EXTRUSION INDUSTRIES

Advanced Web Gauging Solutions
Successful extrusion operations demands running at the highest possible line efficiency. This means maximum process uptime, minimum raw material consumption, low rejects plus quality that meets today’s stringent requirements. It is vital to squeeze as much yield as possible out of today’s high cost resins and produce a flat, uniform, quality product that exceeds the performance expectations from the downstream processes.

Meeting the extrusion measurement challenge: By definition, extrusion products are a diverse family, as are their measurement requirements. This includes thickness, weight and coextrusion layer measurements, as well as speciality measurements such as density of cavitated films or pre-extraction oil content in porous battery separators. NDC’s investment in gauging technology provides the exact system solution for these diverse extrusion application requirements. In fact NDC, offers the widest range of web gauging measurements and controls available today.
Innovative Measurements for

Infrared Film and Sheet Measurements

FilmPro

FilmPro™ is NDC’s most versatile infrared gauge on the market for basis weight and thickness measurements from the thinnest films to thin sheet. FilmPro is ideal for a wide range of products: clear, pigmented, multi-layer, voided / pearlized, tints and even black. FilmPro easily handles costly barrier materials, such as Nylon, EVOH or PVDC simultaneously with other polymers such as PE, PP or Ionomer.

FilmPro has helped hundreds of customers reliably and accurately measure and control thickness with unprecedented reliability – all based upon our proven light engine technology. NDC does the work for you – FilmPro’s easy-to-use linear calibration is a real time saver, delivering dependable results every day!

Key FilmPro features to consider: superb signal-to-noise, accuracy, special optics for thin film fringe suppression, web flutter insensitivity and (unlike nuclear or X-ray sensors) immunity to ambient impact of temperature, humidity and barometric pressure.

Beta

NDC’s Beta transmission gauges feature an ultra high-efficiency detection system and a minimized source activity for safety and performance.

Beta gauges are used to measure the thickness and basis weight of extruded sheet, packaging foam and at the cast end of the biax process.

Gamma Backscatter

NDC’s Gamma BackScatter (GBS) gauge family provides a cost-effective thickness measurement. This compact sensor provides valuable measurements from difficult process locations.

Applications for this gauge typically include blown film, cast film and sheet products.

OptiMike

The OptiMike OM190 optical micrometer provides direct, single-sided thickness measurements.

The sensor is suitable for measuring extruded sheet and non-metallic thick film products.
the Extrusion Processes

Haze Measurement

HazePro

Haze is a critical quality parameter for plastic films, various plastic sheet products and other transparent materials. Manufacturers need to make sure that their products have the correct level of haze they need from crystal to cloudy. Maintaining the proper level of haze can be a real challenge. NDC’s NEW HazePro sensor solves this problem by measuring the haze of films on-line with the highest accuracy and reliability. With HazePro manufacturers can precisely adjust the film and sheet extrusion process to tightly maintain the desired optical quality and reduce scrap. Film applications include optical, flexible packaging, agricultural, hygienic and solar. NDC’s haze measurement is based upon ASTM standard D1003 methodology for transparent materials.

Process adjustments can be automated for real-time control of haze. Film applications include optical, biax-formed packaging, flexible packaging, agricultural, solar panel, coatings on glass (such as solar panels), anti-glare on computer screens and other products.

HAZEPRO
► Optical Film
► Flexible Packaging Films
► Packaging Film
► Solar Panel Film
► Hygienic Films
► Agricultural Film

Laser Transmission
NDC’s laser gauges measure thickness via a distance triangulation computation of a laser beam.

Laser gauges are typically designed to measure thick extruded sheet products. The thickness measurement range for NDC’s single-sided sensor is 50 mm, while the dual-sided range extends to 15 mm.

X-Ray Transmission
NDC’s X-ray transmission sensor’s energy source is tuned for optimum product measurement sensitivity to provide precise measurement of basis weight or thickness for nonwoven products.

X-ray transmission gauges typically measure extruded film and sheet products up to 8,000 microns.

X-Ray Backscatter
The X-ray backscatter sensor’s compact footprint permits it to be installed in difficult measurement locations on the process.

The X-ray backscatter sensor is able to operate over a wide thickness range for extruded products up to 25,000 microns.

Making Light Work
Proven, Capable Solutions

NDC extrusion industry expertise
...a measurement solution for each application

**Machine Direction Control**

Machine direction (MD) controls compare the current scan average thickness against the target. The difference is used to supervise either the extruder or line speed (user-selectable) in order to drive the average thickness to the target.

**Automatic Target Optimization Control (ATO):**

Automatic Target Optimization supervises the average film or sheet thickness to run to the lowest acceptable specification. If the thickness variation is high, the average target will be increased to protect against making under-spec product at any point across the profile. If the sheet is flat, then ATO will ensure that no product is manufactured below the minimum quality limit. The combination of APC and MD control will supervise the thickness target downward to the lowest acceptable limit, resulting in significant raw materials savings while avoiding scrap.

**Ratio Control**

On coextrusion processes ratio control will insure that all extruders maintain the same relative output to maintain layer ratio balance. This is especially valuable during line speed changes.

**Automatic Profile Control (APC)**

APC works with extrusion dies to supervise the die bolt heaters and control the lip opening across the web width to create a flat profile. This technology can be applied to blown film, sheet, cast film and biax processes. For the biax application, our Asynchronous Integrated Mass (AIM) algorithm insures that the film and cast scanners are appropriately mapped to provide fast, responsive control to film thickness upset.

**Other System Options**

- FFT (Fast Fourier Transform) analysis
- SPC quality reporting
- 3D profile analysis displays

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**Sensor** | **Range** | **Application**
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FilmPro | Clear BOPP (Thick Film): 12 to 2500 microns (0.5 mils to 100.0 mils) Clear BOPET (Thin Film): 0.5 to 1000 microns (0.02 mils to 40.0 mils) | Biax film Cast film Blown film Clear, cavitated, porous and translucent films Capacitor film Coextrusion components Oil content (Battery separator)

NDC has specialized in infrared measurement technologies. These non-nuclear gauges provide exceptional performance and are ideal for biax and cast film processes.

**HazePro** | 0.5 - 20% | Optical Films Packaging Films Agricultural Films Solar Panel Films Label Stock

HazePro measures the optical quality of transparent materials to control haze.

**GBS 101** | 6,350-26,000 microns | Sheet

**GBS 102** | 1,500-8510 microns | Sheet Cast end biax

**GBS103** | 0-2,000 microns | Sheet Biax Cast Film Blown Film

The GBS Backscatter Gauge is ideally suited for sheet and thick film on narrow processes.

**Beta Sr90** | 100-5,500 microns | Sheet Cast end biax

**Beta kr85** | 15-1,200 microns | Film end biax Cast film Thin sheet

The measurement performance of beta gauges is largely unaffected by product composition, hence their wide acceptance on sheet, cast and biax applications.

**OptiMike OM190** | 50-8,000 microns | Sheet Non-metallic films

OptiMike provides non-nuclear direct thickness measurement and is ideal for sheet applications.

**Laser 172, 2 Sided** | 1-15 mm | Sheet

**Laser 170, 1 Sided** | 1-18 mm | Sheet

Laser gauges are intended for use on thick sheet applications.

**Low Energy X-Ray Transmission** | 1-2,000 microns | Sheet Biax Cast film

**X-Ray Backscatter** | 5-25,000 microns | Sheet Biax Cast film

X-Ray sensors offer a non-nuclear alternative with minimal licensing issues and provide measurement across a wide range of extrusion applications.
Company overview

Combining industry-best performance and reliability with a global support structure

NDC Technologies, headquartered in Dayton, Ohio, designs, develops and produces a wide range of process measurement and control instrumentation for a broad scope of manufacturing industries.

NDC has manufacturing facilities in Dayton, Ohio and Maldon, UK, with centers of excellence at each of these locations including Irwindale, California and Ans, Belgium. In addition, we have a manufacturing and service facility in Middletown, Connecticut and direct sales and support facilities in France, Germany, Italy, India, China and Japan. There is also a highly trained network of Sales and Service distribution channels in more than 60 countries around the world.

NDC Technologies is strategically structured to serve the following key industry segments:

► **Film Extrusion and Converting**
  NDC provides basis weight, thickness, coat weight and moisture measurement and control systems for a diverse array of applications in the film extrusion and converting industries and also provides solutions for customers in nonwovens and calendering.

► **Food, Bulk and Tobacco**
  NDC delivers both on-line and at-process analyzers for the measurement of key constituents such as moisture, fat, oil and protein. NDC’s broad spectrum of measurement solutions are used in the food, chemicals, minerals building materials, pharmaceutical and tobacco industries.

► **Cable and Tube**
  NDC serves the wire, cable, fiber optic, pipe and tube industries with a broad portfolio of on-line and off-line measurement and control solutions for the dimensional monitoring of diameter, ovality, wall thickness, eccentricity, length and speed, and other parameters.

► **Metals**
  In the steel and aluminum industries, NDC offers advanced solutions to measure the coatings applied to metal surfaces and the non-contact length and speed of products at critical points in the manufacturing process.

NDC Technologies is represented in over 60 countries worldwide. [www.ndc.com](http://www.ndc.com)