

NEWSLETTER

DECEMBER 2025

LABORATORY SCIENTIFIC CAST FILM AND SHEET EXTRUSION LINE FOR MEDICAL-GRADE POLYMERS



Labtech Engineering proudly introduces the **Type LCRM/2/145-300**, a GMP-compliant Cast Film Extrusion Line developed specifically for high-grade polymers used in medical applications, including advanced material such as Polycaprolactone (PCL).

The line is engineered for gentle melt handling and precisely balanced thermal regulation from extrusion to film winding, ensuring an exceptionally stable process with no gels or surface defects and consistent film quality for medical and pharmaceutical use.

The system is composed of a 25 mm single-screw extruder, a two-roll chill-roll attachment with individual temperature control, and a downstream unit designed with a medical-grade compatible surface finish, including guide rolls, edge cutter, pull rolls, and a standard film wind-up. The line can also be customized in different sizes or upgraded from single-layer to co-extrusion, depending on the customer's requirements.

KEY ADVANTAGES

- GMP-qualified construction with full stainless-steel framework and medical-grade silicone contact parts.
- Advanced heating and cooling integration: electric heating and precise cooling in each barrel block for thermal control.
- Stable temperature control across the entire process, preventing overshoot and polymer degradation.
- Low-shear extrusion system ensures uniform molecular structure and eliminates gel formation.
- Wide chill-roll temperature range (10–120 °C) for both rapid quenching and controlled crystallization.
- Compact modular design ideal for R&D and pilot-scale production of medical films.



25 MM SINGLE-SCREW EXTRUDER FOR MEDICAL-GRADE POLYMERS TYPE LEM25-30/C

Designed for precision and consistency, the single-screw extruder provides a stable, low-shear melt flow that maintains the molecular structure of high-grade medical polymers.

KEY FEATURES

- Three heating zones: feeding, melting, and metering; each built as a barrel block with electric heating and precise cooling channels.
- Uniform melt homogeneity under gentle shear, minimizing thermal stress and ensuring smooth film formation without gel or haze.
- Highly stable temperature response, eliminating overshoot and protecting the polymer against degradation.



Pharmaceutical-grade stainless-steel screw & barrel for corrosion resistance, high surface hardness, and easy GMP cleaning.

This section controls film thickness and surface finish with precise roll temperature and smooth transfer to ensure a uniform and defect-free product.

KEY FEATURES

- Accurate temperature balance across both rolls guarantees consistent cooling and uniform crystallization.
- High thermal responsiveness ensures steady process conditions even during extended runs.

FLAT DIE & ROLL-STACK SYSTEM FOR MEDICAL-GRADE POLYMERS TYPE LFDM-175 & LCRM/2/145-300



Special flat die design with minimal gap to the first chill roll, reducing neck-in and maintaining even film width.



A two-roll stack with non-stick surface and independent tempering channels, connected to a chiller system for precise temperature control from 10 °C to 120 °C.

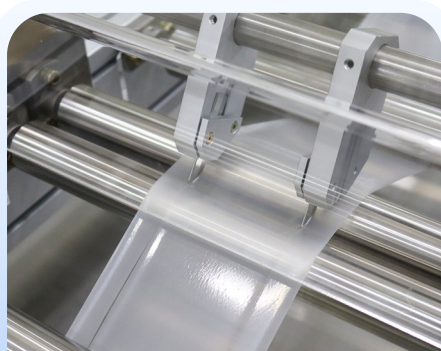
DOWNSTREAM HANDLING & FILM FINISHING

The downstream section completes the process with stable web transfer, edge trimming, and controlled winding, maintaining film quality through every step.

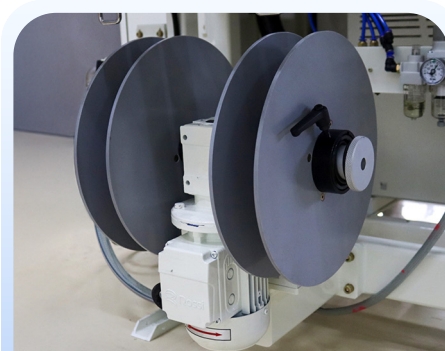
KEY FEATURES



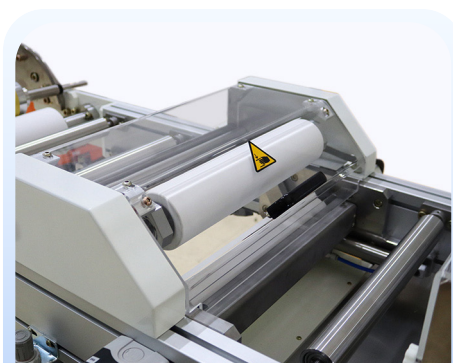
Stainless-steel guide rolls for precise film alignment and easy cleaning.



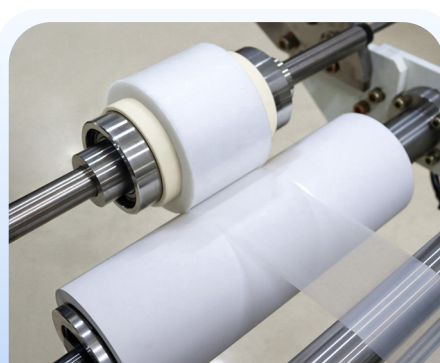
Edge trimming unit for accurate, clean-cut film edges.



Cassette collection system for safe, hygienic film handling and convenient storage.



Adjustable pull rolls for fine control of line speed and film thickness.



Silicone rubber wind-up rollers providing gentle film contact.

TECHNICAL SPECIFICATIONS

25 MM SINGLE-SCREW EXTRUDER FOR MEDICAL-GRADE POLYMERS		LEM25-30/C
Screw Diameter	mm	25
Available L/D Ratio	-	30 : 1
Maximum Screw Speed	RPM	200
Number of Heating Zones on Barrel	-	3
Maximum Standard Barrel Temperature	°C	300
Estimated Maximum Output	kg/hr	10
Motor Power	kW	5.5
CAST FILM AND SHEET EXTRUSION LINE FOR MEDICAL-GRADE POLYMERS		LCRM/2/145-300
Roll Diameter (All 2 Rolls)	m	145
Die Lip Gap Range	mm	0.3 to 2.0
Die Width	mm	175
Film/Sheet Thickness Range	µm	20 to 1000
Maximum Line Speed	m/min	25
Total Line Dimension (L x W x H)	m	2.77 x 1.24 x 1.86

CASE STUDY:

PROCESSING OF PCL



MATERIAL TARGET

A premium-grade biodegradable polymer was used in this project, intended for advanced medical and pharmaceutical research applications. The material was supplied in virgin form without prior thermal processing, designed for high-purity film production in laboratory and pilot-scale environments.



PROCESSING CHALLENGE

The polymer featured a broad molecular-weight distribution, making it difficult to process consistently. Without precise temperature regulation, the melt easily develops gels and surface defects, resulting in poor film clarity. The goal is to achieve stable, defect-free film extrusion through highly accurate thermal and cooling control under GMP conditions.



OUTCOME

Using the Labtech Cast Film and Sheet Extrusion Line Type LCRM/2/145-300, the process successfully delivered uniform, gel-free films with consistent thickness and clear surface appearance. The results confirmed the line's capability to handle sensitive medical-grade polymers with outstanding process stability, repeatability, and clarity, validating its suitability for research and development and drug-delivery applications.

