



# Quad Plus®



## Web Gauging Systems for Building Products

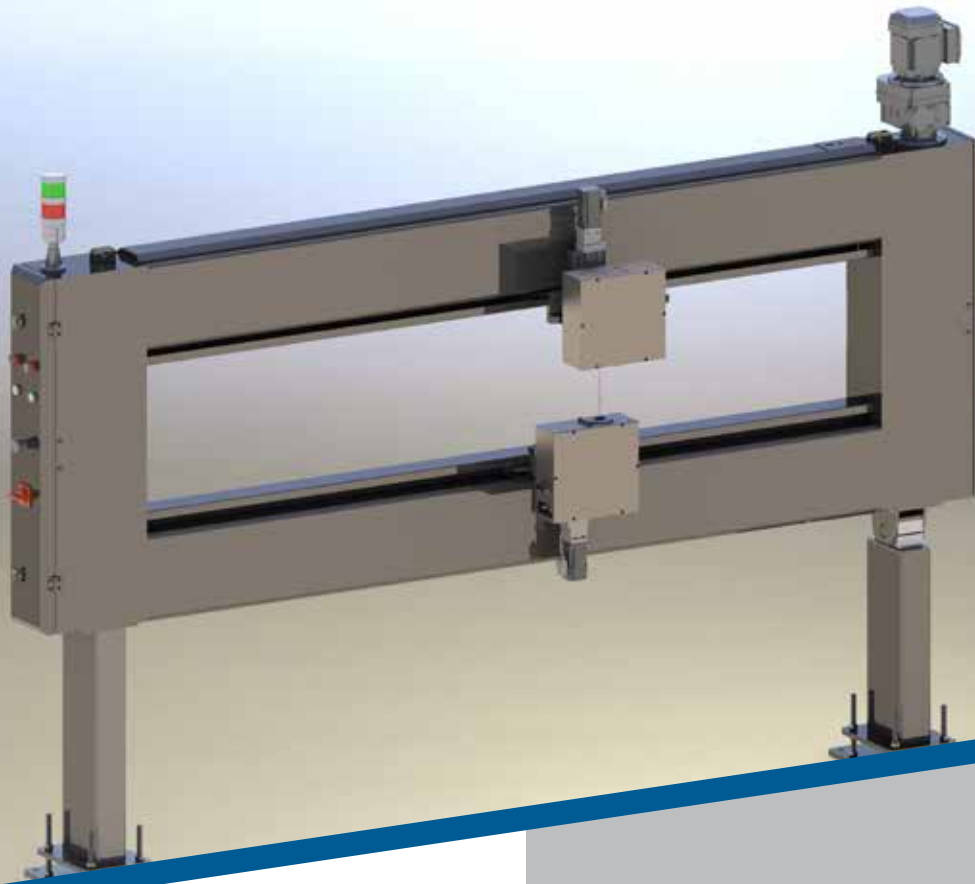
PolyIso Foam Board Production

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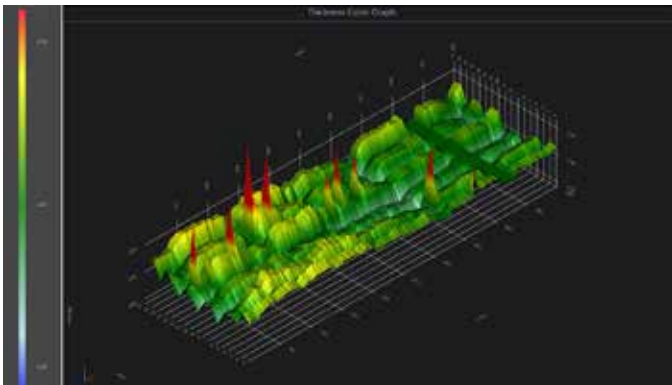


## Poly Iso: Polyisocyanurate

PolyIso insulation boards with flexible facings are primarily used for heat insulation of house and industrial roofs as well as wall, floor, and ceiling insulation.

Quad Plus gauging solutions allow for the continuous thickness, basis weight, and density measurements of insulation boards with flexible facings and a core structure of polyisocyanurate foam

Continuous gauging systems from Quad Plus allows for high-speed measurements of insulation boards with a variety of flexible facings, thickness, and tapers.



## Measurements

- ✓ Cross direction profiles of Thickness, Basis Weight, and Density measurements
- ✓ Machine direction trends show the average measurements over time/footage of production allow operators and engineers understand any variation in the process
- ✓ 2D/3D mapping of every scan in real-time

## Specifications

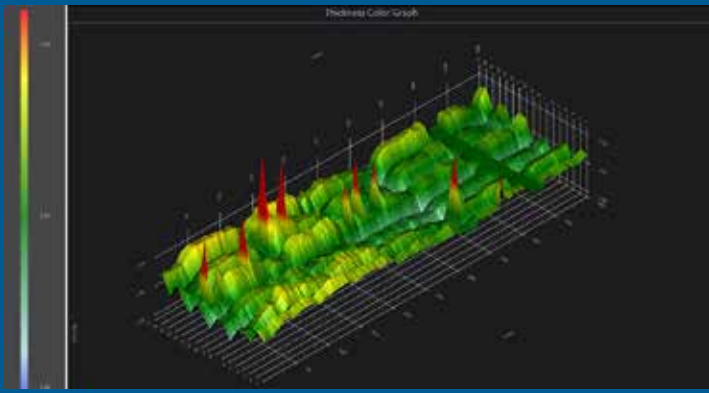
**Width:** Typical to market 48". But can manufacture scanning frames up to 4 meters in width.

**Thickness:** 0.4" to 6"

**Taper Tolerance:** 1/2" slope, 2.4 degrees

**Accuracy:** +/- 5 micron

**Environmental:** Designed for temperatures up to 50C, also taking into account the dusty production environment



## General Description

Quad Plus deploys THz in a transmission configuration to give real-time high-speed measurements online of boards. Our system enables the measurement of thickness from 0.4 inches up to 6 inches in thickness. THz is a non-ionizing radiation so there is no safety concerns or special permitting requirements.

Our system, unlike conventional thickness or mass measurement, allows for the display of the true foam density. Negating any effect of the facer material. Along with allowing same spot measurements.

In addition to the measurements, our high-resolution data profiles allow for visual inspection of the interior of the product. The product knit lines can easily be visualized in our 2D and 3D mapping. The system can also detect voids in the foam, large air pockets, and give alarming if this occurs.

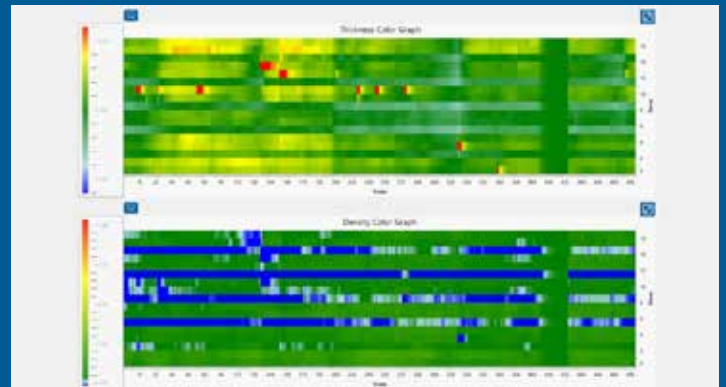
One issue that comes with the production of PolyIso foam sheet is longitudinal depressions (e.g., also referred to as ruts or grooves). The ruts or grooves are associated with "knit-lines", which are lines formed during manufacturing as the flow of liquid-state foam expands from multiple mix heads meet as the material expands just down the manufacturing

line from the liquid-chemical outflow points. As two neighboring lines of expanding liquid foam material meet, if a slight amount of skinning-over has already taken place, and the two masses of foam do not completely meld homogeneously, it leaves a visible line in the material. The two sides, under most ordinary manufacturing conditions, can bond together but there may be a readily visible line of compressed polyisocyanurate cells across the thickness of the board and these are called knit-lines.\*

Realtime 3D mapped profiles allow Operators and Process engineers to see "inside" the board with staggering detail. The knit lines can be seen and operators can adjust the process based on these data ensuring a tighter to spec product and see any issue before scrape or subpar material is created.

Polyisocyanurate roof insulation affected by visibly apparent knit-lines can also be a result in a variation in board thickness.

Cross Direction (CD) profiles across the board give a real-time profile of the board thickness, and foam density. Operators and process engineers know immediately if the product is "in" or "out" of spec just by a glance at the color code profiles in our software.

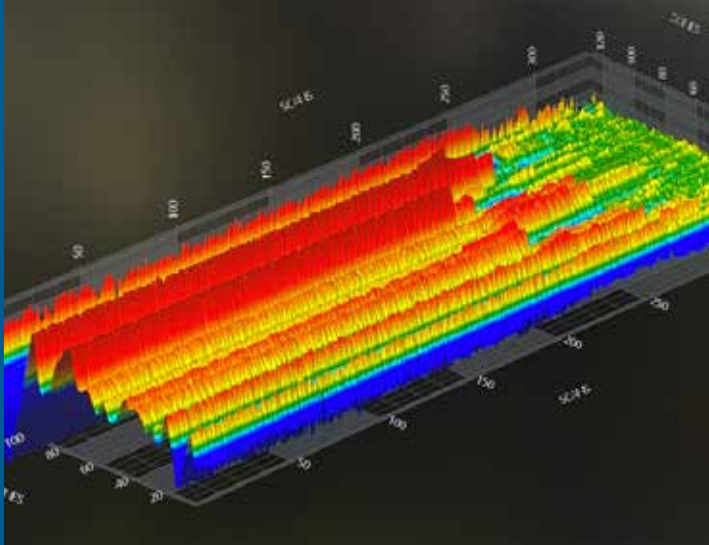


\*Source: <https://wsrca.com/blogpost/1648950/289110/WSRCA-TECHNICAL-BULLETIN-2017-II-1-Knit-line--Facer-Irregularities-in-Rigid-Polyisocyanurate-Foam-Roof-Insulation>





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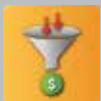


## Gauging System Software and Reporting

Our software takes the data collected during the process and implements this into an HMI system that is easy to understand by operators and gives information at just a glance of the screen. We provide CD (cross direction) and MD (machine direction) trends that show pertinent information about the process. We also have 2D and 3D models of the data to make a better visualization of the process.

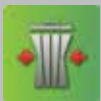
Long term reporting and storage of product data can be useful for tracking and verification of issues at a later date. Our software stores the data for each production batch in a database that can be accessed at a later date for evaluation.

## How Gauging Systems Improve Operations



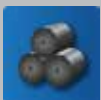
### Maximize Raw Materials

Our gauging systems allow you to monitor the thickness of your product with such precision that you can reduce the thickness by as little as 0.01mm and realize significant annual savings. For example, in tire production, a typical plant might allow as much as a 0.025 reduction in gauge, resulting in over \$1.2 million in annual savings.



### Reduce Waste

Production defects cause waste and use resources such as raw material, labor, energy, and time. Defects provide no value to customers and have an impact on your bottom line. Our gauging systems give you the ability to identify defects in real-time, so you can correct issues sooner and minimize waste.



### Improved Production

As your production line and gauging system run in parallel, you'll be able to identify and correct product defects before they occur. Your output yield will be increased as your production line will run without serious interruptions and extended downtime.



## Why Quad Plus?

A Quad Plus gauging system will ensure you are producing high quality building materials that improve your product quality and bottom line. Quad Plus has made extensive advancements in gauging of polyiso foam board production. Real-time, online measurements of product thickness and foam density, for products up to 6 inches thick.

We help you determine the correct technology, configure the frame for optimal performance, install the system, train the operators, and provide support. Our gauging systems are a full turnkey solution with minimal downtime.