



Technology



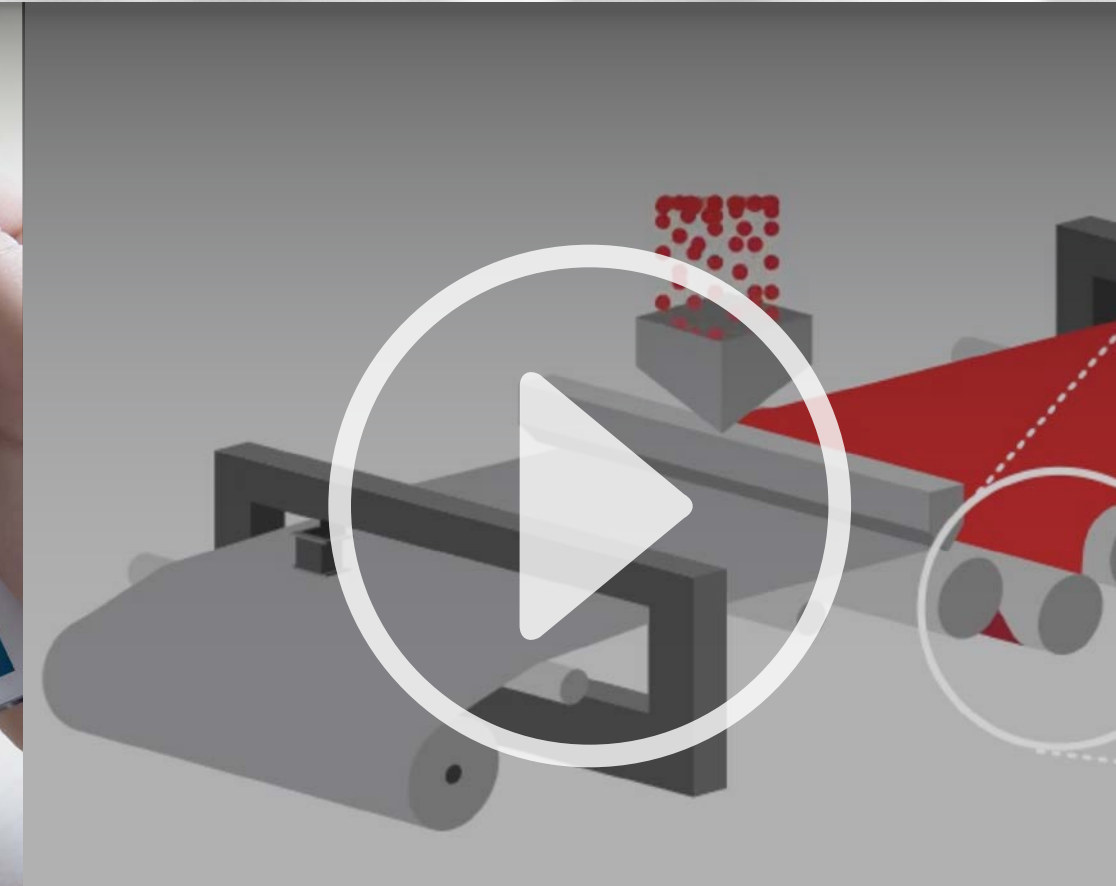
Applications



Service & support



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# Web gauging solutions

## Making a measurable difference

We are the measurement and control specialists serving the continuous web processing and converting industries. Our success is driven by our superior sensing technologies coupled with extensive application knowledge.

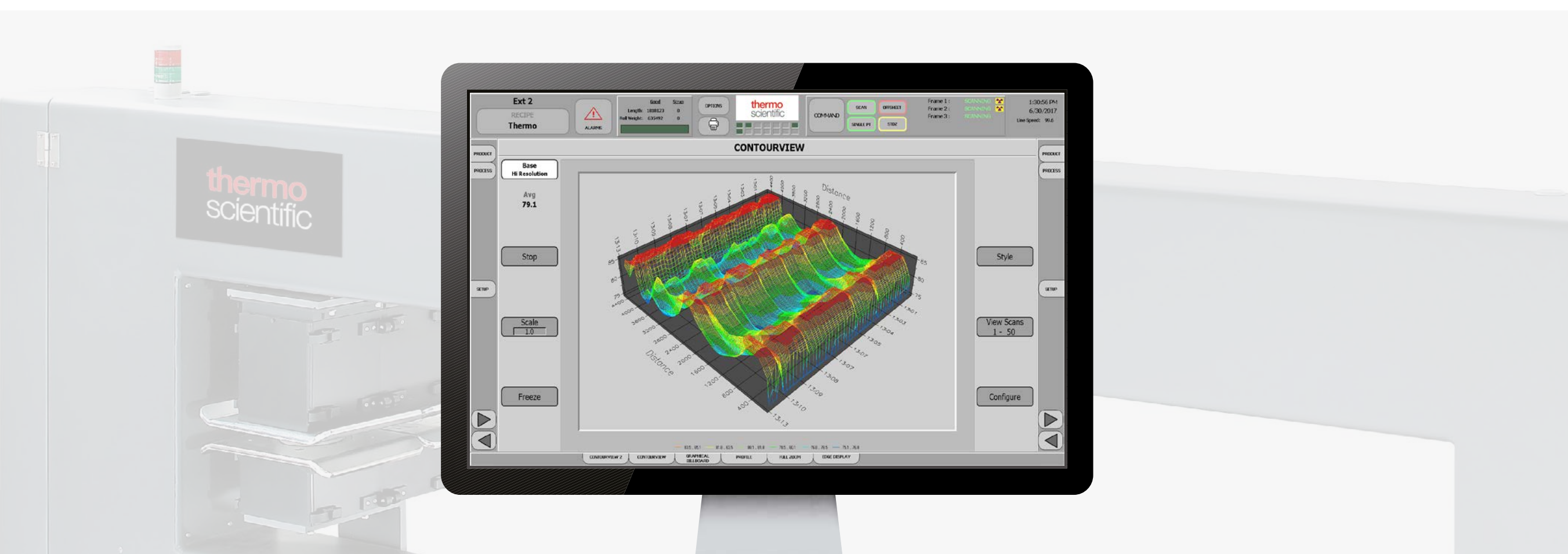


# Thermo Scientific technology

**Meet stringent customer specifications and guarantee the performance of your products, while optimizing line investment and minimizing raw material waste.**

Thermo Scientific™ thickness and basis weight measurement and control systems provide efficient production of uniform, reliable, functional products to meet the demanding requirements of your end customers. We offer a wide range of online, non-contact measurement solutions for flat-sheet applications in the extruded plastic, packaging film, coating, lithium-ion battery, vinyl and textile industries, that meet the tightest specifications in the most challenging measurement environments.

With over 70 years of experience, Thermo Fisher Scientific is well equipped to support ever changing market requirements. Whether it is the need to go thinner, multiple layers, innovative materials or new applications, we are well positioned to meet your gauging requirements.



Thermo Scientific gauging platforms



Thermo Scientific basic weight sensors

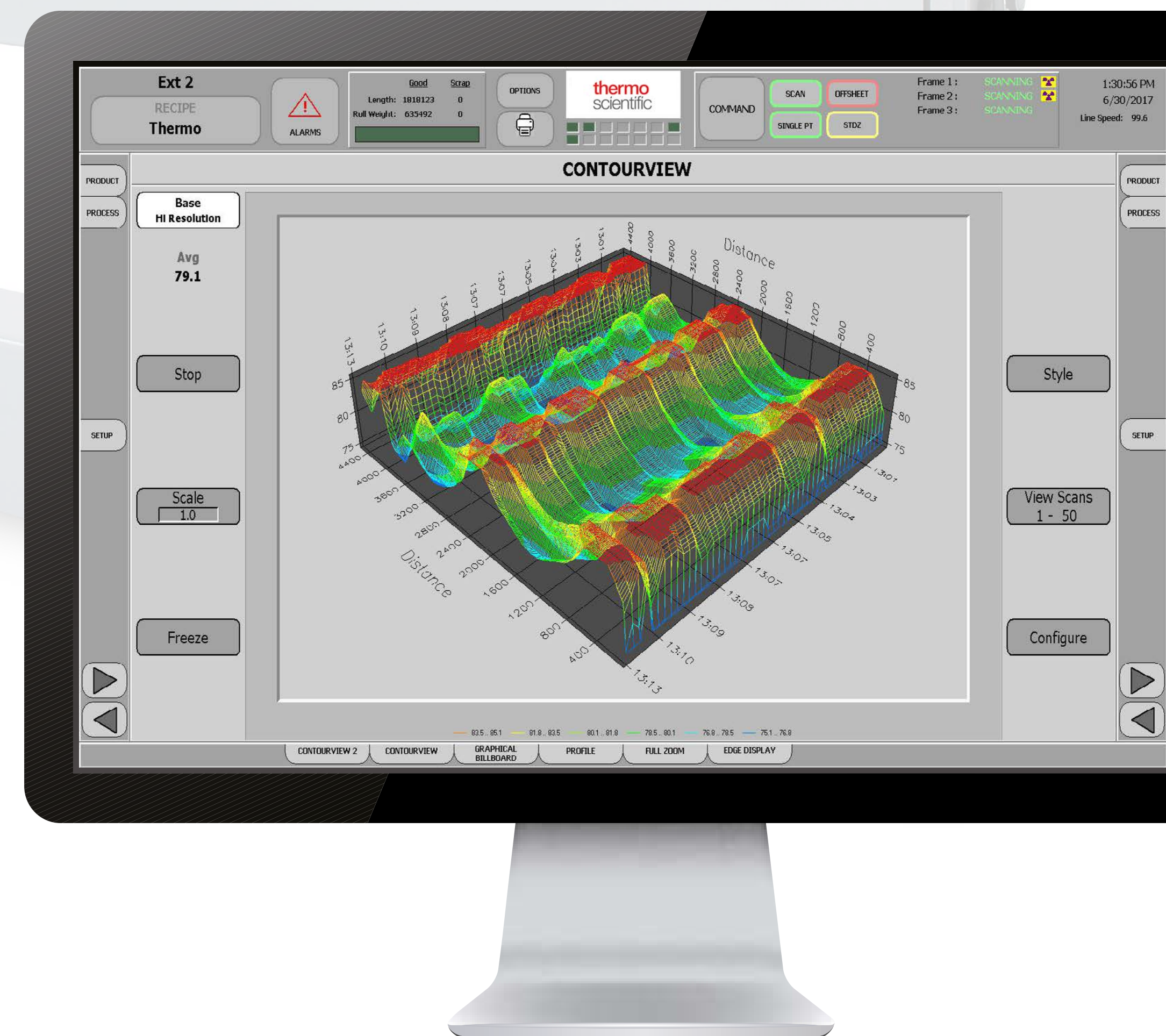
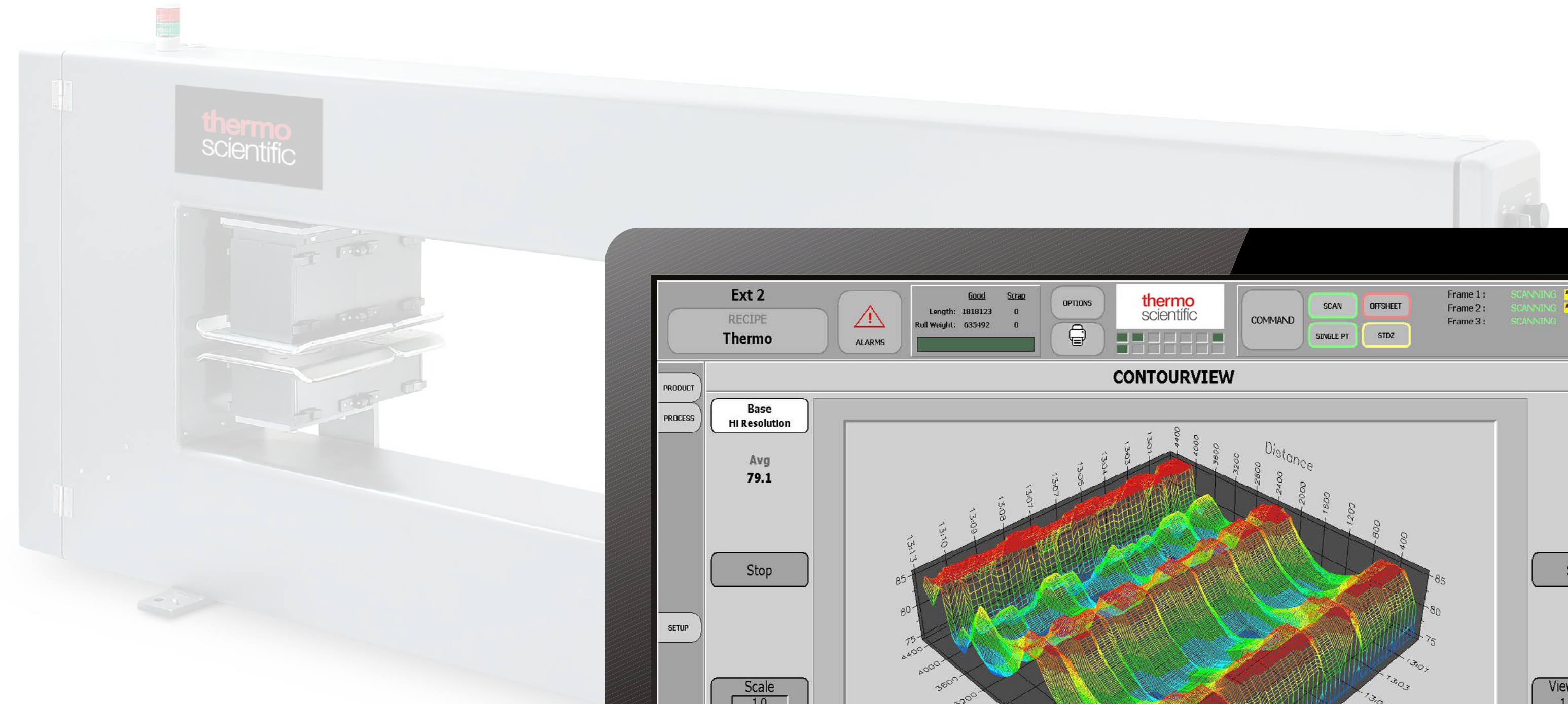


# Thermo Scientific gauging platforms

Our technologies include infrared, x-ray, nuclear and optical measurements, plus an advanced controls portfolio and an intuitive operator interface, to give a unique insight into your process. Everything you need to manage your production.

21PlusHD measurement and control system

IPlus! measurement and control system





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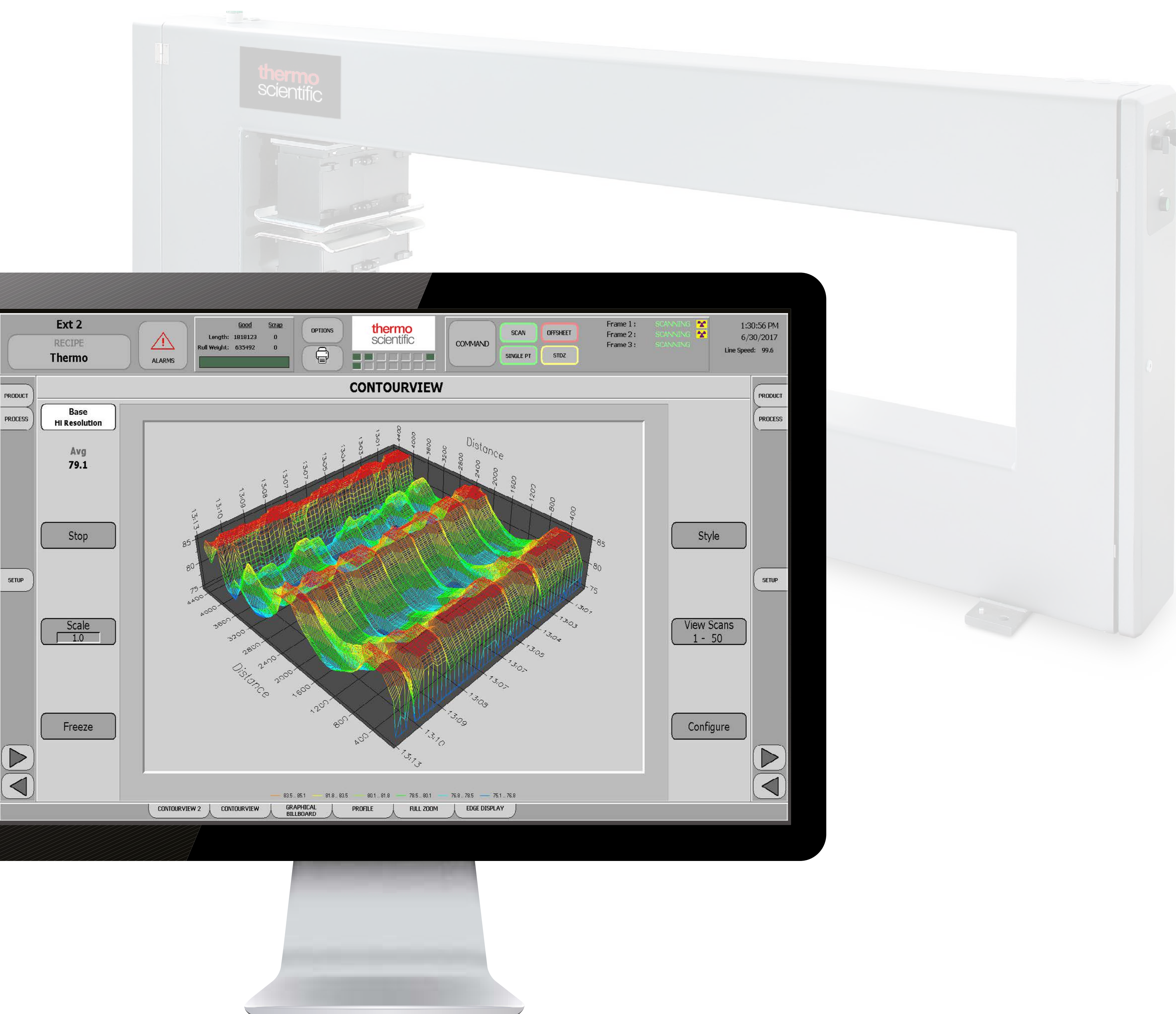
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## 21PlusHD measurement and control system

The Thermo Scientific™ 21PlusHD measurement and control system for continuous web processing supports a comprehensive portfolio that offers over forty specialized application packages.

The system consists of one or multiple scanners, sensors and a control system tailored to your application ensuring a fast return on investment, through improved product quality, process efficiency and raw materials savings.



Film & sheet extrusion

Coating & converting

Lithium-ion battery

Nonwovens

Vinyl calendering

Building materials



## 21PlusHD measurement and control system for building materials

**Produce high quality building materials that improve your customers' success and your bottom line.**

The 21PlusHD measurement and control system for building materials provides repeatable, continuous performance in the manufacturing of insulation, roofing, shingles, carpet, flooring, abrasives, composites and other building supplies that present challenging measurement environments.

The system combines advanced sensor technology with low maintenance operation and a scalable distributed system architecture to allow seamless modular expansion.

The 21PlusHD measurement and control system uses advanced process control algorithms to ensure uniform quality product across the entire width of the web, while reducing raw material waste.

The applications package for building materials consists of a scanner, sensor and control system tailored to the application, and features a Wonderware™ HMI user interface. Operator stations are PC-based and communicate with other system modules across an Ethernet LAN.

The system provides powerful communication capabilities with industry-accepted OPC standards, allowing the sharing of product and process data with popular software packages for data acquisition, database building and quality analysis.





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				<a href="#">X-Ray Master spec sheet</a>



## 21PlusHD measurement and control system for nonwovens

Meet the specialty measurement and reporting requirements for nonwoven manufacturing, whether the process is spunbond, spunlace, airlaid, meltblown or carded.

The 21PlusHD measurement and control system for nonwovens measures the basis weight or thickness of nonwoven materials as well as binder or super-absorbent polymer (SAP) content and moisture, specifically for hygienic applications.

The system's advanced sensor technology ensures efficient production of uniform, reliable, functional products. The system supports the stringent reporting requirements for roll quality with full-lot traceability.

The 21PlusHD measurement and control system uses advanced process control algorithms to ensure uniform quality product across the entire width of the web, while reducing raw material waste.

The package for nonwovens consists of a scanner, sensor and line speed controls and features a Wonderware HMI user interface. Operator stations are PC-based and communicate with other system modules across an Ethernet LAN. The system provides powerful communication capabilities with industry-accepted OPC standards, allowing the sharing of product and process data with popular software packages for data acquisition, database building and quality analysis.





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The 21PlusHD measurement and control system uses advanced process control algorithms to ensure uniform quality product across the entire width of the web, while reducing raw material waste. The package for nonwovens consists of a scanner, sensor and line control and features a Wonderware™ HMI used to interface with the system. It can communicate with other system modules across an Ethernet LAN. The system provides powerful communication capabilities with industry-accepted OPC standards, allowing the sharing of product and process data with popular software packages for data acquisition, database building and quality analysis.



## 21PlusHD measurement and control system for film & sheet extrusion

### **Extend the shelf life of food products and protect medical instruments from contaminants.**

The 21PlusHD measurement and control system for film & sheet extrusion measures the thickness of extruded films and sheet for a range of applications, including cast film, cast sheet, co-extrusion and biax products. The multilayer extrusion application also makes it ideal for producing barrier layer films for the food, medical, and specialty film markets.

The 21PlusHD measurement and control system uses advanced process control algorithms to ensure uniform quality product across the entire width of the web, while reducing raw material waste. The applications package for film & sheet extrusion consists of a scanner, sensor and control system tailored to the application, and features a Wonderware HMI user interface. Operator stations are PC-based and communicate with other system modules across an ethernet LAN. Desktop interface with or without touchscreen configurations are available. The system provides powerful communication capabilities with industry-accepted OPC standards, allowing the sharing of product and process data with popular software packages for data acquisition, database building and quality analysis.





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## 21PlusHD measurement and control system for coating & converting

**The performance of barrier layers in laminated products such as aseptic packaging is critical for food packaging manufacturers. Similarly, for manufacturers of adhesive coatings, maintaining proper adhesive coverage on their products is essential.**

The 21PlusHD measurement and control system for coating & converting measures the direct thickness of barrier layers and coatings allowing manufacturers of coated products or extrusion coated products to maintain the high performance characteristics of critical layers, while minimizing thickness. Advanced process control algorithms ensure uniform product quality across the entire width of the web, while reducing scrap and regrind costs.

The 21PlusHD measurement and control system provides real-time data to keep your manufacturing process running smoothly and continuously, and consistent production quality for smoother downstream processing such as slitting or converting. The applications package for coating & converting consists of a scanner, sensor and control system tailored to the application, and features a Wonderware HMI user interface. Operator stations are PC-based and communicate with other system modules across an ethernet LAN. Desktop with or without touchscreen configurations are available. The system provides powerful communication capabilities with industry-accepted OPC standards, allowing the sharing of product and process data with popular software packages for data acquisition, database building and quality analysis.





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## 21PlusHD measurement and control system for vinyl calendering

**Vinyl calendering is a complex process that requires modular measurement and control strategy that can be configured according to the application.**

The 21PlusHD measurement and control system for vinyl calendering provides accurate, reliable measurement of the basis weight or thickness of materials used in vinyl manufacturing. With a highly efficient two or three zone calender control system, the 21PlusHD measurement and control system ensures each component meets strict manufacturing guidelines and high quality standards.

The applications package for vinyl calendering consists of a scanner, sensor and control system tailored to the application, and features a Wonderware HMI user interface. Operator stations are PC-based and communicate with other system modules across an Ethernet LAN. Desktop interface with or without touch screen configurations are available. The system provides powerful communication capabilities with industry-accepted OPC standards, allowing the sharing of product and process data with popular software packages for data acquisition, database building and quality analysis.





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## 21PlusHD measurement and control system for lithium-ion battery

**Lithium-ion has become the battery of choice for the new generation of electric vehicles. However, manufacturing these batteries is complex and manufacturers need reliable technologies to ensure the quality and consistency of their products.**

The 21PlusHD measurement and control system for lithium-ion battery is designed to increase the quality and performance efficiency of lithium-ion battery separator film, electrode coating and electrode calendering production lines. Its combination of sensor accuracy, reporting capabilities and innovative techniques ensures efficient production of high-quality, reliable battery products with unprecedented traceability.

The 21PlusHD measurement and control system offers a suite of advanced applications packages for lithium-ion battery. Each application package is specifically designed for the different processes required in the manufacture of electrode and separator products.

Advanced mapping strategies are available for separator film thickness control in wet and dry processes. Proprietary techniques for the measurement of continuous, patch, or strip coatings are also available in our electrode coating and electrode calendering application packages.

The applications package for lithium-ion battery consists of a scanner, sensor and control system tailored to the application, and features a Wonderware HMI user interface. Operator stations are PC-based and communicate with other system modules across an Ethernet LAN. Desktop interface with or without touch screen configurations are available. The system provides powerful communication capabilities with industry accepted OPC standards, allowing the sharing of product and process data with popular software packages for data acquisition, database building and quality analysis.





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software packages for data acquisition, database building and quality analysis.

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# IPlus! measurement and control system

The Thermo Scientific™ IPlus! measurement and control system is our reliable and robust value based system.

Its advanced sensor technology and powerful software, packaged in an intuitive easy-to-use system provides users with high performance and a low cost of ownership. The system provides data to improve product quality and uniformity, process efficiency and raw material savings.

Film & sheet extrusion

Coating

Nonwovens

Vinyl calendering





# IPlus! measurement and control system for film & sheet extrusion

**Uniform product thickness and the ability to produce flat rolls for secondary processes, such as thermoforming and slitting, is critical for film and sheet manufacturers.**

The IPlus! measurement and control system for film and sheet extrusion is a highly reliable, simple and cost-effective solution, helping manufacturers meet the demand for durable material in an intuitive easy-to-operate system. The IPlus! measurement and control system measures the basis weight or direct thickness of single layer film and sheet applications using advanced software algorithms and automatic process controls, to ensure uniform product quality and reduce raw material waste.

The application package for film & sheet extrusion is specifically tailored to cast film extrusion or sheet extrusion measurement and process control requirements. A single scanner and sensor are used for measuring total basis weight or direct thickness. Machine Direction (MD) thickness control option is available to automatically maintain the extruded product to thickness specifications, while Automatic Profile Control (APC) controls auto dies to achieve cross-direction uniformity of extruded film and sheet.





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X-Ray Master

ShadowMaster spec sheet

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## IPlus! measurement and control system for coating

Whether for an adhesive coating or a barrier coating on paper, foil or film, uniform product thickness and the ability to produce products that meet industry standards is critical for coated product manufacturers.

The IPlus! measurement and control system for coating is a highly reliable, simple and cost-effective solution designed to measure the overall basis weight or total thickness of a coated substrate. The system uses advanced software algorithms and automatic process controls, to optimize production quality, increase product uniformity and increase the performance characteristics of coated products.

A suite of advanced machine-direction and cross-direction controls improve both quality and productivity, delivering consistent results and an impressive return on investment. Machine Direction (MD) thickness control option is used to automatically maintain the coated product to thickness specifications, while the Automatic Profile Control (APC) option controls auto dies to achieve cross-direction uniformity of coated products. Two-zone CD (Cross Direction) control improves the cross width profile uniformity of blade or roll coated products.





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## IPlus! measurement and control system for nonwovens

**Nonwoven manufacturing processes must be carefully controlled to ensure that the fabrics are resilient, liquid repellent, and leakproof.**

Now you can overcome process challenges and produce high performance nonwoven fabric products with the IPlus! measurement and control system for nonwovens. The IPlus! measurement and control system combines advanced sensor technology and powerful software in an intuitive, easy-to-use system to provide high performance and a low cost of ownership. It is optimized for the spunbond, spunlace, carded, airlaid, and needlepunch processes to control raw material distribution across the web. Closed loop machine direction (MD) control can also be added to enhance quality.





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## IPlus! measurement and control system for vinyl calendering

**Produce flat rolls and maintain critical thickness specifications while saving raw materials by reducing scrap and start-up time.**

The IPlus! measurement and control system for vinyl calendering is a simple, highly reliable and cost effective control platform providing accurate, reliable measurement of the basis weight or direct thickness for vinyl calendering applications. Combining advanced sensor technology and powerful software in an intuitive, easy-to-use system, the IPlus! measurement and control system provides high performance and a low cost of ownership. With an efficient two or three-zone calender control system, it improves product uniformity and ensures end-products meet strict manufacturing guidelines and high quality standards.

Two-zone calender control improves product quality with side-to-side roll gap adjustments to hold product profiles flat. Three-zone calender control for either cross axis or roll bending controls the center zone, assuring flat final product profiles. Nominal control adjusts product average to a fixed target.

The applications package for calendering consists of a scanner, sensor and control system tailored to the application, and features a Wonderware HMI user interface for easier data management.





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# Thermo Scientific basis weight and thickness sensors

Thermo Scientific™ sensors provide fast, accurate and repeatable measurement with superior signal-to-noise ratio. Each solution provides material savings and increased line utilization over a vast array of applications.

Beta Plus basis weight sensor

PROSIS thickness sensor

ShadowMaster direct thickness sensor

X-Ray Master weight and thickness sensor





# Beta Plus basis weight transmission sensor

**Save on raw materials, reduce scrap, improve yields, and produce higher quality products.**

The Thermo Scientific™ Beta Plus™ basis weight transmission sensor provides accurate on-line basis weight measurements for a variety of web gauging processing applications. The measurement is based on the absorption of beta particles emitted from the source to determine the basis weight, resulting in best measurement and the best control for your process, whether it's film and sheet extrusion, extrusion coating, nonwovens, roofing, building products, lithium-ion battery, or vinyl calendering.

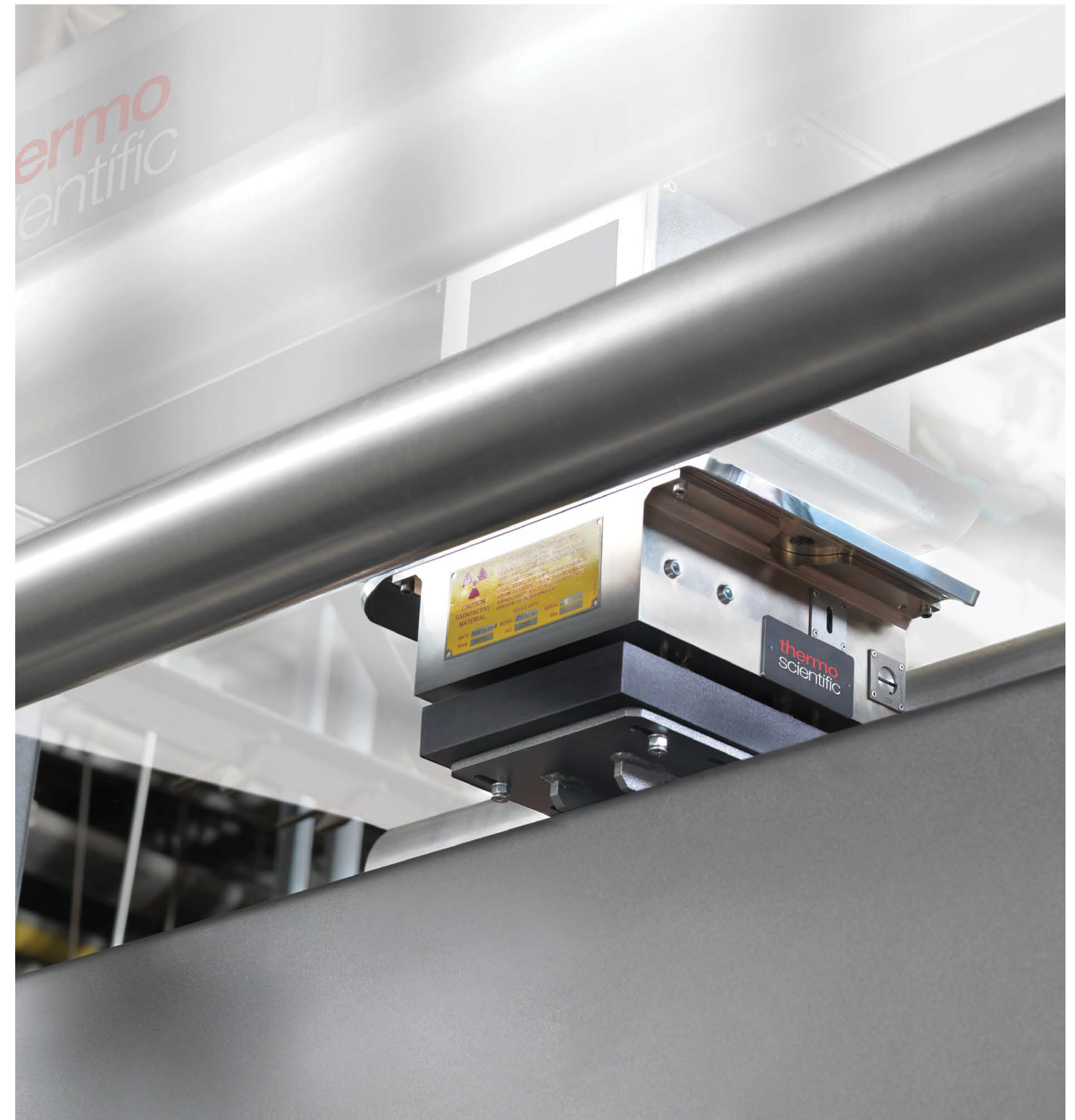
## Features and benefits

- Simple reliable rugged design with low cost of ownership
- Raw material savings and reduced scrap
- Improved yield and higher quality products
- True slot source geometry
- Temperature and pressure compensation
- High-speed digital electronics
- Strongest signal / lowest noise measurement
- Low radiation profile

## Applications

**Roofing**  
**Calendering**  
**Extrusion coating**  
**Lithium-ion battery**

**Building products**  
**Film & sheet extrusion**  
**Nonwovens**





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- Raw material savings and reduced scrap
- Improved yield and higher quality products

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# PROSIS infrared process analysis thickness sensor

Whether you need a coating thickness gauge, paint thickness gauge, or film thickness gauge, the Thermo Scientific™ PROSIS™ infrared process analysis thickness sensor uses the full spectral response of the near infrared range to analyze materials on the line, providing precise, multi-component thickness data that improves production quality and reduces waste.

Producers of plastic films, extrusion coatings, coextruded films, lithium-ion batteries and nonwovens can get accurate thickness and moisture data, improve product quality, and precisely control raw material use with this easily-calibrated infrared thickness sensor.

## Features and benefits

- Easy to use and calibrate with low cost of ownership
- Exceptional performance for both single and multi-layer product structure
- Raw material savings and reduced scrap
- Improved yield and higher quality products
- Ideal for multi-layer coatings and extrusions, and multi-component non-wovens
- Complete spectrum infra-red detector for best measurement
- Temperature stabled sensor compatible with ambient temp of up to 55°C without external cooling
- Zero moving parts for durability and long life

## Applications

**Stretch & shrink film**  
**Extrusion coatings**  
**Lithium-ion battery**

**Coextruded film**  
**Nonwovens**





[Gauging platforms](#)

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[Scanners](#)

[Beta Plus](#) [PROSIS](#) [ShadowMaster](#) [X-Ray Master](#)

# PROSIS infrared process analysis thickness sensor

Whether you need a coating thickness gauge, paint thickness gauge, or film thickness gauge, the Thermo Scientific™ PROSIS™ infrared process analysis thickness sensor uses the full spectral response of the near infrared range to analyze materials on the line, providing precise, multi-component thickness data that improves production quality and reduces waste.

Producers of plastic films, extrusion coatings, coextruded films, lithium-ion batteries and nonwovens can get accurate thickness and moisture data, improve product quality, and precisely control raw material use with this easily calibrated infrared thickness sensor.



Related content (click to hide)

- Easy to use and calibrate with low cost of ownership
- Exceptional performance for both single and multi-layer product structure
- Low material savings and reduced scrap
- Improved yield and higher quality products

## Applications

## Gauging platforms

## Scanners

## Controls

## Collateral & literature

Film & sheet extrusion	21PlusHD for building materials	Mark III	Automatic profile control	21PlusHD spec sheet
Coating	21PlusHD for nonwovens	L400	Machine direction control	21PlusHD advanced application controls spec sheet
Building materials	21PlusHD for film & sheet extrusion	L220	Calender control	21PlusHD for lithium-ion battery brochure
Nonwovens	21PlusHD for coating & converting			IPlus! spec sheet
Lithium-ion battery	21PlusHD for lithium-ion battery			PROSIS brochure
	IPlus! for film & sheet extrusion			
	IPlus! for coating			
	IPlus! for nonwovens			



# ShadowMaster direct thickness sensor

**Many interacting variables in the manufacturing process make accurate thickness measurement a challenge.**

The Thermo Scientific™ ShadowMaster direct thickness sensor provides accurate, non-contact online thickness measurement of a moving web. It can measure a variety of materials up to 6500 microns (260 mils), for greater process control, improved quality and increased productivity without calibration or regulatory approval. The ShadowMaster direct thickness sensor is insensitive to product color, transparency and opacity and can also measure the total thickness of single, multi-layer and embossed materials. The measurement package comprises optical, inductive and temperature sensors to accurately measure material with a variety of surface finishes.

## Features and benefits

- Fast installation and easy to use
- Low cost of ownership and high return on investment
- High reliability and ease of maintenance
- Thickness measurement is not influenced by material type, color or density
- Non-nuclear and license-free
- Non-contacting, no web marking
- No instrument air or water utility requirements for sheet temperature under 60°C
- Does not require regulatory licensing, protective gates or interlock devices

## Applications

**Extruded sheet**

**Foam**

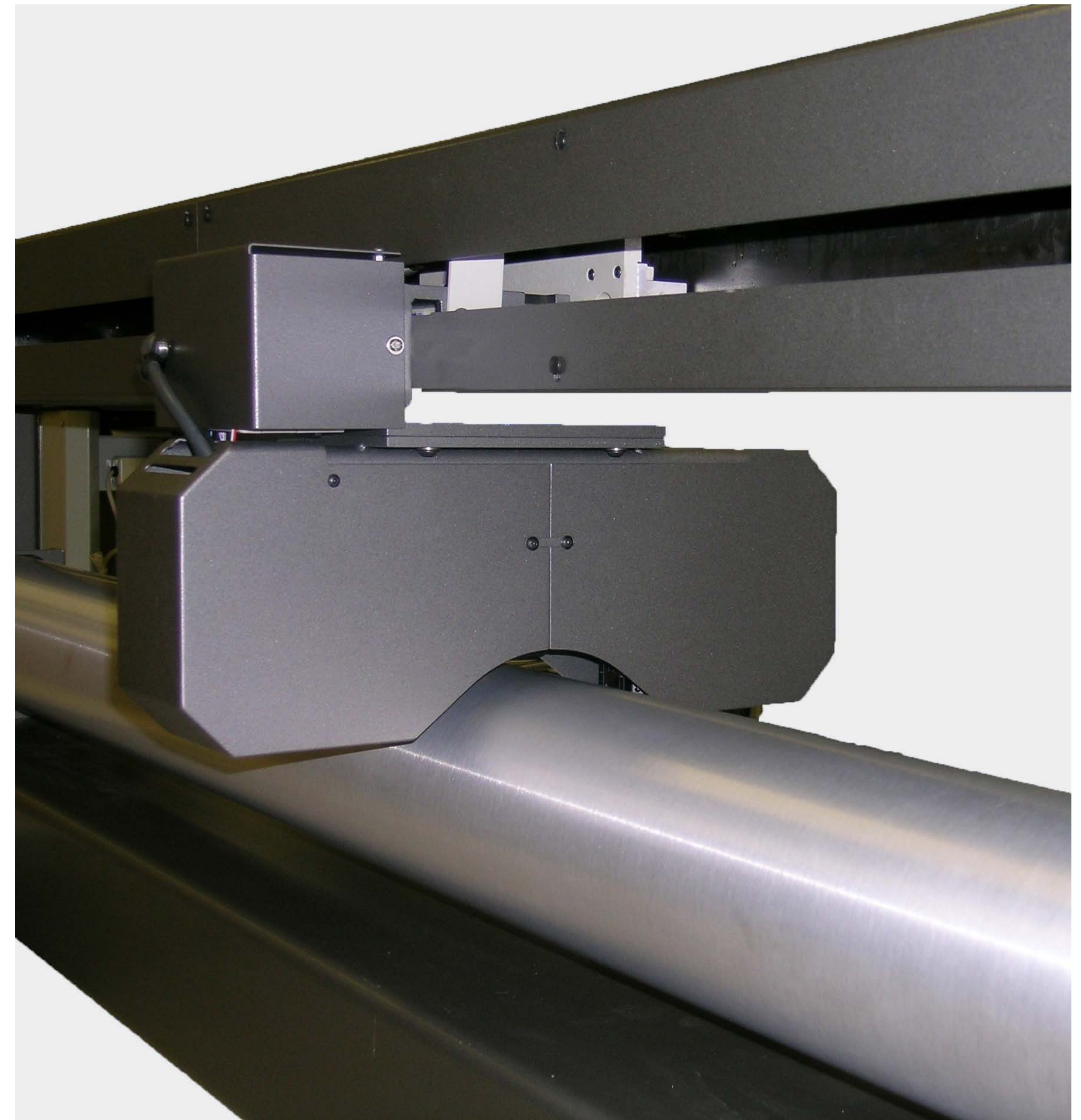
**Composites**

**Multilayer/embossed materials**

**Calendered sheet**

**Vinyl**

**Coated substrates**





[Gauging platforms](#)

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[Controls](#)

[Scanners](#)

[Beta Plus](#) [PROSIS](#) [ShadowMaster](#) [X-Ray Master](#)

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Related content (click to hide)

## Features and benefits

### Applications

Film & sheet extrusion

Vinyl calendering

Building materials

### Gauging platforms

21PlusHD for film & sheet extrusion

21PlusHD for vinyl calendering

21PlusHD for building materials

IPlus! for film & sheet extrusion

IPlus! for vinyl calendering

### Scanners

Mark III

L400

L220

### Controls

Automatic profile control

Machine direction control

Calender control

### Collateral & literature

21PlusHD spec sheet

21PlusHD advanced application controls spec sheet

IPlus! spec sheet

ShadowMaster spec sheet

### Applications

Extruded sheet

Foam

Composites

Multilayer/embossed materials

Vinyl

Coated substrates



# X-Ray Master weight and thickness sensor

Get accurate, stable, high-resolution weight or thickness measurement and improve the quality of films to fiberglass to nonwovens.

The Thermo Scientific™ X-Ray Master weight and thickness sensor provides non-contact measurement of a material on a moving web. The x-ray absorption characteristics of the product are used to accurately measure its properties, while the sensors deliver accurate, high-resolution measurement over a wide product range compared to nucleonic techniques. Its digitally controlled power source enables the sensor to be precisely tuned to measure specific material properties, allowing a wide range of products to be measured on the same line with a single sensor, resulting in a simple, cost-effective solution.

## Features and benefits

- Simple, cost-effective solution
- Raw material savings and reduced scrap
- Improved yield and higher quality products
- Accurate, high-resolution measurement over a wide product range
- Non-nuclear sensor
- Minimum radiation shielding requirements
- High-speed thermopile air gap temperature measurement
- Digitally-tuned x-ray source

## Applications

**Cast film**

**Nonwovens**

**Coating weight**

**Biax**

**Insulating materials**





[Gauging platforms](#)

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[Controls](#)

[Scanners](#)

[Beta Plus](#) [PROSIS](#) [ShadowMaster](#) [X-Ray Master](#)

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Related content (click to hide)

## Features and benefits

• Simple, cost-effective solution

• Low material savings and reduced scrap

• Improved yield and higher quality

• Non-wasteful sensor

• High speed, thermal stability

• High accuracy measurement

• High speed, thermal stability

• High accuracy measurement

• High speed, thermal stability

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• High accuracy measurement

• High speed, thermal stability

• High accuracy measurement

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## Applications

Film & sheet extrusion

Building materials

Nonwovens

## Gauging platforms

21PlusHD for building materials

21PlusHD for film & sheet extrusion

21PlusHD for nonwovens

IPlus! for film & sheet extrusion

IPlus! for nonwovens

## Scanners

Mark III

L400

L220

## Controls

Automatic profile control

Machine direction control

Calender control

## Collateral & literature

21PlusHD spec sheet

21PlusHD advanced application controls spec sheet

IPlus! spec sheet

X-Ray Master spec sheet

## Applications

Cast film

Nonwovens

Coating weight

Biax

Insulating ma



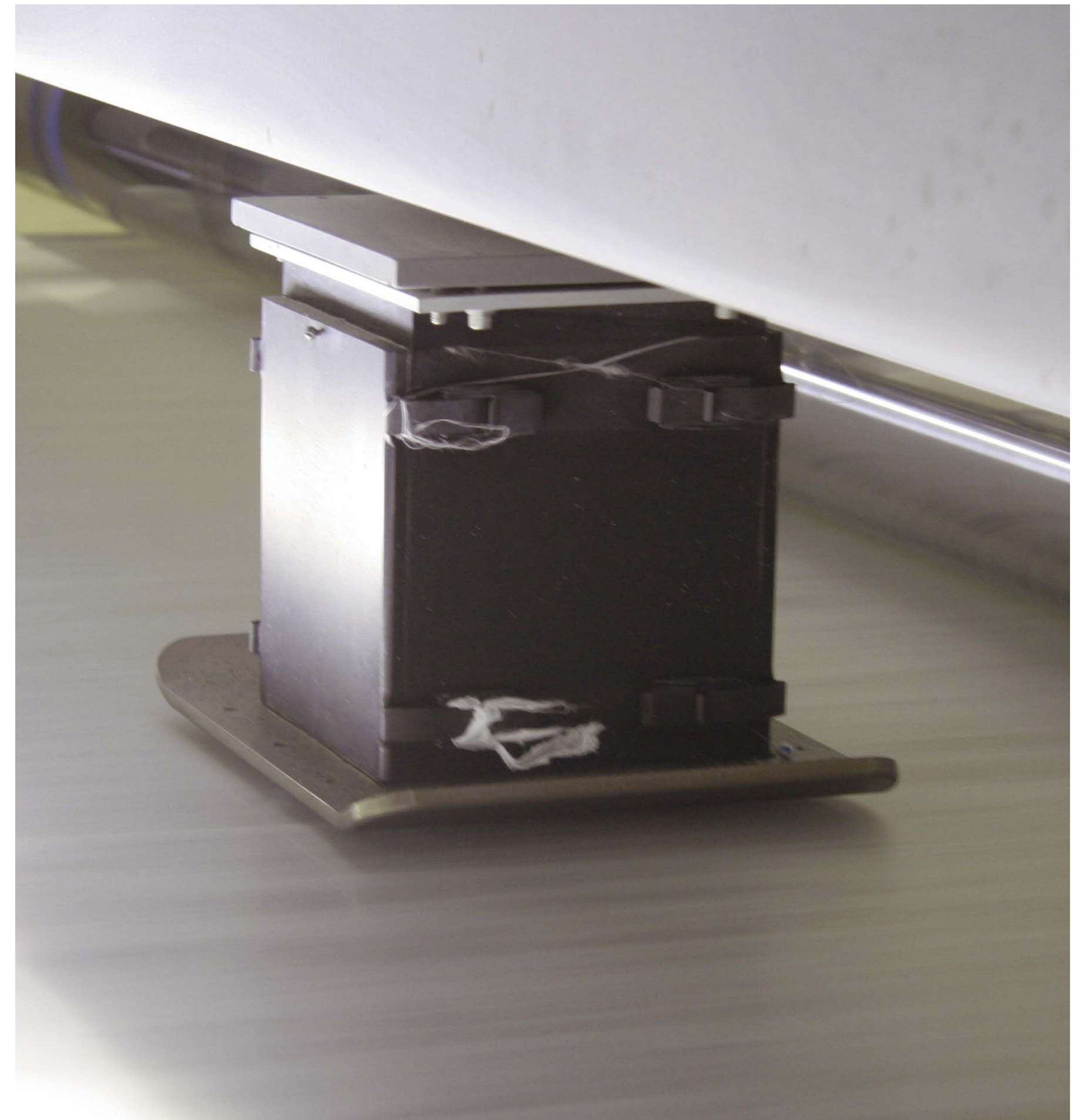
# Thermo Scientific advanced application controls

Our suite of advanced machine-direction and cross-direction controls cover a wide range of processes with complex requirements. These advanced application controls significantly improve both quality and productivity, delivering consistent results and an impressive return on investment.

Automatic profile control

Machine direction control

Calendar control





# Automatic profile control

Thermo Scientific™ automatic profile control (APC) is a complete hardware and software solution for automatic extrusion dies that delivers flat quality profiles for extruded film, sheet or coatings.

APC captures high-resolution profile measurements from the system scanning sensors to supervise the extruder die bolt positions. A die-mapping algorithm continuously aligns each measurement zone to its respective die bolt.

Precise die mapping is achieved with a melt flow algorithm that models both the linear and non-linear shrinkage of the polymer in the neck-in region. This die mapping function operates at the end of every scan to deliver consistent control performance. The final control output arrays are corrected with a convolution algorithm that decouples the crossflow interactions between the adjacent die bolts.

For biax processes, APC employs a mass balance control algorithm that accurately maps and controls the film profile after the tenter oven. Cascade control automatically adjusts the shape target of the primary die control at the cast end. This measurement and control strategy provides faster start-up, higher quality and greater overall economic benefits.

## Features and benefits

- Uniform cross-direction product profile for maximum product quality
- Tunable die bolt heating and cooling gains allow optimum actuator control
- Accelerated time response ensure flat profiles are achieved quickly
- Randomization and roll factor algorithms eliminate gauge bands
- Melt flow algorithm provides precise die mapping in the non-linear neck-in region
- Biax cascade controls provide fast, stable control response
- Convolution modeling between die bolts decouples adjacent diebolt interaction
- Skip and duplicate positioning locks actuators outside the sheet width to a fixed value for stable edges
- Shape sub-recipe archive ensures repeatable profile shape control for each product
- Die bolt shuffle option reallocates final control outputs to operational hardware in the event of failure
- Heater burnout detection alarm option alerts operators to malfunctioning actuators





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## Related content (click to hide)

### Applications

Film & sheet extrusion

Coating

### Gauging platforms

21PlusHD for film & sheet extrusion

21PlusHD for coating & converting

21PlusHD for lithium-ion battery

IPlus! for film & sheet extrusion

IPlus! for coating

### Scanners

Mark III

L400

L220

### Sensors

Beta Plus

PROSIS

ShadowMaster

X-Ray Master

### Collateral & literature

IPlus! spec sheet

21PlusHD spec sheet

21PlusHD advanced application controls spec sheet

21PlusHD for lithium-ion battery brochure

PROSIS brochure

Beta Plus brochure

X-Ray Master spec sheet

ShadowMaster spec sheet



# Machine direction control

Thermo Scientific™ machine direction (MD) nominal control supervises either line speed or screw/pump speed in order to maintain uniform product basis weight or thickness.

At the end of each scan the thickness or basis weight setpoint is compared to the last scan average. The difference is used to calculate a new setpoint for either the line speed or screw/pump inner control loop.

## Target management control

Raw material savings through ‘down-gauging’ can be realized with target management control (TMC). This control ensures that no part of the final product is outside either an upper or lower quality control limit. TMC takes advantage of flat profiles and straight quality trends to reduce the nominal control target, thus automating the process of down-gauging. This provides substantial raw material savings while also eliminating scrap. In cases where products are sold by area, TMC produces increased yield per unit weight of raw material consumed.

## Adaptive throughput control

Adaptive throughput control (ATC) optimizes the throughput rate of a process based on a matrix of process and quality constraints to deliver maximum productivity at the highest quality. This adaptive control reacts to process conditions and product changes in real-time. Process parameters such as line speed, screw speed, melt pressure and melt temperature are continually monitored along with product variations; both sets of data are fed forward to a process variance analyzer (PVA). ATC then ramps the process variables to optimum production conditions in a coordinated fashion.





[Gauging platforms](#)

[Sensors](#)

[Controls](#)

[Scanners](#)

[Automatic profile](#) [Machine direction](#) [Calendar](#)

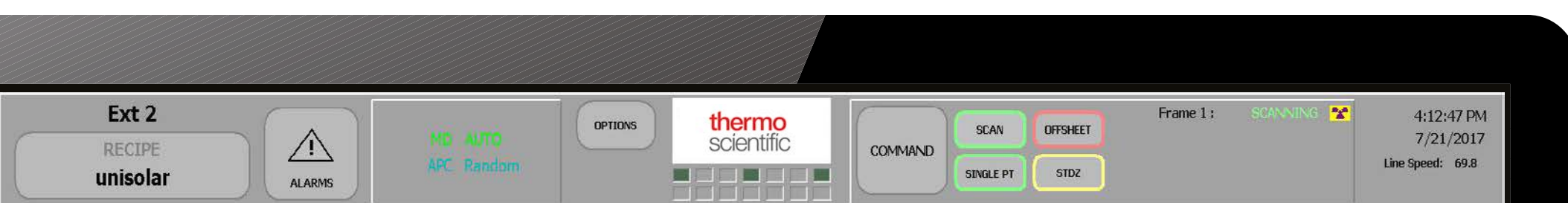
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### Related content (click to hide)

#### Applications

#### Gauging platforms

#### Scanners

#### Sensors

#### Collateral & literature

Film & sheet extrusion	21PlusHD for building materials	Mark III	Beta Plus	IPlus! spec sheet
Coating	21PlusHD for nonwovens	L400	PROSIS	21PlusHD spec sheet
Building materials	21PlusHD for film & sheet extrusion	L220	ShadowMaster	21PlusHD advanced application controls spec sheet
Nonwovens	21PlusHD for coating & converting	L220 Shadow	X-Ray Master	21PlusHD for lithium-ion battery brochure
	21PlusHD for lithium-ion battery	C-Frame		PROSIS brochure
	IPlus! for film & sheet extrusion	Box Beam		Beta Plus brochure
	IPlus! for coating			X-Ray Master spec sheet
	IPlus! for nonwovens			ShadowMaster spec sheet



# Calendar control

Thermo Scientific™ calendar controls deliver significant economic savings through raw material savings, faster start-ups, more rapid product change and scrap minimization.

Incorporating knowledge from hundreds of applications, including vinyl and adhesive calendaring processes, these control strategies provide fast, stable performance over a broad range of products.

First, a quadratic curve-fit algorithm determines the shape of the thickness profile to be used for supervisory roll gap control. Then three control loops operate simultaneously to reduce the offset, crown and thickness tilt errors to zero at the end of each scan. Finally, to prevent control oscillation, a variscan feature coordinates the scanner speed with the web width and speed to eliminate the roll run-out from zone average calculations. Additional control options such as absolute or delta preset, mid-range, feed forward, growth compensation, and width control are available.

## Features and benefits

- Unique curve-fit algorithm accurately models the process for optimum control
- Variscan eliminates the effect of roll runout on control
- Absolute or delta preset feature provides fast control setup at startup and product change
- Feed forward control decouples line speed change effects
- Motor start compensation models control motor response delay
- Screw control backlash compensates correctly for turn-around control outputs
- Automatic gain algorithm compensates for stock hardness or thin products





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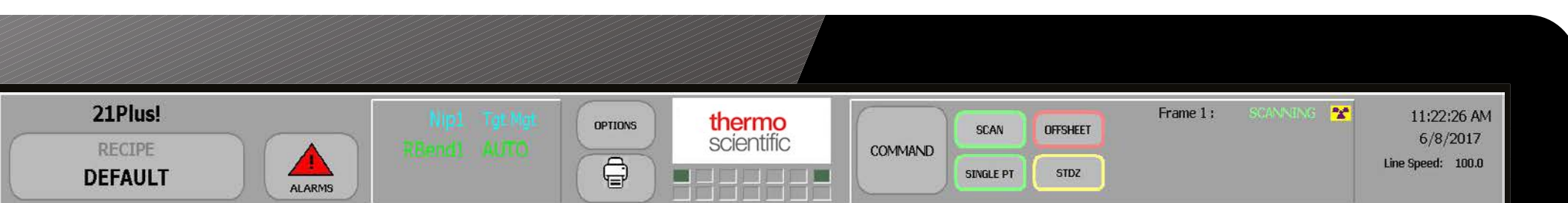
[Automatic profile](#) [Machine direction](#) [Calendar](#)

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## Related content (click to hide)

### Applications

[Vinyl calendaring](#)

[Building materials](#)

### Gauging platforms

[21PlusHD for building materials](#)

[21PlusHD for vinyl calendaring](#)

[21PlusHD for lithium-ion battery](#)

[IPlus! for vinyl calendaring](#)

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### Sensors

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### Collateral & literature

[21PlusHD spec sheet](#)

[21PlusHD advanced application controls spec sheet](#)

[21PlusHD for lithium-ion battery brochure](#)

[IPlus! spec sheet](#)

[Beta Plus brochure](#)

[X-Ray Master spec sheet](#)



# Thermo Scientific scanners

Reliability, modularity, ease of maintenance and low cost of ownership are of paramount importance. Thermo Scientific™ solid scanner designs assure accuracy and profile repeatability. Each scanner incorporates an embedded iBox processor and Linux operating system to provide fast, secure, robust measurement.

Mark III scanner

L400 scanner

L220 scanner

L220 Shadow scanner

C-Frame scanner

Box Beam scanner





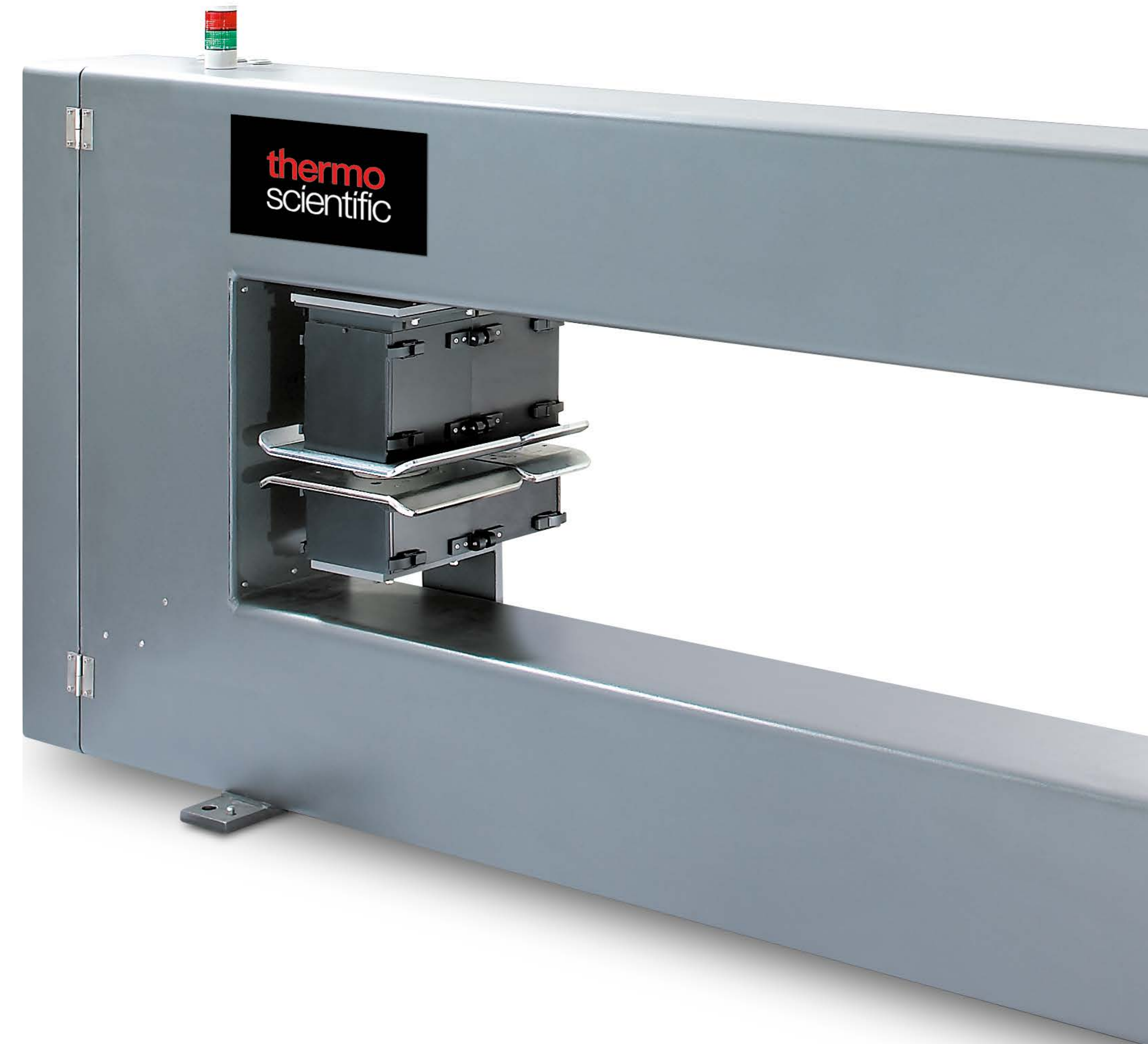
## Mark III scanner

**The Thermo Scientific™ Mark III scanner is a high performance measurement platform for the complete family of Thermo Scientific online sensors.**

The solid scanner design combines stability, reliability and maintainability to ensure maximum life cycle performance. It utilizes the proven exoskeleton design, incorporating a tubular steel structure, which provides high stability and isolates internal components from the environment. The rugged design makes the MARK III scanner an excellent solution for demanding applications subject to high temperature, moisture, dust and fiber.

### Features and benefits

- Provides reliable scanning platform for the complete family of Thermo Scientific sensors
- Multiple sensor heads can be mounted for a variety of on-line measurement requirements
- Exoskeleton design isolates mechanical and electrical components from the environment
- Side access design prevents particles from falling onto the web while protecting the rails and bearings
- Factory laser rail alignment ensures optimum sensor alignment and performance
- DC drive system allows scan speeds of up to 50.8 cm/s (20 in/s)
- Steel-reinforced drive belts ensure precise alignment and positioning of sensor heads
- Distributed scanner processor performs all data acquisition and sensor control functions locally
- Modular internal electronics improve reliability and simplify maintenance
- Cat track style cable carriers ensure a long maintenance free life for sensor cables and hoses
- 90° and 45° passline angle options available
- Blower purged options available with hazard reduced electronics for sensitive environments.





# Mark III scanner

The Thermo Scientific™ Mark III industrial scanner is a high performance measurement platform for the complete family of Thermo Scientific online sensors.

The solid scanner design combines stability, reliability and maintainability to ensure maximum life cycle performance. It utilizes the proven exoskeleton design, incorporating a tubular steel structure, which provides high stability and isolates internal components from the environment. The rugged design makes the MARK III industrial scanner an excellent solution for demanding applications subject to high temperature, moisture, dust and fiber.



## Features and benefits

Related content (click to hide)

### Applications

### Gauging platforms

### Sensors

### Controls

### Collateral & literature

Film & sheet extrusion	21PlusHD for building materials	Beta Plus	Automatic profile control	21PlusHD spec sheet
Coating	21PlusHD for nonwovens	PROSIS	Machine direction control	21PlusHD advanced application controls spec sheet
Vinyl calendering	21PlusHD for film & sheet extrusion	ShadowMaster	Calender control	21PlusHD for lithium-ion battery brochure
Building materials	21PlusHD for coating & converting	X-Ray Master		PROSIS brochure
Lithium-ion battery	21PlusHD for vinyl calendering			Beta Plus brochure
Nonwovens	21PlusHD for lithium-ion battery			ShadowMaster spec sheet
				X-Ray Master spec sheet



## L400 scanner

The Thermo Scientific™ L400 scanner is a high performance platform for many of the Thermo Scientific on-line sensors, combining stability, reliability and maintainability to ensure maximum lifecycle performance.

Its unique design incorporates a precision weldment for strength and durability, as well as completely enclosed rails to prevent contamination of the sheet. The sensor drive uses a steel reinforced timing belt for strength and precision while a digital encoder precisely controls the sensor position.

### Features and benefits

- Rugged design protects mechanical and electrical components from the environment and keeps debris from contaminating the web
- Steel reinforced timing belt ensures precision and low maintenance
- Scanner processor performs all measurement functions, eliminating the dependence on a supervisory computer
- Modular electronics improve reliability and simplify maintenance
- Standard ethernet interface provides simple connection to network
- Remote push button control allows scanner control from any location
- Remote red and green indicator lamps alert operator of measurement status
- Cable track style cable carriers ensure a long maintenance free life for sensor cables





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## Related content (click to hide)

### Applications

### Gauging platforms

### Sensors

### Controls

### Collateral & literature

<a href="#">Film &amp; sheet extrusion</a>	<a href="#">IPlus! for film &amp; sheet extrusion</a>	<a href="#">Beta Plus</a>	<a href="#">Automatic profile control</a>	<a href="#">IPlus! spec sheet</a>
<a href="#">Nonwovens</a>	<a href="#">IPlus! for coating</a>	<a href="#">PROSIS</a>	<a href="#">Machine direction control</a>	<a href="#">PROSIS brochure</a>
<a href="#">Building materials</a>	<a href="#">IPlus! for nonwovens</a>	<a href="#">X-Ray Master</a>	<a href="#">Calender control</a>	<a href="#">Beta Plus brochure</a>
<a href="#">Vinyl calendering</a>	<a href="#">IPlus! for vinyl calendering</a>			<a href="#">X-Ray Master spec sheet</a>



## L220 scanner

The Thermo Scientific™ L220 scanner is a high performance scanning platform combining stability, reliability and maintainability to ensure maximum lifecycle performance.

It is an extremely rugged scanning platform with a low profile designed to fit into reduced space with minimal machine modifications. The unique design needs no adjustments and is precision machined for extended lifetime maintenance of sensor alignment, while the rails are completely enclosed to keep them free of dirt and to ensure that material cannot drop on to the sheet.

### Features and benefits

- Sturdy and reliable scanning platform for on-line product quality sensors
- Rugged design protects mechanical and electrical components from the environment and keeps dust from contaminating the web
- Precision stress relieved weldment with machined railmounts for lifetime alignment
- Steel reinforced timing belt ensures precision and low maintenance
- Modular remote electronics, maximize reliability and simplify installation and maintenance
- Standard Ethernet interface provides simple connection to network
- Horizontal mounting and passline
- Remote push button control allows scanner control from any location
- Remote red and green indicator lamps alert operator of measurement status
- 'Cat track' style cable carriers ensure a long maintenance free life for sensor cables





# L220 scanner

The Thermo Scientific™ L220 scanner is a high performance scanning platform combining stability, reliability and maintainability to ensure maximum lifecycle performance.

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## Features and benefits

### Related content (click to hide)

#### Applications

- Film & sheet extrusion
- Lithium-ion battery
- Nonwovens
- Coating
- Vinyl calendering

#### Gauging platforms

- 21PlusHD for building materials
- 21PlusHD for nonwovens
- 21PlusHD for film & sheet extrusion
- 21PlusHD for coating & converting
- 21PlusHD for lithium-ion battery
- 21PlusHD for vinyl calendering
- IPlus! for film & sheet extrusion
- IPlus! for coating
- IPlus! for nonwovens
- IPlus! for vinyl calendering

#### Sensors

- Beta Plus
- PROSIS

#### Controls

- Automatic profile control
- Machine direction control
- Calender control

#### Collateral & literature

- IPlus! spec sheet
- 21PlusHD spec sheet
- 21PlusHD advanced application controls spec sheet
- 21PlusHD for lithium-ion battery brochure
- PROSIS brochure
- Beta Plus brochure



## L220 Shadow scanner

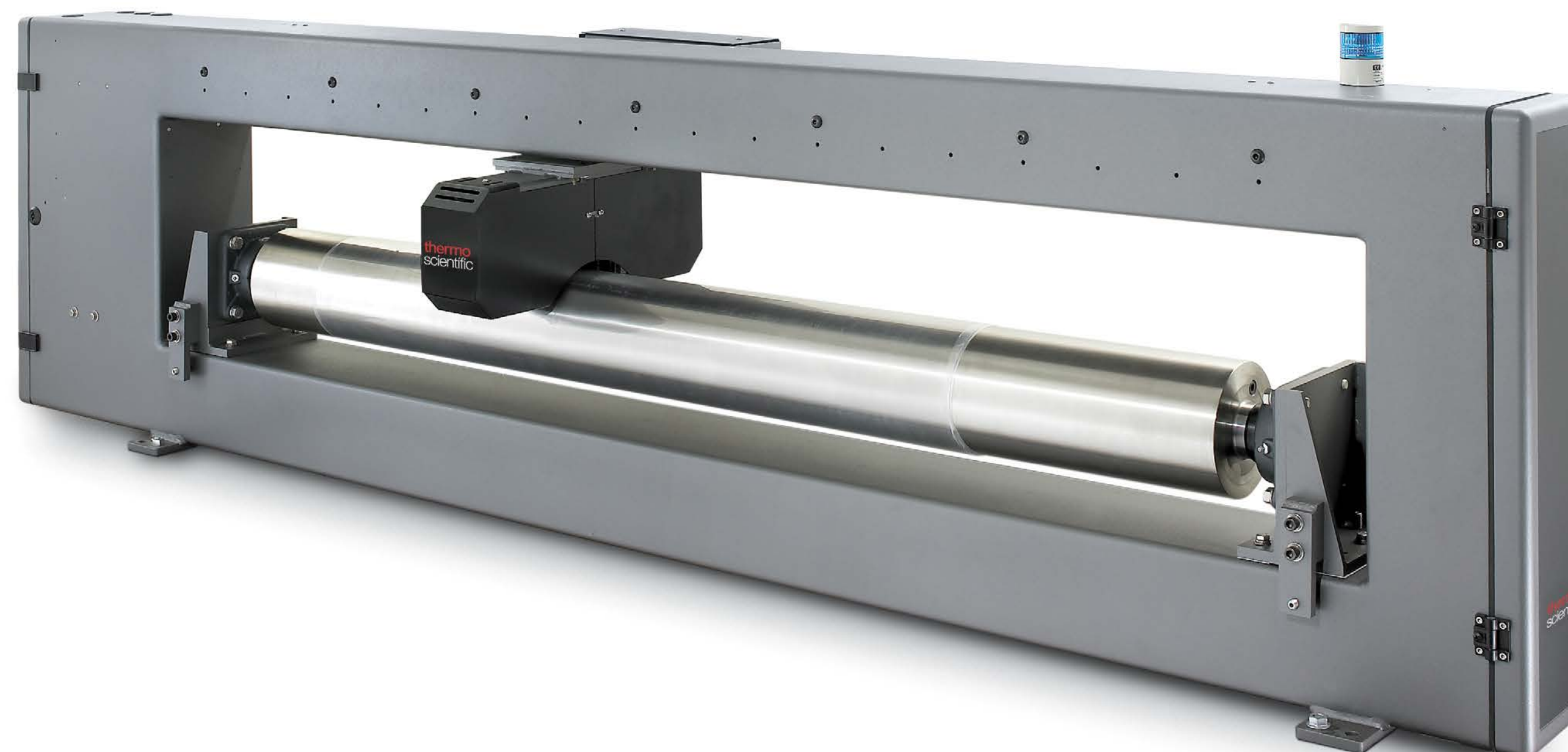
**The Thermo Scientific™ L220 Shadow scanner integrates a 6.25in (15.8cm) diameter stainless roll required for measurement technique exclusively with the Thermo Scientific™ ShadowMaster direct thickness sensor.**

It combines stability, reliability and maintainability to ensure maximum lifecycle performance.

The L220 Shadow scanner is an extremely rugged and high performance scanning platform with a low profile designed to fit into reduced space and to minimize machine modifications. Its unique design needs no adjustments and is precision machined for extended lifetime maintenance of sensor alignment, while the rails are completely enclosed to keep them free of dirt and to ensure that material cannot drop on to the sheet.

### Features and benefits

- Sturdy and reliable scanning platform for the ShadowMaster direct thickness sensor
- Rugged design protects mechanical and electrical components from the environment and keeps dust from contaminating the web
- Precision stress relieved weldment with machined rail mounts for lifetime alignment
- Steel reinforced timing belt ensures precision and low maintenance
- Modular electronics improve reliability and simplify maintenance
- Blue indicator lamp alerts operator of measurement status
- Cable track style cable carriers ensure a long maintenance free life for sensor cables
- True thickness measurement is not influenced by material type, color or density
- No regulatory license requirements
- Easy to install and use





[Gauging platforms](#)

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[Controls](#)

[Scanners](#)

[Mark III](#) [L400](#) [L220](#) [L220 Shadow](#) [C-Frame](#) [Box Beam](#)

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## Related content (click to hide)

### Applications

### Gauging platforms

### Sensors

### Controls

### Collateral and literature

<a href="#">Film &amp; sheet extrusion</a>	<a href="#">21PlusHD for building materials</a>	<a href="#">ShadowMaster</a>	<a href="#">Automatic profile control</a>	<a href="#">21PlusHD spec sheet</a>
<a href="#">Vinyl calendering</a>	<a href="#">21PlusHD for film &amp; sheet extrusion</a>		<a href="#">Machine direction control</a>	<a href="#">21PlusHD advanced application controls spec sheet</a>
<a href="#">Building materials</a>	<a href="#">21PlusHD for vinyl calendering</a>		<a href="#">Calender control</a>	<a href="#">IPlus! spec sheet</a>
	<a href="#">IPlus! for film &amp; sheet extrusion</a>			<a href="#">ShadowMaster spec sheet</a>
	<a href="#">IPlus! for coating</a>			
	<a href="#">IPlus! for vinyl calendering</a>			



## C-Frame scanner

The Thermo Scientific™ C-Frame scanner is a unique high performance scanning platform combining stability, reliability and maintainability to ensure maximum life cycle performance.

The C-Frame scanner is the ideal choice for installations with restricted space, harsh environments, or where the need to easily retract all of the measurement hardware from the passline is required. It is available in a variety of configurations or application specific designs and incorporates heavy tubular steel weldments to ensure durability and guarantee the permanent alignment of the source and detector for optimum measurement performance.

### Features and benefits

- Ultra reliable scanning platform
- Low profile compact design, allowing installation in very tight spaces
- Fully retractable sensor allows maximum passline accessibility and easy maintenance
- Patented hexrail, cam roller bearings and rail wipes ensure smooth reliable operation
- Flexible design offers a variety of configurations including upright or suspended mount, horizontal or vertical passline, angled passline, or application specific designs
- Modular remote electronics, maximize reliability and simplify installation and maintenance
- Standard ethernet interface ensures reliability and simplifies installation connection





[Gauging platforms](#)

[Sensors](#)

[Controls](#)

[Scanners](#)

[Mark III](#) [L400](#) [L220](#) [L220 Shadow](#) [C-Frame](#) [Box Beam](#)

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## Related content (click to hide)

### Applications

[Building materials](#)

### Gauging platforms

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### Sensors

[Beta Plus](#)

### Controls

[Machine direction control](#)

### Collateral & literature

[21PlusHD spec sheet](#)

[21PlusHD advanced application controls spec sheet](#)

[Beta Plus brochure](#)



## Box Beam scanner

**The Thermo Scientific™ Box Beam scanner is a high-performance scanning platform engineered to provide cross machine scanning measurement for Thermo Scientific™ 21PlusHD sensors that work in reflection mode.**

This proven scanner design combines precision, reliability and maintainability to ensure maximum life cycle performance.

The backscatter scanning frame is designed for demanding applications where durability and performance are required in extremely harsh environments, and uses a unique box beam mount design to provide protection for the drive components from the harsh environment. The mount has purge ducts available to allow for positive pressure to prevent ingress of debris into the drive system.

High stability and durability guarantees the permanent alignment of source and detector or optimum measurement performance. The rugged yet high precision design makes this an excellent solution for demanding measurement requirements where the hardware is subjected to dust, high temperature, high moisture, and high levels of contaminants.

### Features and benefits

- Reliable scanning platform for online product quality sensors
- Compact design with low profile for reduced space applications
- Data acquisition and sensor control functions performed locally, eliminating the dependence on a supervisory computer
- Protective covers, sealed motor and sealed sensor components ensure performance in harsh conditions
- Protected cable track cable carriers ensure long, maintenance free life for cables and hoses

- Modular remote electronics maximize reliability and simplify installation and maintenance
- Scan, off-sheet, stop and sample check buttons can be mounted remotely for easy access
- Scanning modes include automatic edge find, fixed edge, single point, and more
- Standard ethernet interface simplifies installation and connectivity





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Vinyl calendering	21PlusHD for film & sheet extrusion	X-Ray Master	Machine direction control	21PlusHD advanced application controls spec sheet
Building materials	21PlusHD for vinyl calendering		Calender control	Beta Plus brochure
				X-Ray Master spec sheet

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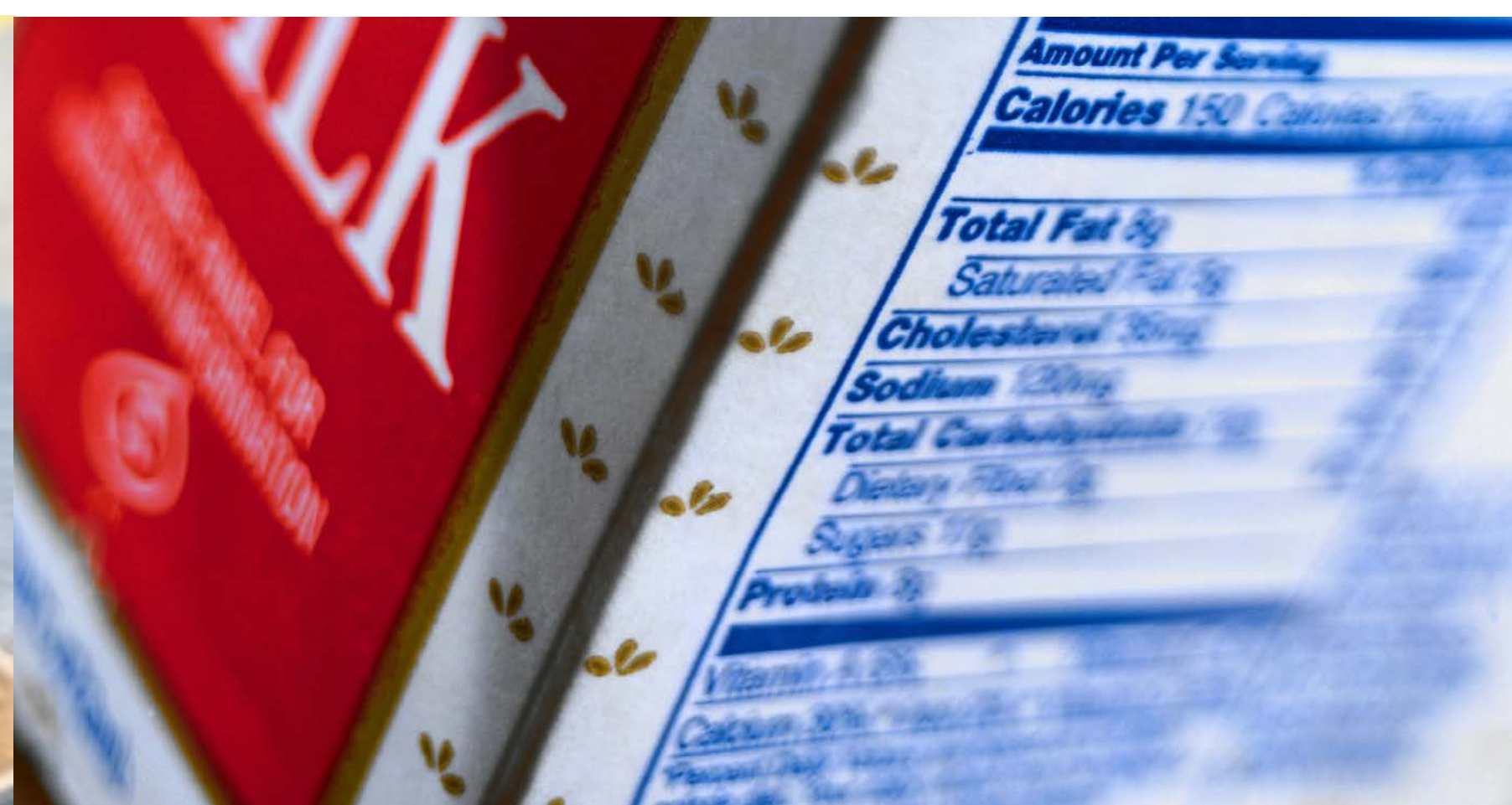
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# Applications

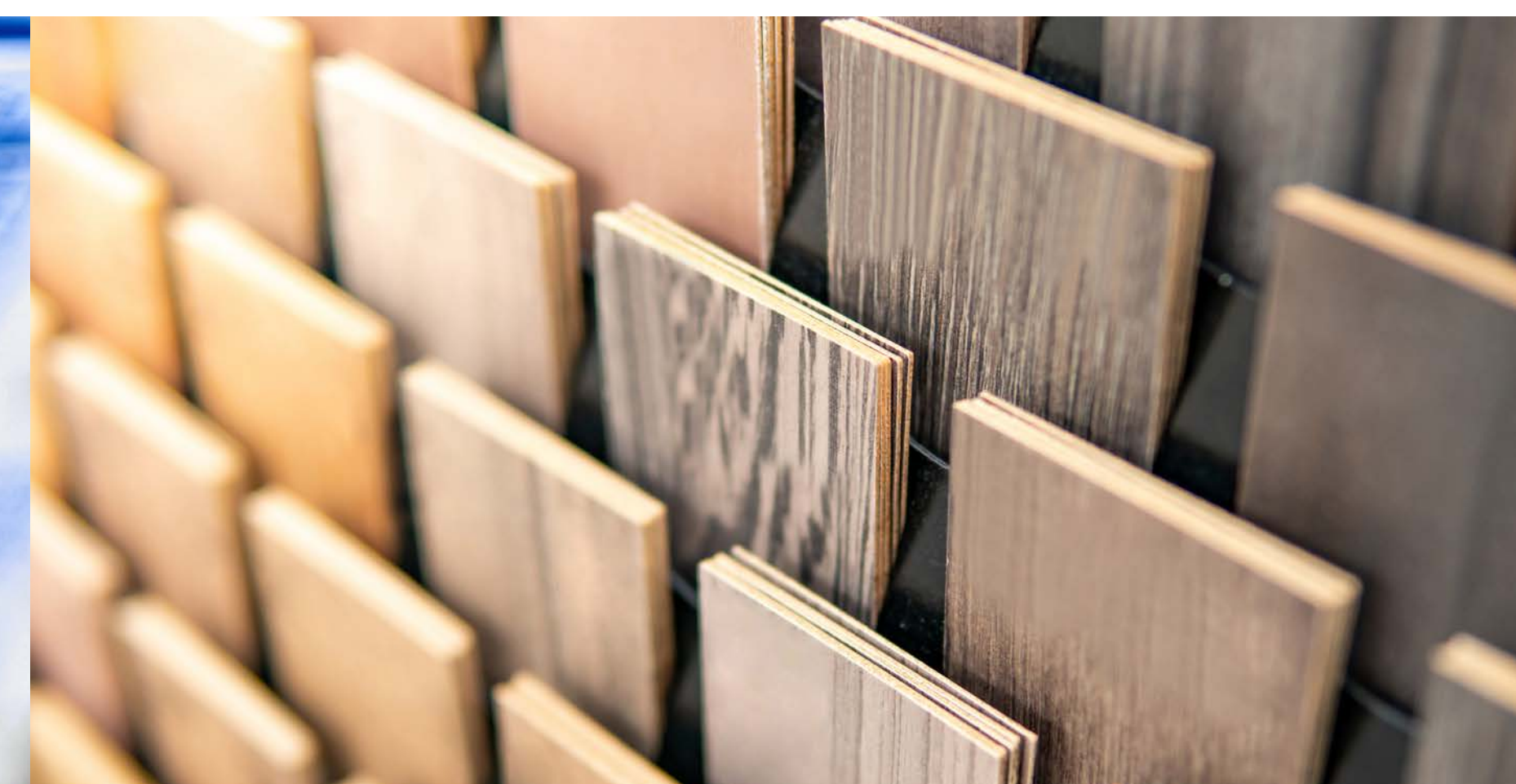
From raw material to end product... we understand web gauging applications.



Film & sheet extrusion



Coating



Vinyl calendering



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## Film & sheet extrusion

We have a wide range of experience with all major makes of extrusion lines. Our comprehensive measurement family of caliper, infrared, nuclear, optical and x-ray sensors and advanced controls is available to address the unique requirements of these applications.

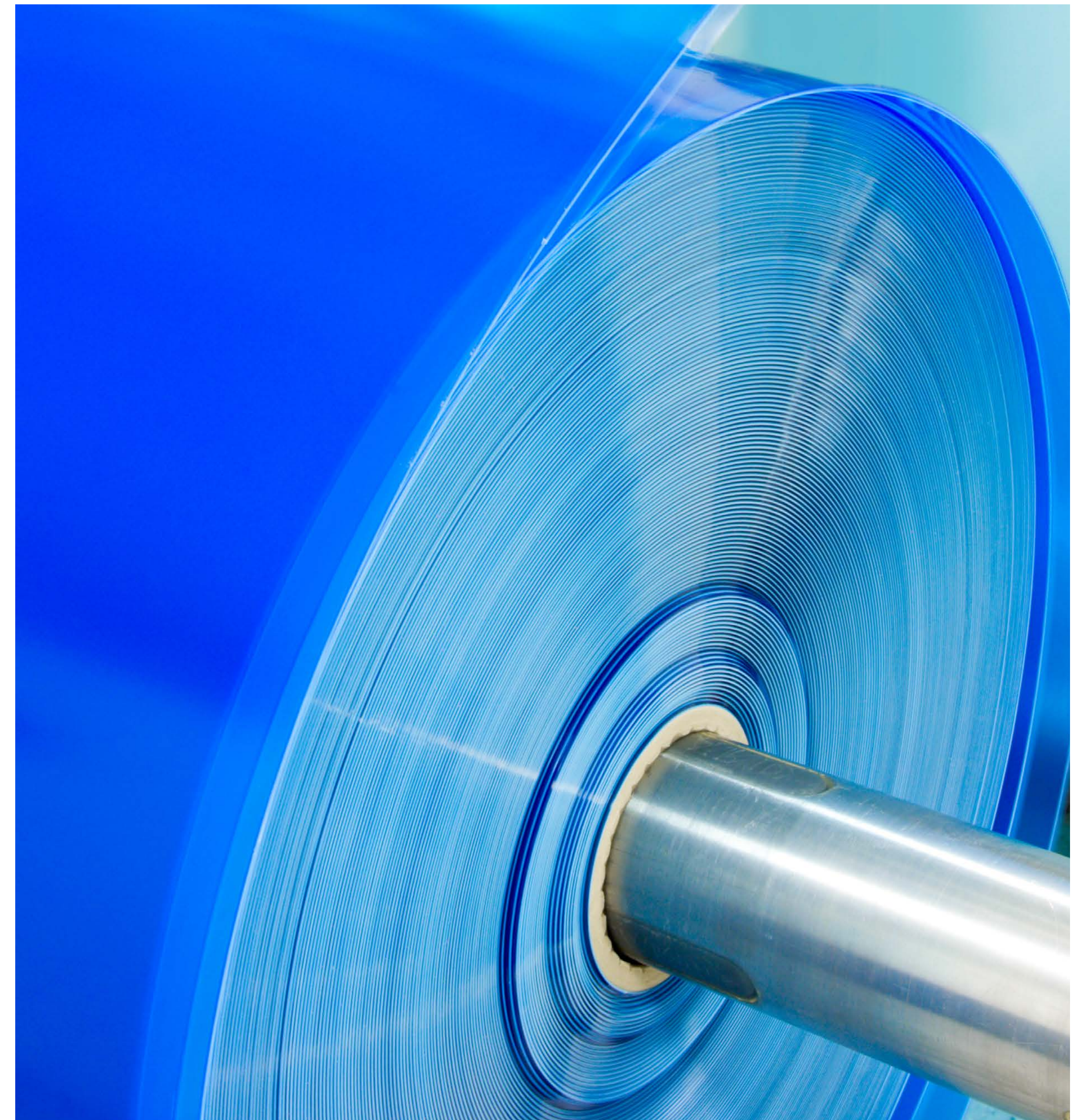
**Mono and bi-axial film**  
**Co-extrusion**  
**Cast film extrusion**  
**Film/sheet extrusion**

Biax film lines, for example, realize their greatest web gauging economic benefits through superior process visibility, responsive controls, fast start-up and product change. Cast and film-end scanning with high-resolution measurement and accurate mapping help deliver these results.

An integrated mass-balance algorithm dynamically compensates for machine direction (MD) and cross direction (CD) stretch for the cascade and automatic profile controls (APC). This strategy significantly improves MD and CD control performance, reducing film product variation and producing superior roll quality for maximum return-on-investment.

Similarly, co-extrusion and cast film applications benefit from the full portfolio of sensors and controls. Automatic sheet edge detection with non-linear asymmetric neck-in dynamically compensates for the multiple shrinkage factors of various polymers. In addition advanced MD and APC control options help deliver consistent, outstanding results.

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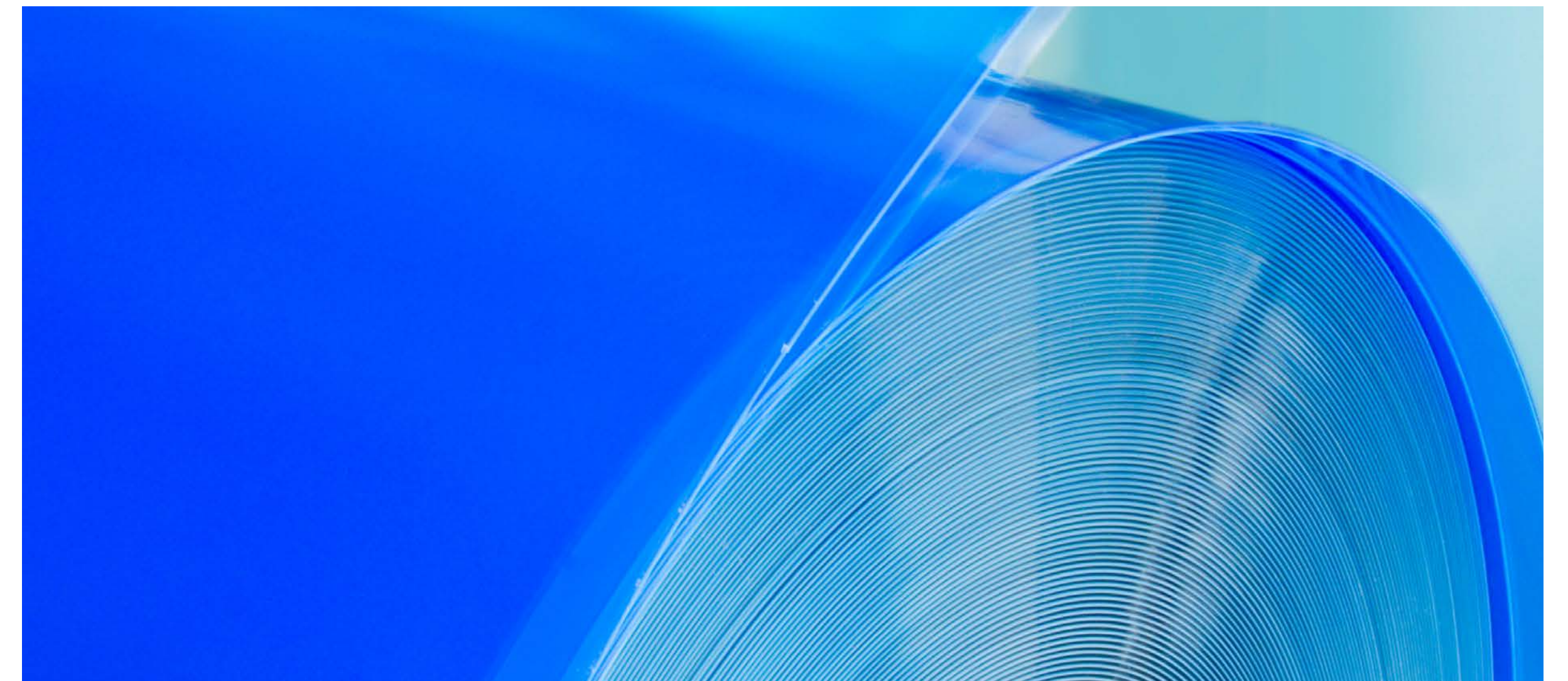
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Biax film lines, for example, realize their greatest web gauging economic benefits



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## Film & sheet extrusion (continued)

### Thermo Scientific system components for extrusion applications:

#### Biax film extrusion

Mark III scanner, PROSIS thickness sensor or Beta Plus basis weight sensor, and mass balance with cascaded autodie control.

#### Coextruded film extrusion

Mark III scanner, PROSIS thickness sensor or Beta Plus basis weight sensor, and multilayer measurement with individual MD, ratio, and autodie control.

#### Cast film extrusion

L220, L400 or Mark III scanner, ShadowMaster direct thickness sensor, X-Ray Master weight and thickness sensor, PROSIS thickness sensor or Beta Plus basis weight sensor and autodie control with target management and die bolt profile.

#### Sheet extrusion

Mark III, L220 or L400 scanner, Beta Plus basis weight sensor, ShadowMaster direct thickness sensor or X-Ray Master weight and thickness sensor and autodie control with target management and die bolt profile.



# Film & sheet extrusion (continued)

## Thermo Scientific system components for extrusion applications:

### Biax film extrusion

Mark III scanner, PROSIS thickness sensor or Beta Plus basis weight sensor, and mass balance with cascaded autodie control.

### Coextruded film extrusion

Mark III scanner, PROSIS thickness sensor or Beta Plus basis weight sensor, and multilayer measurement with individual MD, ratio, and autodie control.

### Cast film extrusion

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# Coating

Typical coating applications include liquid packaging, adhesive coatings, polyethylene, foil, barrier materials, sealants and adhesive layers.

- [Blade coating](#)
- [Roll coating](#)
- [Extrusion coating](#)
- [Tandem extrusion coating](#)
- [Lamination](#)
- [Saturation](#)
- [Slot die](#)

As the world leader in aseptic packaging measurement technology, we understand that coating weight measurement accuracy is critical for quality, productivity and scrap reduction. Thermo Scientific™ coating weight measurement solutions are available to support this.

The most accurate differential coat weight in the industry is due to the innovative Thermo Scientific™ Substrate Independent Calibration, (SICAL)™. SICAL allows for independent calibration of the base and coating materials, significantly reducing the number of product recipes as well as simplifying the calibration effort. The Thermo Scientific™ EXACTRAX™ same spot measurement then calculates accurate net coating weights. This ensures that the substrate and coated product scanners traverse precisely the same path on the web, even with line speed variation.

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- Roll coating
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- Tandem extrusion coating
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- Saturation
- Slot die



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## Coating (continued)

### Thermo Scientific system components for coating applications:

#### Blade coating

Mark III, L220 or L400 scanner, PROSIS thickness sensor, Beta Plus basis weight sensor or ShadowMaster direct thickness sensor, and high resolution profiles and zone control.

#### Roll coating

Mark III, L220 or L400 scanner, PROSIS thickness sensor, Beta Plus basis weight sensor or ShadowMaster direct thickness sensor, and high resolution profiles and zone control.

#### Extrusion coating

Mark III, L220 or L400 scanner, PROSIS thickness sensor, Beta Plus basis weight sensor or ShadowMaster direct thickness sensor, and autodie control with target management and die bolt profile.

#### Tandem extrusion coating

Mark III, L220 or L400 scanner, PROSIS thickness sensor, Beta Plus basis weight sensor or ShadowMaster direct thickness sensor, and autodie control with target management and die bolt profile.

#### Lamination

Mark III, L220 or L400 scanner, PROSIS thickness sensor, Beta Plus basis weight sensor or ShadowMaster direct thickness sensor, and autodie control with target management and die bolt profile.

#### Saturation

C-Frame, Mark III, L220, or L400 scanner, Beta Plus basis weight sensor, and high resolution profiles, zone control and substrate independent calibration.

#### Slot die

Mark III, L220 or L400 scanner, PROSIS thickness sensor, Beta Plus basis weight sensor or ShadowMaster direct thickness sensor, and high resolution profiles and zone control.



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# Coating (continued)

## Thermo Scientific system components for coating applications:

### Blade coating

Mark III, L220 or L400 scanner, PROSIS thickness sensor, Beta Plus basis weight sensor or ShadowMaster direct thickness sensor, and high resolution profiles and zone control.

### Roll coating

Mark III, L220 or L400 scanner, PROSIS thickness sensor, Beta Plus basis weight sensor or ShadowMaster direct thickness sensor, and high resolution profiles and zone control.

### Tandem extrusion coating

Mark III, L220 or L400 scanner, PROSIS thickness sensor, Beta Plus basis weight sensor or ShadowMaster direct thickness sensor, and autodie control with target management and die bolt profile.

### Lamination

Mark III, L220 or L400 scanner, PROSIS thickness sensor, Beta Plus basis weight sensor or ShadowMaster direct thickness sensor, and autodie control with target management and die bolt profile.

### Saturation

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## Vinyl calendering

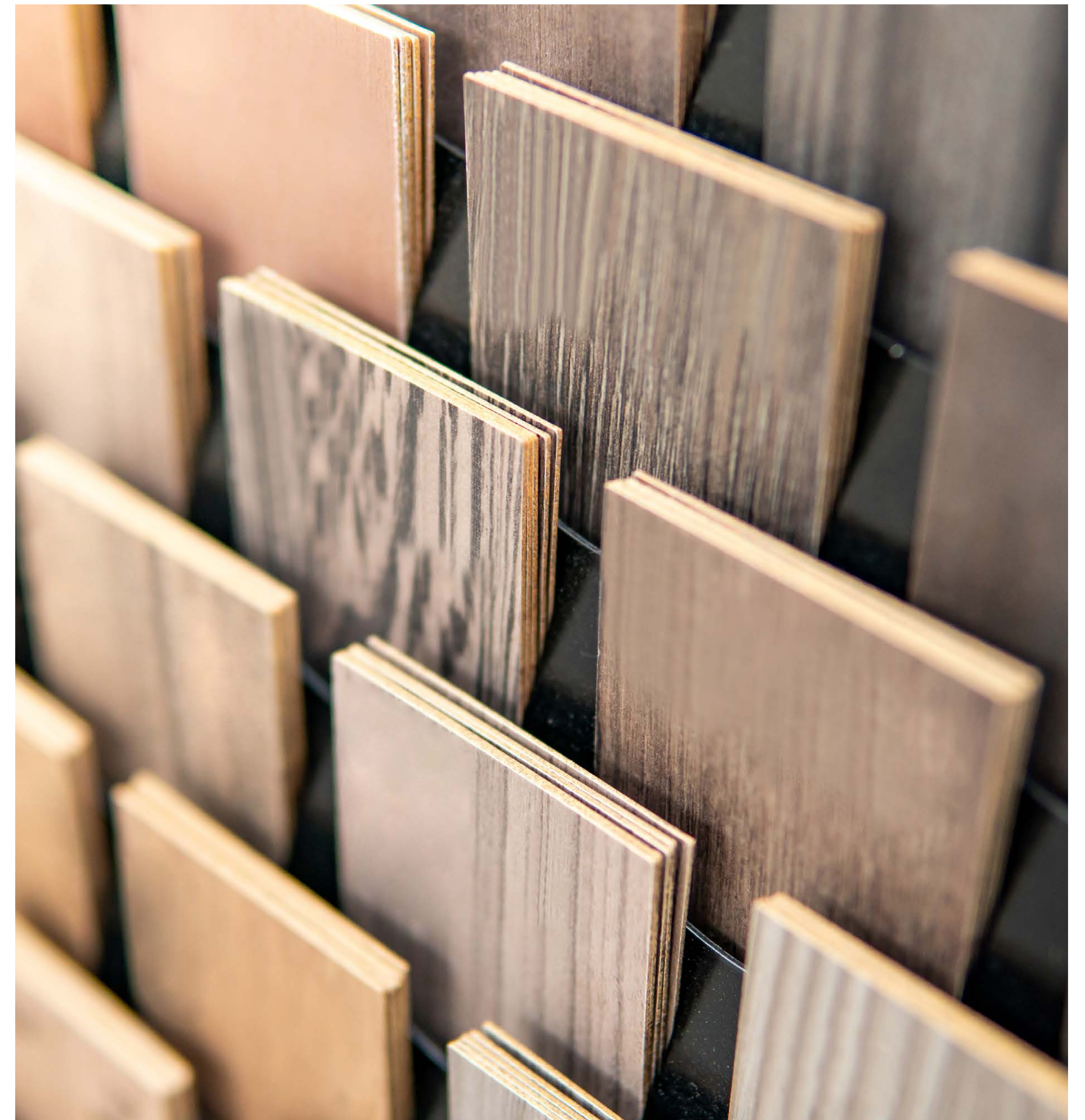
**Vinyl calendering is a complex process that requires a modular measurement and control strategy that can be configured to almost any calender.**

Thermo Scientific measurement and control systems provide accurate, reliable measurement of the basis weight or thickness of materials used in vinyl manufacturing. With a highly efficient two or three zone calender control system, this ensures each component meets strict manufacturing guidelines and high quality standards.

Vinyl calendering systems incorporate scanning basis weight and true thickness measurements with optional stationary sensors. Accurate profile measurement that is independent of roll condition and line speed is important. The Thermo Scientific™ SYNCRO-SCAN roll runout compensation synchronizes the scanning measurements to the roll rotation, eliminating short-term machine direction roll variations from profile measurement. This produces fast, responsive, accurate profiles. Flat final product profiles are assured with three-zone control via roll gap and x-axis or roll bending.

### **Thermo Scientific system components for vinyl calendering applications:**

Mark III or L400 scanner, Beta Plus basis weight sensor, ShadowMaster direct thickness sensor or X-Ray Master weight and thickness sensor, and calender control with feed forward.





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Vinyl calendering systems incorporate scanning basis weight and true thickness



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[L220 Shadow](#)

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## Vinyl calendering

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# Building materials

**Building materials are often manufactured in challenging and hostile measurement environments. Thermo Scientific measurement and control systems for building materials provide repeatable, continuous performance in the manufacturing of insulation, roofing, shingles, carpet, flooring, nonwovens, abrasives and other building supplies.**

Our systems combine advanced sensor technology with low maintenance operation and a scalable distributed system architecture, to allow seamless modular expansion and ensure the production of high quality building materials to improve your success and your bottom line.

- Roofing**
- Flooring**
- Abrasives**
- Carpet coating**
- Rockwool**
- Glasswool**
- Oriented strand board**
- Carbon fiber**
- Fiberglass/fleece**
- Insulation mat**

**Roofing**  
Roofing lines are notoriously hostile measurement environments. Hence, our answer: a reliable stainless steel C-Frame scanner. Add to that SYNCRO-SCAN to eliminate backcoating roll runout and two-zone asphalt control package that delivers flat profiles.

The bottom line: product uniformity, reduced scrap, asphalt savings and a sound ROI. For flat industrial roof applications that use either calendaring for EPDM or extrusion for TPO, we utilize our established control techniques with various sensor technologies to provide the desired measurement and control.

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	C-Frame	PROSIS	Machine direction control	21PlusHD advanced application controls spec sheet
	Box Beam	ShadowMaster	Calendar control	PROSIS brochure
		X-Ray Master		Beta Plus brochure
				ShadowMaster spec sheet
				X-Ray Master spec sheet

Abrasives  
 Carpet coating  
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## Building materials (continued)

### Rockwool and glasswool

Rockwool and glasswool measurement employ wide-gap scanning techniques designed for use in harsh environments and provide three zone quality trend.

### Oriented Strand Board (OSB) and fiberglass insulation

Systems for OSB and fiberglass insulation employ wide-gap geometry scanning measurements. Fiberglass systems may also measure the constituent components of the insulation materials. A unique reporting package is also available with SPC QC trace-ability using an RQMS module.

### Thermo Scientific system components for building materials applications:

#### Abrasives

C-Frame scanner and Beta Plus basis weight sensor

#### Carbon filter composites

Mark III scanner with Beta Plus basis weight sensor or L220 scanner and ShadowMaster direct thickness sensor

#### Custom composition materials

Mark III scanner with X-Ray Master weight and thickness sensor, Beta Plus basis weight sensor or ShadowMaster direct thickness sensor

### Flooring

Mark III scanner with Beta Plus basis weight sensor or L220 scanner with ShadowMaster direct thickness sensor

### Hi loft fiberglass/glass fleece

Mark III scanner with X-Ray Master weight and thickness sensor

### Insulation materials

Mark III scanner with X-Ray Master weight and thickness sensor or Beta Plus basis weight sensor

### Oriented strand and medium density fiberboard

Mark III scanner with Beta Plus basis weight sensor

### Roofing

C-Frame scanner with Beta Plus basis weight sensor

### Rug and carpet

Mark III scanner with Beta Plus basis weight sensor



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# Building materials (continued)

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## Flooring

Mark III scanner with Beta Plus basis weight sensor or L220 scanner with ShadowMaster direct thickness sensor

## Hi loft fiberglass/glass fleece

Mark III scanner with X-Ray Master weight and thickness sensor

## Insulation materials

Mark III scanner with X-Ray Master weight and thickness sensor or Beta Plus basis weight sensor

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# Nonwovens

**Nonwoven manufacturing processes must be carefully controlled to ensure that the fabrics are resilient, liquid repellent, and leakproof. Thermo Scientific measurement and control systems enable you to overcome process challenges and produce high performance nonwoven fabric products for nonwovens applications.**

Our technology allows you to meet the specialty measurement and reporting requirements for nonwoven manufacturing, whether the process is spunbond, spunlace, airlaid, carded, meltblown or needlepunch processes. Thermo Scientific measurement and control systems measure the basis weight or thickness of nonwoven materials as well as binder or super-absorbent polymer (SAP) content and moisture, specifically for hygienic applications. Our advanced sensor technology controls raw material distribution across the web and ensures efficient production of uniform, reliable, functional products. The system also supports the stringent reporting requirements for roll quality with full-lot traceability.

- [Air laid](#)
- [Carded](#)
- [Melt-blown](#)
- [Needle-punched](#)
- [Spun-bond](#)
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## Nonwovens (continued)

### Thermo Scientific system components for nonwovens applications:

#### Air laid

Mark III or L400 scanner with PROSIS thickness sensor or Beta Plus basis weight sensor

#### Carded

Mark III or L400 scanner with PROSIS thickness sensor or Beta Plus basis weight sensor

#### Melt-blown

Mark III or L400 scanner with PROSIS thickness sensor or Beta Plus basis weight sensor

#### Needle-punched

Mark III or L400 scanner with PROSIS thickness sensor or Beta Plus basis weight sensor

#### Spun-bond

Mark III or L400 scanner with PROSIS thickness sensor or Beta Plus basis weight sensor

#### Spun lace

Mark III or L400 scanner with PROSIS thickness sensor or Beta Plus basis weight sensor

#### Wet-formed

Mark III or L400 scanner with PROSIS thickness sensor or Beta Plus basis weight sensor



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# Nonwovens (continued)

## Thermo Scientific system components for nonwovens applications:

### Air laid

Mark III or L400 scanner with PROSIS thickness sensor or Beta Plus basis weight sensor

### Carded

Mark III or L400 scanner with PROSIS thickness sensor or Beta Plus basis weight sensor

### Melt-blown

### Needle-punched

Mark III or L400 scanner with PROSIS thickness sensor or Beta Plus basis weight sensor

### Spun-bond

Mark III or L400 scanner with PROSIS thickness sensor or Beta Plus basis weight sensor

### Spun lace

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## Lithium-ion battery

From small hand-held electronics to medium sized electric vehicles such as cars, buses and trucks to larger marine vessels and smart grid energy storage systems, lithium-ion battery technology is changing our lives.

Critical to the advancement of the battery is the emergence of higher quality separator film, the coating of separator film for higher efficiency, and the coating of the anode and cathode. Thermo Scientific thickness measurement and control systems are helping the industry improve the quality, consistency and productivity of lithium-ion batteries.

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## Lithium-ion battery (continued)

### Separator films

As one of the key components of a lithium-ion battery it is critical that the separator film has a consistent thickness, while homogenous distribution of the pores are necessary to optimize performance and life of the battery. Utilizing our years of experience in biax application, we have solutions for wet and dry processes in both two and three scanner configurations.

### Thermo Scientific system components for lithium-ion separator films

The PROSIS thickness sensor is a new breed of advanced non-nuclear measurement technology and is the ideal solution for measuring the thickness of separator film. Designed to provide the highest accuracy and measurement resolution possible, the PROSIS thickness sensor has a wider spectral coverage range that allows it to measure more materials than ever before. Unlike any other IR sensing technology available on the market, the PROSIS thickness sensor analyzes the full spectral response of the separator film to IR energy and provides the most accurate thickness measurement possible. It is also the solution for customers opting to take the added step of coating the separator film. By combining the PROSIS thickness sensor with multiple Thermo Scientific scanners, we can leverage the biax mass balance control package with cascaded autodie control.

### Anode/cathode coating and calendering

Continuous or patch coating on aluminum substrate for the cathode or on copper substrate for the anode is also an expensive and demanding operation. Uneven coating of the cathode or anode will ultimately result in poor construction of the battery or even worse, creating a hotspot which could lower the efficiency of the battery, shorten its lifespan, increase charge time and/or increase the risk of thermal runaway. Therefore, an accurate measurement of the coat weight on both sides of the substrate is paramount to controlling and perfecting the process and improving yield and quality.

### Thermo Scientific system components for lithium-ion anode/cathode coating applications

Leveraging our experience in various web coating applications, we take known techniques and apply them to this application. The Mark III or L220 scanner with Beta Plus basis weight sensor or X-Ray Master weight and thickness sensor offers solutions to monitor the coating weight whether it is continuous or in patches. The software provides control information and can compensate for the uncoated areas in the patch process to provide precise information for the area of interest. Our Dual Laser C-frame uses the latest confocal technology to deliver unprecedented resolution, accuracy, and repeatability when measuring the electrode material thickness after it has been pressed.



[Film & sheet extrusion](#)

[Coating](#)

[Vinyl calendering](#)

[Building materials](#)

[Nonwovens](#)

[Lithium-ion battery](#)

# Lithium-ion battery (continued)

## Separator films

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### Thermo Scientific system components for lithium-ion anode/cathode coating applications

#### Related content (click to hide)

#### Gauging platforms

[21PlusHD for lithium-ion battery](#)

#### Scanners

[Mark III](#)

[L220](#)

#### Sensors

[PROSIS](#)

[Beta Plus](#)

[X-Ray Master](#)

#### Controls

[Automatic profile control](#)

[Machine direction control](#)

[Calender control](#)

#### Collateral & literature

[21PlusHD spec sheet](#)

[21PlusHD advanced application controls spec sheet](#)

[21PlusHD for lithium-ion battery brochure](#)

[PROSIS brochure](#)

[Beta Plus brochure](#)

[X-Ray Master spec sheet](#)



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- [Service agreements](#)
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- [Professional services](#)

# Service & support

Thermo Scientific products are supported by our extensive network of qualified application engineers who will work closely with you to understand and evaluate your specific production parameters.

Our experts will help you choose the right instruments for your application, then keep them performing to spec. Their goal is to optimize your process today, and also lay the foundation for easy upgrades in the future.



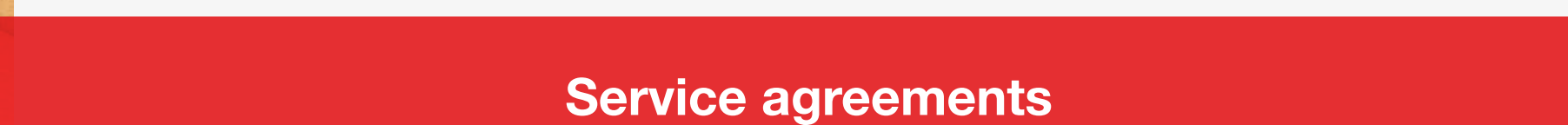
Product maintenance



Education and training



Parts and upgrades



Service agreements



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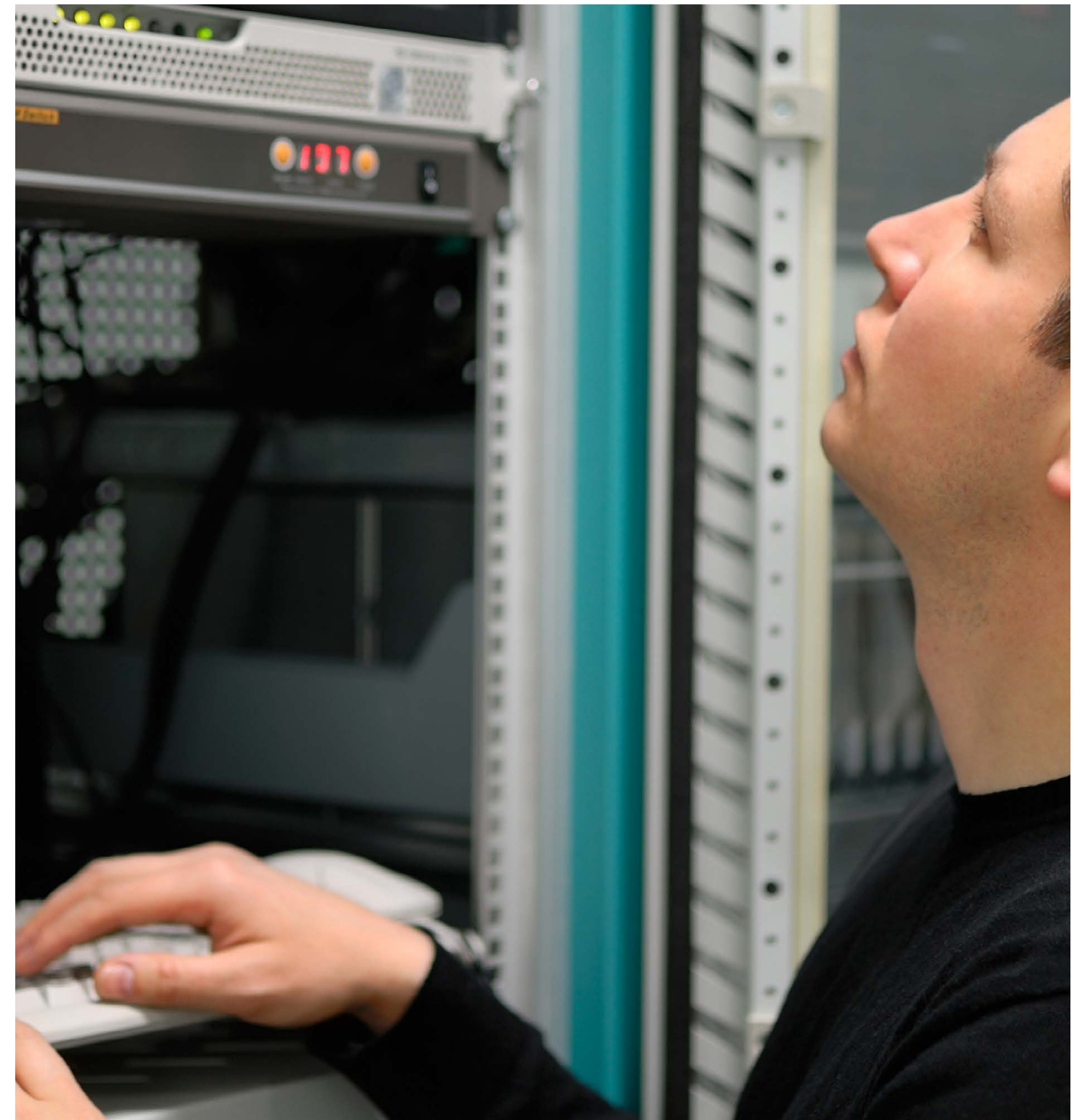
# Product maintenance

Our comprehensive service offering is based on corrective and preventative maintenance that not only reduces downtime, but also helps you improve your process.

We offer multiple levels of support agreements, with varying degrees of access and response, including:

- [System commissioning](#)
- [System calibration](#)
- [Preventative maintenance](#)
- [On-site repair](#)
- [Depot repair](#)

Some options feature complete cost predictability, with all travel, labor, spare parts, and consumables included.





Product maintenance

Parts and upgrades

Service agreements

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## Related content (click to hide)

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Product maintenance

**Parts and upgrades**

Service agreements

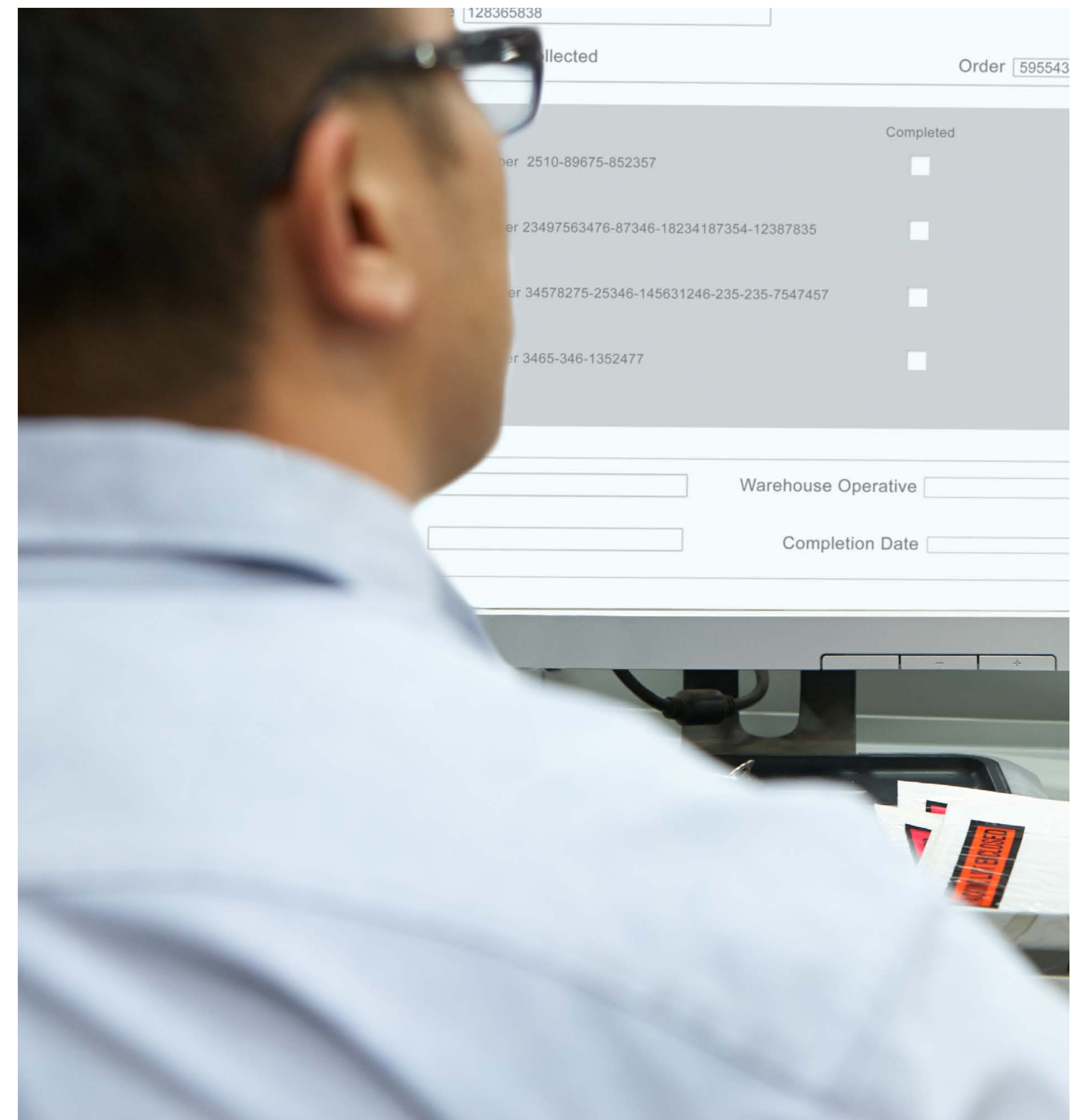
Education and training

Professional services

## Parts and upgrades

**Our spare parts are designed specifically for your Thermo Scientific system, and we make it easy for you to secure high-quality, low-cost replacements by maintaining offices around the world that respond quickly to your phone or online requests.**

You can also extend the lifetime of your older equipment with our add-on system enhancement and retrofit packages, a cost-effective way of reusing a portion of your existing hardware while enjoying the benefits of the latest software features.





[Product maintenance](#)

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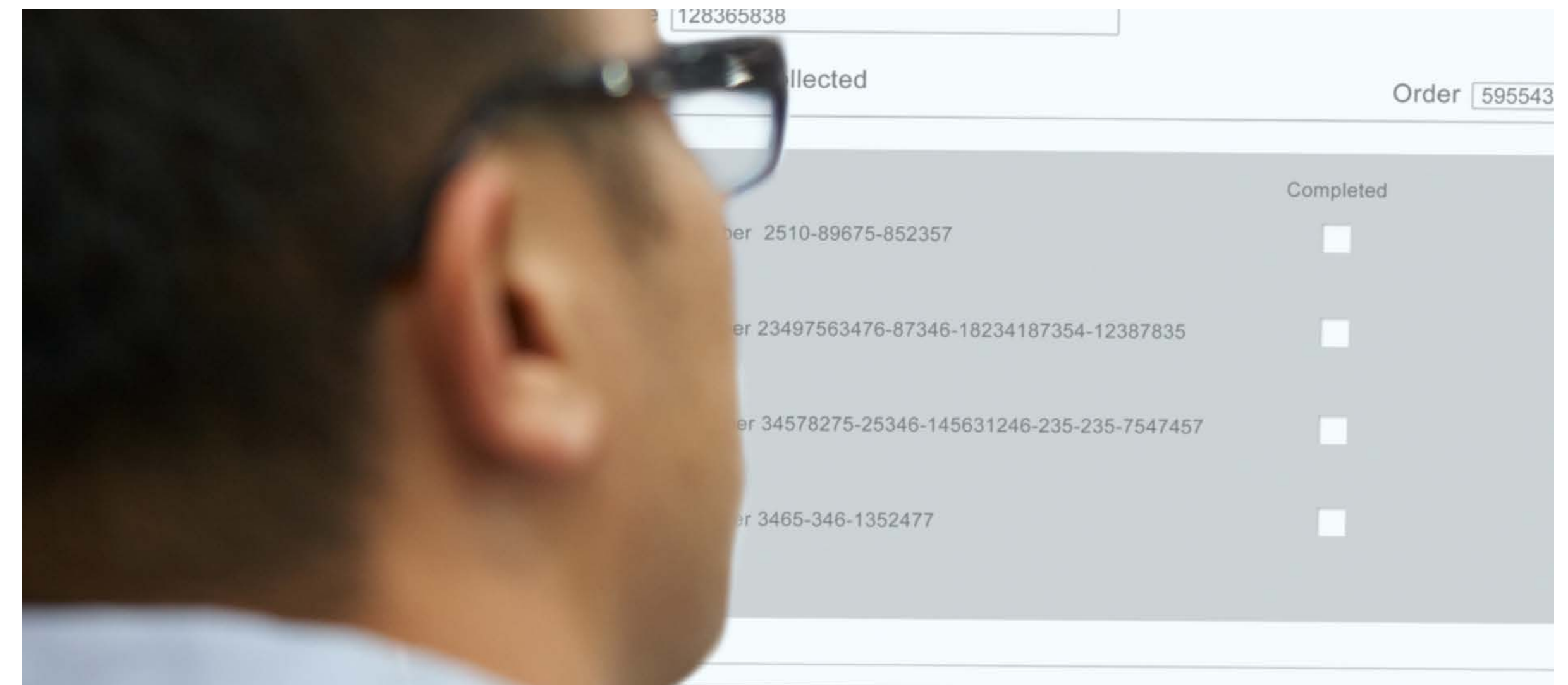
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## Service agreements

**We provide a variety of Product Support Agreements (PSA) to ensure your production doesn't miss a beat.**

A PSA can be custom tailored to your specific need and could include any of the following:

### Preventative maintenance

- Review, inspection and testing of the gauging systems
- including both mechanical and electrical components
- Device inspection survey (if applicable)
- Identification of preventive/planned replacement of durable components
- Replacement of non-durable parts
- Back-up system software
- Equipment safety interlock checks
- Durable and non-durable parts coverage

Results Annual Maintenance Program (RAMP) is designed to maintain optimal gauging system performance and reduce operating costs. A RAMP visit can also help identify or uncover process issues that have previously been undetected or unsolved. RAMP includes services such as calibration, control tuning, and training. This program can be tailored to meet your specific requirements and typically includes:

- On-site visit from an application specialist
- Evaluation of measurement calibration and control tuning
- Tracking of gauge repeatability with standard samples
- Optimal system tuning
- Estimate of raw material savings
- Training/operator refresher
- Detailed summary report including operating conditions, performance, and recommendations

We also provide local spare parts sales support, on-demand service visit, 24/7 technical support including telephone and remote system diagnosis, start-up services, system upgrades and various training modules. Please [contact us](#) for additional details.





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## Education and training

**We offer multiple training options to help you increase productivity by optimizing the use of your instruments and expanding the skills of your operators.**

You can receive hands-on instruction in your plant or at one of our training facilities in the USA, Europe and Asia. Our range of courses covers:

- Basic operation
- Calibration
- Routine maintenance
- Troubleshooting
- Certification

We will also work with you to develop a custom program that meets your specific training objectives, often incorporating your own operating procedures.





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## Professional services

Our certified engineers are available to review your process, perform benefit analysis and recommend improvements to help you meet your best-practice goals.

We will develop an implementation plan that integrates all Thermo Scientific™ systems, as well as third-party components including:

- System layout and connectivity
- Software implementation, configuration and support
- Site modifications

You can rely on us to manage the entire installation and start-up if you choose, including serving as a liaison with licensing agencies where necessary.





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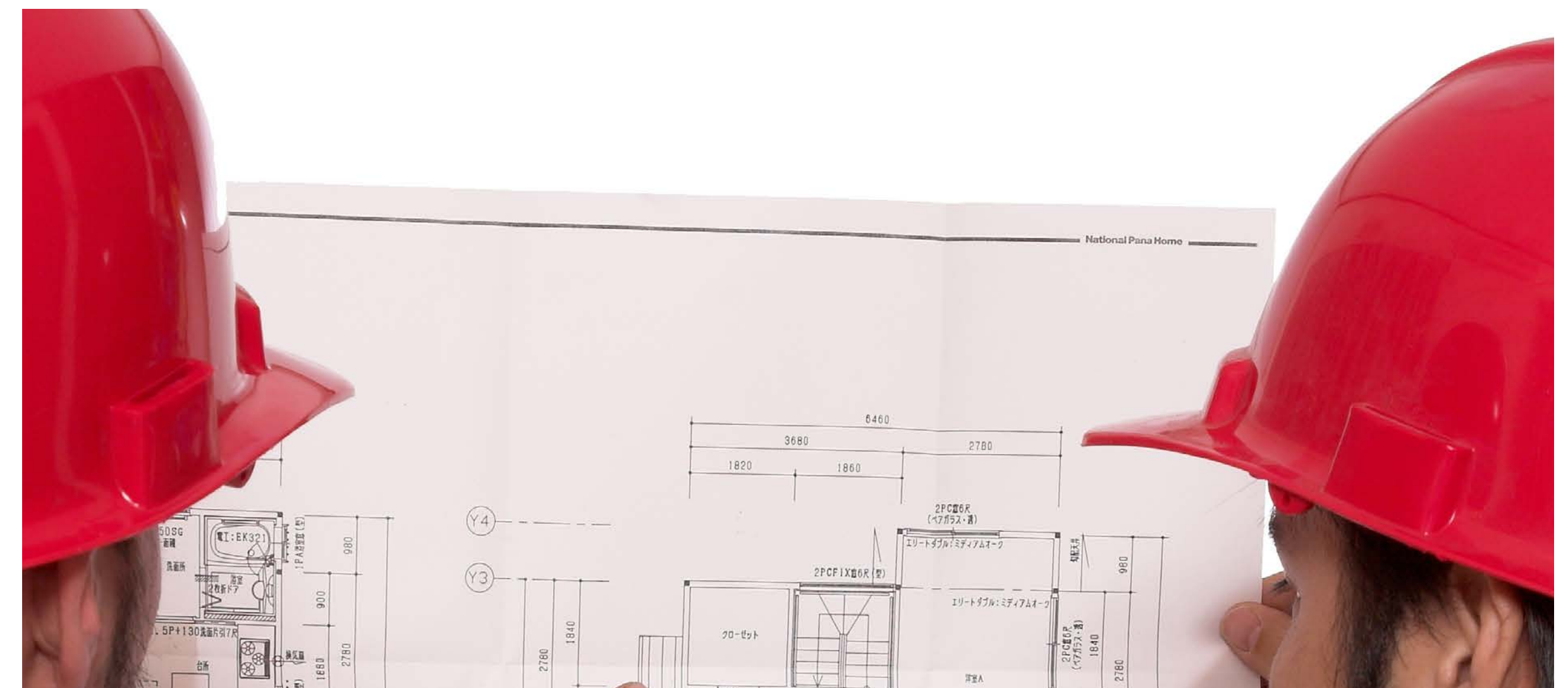
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# Contact us

We have thousands of Thermo Scientific web gauging installations covering a myriad of applications throughout the world. Our world-class service teams are located where you are, making sure that you are getting the most out of your gauging investment.

Find out more at  
[thermofisher.com/gauging](https://thermofisher.com/gauging)

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