

- Gauge totally protected by external suspended water cooled radiators and insulated stainless reflectors
- Each Laser mounted in independent cooled chamber
- Measures independent of alloy content and provides high resolution independent of plate thickness
- Low cost solution, yet high accuracy as automatic zeroing and temperature compensation algorithm
- Gauge automatically calibrated off Certified standard on each insertion or as in use
- Various Gauge options - single spot or multi-point for full plate profile
- Flat resistive touch screen with user friendly graphics on floor standing cabinet
- Kontron PC104 Pentium 3 VX Windows Controller
- Convertteam HCPI software incorporating expansion algorithms and 10 alloy hot/cold conversion rates

## General Description

This Gauge is purpose built to determine the thickness of the hot plate at the reversing Stand in the Plate Mill. The Gauge utilizes Class II Laser Triangulation Meters (LTMs) across the C-Frame to determine both the thickness of the plate in conjunction with automatic calibration identify the distortions in the gauge frame due to ambient changes and radiant heat are compensated of the thickness output. In addition, the frame temperature is monitored by implanted thermocouples that are used in the Gauge Controller algorithms. By this means this Gauge automatically compensates for any distortions and provides high-resolution thickness measurement provided regardless of the effect of such temperature changes.

Whilst other Thickness Gauges are unable to provide accurate measurement off both thick and thin plate from one Gauge and require calibration for the various steel alloys that commonly need measuring, this gauge operates over a wide plate thickness range, as well as measuring turn-up, and is totally unaffected by alloy content. In addition, there are no x-ray or radioactive isotopes that need to be controlled when in use.

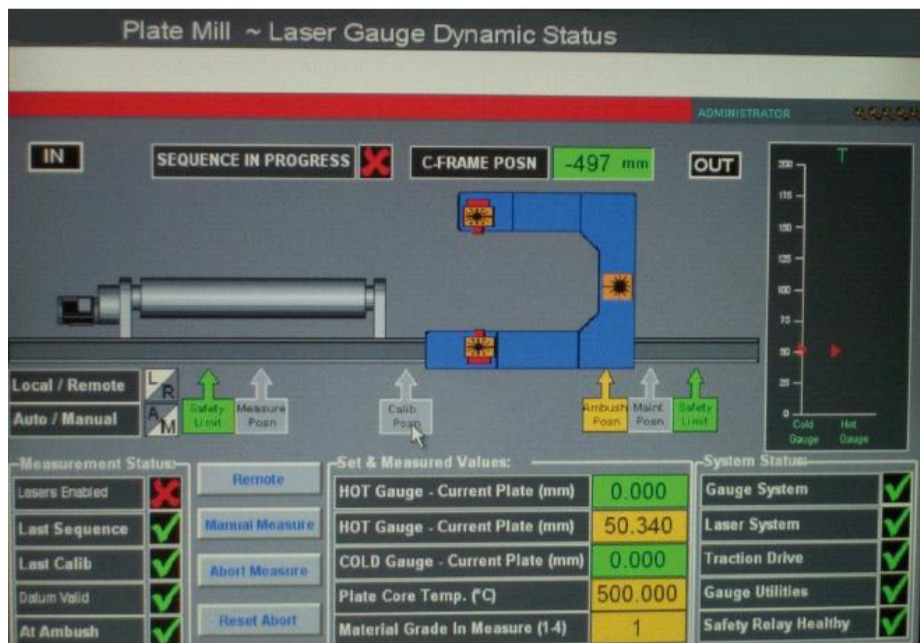
Operates via Kontron PC104 Pentium 3 VX Windows controller mounted in floor standing cabinet with flat resistive touch screen and user friendly graphic display. Convertteam HCPI software addresses expansion algorithms for 10 alloys to provide hot/cold conversion of plate thickness.

## Unique Construction for Dimensional Stability

The C-Frame is purposely built from heavy steel plate and I beam support to maintain dimension stability with changing ambient and high radiant heat emitting from the hot plate as it passes through the Gauge. The rigid C-Frame is furthermore surrounded and protected by multiple water-cooled radiators suspended/secured to the C-Frames that in turn are protected by ceramic board insulation and shiny stainless reflector panels. As added security the lasers themselves are mounted within independently vortex air cooled chambers.



## Auto Zeroing Calibration



One of several Graphic displays. This one shows the Gauge whilst in operation.

All Changes in the C-Frame throat dimensions are automatically compensated for. This Gauge automatically calibrates master thickness. This input thereby automatically zeros the Gauge measured thickness.

In addition, multiple thermocouples are fitted to the C-Frame that continuously monitor the C-Frame temperature. This is inputted into an established algorithm from calibrated gauge movement to further zero the gauges measured thickness output and provide exceptional accuracy over a wide thickness range.

## Model Options

Three specific thickness gauge C-Frames are available with differing combination of measuring lasers.

- Incorporating two laser triangulation meters measuring centre plate thickness which are automatically calibrated each time the C-Frame moves in across the line.
- Incorporating four laser triangulation meters providing plate profile by measuring centre thickness and near side edge thickness. Automatically calibrated each time the C-Frame moves in across the line.
- Incorporating six laser triangulation meters with two sets providing plate profile one set continuously monitoring dimensional movements in the C-Frame from the master sample.

## Gauge Functional Sequence

On powering up the Controller Cabinet, Lasers self test and confirm available for measurement, initiating volt free output. On receipt of this output, the system ready and plate within measuring limits, the Gauge will measure providing the data.

The measurement data is collected as a rolling average sampling at 2000 Hz from the latest 2000 values from both lasers. Out of tolerance rogue samples are rejected as top/bottom pairs to maintain synchronisation of the data collection. Once 2000 valid values are collected for providing 1 second rolling average from matching top and bottom lasers, a volt free digital output is energised indicating the Serial Com's data is valid for the current position of the Lasers.

Should the data become corrupted/invalid, this output will de-energise and indicate faulty/corrupted data, or otherwise out of range, as in the case when the C-Frame in home position.

## Performance Specifications of the Gauge

Provides thickness to 0.010 mms (10 micron) standard deviation and repeatability via moving average analysis measurement off plate thicknesses from 3 mm to 150 mm thick. Resolution to 10 micron. Plate thickness determined on the turn up where up to 70 mm from the pass line. Where plate thickness 150 mm this range is reduced.

Where no plate turn up, or this not to be measured, then repeatability can be substantially improved.

Hot slabs of up to 400 mm thick can be accommodated by raising of the C Frame and implementation of larger range LTMs. In this case thickness would be determined in the region of 0.10 mms repeatability.

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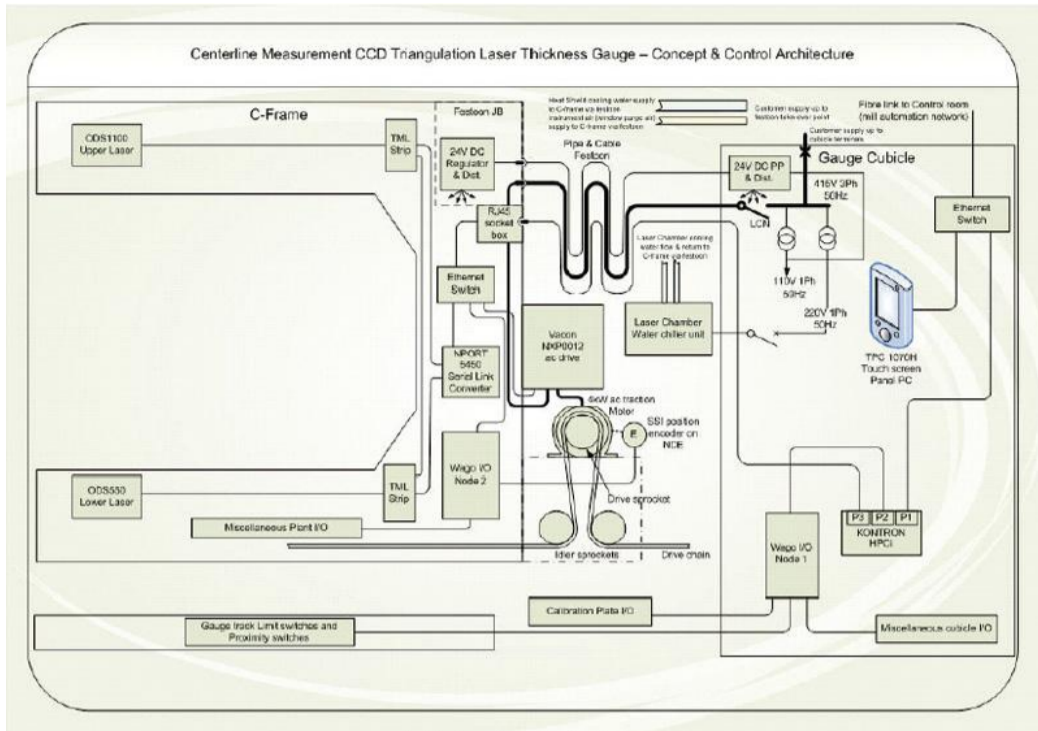
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# Gauge PC Interfaces and functions



- Automatically starts the Laser Measurement
- Local Keyboard and user friendly menu display
- Flash memory for specific requirements
- Provide synchronisation to Lasers
- Supply 24 VDC supply to the Lasers
- Supply RS422, 38400 baud rate CPU output to Gauge PLC Controller
- Gauge PLC digital Interface I/Os –
- Input to CPU – activate / allow measurement
- Output – System healthy/ready for measurement
- Output – CPU measurement valid /OK
- Serial Communication data links
- RS 422/485 Com port at 38400 baud rate
- measurement values from as rolling average

## General Specifications

Secondary temperature compensation distortion determined via algorithm thermocouple input. C-Frame distortion calibrated on each insertion. Stated measurement repeatability calibrated over 20° to 50°C operating range

Line insertion width requirement - Max width of frame 290mm including support top and bottom wheels

Air wipes provided on Laser windows via motor room air supply or air blower

Accommodates insertion of Velocity Meter via periscope

Maximum plate width - up to 2500 mm wide

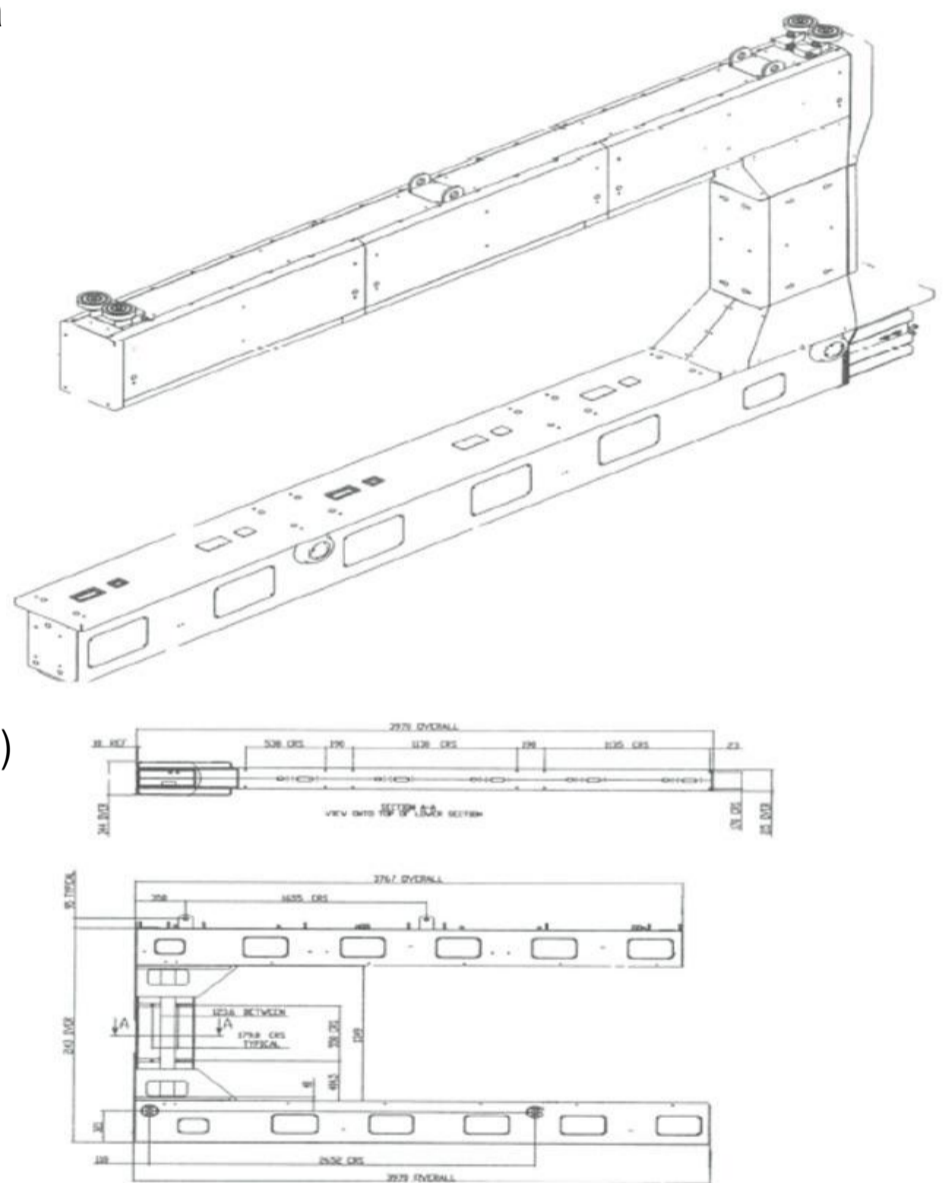
C Frame throat depth - up to 4,200 mm according to model

Frame throat height - 200 to 1800 mm (according to LTMs used)

Maintained C-Frame internal temperature - 50° C

Display – Graphic flat screen Industrial PC in Floor Cabinet

NOTE: Various Lasers are available providing greater resolution, alternative working ranges and stand off distances



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