COLLIN

Laboratory and pilot plants
for the processing of polymers

Coextrusion systems for Flat Film and Sheet

Innovative technologie in modular design

From the abstract polymer to the real properties

Dies for the coextrusion of flat film

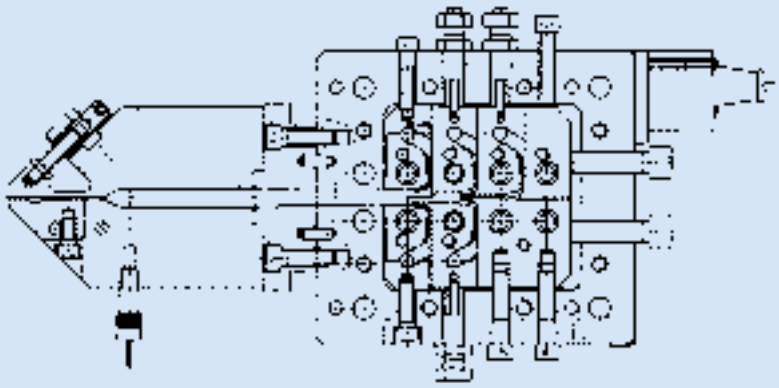
Feedblock system for 2 to 9 layers

The feedblock system is the most frequently used configuration for the manufacture of multi-layered films and sheets.
The multi-layered polymer melt is produced in the relatively narrow feedblock; this material is brought to the required final width in a conventional slot die.

The objective is to manufacture tailor-made packaging materials by combining a number of products which have complementary properties;
the materials feature:

- High gas and aroma barriers
- Moisture block
- Taste neutrality
- Oil and grease resistance
- Good optical and mechanical properties
- Sealability
- Cost reduction by using recycled material

The basic requirement for coextrusion with the feedblock system is a large common processing window with comparable viscosity of all layer materials.



Section through a 5-layer feedblock for the production of symmetrical or asymmetrical layered materials.

Special features

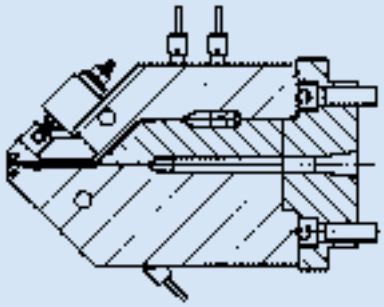
- Adjustable slot width for each individual layer for obtaining a wide variation of different layer thickness ratios
- Throttle valves for setting the flow for each layer
- Configurable for any combination of symmetrical or asymmetrical layers
- Rotating adapter for straight or angled connection of the extruders
- Production of layered materials with 2 to 9 layers
- Feedblock combinations with dies of 150 mm to 500 mm width

Example of a five-layer feedblock with slot die of 200 mm. Using three extruders, three, four or five layers can be produced

Multi-manifold die

Manifold dies are used to generate multi-layers with materials of differing viscosity, at their processing temperature. A flow channel with a “coat-hanger” shape is provided for each material.

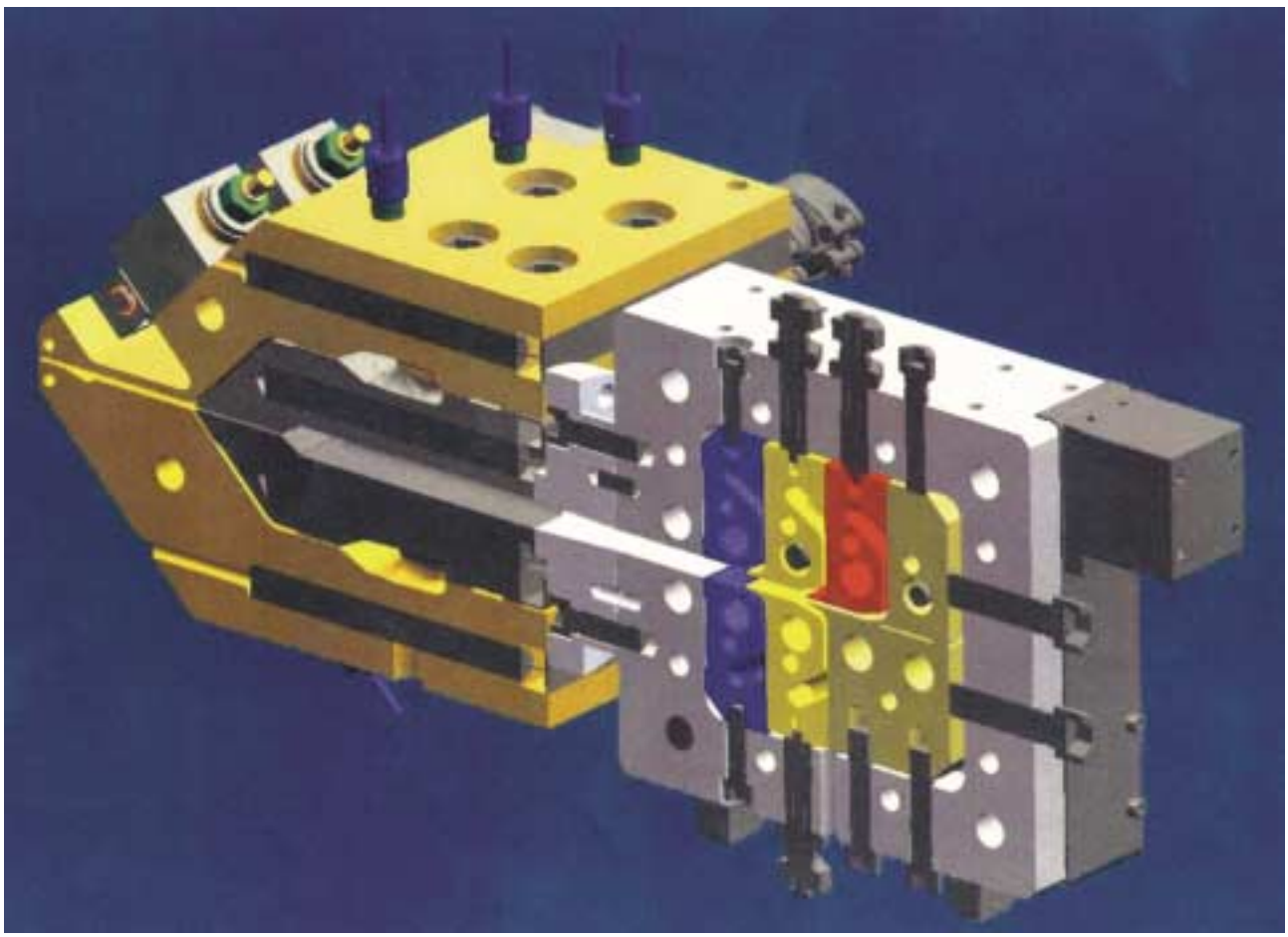
Only at the end of the channel, i.e. almost at the die lips, do the various fully formed polymer films meet and jointly leave the die. Manifold dies for 2 and 3 layers are offered.



Combination of feedblock and manifold die

The combination of feedblock with a manifold die offers the maximum flexibility. Numerous materials of similar viscosity can be covered with layers having different flow properties.

Figure below:
The illustration shows a combination of a 5-layer feedblock with a 3-layer manifold die for the production of a 7-layer film or sheet.



Examples of delivered systems

Five-layer coextrusion system with two extruders with a calender type 136/350 and gravimetric feeding

The fundamental principle for the production of individually defined layer thicknesses with multi-layered materials is the exact determination of the material throughput of each extruder. This can be effected by:

- Weighing the extruder output
- Gravimetric feeding (loss in weight)
- Use of melt pumps between the extruder and die

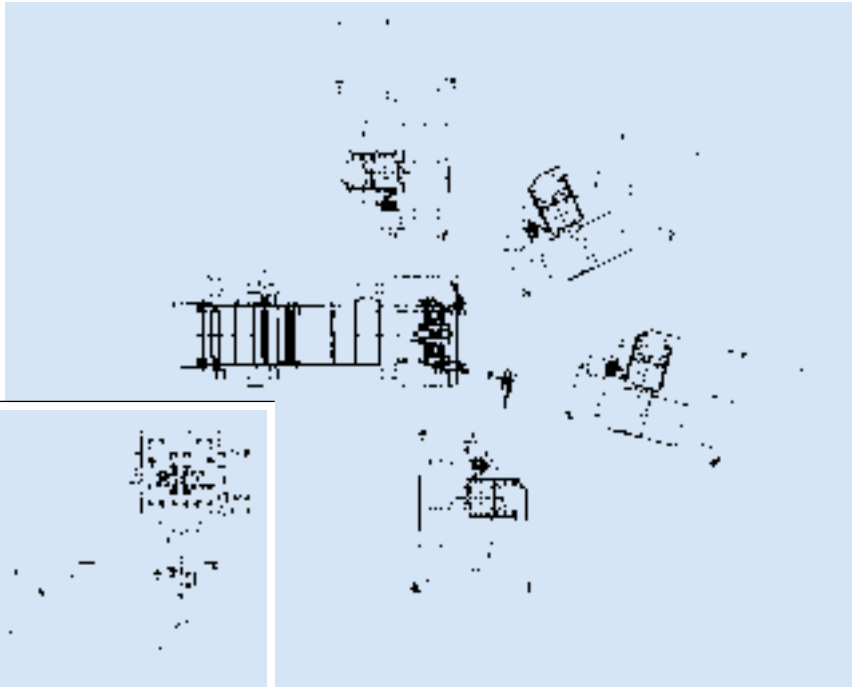
A system with gravimetric feeding is shown in the photograph opposite. Here the feed from the extruder to the feedblock occurs via flexible melt hoses to compensate for height and axial offset.

Five-layer coextrusion system with three extruders and a calender type 136/350

Extruders with diameters 20, 25 and 30 mm, on mobile frames, can be positioned at any angle to the feedblock. The system is used for producing symmetrical 'ABCBA' film.

Coextrusion cast-film system with four extruders for five-layer cast film

- Direct feed into the feedblock with short adapters and hence short dwell times
- All four extruders adjustable in height and position
- Die and feedblock mounted on moveable pillars
- Chill-roll unit adjustable in height for fine adjustment of the distance between die and cooling roll
- Additional unwinding station for lamination trials
- Alternatively, calendering is also possible when using a three-roll unit
- With the additional installation of a rubber-covered nip roll, many techniques of film manufacture are possible, such as:
  - Casting
  - Calendering
  - Embossing
  - Backing
  - Laminating



The vertical arrangement of the feedblock and die enables the casting of thin films on a two-roll cast-film take-off.
Air knives or ‘electro-pinning’ enable even contact and therefore cooling as well as reducing the ‘neck-in’.

Technical data

EXTRUDER / TYPE		E 16	E 20	E 25	E 30	E 45
Diameter	(mm)	16	20	25	30	45
Length	(LD)	20 - 30	25 - 30	25 - 30	25 - 30	25 - 30
Drive power	(kW)	0,8	1,9	5,8	8,8	18,3/27
Screw speed	(Min-1)	0 - 180	0 - 180	0 - 170	0 - 160	0-140/240
Throughput	(kg/h)	0,1- 1,5	0,3 - 3	0,7 - 7,5	1,5 - 15	3-30/50

FEEDBLOCK		
Width	(mm)	40
No. of layers		3 / 5 / 7 / 9

SLOT DIES					
Width	(mm)	150	200	250	up to 550 mm
Slot width Film	(mm)	0,3 - 1,5	0,3 - 1,5	0,3 - 1,5	0,3 - 1,5
Slot width Sheet	(mm)	0,3 - 6 (8)	1,5 - 3	1,5 - 3	1,5 - 3

MANIFOLD DIE				
Width	(mm)	250		
No. of layers		2	3	
Slot	(mm)	0,2 - 2,5		

CALANDER / TYPE		136 / 230	136 / 350	168 / 400	168 / 600
Roll diameter	(mm)	72-144-72	72-144-72	3x168 (250)	3x168 (250)
Roll width	(mm)	230	350	400	600
Drive power	(kW)	0,4	0,4	3x0,5	3x0,8
Take-off speed I	(m/min)	0,5 - 6	0,5 - 10	0,3 - 5	0,3 - 5
Take-off speed II	(m/min)	3 - 30	3 - 30	1 - 20	1 - 20

The technical data given provides guidelines for a basic configuration for a co-extrusion system. A detailed design can only be provided after definition of the polymers used, the layer structure and the dimension of the required finished product.

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