

Argotec news

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FOR IMMEDIATE RELEASE

ARGOTEC BUILDS SUCCESSFUL BLOWN FILM PROGRAM **Lab Line Expedites Product Development, Reduces Costs**

GREENFIELD, Massachusetts — December 13, 2006 — Argotec, Inc., of Greenfield, Massachusetts, announces the availability of its blown film laboratory extrusion line to expedite preproduction testing of high-performance, precision-engineered, thermoplastic polyurethane (TPU) film and sheet. Similar in function to its full-sized blown film equipment, the lab extruder allows Argotec to run smaller test batches prior to committing customers to the expense of a full production run. It also avoids interruption of commercial production for trial runs on the company's full-size blown film line. The net result is faster, lower-cost scale-up of commercial TPU blown film.



Vice president of manufacturing & technology David Collette examines the film bubble on Argotec's blown film laboratory extrusion line.

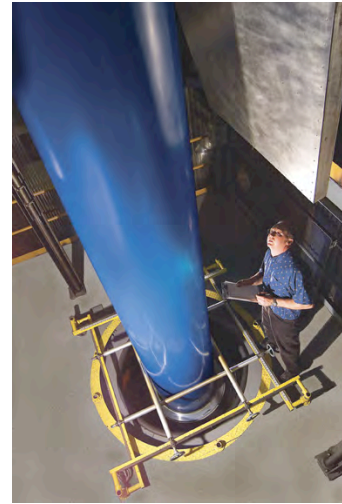
WHAT IS BLOWN FILM?

Argotec's blown film extrusion process begins with computerized mixing of virgin resin and any additives needed to control the film production process and properties, along with carefully controlled rates of regrind, if necessary, to reduce customer cost.

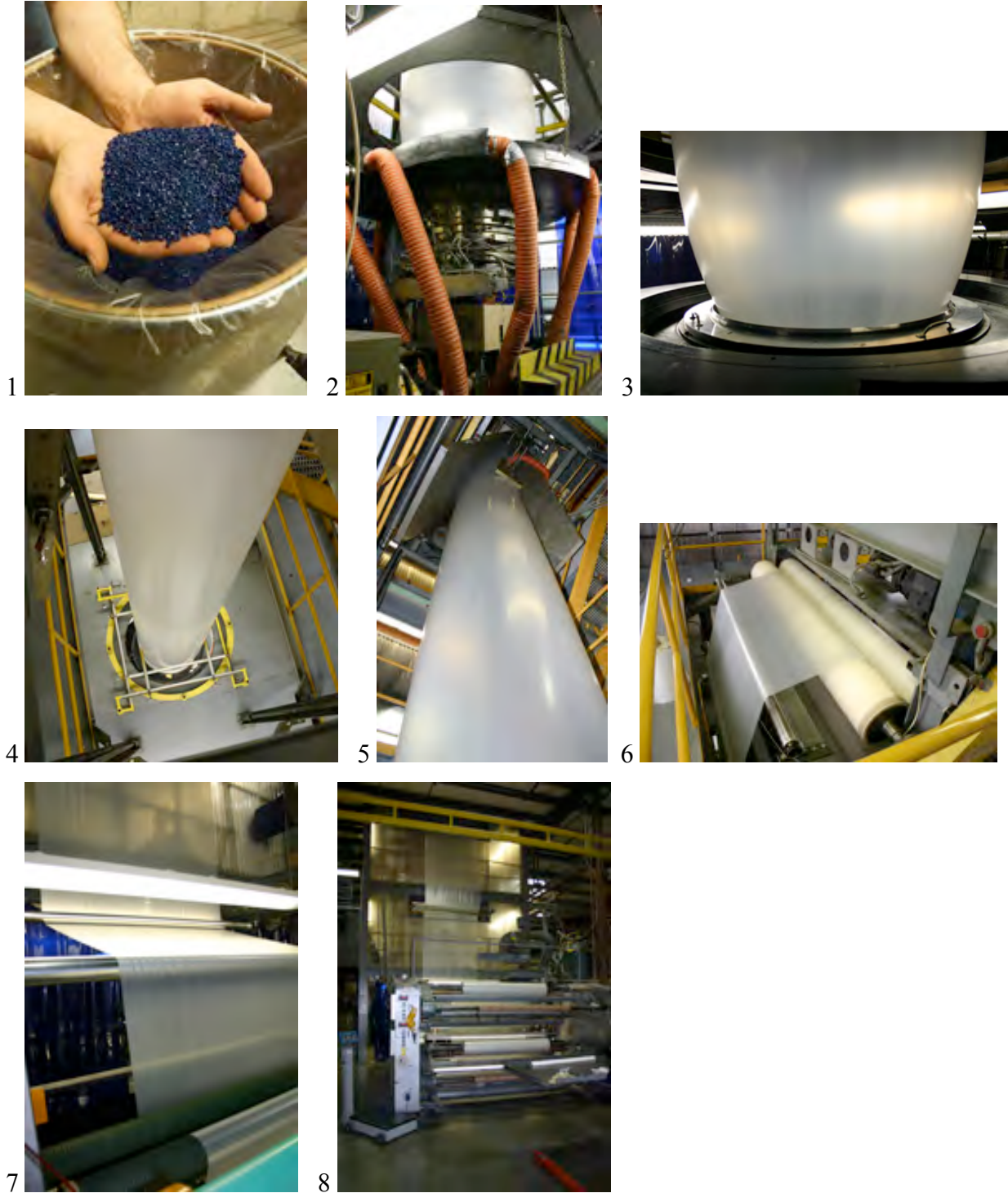
The mixture is heated and conveyed through the extruder. The melted material is then pumped, under continuous pressure, through a circular, rotating die that creates a tube of thin polyurethane or other polymer. As the warm, extruded material is drawn up several stories by nip rollers, the tube is expanded by filling it with air, creating a "bubble" that performs three basic functions:

1. The volume and pressure of air "blown" into the tube causes the material to stretch, thereby determining the overall size of the bubble and the width of the finished sheet.
2. This same action, in conjunction with the rate at which the bubble is being pulled upward away from the die, determines the thickness of the finished film.
3. The bubble begins the air-cooling process while traveling up to the nip rollers.

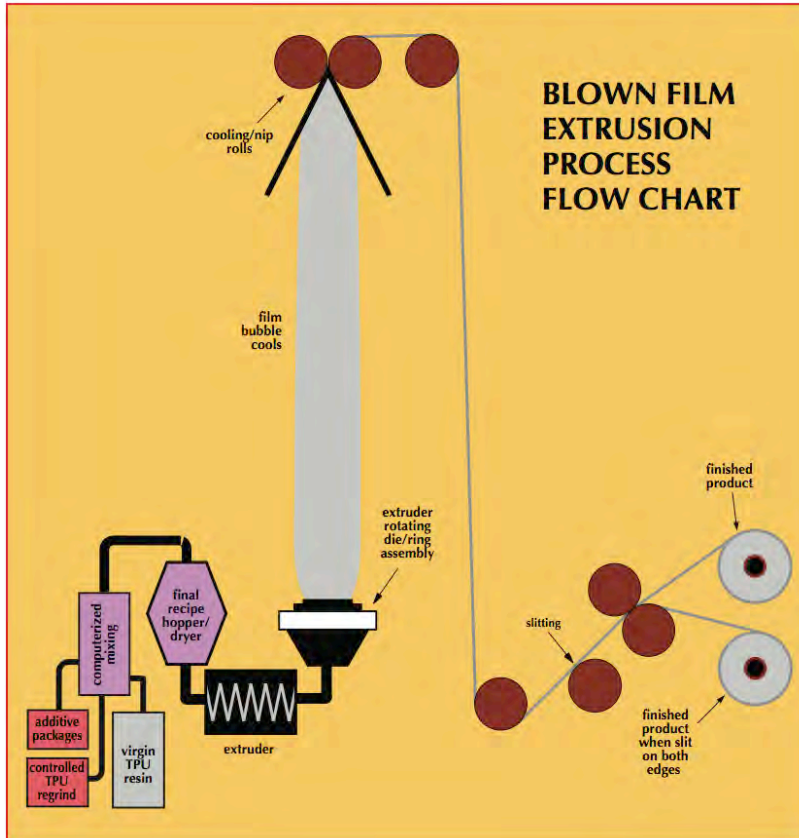
As the bubble enters the nip rollers it is collapsed into a flat tube and then cools further while it travels back down the outside of the tower to an additional set of rollers. As it enters the slitter station, one or both sides of the flat tubular film can be slit. Slitting both edges allows the flat tube to be separated into two layers that can each be wound onto their own core. Slitting only one edge allows the flat tube to be wound onto one core as a double wound layer with one "open" edge that can later be opened by the customer to a double width film. The finished product is wound onto corrugated or plastic cores and packaged for shipment to the customer.



Vice president of manufacturing Jim Antes examining full blown-film bubble



The blown film extrusion process (from top left): (1) virgin resin is mixed with any specified regrind and other additives; (2) the blended, heated recipe mixture is pumped into the circular rotating die; (3) a tube is drawn upward as it is extruded from die; (4) controlled air is blown into the tube to create dimension and cool the resulting bubble as it is drawn up the interior of the tower; (5) the bubble is collapsed as it passes through and (6) over the nip rollers, then (7) down the outside of the tower to a final configuration of rollers, where it is (8) trimmed and wound onto corrugated or plastic cores prior to packaging and shipping to customer.



Blown film extrusion process flow chart.

WHEN TO USE BLOWN FILM

Blown film extrusion has several advantages over flat-die or cast-on-carrier extrusion, the other methods typically used to manufacture polyurethane film and sheet. These include:

- When cost is a factor. Blown film can be the most economical method for producing films from 1-10+ mils thick.
- When a carrier or interleaf is not required.
- When consistently flat roll put-up is critical. The rotating die on a blown film extruder distributes any gauge variations evenly across the width of the roll.
- When the high-slip attribute of the processing aid is acceptable or desirable.

However, when these factors do not exist, flat-die or cast-on-carrier may be the preferred extrusion method for the following reasons:

- Films produced by these methods often contain less gel – unmelted resin or resin particles with slightly different melt properties – which can affect aesthetic properties.
- In-line gauge measurement and adjustment is possible only on flat-die extruders.
- No processing aids or lubricants are required. These can affect adhesive wet-out as well as interfere with downstream processing, such as lamination or printing.
- Surface finish can be controlled. Matte and gloss finishes are possible.
- Extremely thin films can be extruded using the cast-on-carrier option, to thicknesses as low as 0.2 mil.
- Thick films up to 125 mils can be produced.
- One or more interleaves and/or carriers may be used for cleanness, ease of handling or other reasons.

BLOWN FILM PRODUCT OPTIONS

The product designer, converter or fabricator who determines that blown film extrusion can provide the economies and product characteristics required for their specific application has a variety of product options to specify. These include:

- Thickness: typical film gauge from blown film extrusion ranges from 1 to 10 mils, although Argotec can extrude from 0.8 to 20 mils.
- Width: Argotec can produce maximum sheet widths up to 85 inches.
- Length: is a function of the size of the bubble and resulting gauge, up to a maximum roll diameter of 20 inches.
- Polymer: aromatic or aliphatic polyester polyurethane; aromatic or aliphatic polyether polyurethane; aromatic or aliphatic polycaprolactone polyurethane.
- Surface finish: smooth or rough.
- Additive packages: flame resistance; UV resistance; antibacterial; antifungal; lubricant and antiblock packages.

THE LABORATORY TEST LINE

The Argotec lab line can produce thermoplastic film in thicknesses ranging from 0.8 to 20 mils, widths of 6 to 15 inches, and lengths of up to 100 feet. It is used for a variety of key functions, including:

1. Generating short-run film concept samples for customers.
2. Testing the processability and physical characteristics of new film formulations.
3. Performing preliminary tests of new product offerings from resin suppliers.

In addition to demonstrating Argotec's commitment to research & development, its blown film lab line also enhances the company's ability to engineer polyurethane or other TPE film compounds to a customer's specific application requirements and then test the feasibility of the formulation in advance of a full production run, thus saving the customer significant development costs.

ELEMENTS OF A SUCCESSFUL BLOWN FILM PROGRAM

A successful blown film extrusion program involves much more than just having the right equipment. Up to five additional key factors must also be included:

1. **Recipe Control** – the fixed ratio of ingredients that go into the film. Argotec uses up-front engineering and the lab test line to eliminate mid-run recipe changes to fix problems or increase yield. Three basic components are custom designed to meet the specific needs of the application:
 - Virgin TPU resin, straight out of the box from the resin supplier.
 - Chemical additives which can impart flame resistance, UV resistance, antibacterial (odor) control, infection control, antifungal, antistatic, lubricant or antiblock properties.
 - Regrind, the recycling of edge trim or other films of the same chemistry previously produced by Argotec. Use of regrind is carefully controlled and limited to the same resin type, color and additives when needed



Virgin resin



Regrind

to reduce costs. Cleanness of the regrind is strictly monitored. Argotec does not buy regrind on the open market unless instructed by the customer.

2. **Process Control** – standardized operating conditions and procedures are used to ensure consistent film quality, lot-to-lot, roll-to-roll. The conditions and procedures include:
 - Temperature & pressure used to pump the melted recipe through the die.
 - Running speed effects product quality. Running film at low temperatures and high speeds can result in poor dimensional stability in the end use as the film becomes directionally oriented. When it is exposed to ambient or secondary processing heat, the polymer will attempt to relax, causing the film to change dimension. Argotec maintains the optimum temperature and through-put rate for consistent dimensional stability.
 - Measurement of critical film properties and comparison to standard to ensure consistently high product standards.

3. **Packaging** – Argotec will package blown film in a variety of configurations to meet customer requirements, including:
 - Individually boxed rolls, horizontally suspended with end plates.
 - Vertical bulk pack, rolls stacked on end.
 - Horizontal bulk pack, rolls suspended in cradles.

4. **Labeling** – Argotec will package, label and ship in a manner that will support customer objectives:
 - Standard Argotec labels.
 - Private labeling customized to specific customer requirements. (“Drop shipping” option available.)

5. **Secondary Processing** – Argotec can refer you to a number of industry partners who meet rigorous quality standards and can provide a variety of secondary processing operations, including:

- Slitting
- Die cutting
- Sealing
- Adhesive coating
- Textile lamination
- Glass lamination
- Perforation

This control of carefully engineered recipes, tight process and measurement of film properties, packaging and labeling options, and industry partners, provides a complete blown film program.

A RECOGNIZED LEADER IN THE SPECIALTY FILMS INDUSTRY

Argotec is recognized as a leading global supplier of custom-engineered, high-performance, polyurethane film and sheet for a wide variety of critical applications. In addition to blown film extrusion, the company also has extensive experience in flat-die and cast-on-carrier extrusion technologies, as well as extrusion coating and multi-layer constructions. Argotec offers precision film & sheet products made from the full range of TPUs available for blown-film and flat-die extrusion, as well as copolyesters, copolyamides, ether-amides and other difficult-to-extrude specialty thermoplastic elastomers. Further information may be obtained by writing: P.O. Box 1167, Greenfield, MA 01302-1167; calling (413)772-2564; faxing (413)772-2565; e-mailing info@argotecinc.com; or visiting the Argotec website, www.argotecinc.com.

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Art & Photography: The photographs shown in this article are low-res files to let you know what images are available. We are happy to provide any of them to you in different sizes, formats or resolutions to meet your specific design needs. Please contact Rob Nicoll at (413)238-4425 or rpicoll@att.net.