

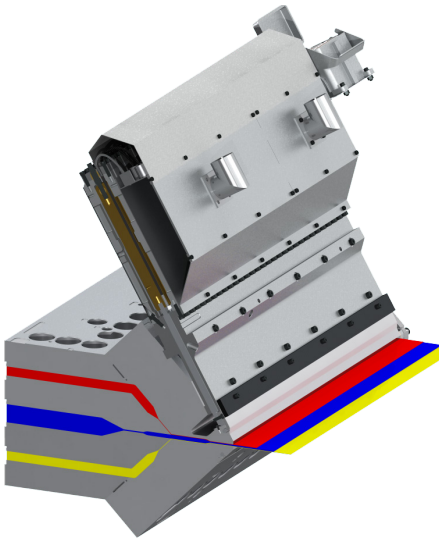

# EDI® Die Solutions for Biaxially Oriented Films

**Extrusion Die Systems Designed to Optimize Production Efficiency**

## The Challenge

### Delivering a Quality Product Without Producing Excessive Scrap

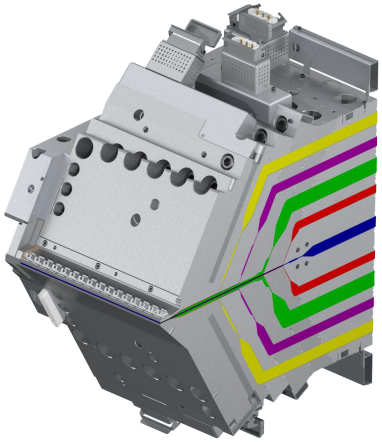
Processors have long tried to solve the problem of ensuring their film is produced with consistent strength and durability while also meeting the visual requirements dictated by the end product. To do this, the structural elements in the film must be proportionally extruded across its width.



## The Importance

### Inconsistent Layer Structures Create Weak Points When Stretching

To create a balanced layer structure, it's important to minimize the opportunities for layer interface distortion to occur. In an EDI® multi-manifold die system, each material is distributed in its own customized die flow channel prior to combination with the other layers. The layers then combine at full width and shortly before exiting the die, reducing the chance of structural changes. Ultimately, this leads to film that consistently maintains its properties while being stretched in multiple directions.



## The Nordson Solution

### *EDI®* Die Systems for Biaxially Oriented Film Production

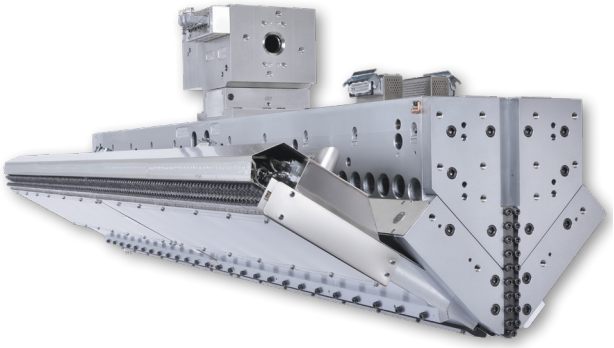
Nordson is committed to providing the most innovative solutions that enable processors to optimize production. The uniform and precise layer-to-layer structure created by an EDI® die system means the film's integrity remains intact during stretching, creating film with exceptional protective qualities against chemical and environmental factors.

Nordson

*Precision Technology Solutions. Every day, Everywhere.*

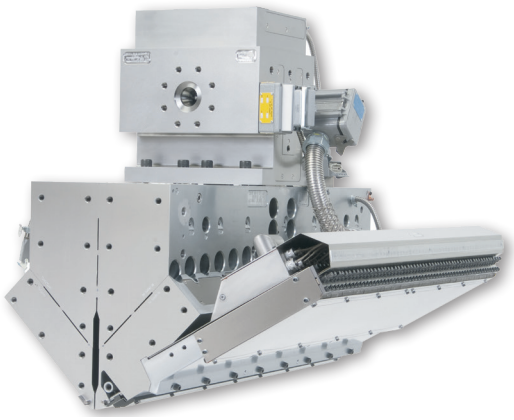
## EDI® Coextrusion Die Systems

Utilizing our knowledge of the process challenges common in biax film production, Nordson has designed our EDI® coextrusion die systems to accommodate dissimilar viscosity materials and partial coverage requirements, creating increased structure versatility for our customers.



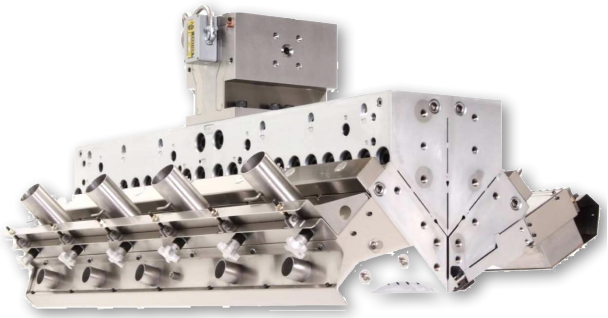
### BOPET

- Nordson has extensive experience in the BOPET film industry, with the most global installations of any die manufacturer
- Capability for producing multiple layer structures using a multi-manifold die or single manifold die and coextrusion feedblock
- Innovative surface finishing techniques allow for highest quality end products
- Optional features include EverSharp™ lip coating technology or laser-hardened lips to further increase the length of production runs



### BOPP/BOPE

- Capability for 9 or more layers through a combination of dedicated flow channels and coextrusion technology
- Partial coverage of process dependent film structures is possible with fixed internal deckling, allowing for coverage widths to be varied by simply exchanging inserts
- Fixed distribution bar inserts, positioned at the point of convergence, enable flow geometries to be exchanged without additional machining of die surfaces
- Optional features include EverSharp™ lip coating technology or laser-hardened lips to further increase the length of production runs

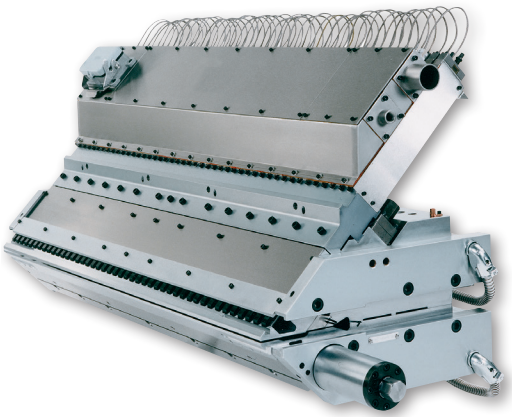


### BOPA

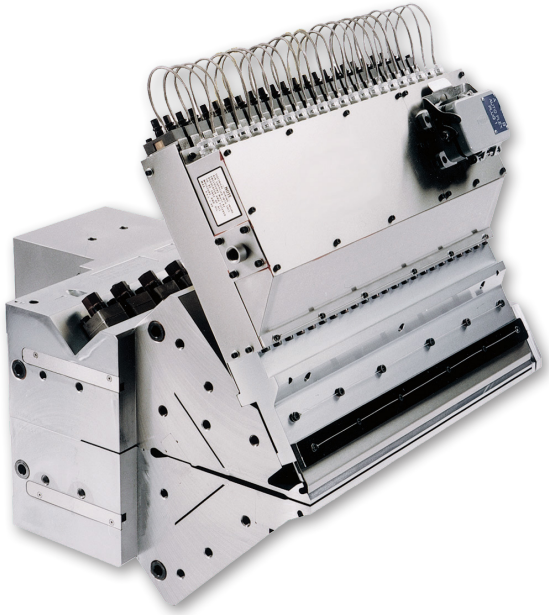
- Capability for producing multiple layer structures using a multi-manifold die or single manifold die and coextrusion feedblock
- Optional features include EverSharp™ lip coating technology or laser-hardened lips to further increase the length of production runs

### OPS

- Restrictor Bars are used to achieve fundamental distribution with the flexible lip employed for fine-tuning
- Optional features include small profile sliding deckles (which will not compromise the conventional lip-to-nip air gap) and the FastGap™ lip positioning system
- Capability for producing multiple layer structures using a multi-manifold die or single manifold die and coextrusion feedblock



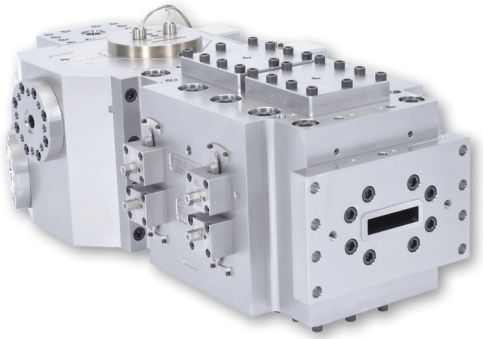
## EDI® Autoflex™ Technology



Installed on thousands of dies worldwide, the Autoflex™ automatic lip adjusting system is the premier technology for precisely controlling the thickness profile of the film and sheet. In addition to making possible higher quality, more accurate products, the Autoflex™ system can generate substantial raw material savings compared to conventional manual adjustments.

- Reduce gauge variation and increase product yield when paired with a processor-based gauging system
- Eliminate heat transfer between die body, lip, and translator block with the heating unit isolated above the flexible lip die body
- Reduce operational adjustments with automatic mode allowing for more linear movement
- Fine manual tuning is possible with a differential adjustment system
- Adjustments available on 21.0mm (0.827”), 25.4mm (1.000”), or 28.6mm (1.125”) centers
- Low profile, close approach to the casting roll
- Optional feature allows for system to be removed as a complete modular assembly

## EDI® Coextrusion Technology

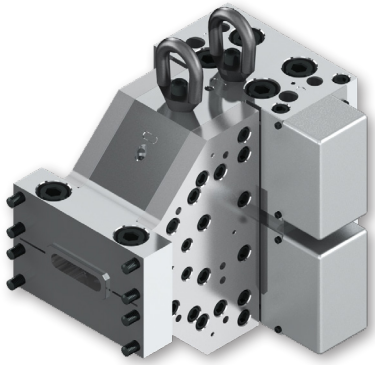


Nordson provides processors with options for further improving their coextruded layer uniformity and count. EDI® coextrusion feedblocks and distribution blocks enable operations to increase the durability and strength of their final product.

### Ultraflow™ Adjustable Geometry Coextrusion Feedblocks

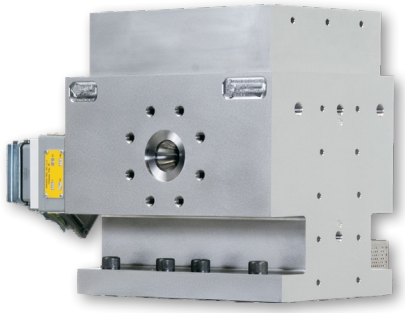
*US Patent 10,442,126*

- Large diameter profiling actuators provide highly effective tuning lands, which can be positioned at the combination point or significantly upstream to refine the layer distribution
- “On-the-fly” layer ratio adjustability increases uptime and precision, while allowing for greater end-product versatility
- Optional selector spool feature allows layer sequence to be prearranged upstream of the combining point, all without removing the feedblock from the production line



### Ultraflow™ Fixed Geometry Coextrusion Feedblocks

- Controllable linear valves allow for highly precise layer ratio changes
- Split body design minimizes the physical space requirement and allows for easy cleaning
- Entrance locations can be customized with optional selector spools



### Distribution Blocks/Adaptors

- Entrance locations can be customized to fit new or existing line layouts with minimal modifications
- Selector plate feature allows layer combinations to be easily changed

## EDI® Multi-Manifold Die Cleaning Carts

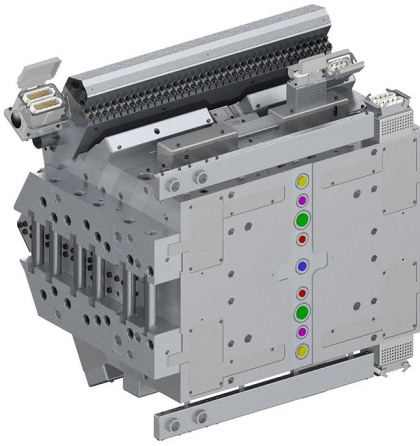
Simplify the die cleaning process, while also enhancing workplace safety, with a special cleaning cart designed to support your multi-manifold EDI® die. Operations are able to move an entire die from the processing line to the maintenance area, where die body sections can be easily rotated, creating access to the flow surfaces for cleaning.

- Adjustable widths for various die sizes
- Stores spare dies
- Included brackets support each die segment individually
- Gear rack and hand wheel provided for splitting die segments
- Optional built-in electro/hydraulic lifting and lowering mechanisms
- Optional preheat station also available

## Proven Technology: World's First 9-Manifold Die

One of the latest advances in coextrusion technology from Nordson Corporation enables film processors—particularly those with high-throughput lines dedicated to a narrow range of products—to achieve tighter thickness tolerances for the individual layers in a multi-layer structure.

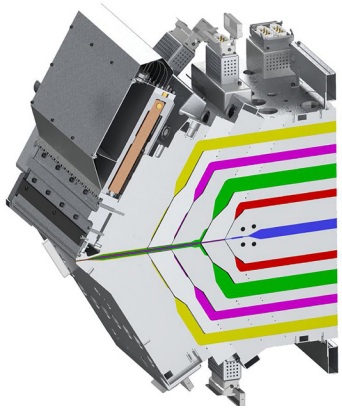
An EDI® nine-manifold flat die, the first of its kind, has been successfully commissioned, producing nine-layer film from various resins. While the degree of improvement will vary with the application, in general Nordson's nine-manifold die technology promises to reduce variation in individual layer thickness from the +/- 15% tolerance often encountered with comparably advanced feedblock systems to +/- 5%.



*Rear view of 9-manifold EDI® die, with entry ports for the polymer streams shown in different colors.*

This greater accuracy achievable with multi-manifold dies enables processors to run thinner layers of the costly specialty materials often required for high-performance packaging films, while at the same time enhancing product quality and consistency.

A manifold is a flow distribution channel inside the die whose complex internal geometry, engineered for a specific polymer, is designed to develop a uniform, streamlined flow and distribute the material to its full width. In a multi-manifold die, each polymer flow stream has its own manifold, and the layers are combined into a single structure only after each layer has been individually spread to its full width. By comparison, a feedblock combines multiple polymer streams into a narrow multi-layer "sandwich" that is subsequently distributed to full width in a single-manifold die. A chief reason why the multi-manifold method provides greater layer uniformity and thickness accuracy is that it avoids much of the layer-interface deformation that occurs when multiple layers pre-assembled in a feedblock are then spread simultaneously through the die.



*Cutaway view of 9-manifold Nordson EDI die, with polymer streams represented in different colors. The streams combine to form a single multi-layer structure which exits the die at left.*

Nordson customers around the world have long benefitted from multi-manifold coextrusion, using dies with two, three, four, or five manifolds. Engineering a nine-manifold die required extensive process knowledge, as ten major die body segments had to be adequately fastened and heated. In addition, the nine flow channels were each custom designed for the specific layer that they were distributing, meaning the flow channels vary in sizes and layouts in the design.

**Nordson Extrusion Dies Industries, LLC**
1450 Lakeland Drive
Chippewa Falls, WI 54729 USA
**Phone** +1.715.726.1201

**Germany**
**Phone** +49.251.26501.0

**China**
**Phone** +86.21.5785.091.8

**Japan**
**Phone** +81.3.5762.2770

nordsonpolymerprocessing.com | info@nordsonpolymerprocessing.com