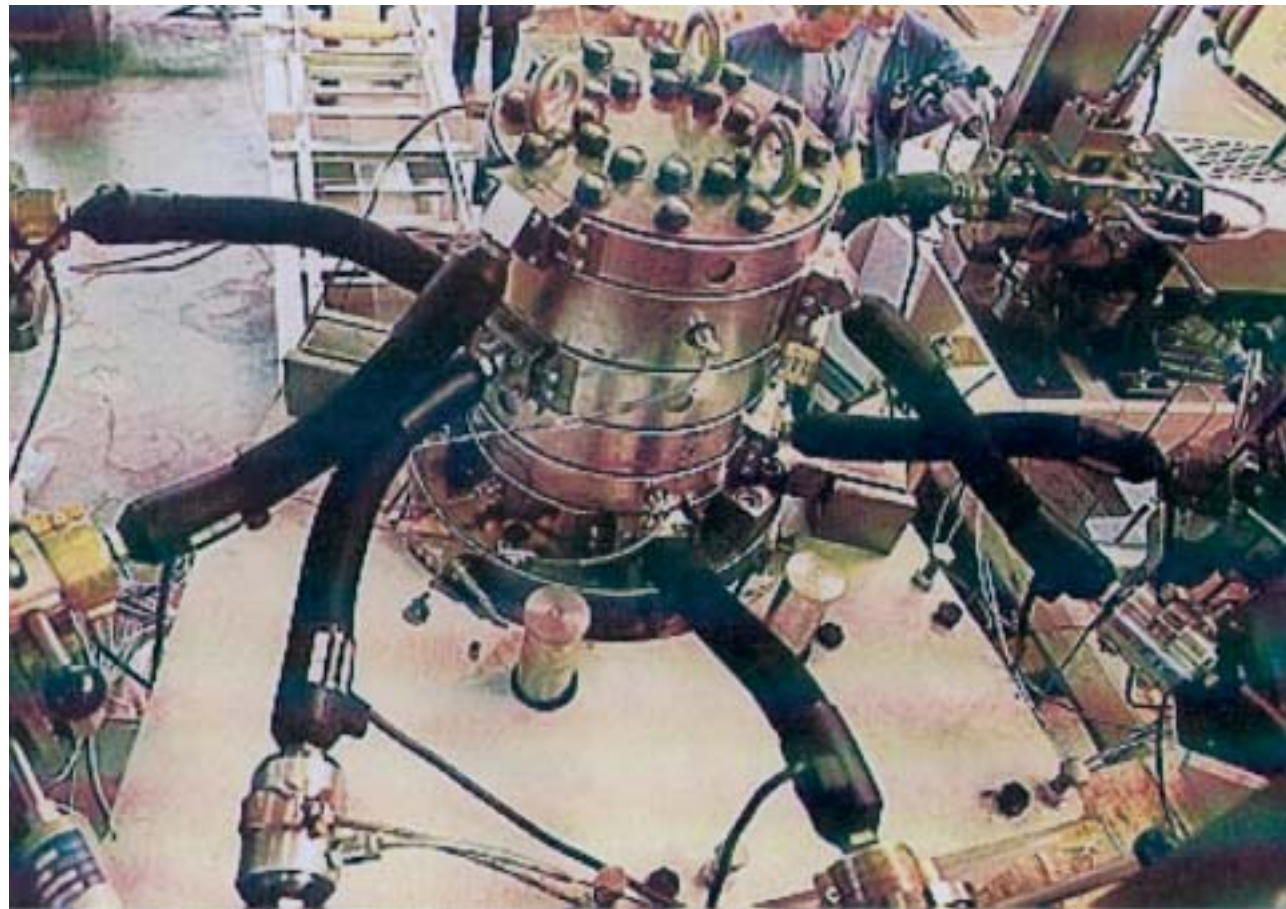


Laboratory machines for the processing of polymers



7-layer blown film line. Top view of melt pumps, melt hoses as well as top part of the coextrusion die

Technical Data			
Extruder	Diameter	mm	20/25/30/45 x 25-30 D
	Throughput	kg/h	2 - 90 kg
Melt pumps	Throughput	cm ³ /rpm	0,6 / 1,25 / 2,25 / 4,5
	Coextrusion die type RWT with radial melt distribution system	No. of layers No. of extruders Die diameter	3 / 5 / 7 / 9 2 to 9 mm 30 - 180
Blown film haul-off with air cooling	Lay-flat width	mm	350 / 550
	Haul-off height	mm	3000 / 4000
Blown film haul-off with water cooling	Lay-flat width	mm	350 / 450

Technical modifications reserved Issued 08C2500

Represented by:

Dr. Collin GmbH
Sportparkstr. 2, D-85560 Ebersberg, Germany
Phone ++49 8092 / 20 96-0, Telefax ++49 8092 / 2 08 62

www.drcollin.de, eMail: collin@drcollin.de

Coextrusion Blown Film Lines

Unique - variable - from 2 to 9 layers - optional air or water cooling for film bubbles with diameters from 20 to 350 mm - easy operation and quick change-over



Coextrusion with air cooling for 2 to 9 layers
Coextrusion with water cooling for 2 to 7 layers

From polymer to information

Application

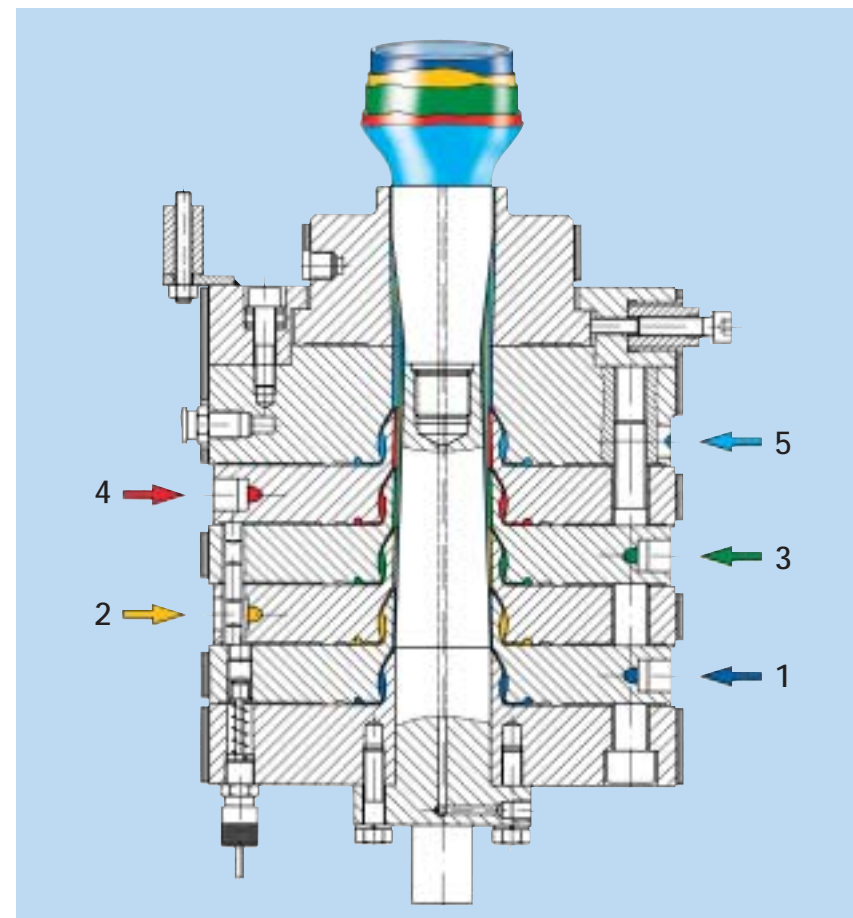
COLLIN multi-layer blown film lines are used for the development of products from multi-layer composites in laboratories, pilot plants or for small-scale productions. Collin units can easily be adapted to perform

different tasks.

The main modules of a multi-layer line are as follows:

- coextrusion die
- extruder
- extruder carriage
- melt pump
- film haul-off and winder
- central control

The patented 5-Layer Coextrusion Die Type RWT



Coextrusion dies

The coextrusion die is the heart of the multi-layer line. Dies of COLLIN are equipped with a spiral mandrel distributor (RWT).

Special features:

- design comprises flat disks
- radial melt feeding
- identically short melt flow paths in each layer
- identical geometry of distributor disks, hence easy expansion in the number of layers
- greatly simplified disassembly and purging compared with dies operating with coaxial cylindrical distributors.

The spiral mandrel distributor is designed to allow processing of a wide range of viscosities. Moreover, the flow speed and hence the thickness of the individual layers may be changed within a wide range of options.

Different variations in the design of coextrusion dies

Number of layers

- 2 up to 9 layer

Sizes

- Type RWT 20 die diameter 20 to 30 mm
- Type RWT 40 die diameter 40 to 100 mm
- Type RWT 80 die diameter 80 to 180 mm

Special designs

The coextrusion die type RWT V can accommodate substantial thermal differences between individual layers. Hence, thermally sensitive barrier layers other than the supporting layers may be processed at a markedly lower temperature.

Modules for Multi-Layer Blown Film Lines

Extruders

Sizes

Collin offers extruders with diameters of 20, 25, 30 and 45 mm. These come with an L/D ratio of 25 or 30. Corresponding **screw geometries** for all standard polymers as well as geometries with shear sections or mixing sections also are available.

The product range

includes measuring devices for the melt temperature, melt pressure, torque and screw back pressure. All extruders are equipped with an interface for PC operation.

Extruder carriages

Extruders and their control cabinets are independent units which can be adapted to the required centre height in various ways:

- a) in case of extruders with a fixed height, flexible melt hoses are used to match the different feed heights of the die zones.
- b) a hydraulically adjustable system with four synchronised cylinders allows fine-adjustment of the required height.
- c) extruder with height adjustment by a motor allow an adaption of the extruder height within a range of 450 mm to 1,350 mm (see fig. below).



Screens

a) **Breaker plates** with inserted screens allow rough filtering at long intervals. For the screen change the flange connection has to be opened

b) **Pivotable screens** allow a screen change-over without opening the flange

Gravimetric feeding

Gravimetric feeding systems have become the state-of-the-art method of ensuring even layer thicknesses. The screw speed is controlled via the weight reduction in the weighing hopper (see fig. below).



Melt pumps

Melt pumps are a preferred alternative for a very small throughput rate per layer which may escape the precise control range of the gravimetric metering system, or a very high pressure consumption of the die. The constant melt flow leads to the production of the required wall thickness, independent of the build-up of back pressure. For continuous feeding of the melt pump the extruders are equipped with a pressure/speed control device.

Film haul-offs

a) Air cooling

Most blown film lines are hauled off in an upward direction with air cooled devices. Features include height-adjustable collapsible frames, alternative roller trains, water-cooled nip rolls. Winders may optionally be used as a circumferential or as central winding device.

b) Water cooling

In special cases, such as the production of transparent tubular PP film, direct shock cooling by means of a water calibration ring has proved efficient. In this case, the product is extruded in a downward direction.

Central control

Each individual extruder can be equipped with an ECS microprocessor control unit. The ergonomically designed operator panel is swivel-mounted and positioned at eye level. The die and all downstream units are equipped with an ECS control. All control units are connected to a master computer via a RS 485 interface. The master computer can manage all set value points and formulation parameters, activate the extruders and record all measured values.

A special start-up control is also available. It allows synchronous starting up of the system to production output level via the master computer.

The control system is also comprised of extensive monitoring, diagnostics and alarm utilities.

Examples

Pages 4-8 show units for different applications.

2 to 3-Layer Blown Film Lines

with air cooling of the film bubble



Line design

Extruders

A high pressure build-up and materials which are sensitive to long residence times require short fixed couplings between the extruder and the die. The height-adjustable design facilitates the adaption of the extruder to the required feed height.

Die

A coextrusion die type RWT 40 with a dual-lip cooling ring allows the production of film with narrow thickness tolerances and an even structure.

Haul-off

The haul-off is also height-adjustable, which facilitates the winding-up of the film.

Control unit

All line units are equipped with ECS controls for an activation via one central PC.

3-layer blown film line with 3 extruders 30 mm, 30 mm and 45 mm diameter extruders

5-Layer Blown Film Lines

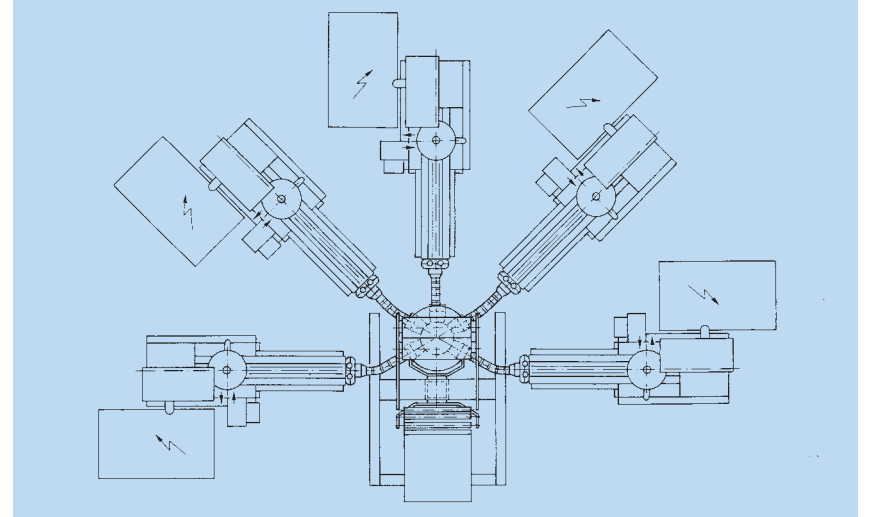
with air cooling of the film bubble

Line design

Extruders in a semi-circular arrangement ensure efficient floor space utilisation. Their mobility allows swift interchanges as each extruder has its own control unit, thus acting as an independent unit which may be operated as an individual machine as well as part of a complete line.

The units can be interconnected with the help of the master computer by means of a simple interface cable.

Configuration example



5-layer blown film line with 5 extruders

Coextrusion Blown Film Lines

with water cooling of the film bubble (quenching)



3-layer blown film line with water cooling for the production of tubes with small diameters

Processing method

In contrast to the air cooling system, the film blowing die is mounted with its die gap pointing down and the warm film bubble is cooled by water in a calibrator.

Application

- for the production of thick-wall blown film of up to 300 μm or optionally for PP or PA film
- in a diameter range from 20 mm to 280 mm
- for the production of tubes for medical or food applications
- for mono or coextrusion film with up to 7 layers
- with extremely short purging and change-over times, even when coextrusion dies are used



3-layer quenching line for the production of infusion bags

Double-bubble Line for the production of biaxially oriented film bubbles

This process is based on the production of a primary film bubble using the method of water cooling. The shock of cold "freezes" the product into a crystalline structure which then allows a biaxial orientation.

In order to achieve this, the film

bubble is heated up in a second bubble (hence the name double bubble) and then stretched into biaxial orientation. The longitudinal stretching process is accomplished by an increased haul-off speed of the second pair of haul-off rolls.

The transverse stretching process

is achieved by blowing up the film bubble. The conditions for setting the temperature and speed must strictly be adhered to.

Applications include:

- Bubbles for food packaging such as sausage skins, mainly made from PA
- thin biaxially oriented film made from PP or PE



3-layer coextrusion line for film with water cooling of the primary film and IR-heating zone for biaxial stretching of the secondary film