

Historical crop images with shape classification and cut data

EyeSpy Archive

Defect image archive with coil/defect group/feature tables

Hardware & System Components

Camera Assembly

- NEMA 4X rated enclosures (stainless steel options)
- Water-cooled thermal management system
- Sealed optics with continuous air purge
- GigE industrial digital linescan cameras
- Laser cross-hair for fixed pixel reference
- Quick-disconnect fittings for water and air

Electronics Power Console (EPC)

- Industrial PC with vision processing software
- NEMA-rated climate-controlled enclosure
- I/O and communication modules (GigE, fiber)
- Integrated power supplies and signal conditioning
- Local HMI connection for operator interface

Why Global Gauge Corporation

400+ installations worldwide | 25+ years | USA-based engineering, manufacturing, and field support

Single-Source Integration

One vendor, one platform, one server for all vision and width measurement across the entire mill. Simplified procurement, training, spares, and long-term support.

Proven HSM Performance

Purpose-built for hot strip mill environments. Water-cooled, sealed optics, and ruggedized construction are standard. Not adapted from other industries.

Common Platform Architecture

HM3100 and HM3200 share common hardware and software. Common spare parts, operator interfaces, and streamlined maintenance training.

Measurable Yield Impact

Crop optimization delivers yield improvement within first months. Width gauge feedback to L1 reduces overrolling and improves dimensional consistency.

GLOBAL GAUGE CORPORATION

Thank You

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