

# FILM

# SHEET

# HOLLOW PROFILE SHEET

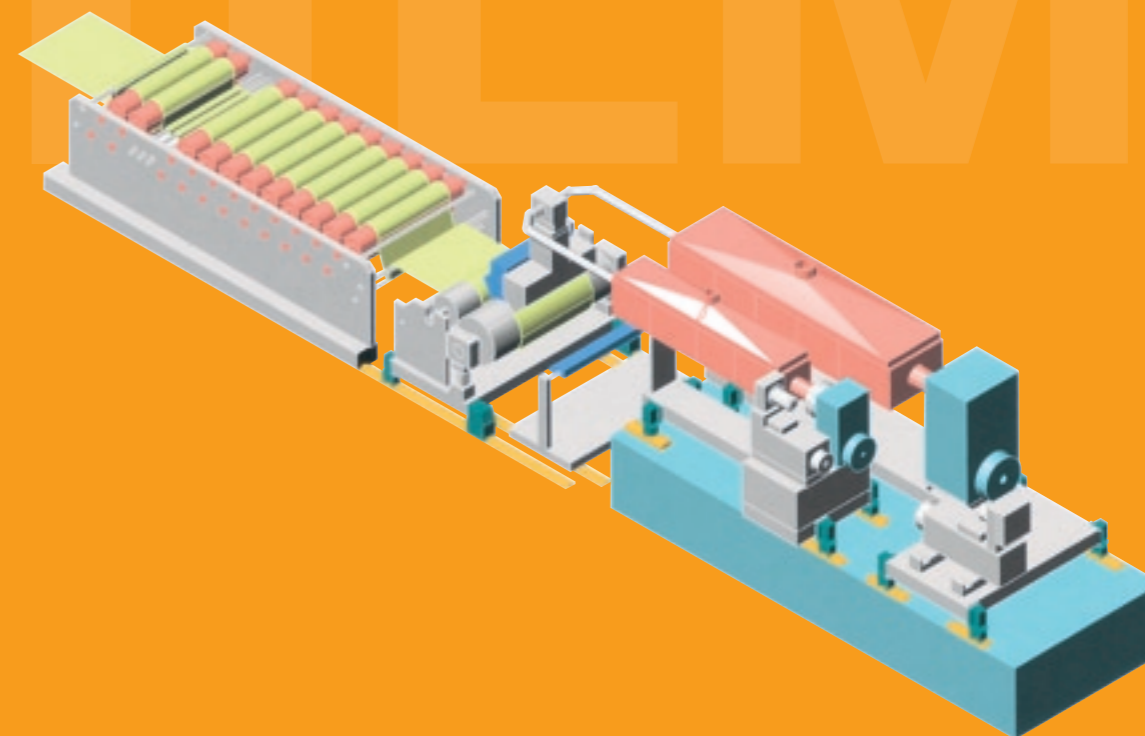


**LEADER EXTRUSION MACHINERY IND.CO.,LTD.**



Taichung

# FILM



LEADER EXTRUSION MACHINERY

**LEADER EXTRUSION MACHINERY IND.CO.,LTD.**

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# COMPANY PROFILE

- 1989** Founded in Taichung County, we were originally a designer & manufacturer of plastic flat sheet Dies, gear box and other auxiliary parts of extrusion line.
- 1990** Invested in development of PP hollow profile extrusion line, and the whole plant of sheet, film, and coating machine. We hired foreign and domestic scholars in macromolecule and chemistry field as technical consultants. We also successfully built PVC shrink film tenter at this time.
- 1993** Succeeded in manufacturing the first domestic self-made PC, UVPC three-layer sheet co-extrusion Die, and A.B.A & A.B collective Feed Block, which were installed coordinately on a Japanese machine.
- 1995** Successfully released the first self-made widest PP hollow profile plant (W: 2,150 mm) in Southeast Asia, and officially stepped into mass production.
- 1996** Successfully developed environmental friendly LDPE coating machine to replace PVC adhesive tape.
- 1997** Achieved mass production of saleable PP/ PS sheet lines for stationery, thermoforming, and print purposes, and released A, B, C three-layer co-extrusion line in which B is PP foamed layer.
- 1998** Developed and put PE/ EVA/ LDPE five-layer film co-extrusion automatic production line in the market.
- 1999** Accomplished our mission on building the first domestic self-made PC hollow profile co-extrusion line with its width of 2,130 mm, and the product thickness range was from 4 to 20 mm. Great strides had been made in domestic PC hollow profile field.
- 2000** Launched two-extruder co-extrusion line for PC, UVPC super clear sheet of 1,220 mm × 2,121 mm width, and product thickness: 0.8mm~12mm. Meanwhile, we developed and put our new PETG multi-layer film automatic production line in the market.
- 2001** Successfully launched to market: 1. PP two-extruder, A.B.A three-layer hollow profile line which was the first self-made line in Southeast Asia. 2. World first PC/ PET/ PP share hollow profile extrusion line with product thickness range: 2 ~ 20 mm. 3. APET sheet extrusion line and PC corrugated sheet extrusion line stepped into mass production.
- 2002** Launched PC/ PET/ PMMA/ PBT/ PEN multi-layer film automatic extrusion line and PETG/ APET/ PETG three-layer sheet extrusion line which were both first plant ever made in Taiwan. We achieved PP curved hollow profile production line of width from 1,350 ~ 2,950 mm, and over 500kg/ hr output. Its special structure is approved by the Patent Office.
- 2003** LEADER successfully developed TPU/ EVA membrane automatic extrusion line, and PE/ EVA protection film automatic extrusion line for sheet protection use.
- 2004** Independently built the world first 2-meter wide, 700 layer film plant with its product thickness of 0.06 mm. Furthermore, we developed PP/ PE three-layer(A/B/C) foamed sheet extrusion line.
- 2005** Cooperated with a Japanese company and released the first PC multi-layer diffusion sheet extrusion line made in Taiwan, and first PC thin sheet extrusion line of 0.5 mm product thickness domestically made. At the same time, LEADER put the lines below in the market:
- \* W: 2,121 mm PMMA sheet co-extrusion line
  - \* W: 1,600 mm PMMA/ PS/ PC/ MS optical sheet extrusion line
  - \* Protection film extrusion line for optical sheet use
  - \* PC/ ABS sheet co-extrusion line for suitcase/ baggage/ luggage application, which its product is going to substitute ABS sheet because of its lightweight advantage.
- 2006** LEADER researched, designed, and produced the first PET multi-layer shrink film line made in Taiwan, and the first PLA multi-layer bi-orientation film production line and first PLA thermal-setting film production line in Southeast Asia.



LEADER bi-orientation extrusion lines are capable of manufacture products below:

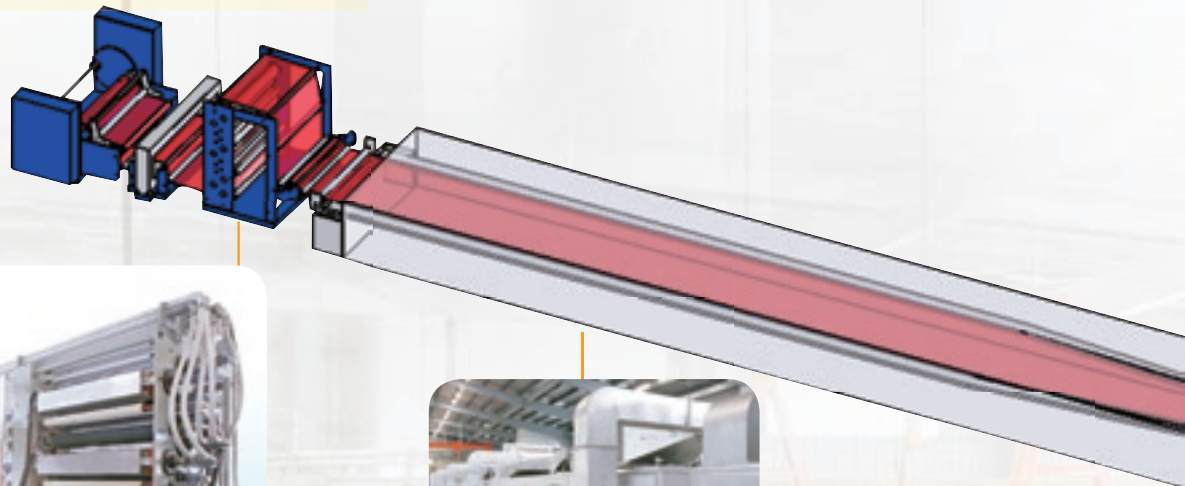
- (1) PVC high shrinkage label: MD shrinkage rate 0~5%, TD shrinkage rate 65% Max.
  - (2) OPS high shrinkage label: MD shrinkage rate 0~5% , TD shrinkage rate 78% Max.
  - (3) PETG high shrinkage label: MD shrinkage rate 0~5% , TD shrinkage rate 80% Max.
  - (4) PLA high shrinkage label: MD shrinkage rate 0~5% , TD shrinkage rate 75% Max.
  - (5) Thermal setting Film - resists to 130°C
- All shrinkage products simulate the best shrinkage curve.

## Casting, MDO, TDO In-line Bi-orientation Extrusion Line

The first shrink label in-line extrusion machine made in Taiwan. This machine stands out the creativity and technology ability of LEADER.

### BI-ORIENTATION EXTRUSION LINE

LEADER proudly launches the first made-in-Taiwan bi-orientation extrusion line for shrink film (label). This machine reflects the creativity and integrated technical ability of LEADER. After developing TPU, PETG extrusion line to replace PVC soft, rigid film, LEADER also launches the extrusion line for bio-degradable materials on the conscious of environmental protection. In order to enhance its production range, LEADER unites the technology which aimed at the properties of OPS and PETG, and integrates it into our PLA production line. Most of the orientation processes in Asia are separated from extrusion line as so called "Off-line". LEADER devises In-line orientation line in which the extruder connects to TDO directly and successfully lessens junction material (2%) and trimmed material (6%). That is, LEADER production line efficiently achieves cost down 8%.

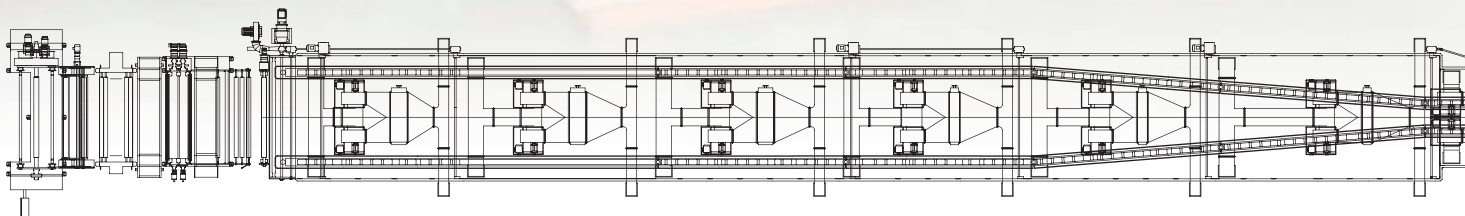


LEADER MDO



### 24M ~ 36M MULTI-SECTION TDO

LEADER TDO oven has multi-section design that provides multi-function. Besides two-stage cross direction orientation enables control of the stretching from different temperature. We add the thermal setting section and counter-orientation section, and these sections balance the forming of MD \ TD orientation. We offer TDO of different length based on the material our client has required and design for each line speed.



## CORE TECHNOLOGY

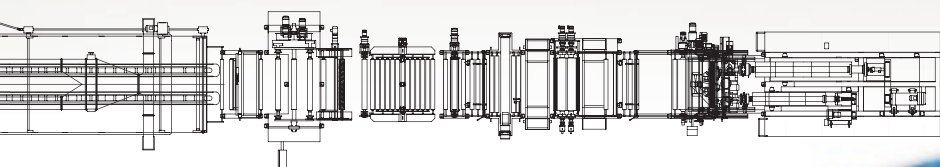
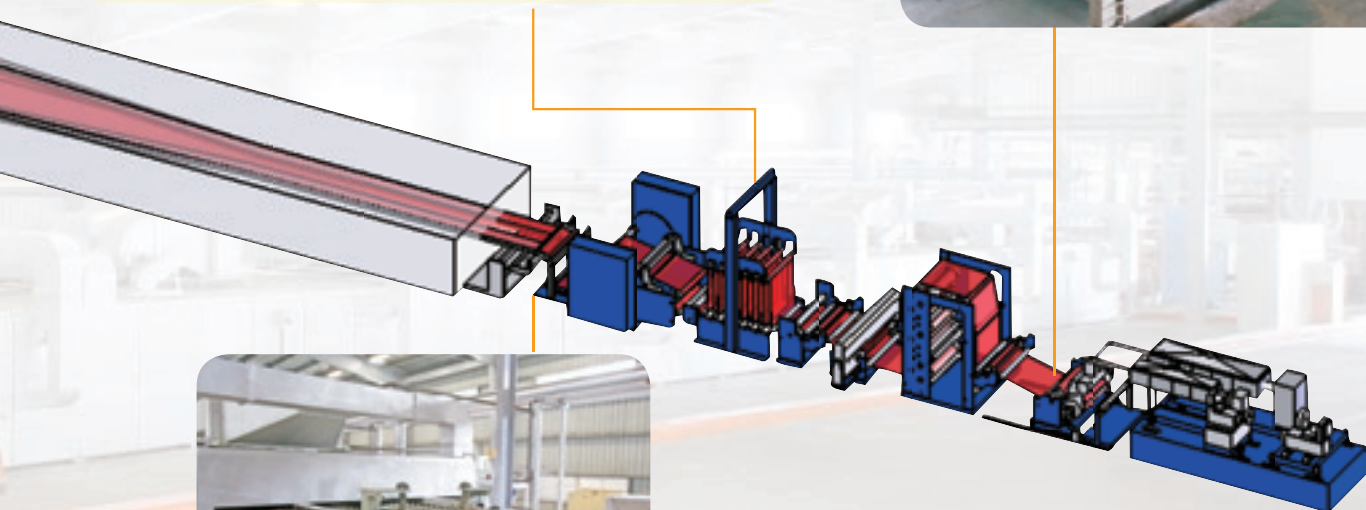
- (a) Machinery direction orientation MDO: Tri-section orientation. MDO utilizes the thermal deforming & stretching character of material to orientate the film fully for stable width.
- (b) Traverse directional orientation TDO: 3 ~ 6 sections control of transverse directional orientation and shrinkage. It has the effect of thermal setting at 180°C. Furthermore, we specially offer 350°C thermal setting design for special materials such as Polyimide or Teflon.
- (c) Automatic multi-layer T-die: We have successfully developed 131、263 and 700 layers co-extrusion film. We not only match the optical properties of different material, but also reinforce the characteristics of the material.
- (d) Electro-pinning device and vacuum box: This device forces the film tight to the roller in order to get best width and gloss. Thanks to the vacuum box, the width of film will not change while raising the speed.

## APPLICATIONS

1. Shrink label Full size - shrinkage rate at 80% Half size - shrinkage rate at 55%
2. Thermal-setting film Bread bag - substitution for BOPP Cosmetic packaging film
3. Odor barrier film/ laminated on PP、PE film
4. Tough tape - stretching intensity is 10 to 15 times better than common tape
5. Gas permeable film - infant diaper
6. Iridescent film - extensive application

## LEADER ACCUMULATOR

LEADER invents many kinds of accumulator. By using air pressure and encoder to control the speed of up and down and the tension within the accumulator, we maintain the equal tension of film during its time elongation. The accumulator is advantageous to the variation of process. One can get higher output through LEADER bi-orientation casting line than blown film line (approx. 8 times). The product thickness will be more average than blown is, and better surface gloss makes the product film suitable for printing and transparent application.

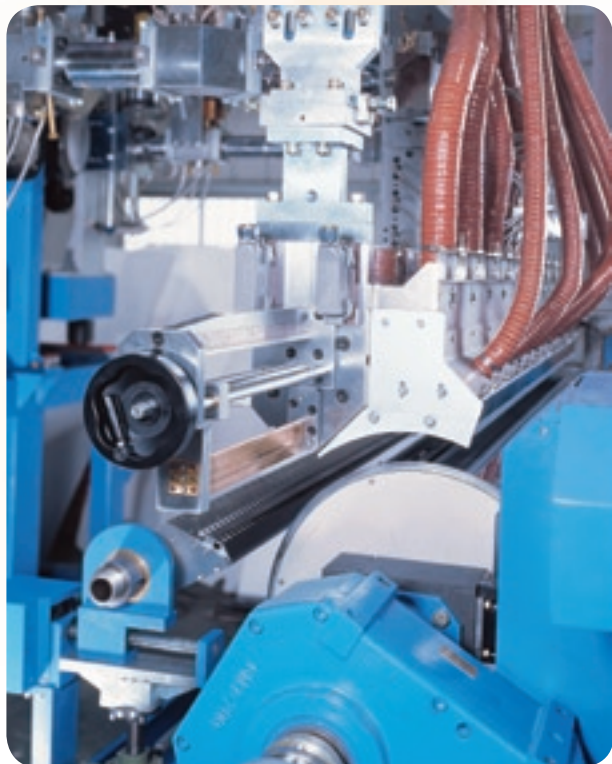
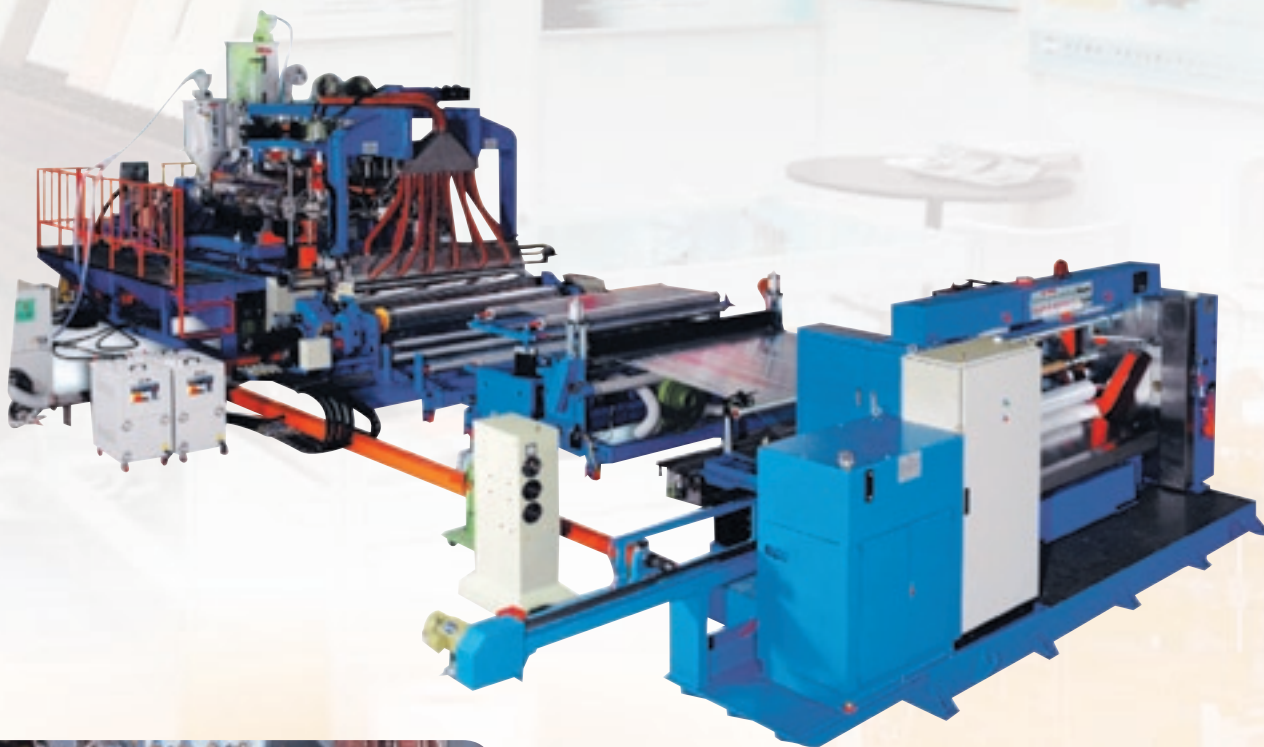




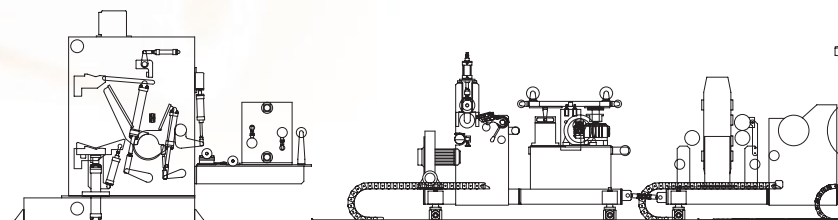
## MULTI-LAYER CO-EXTRUSION LINE FOR PROTECTION FILM < EVA/ LDPE/ LLDPE+HDPE >

### SPECCIFICATION:

Suitable Raw Material	PE, PP, PLA, PET, PI, PC, LDPE, LLDPE
Extruder	Single, Twin, Three to Five Extruders
Main Extruder Screw	Ø60 mm ~ Ø200 mm
Sub. Extruder Screw	Ø30 mm ~ Ø180 mm
Control System	Motion or Server Control System
Auto Winding System	Surface or Central Winding



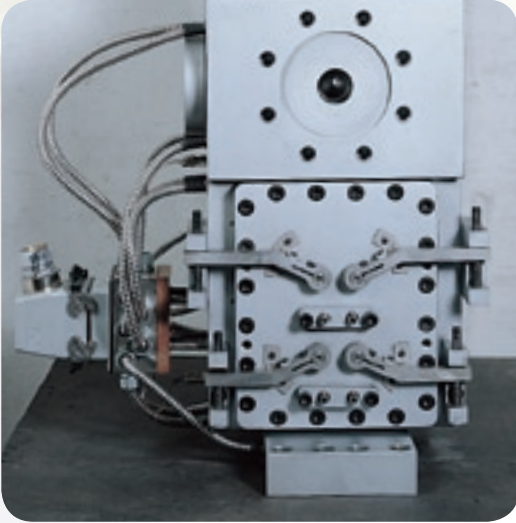
User Friendly Computer Interface



## FIVE LAYER FEEDBLOCK

In order to match the intensity and viscosity of product, LEADER offers 5 layers co-extrusion for our clients to adjust their formula.

- Made of high-carbon steel with extreme precision.
- Split body design makes it simple to clean and disassemble.
- Streamline flow channel, which is processed with special treatment to minimize gel formation.
- Accurate valve design for layer ratio.
- Modular layer configuration for efficient changing.



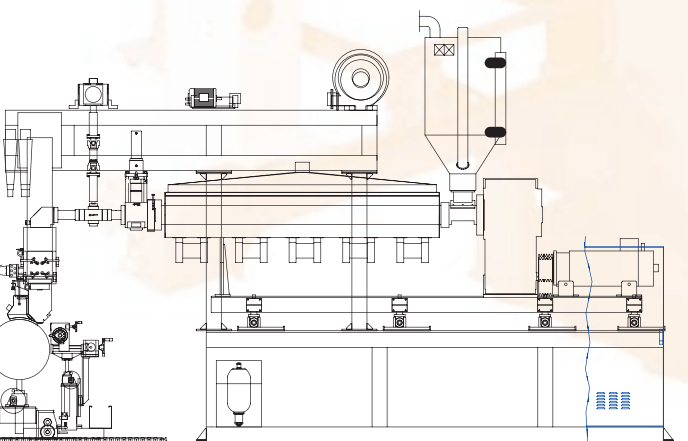
## FEATURES

1. Multi-layer co-extrusion, alternative laminating temperature and glue-free.
2. Flexible viscosity film fits all kinds of plastic sheet surface, structural or rough. "Without using glue makers solves the problem of leftover glue while heating the product, "nor do the film become undetachable after shaping.
3. Variability of changing color; adjustable product width.
4. Unique temperature control and thickness distribution.

## APPLICATIONS

Multi-layer co-extrusion protection film: Using EVA, C4, C6, C8, LLDPE, LDPE, HDPE, PET, PLA materials.

1. Low gel application for PC, LCD.
2. Common sheet protection film (plastic sheet) - EVA/ PE.
3. Heat-resistant protection film (anti-riot sheet) - EVA/ C8/ PE.
4. Adhesive protection film (transparent products).





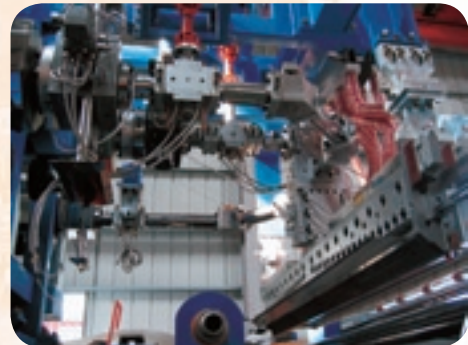
## MULTI-LAYER CO-EXTRUSION LINE FOR EVA/ TPU MEMBRANE -SOFT PVC REPLACEMENT-

### SPECCIFICATION:

Suitable Raw Material	TPU, EVA, POF, PA6, PA666
Extruder	Single, Twin, Three to Five Extruders
Main Extruder Screw	Ø60 mm ~ Ø200 mm
Sub. Extruder Screw	Ø30 mm ~ Ø180 mm
Control System	Server or Motion Control System
Auto Winding System	Surface or Central Winding

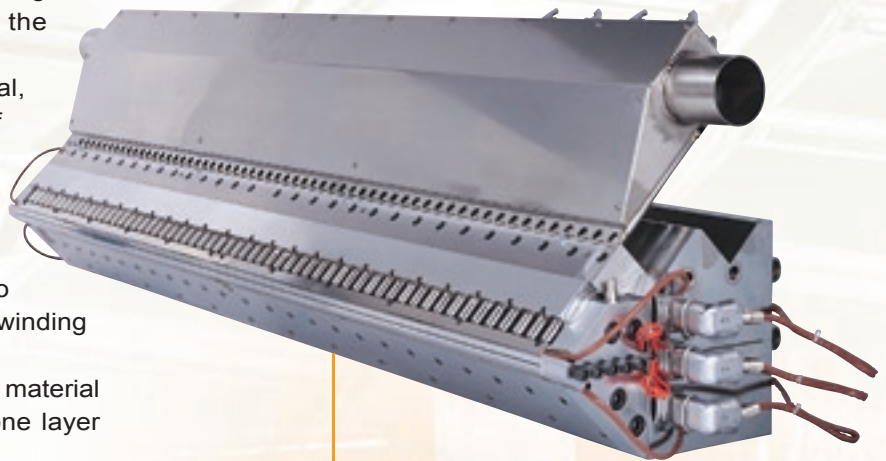


LEADER specialists have accumulated experience over the years. We have a positive attitude toward the improvement and innovation of our machines. Moreover, LEADER cooperates with many raw material companies for developing new materials or new formula. This helps us to gain competent knowledge of co-extrusion, and makes our lines competitively against top machinery makers in the world. LEADER builds our line based on client's demand and research on the product in order to match the requirement; the diversification and specialization are so called "LEADER MODULOUS DESIGN".



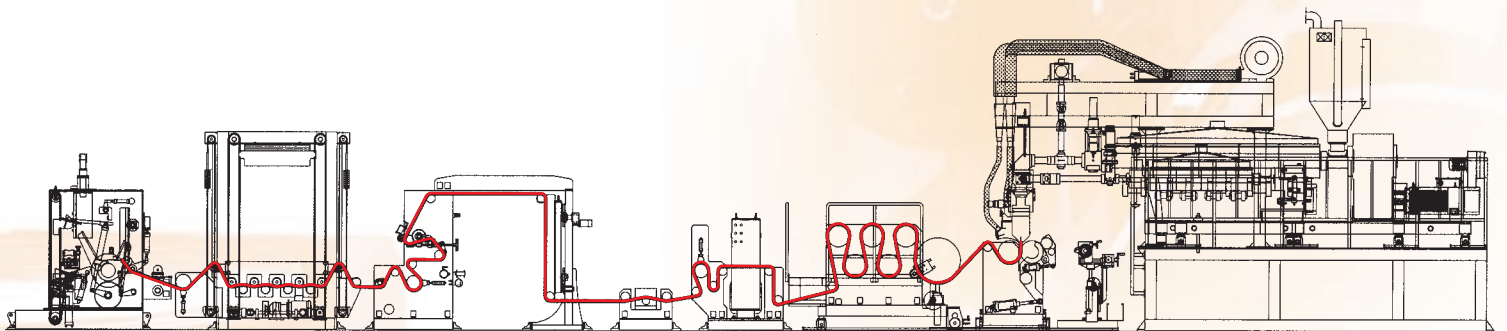
## FEATURES

1. Excellent drill type cooling roll could control the temperature difference of cross direction within  $1^{\circ}\text{C}$ .
2. According to different material, to design different cooling covering area to control the stretch direction of thin film.
3. According to different properties of material, to design roll for different viscosity of material to control the stretch of material.
4. Adjustable T-Die to match the thickness gauging system to reach the best thickness control.
5. According to the request of customer, to design the central suspending touch type winding unit and oscillating unit.
6. Encapsule design of mold end, the trimmed material of multi-layer film could be recycled with one layer on the edge.
7. Servo / motion feed back control, the whole line speed could be controlled simultaneously.
8. Special cutting design with high temperature control without overheat condition.
9. The surface of roll with special viscosity proof to prevent TPU / EVA from sticking on roll.
10. The whole lines are motion feed back controlled and each section of line speed could be controlled within 0.1m.



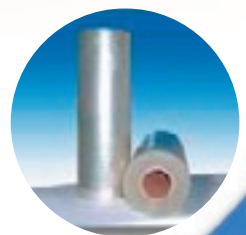
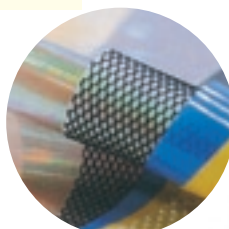
## LEADER AUTO DIE

- ◆ Automatic thickness adjustment which is collocating with thickness scanner.
- ◆ European thermal bolt control system control minimum thickness tolerance.
- ◆ Special treatment to internal flow channel, and the surface roughness is below  $0.05\mu$ .



## APPLICATIONS

1. Protective gloves, Lab robe, Bandage, Sterile wound dressing, inflatable support and air cast substitute for plastic caste.
2. Shoe material.
3. Waterproof air cushion clothes.
4. Soft material of dry type tape.
5. Raincoat and protection material.

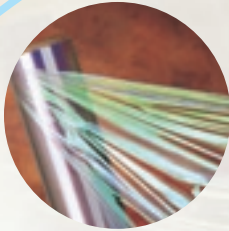




## MULTI-LAYER CO-EXTRUSION LINE FOR ULTRA MULTI-LAYER FILM

### SPECCIFICATION:

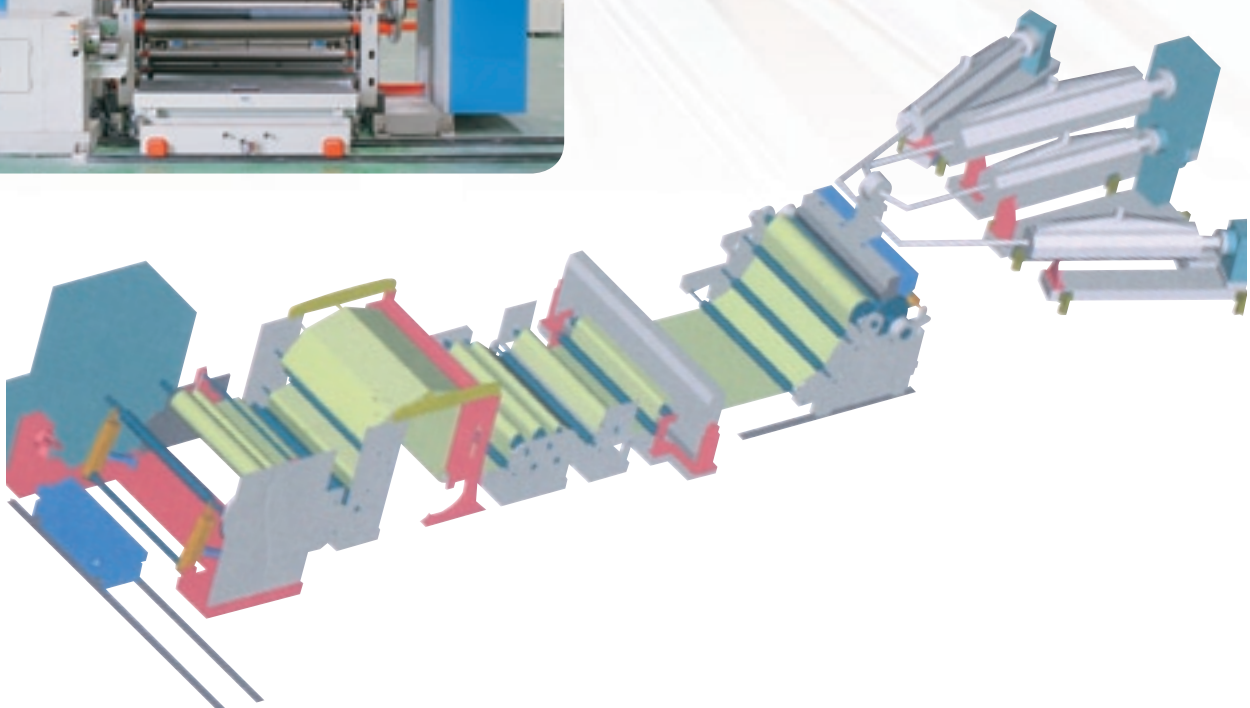
Suitable Raw Material	PET/ PBT/ PMMA, PS, PE, EVA, TPO, PLA, PP, PI, PC
Extruder	Single, Twin, Three to Five Extruders
Main Extruder Screw	Ø60 mm ~Ø200 mm
Sub. Extruder Screw	Ø30 mm ~Ø180 mm
Control System	Server or Motion Control System
Auto Winding System	Surface or Central Winding



### PETG/ APET/ PETG

PETG is a good barrier material for non-vinyl application. Its specialty is good for sealing, welding and thermoforming. The clarity and environmental friendly character make PETG the best choice to replace clear rigid PVC.

1. By using APET as the middle layer, it reduces cost and enables the product to have a better competitive advantage than PVC has. Also, the trimmed edge can be recycled. This increases the production yield up to 97%.
2. The design of 4 extruders for multi-layer construction enables to manufacture over 100 layers optical composition.
3. Vacuum box stably controls the width of the film, and makes the machine reaching 100 m/min. output line speed easily.



# BRIEF INTRODUCTION

LEADER Extrusion Machinery company is one of the leading companies in plastic extrusion field which specializes in the design, production, and development of extruding system. LEADER has more than 30 years' technical experience in the manufacture of plastic products, and our staffs have made research into a variety of plastics such as PC, PP, PE, PI, PET, PLA, PS, K-resin, PMMA, PBT, EVOH, Ecoplast, PA6, etc, and have developed our distinctive extruders, Dies, MDO, TDO, winders and other processing facilities.

## LEADING TECHNOLOGY

### ◎ Extrusion plant design:

- a. Single layer, sheet, film, corrugated sheet, hollow profile, foam and other complete set of forming system.
- b. Multi-layer (two to seven layers) co-extrusion lines, customer-oriented design.
- c. Turnkey design system.
- d. Standard design, option design, modulus design.
  - (1) Precision Motor
  - (2) Digital Control
  - (3) Vacuum Ventilation
  - (4) Vacuum Calibrator—Water cooling type: direct or indirect; Gap control type
  - (5) Screen Changer
  - (6) Gear Pump
  - (7) 4D Static Mixer
  - (8) Flexible Die Set—Automatic or Manual, fixed lip or flexible lip, adjustable “fast gap” lip, Choke bar; multi-layer dies, and double slit design.
  - (9) Computer design Screw base on different material and exclusive combination.
  - (10) Polishing Roll: Independent transmission, oil pump control, and freeze roll temperature control; horizontal, vertical or 45 degree; variable position of the third roll, rapid change of the rolls; special embossed rolls.
  - (11) Edge Trim Cutter
  - (12) Crusher
  - (13) Winding Machine: Surface winding machine—pressurized type, oblique angle type and direct winding type. Central winding machine with tension control—contact control, gap control.
  - (14) Feeding System: Batch type. Continuous type—volumetric dosing system, integrated gravimetric system.
  - (15) Oven: Sheet type. Film: Bi-orientation type. Cross elongation oven: auto clamp.
  - (16) Corona Treater—Single side, double side.
  - (17) MDO
  - (18) Pulling Roller Unit.
  - (19) Thickness Scanning System: \*  $\beta$ -ray (Kr 85, Sr 90) \* Eddy Current. \* Infrared rays. \* Software to control with Auto Die.
  - (20) Cutting System: Longitudinal cutting, cross cutting.
  - (21) Dancing Storage Roller Set with Accumulator.
  - (22) Pelletizing Machine.

### ◎ Rear section shaping \ shrinking \ leveling \ stretching roll set: Flexible shrinkage percentage control — specific design according to the hardness \ transparency \ tension of the product, such as S-wrap, three-roller, five-roller, seven-roller and hoist type roller.

### ◎ Control Interface Design:

- (1) Computer display and control.
- (2) DDC design panel and control cabinet with push button and switch on/ off control.

## FUTURE DEVELOPMENT

1. LEADER specially offers ultra multi-layer film co-extrusion line. LEADER has successfully developed 113-layer and 226-layer film, and plans to proceed to 1,000-layer optical refractive film and 452 layer iridescent films now.
2. LEADER co-extrusion lines are classified as below:
  - ◆ High shrinkage rate and bi-orientation film of PS/ PETG/ PLA/ PGA materials.
  - ◆ High strength gas permeable film (9~15 times) for HDPE/ PP/ PS materials.
  - ◆ 3 ~ 5 layer co-extrusion film for CPP/ BOPP/ PE/ PP materials.
  - ◆ PC film: LEADER estimates to achieve 4 ~ 8 Ga thickness in year 2009.
  - ◆ Optical protective film: free from gel and heat-resistant film (180°C \* 10 sec.) of 3 ~ 5 layers. The application will be coated surface protection of refrigerator, special metal surface cladding, and mobile phone/ liquid crystal processing protection. Product thickness range is from 18 $\mu$ ~40 $\mu$ , 2,400mm in width, and 400 kg/hr output.
3. The cooling efficiency of calender and forming roller accomplish good transparency and excellent forming ability due to the high pressure pump for water, which makes the temperature difference to be controlled within 1°C.
4. LEADER high speed central winding machine: Now we offer for 250m/min line speed, and we expect to build a 600m/min winding machine in year 2008.
5. User friendly computer interface - Computer display and control. DDC design, control cabinet with push button and on/ off switch.

