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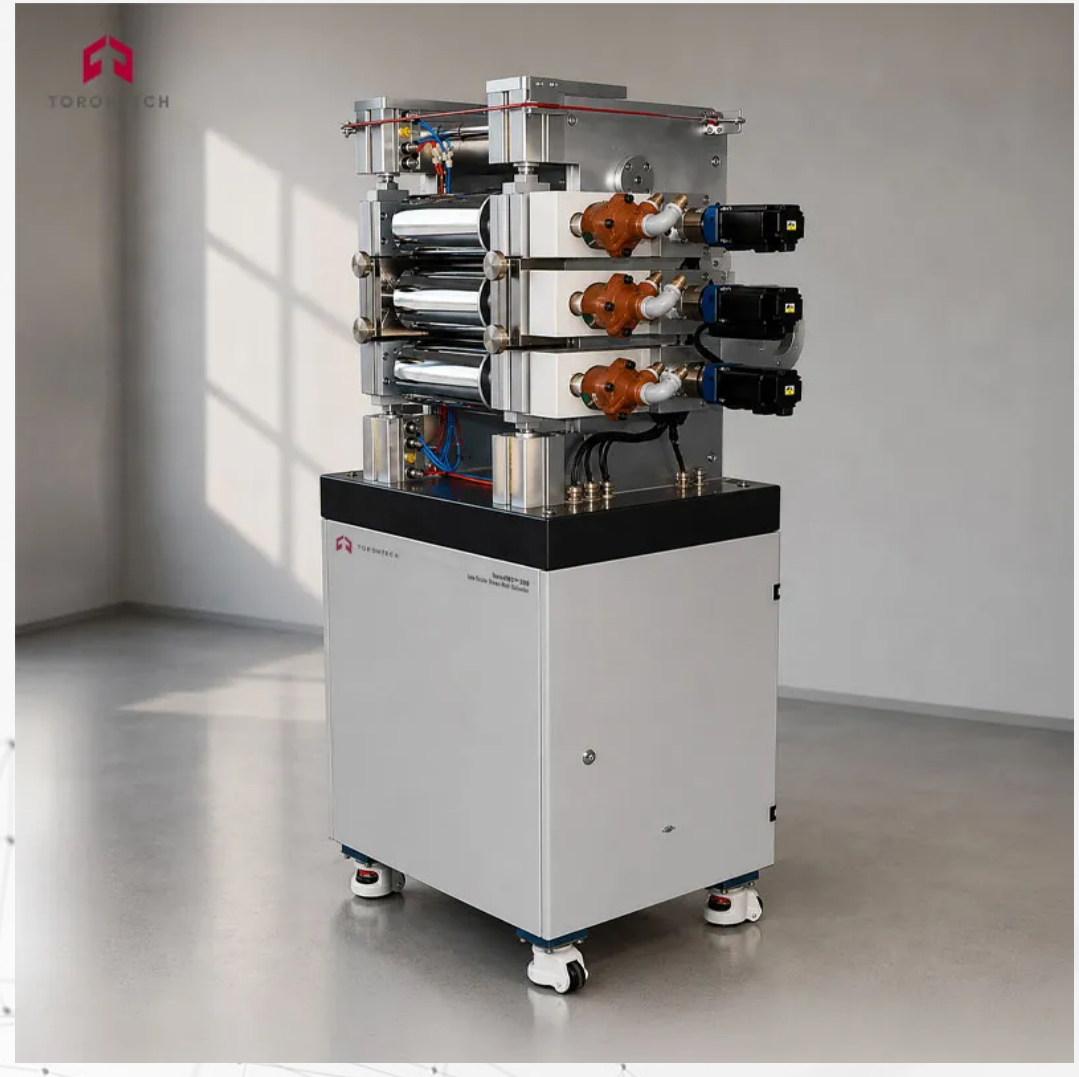


LAB-SCALE THREE-ROLL CALENDER

Lab-Scale Three-Roll Calender - ToronTRC™ 300

ToronTRC™ 300 lab-scale three-roll calender takes molten polymer from an extruder and compacts it into sheet with uniform thickness and a smooth, mark-free surface. Two 120 mm forming rolls and one 80 mm pull roll work across a 260 mm face. The unit carries its own frame and control system, so it couples to an extruder and calendering die to form a complete extrusion-calendering test line. Sheet leaves the last nip and passes to an electric cutter.

Calendering here is a secondary forming step. The extruder supplies melt through the calendering die, and the roll stack does the shaping, so the two machines divide the work the way a production line does. Laboratories that already run a compatible extruder can add sheet capability without buying a second complete line. The modular arrangement also lets one facility switch between extrusion trials and calendering trials as projects change.

Roll temperature comes from an independent water circulation circuit rather than cartridge heating. Fluctuation stays small, which suits the range of melt temperatures that different polymers demand during calendering. A synchronized drive keeps all three rolls turning together and distributes pressure evenly across the roll face. Consistent nip pressure and consistent temperature are what produce sheet without visible lines or pitting.

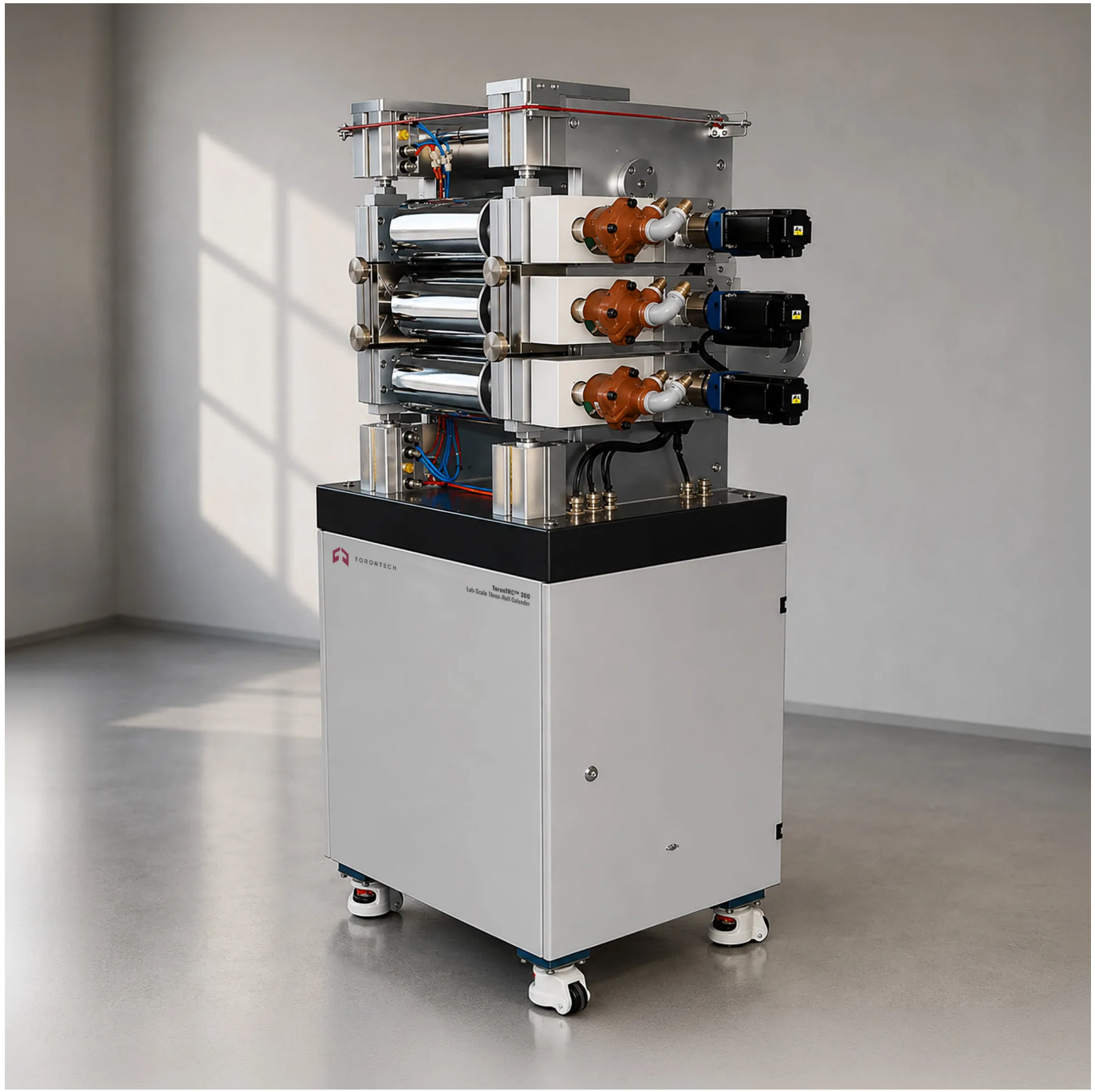
APPLICATIONS

Lab-Scale Three-Roll Calender - ToronTRC™ 300 Applications

The ToronTRC™ 300 suits laboratories that need polymer sheet with controlled gauge and surface quality, either as a test specimen or as a step in developing a sheet product.

- **Polymer Sheet Development**: forms experimental compounds into flat sheet so formulators can assess thickness uniformity and surface quality at laboratory scale

- **Test Specimen Preparation**: produces sheet of consistent gauge for tensile, tear, impact, and thermal testing on cut specimens
- **Extrusion Calendering Process Trials**: maps how die output, nip gap, roll temperature, and haul-off tension interact before scaling to a production stack
- **Surface Finish Development**: shows how roll finish and nip conditions translate into gloss, texture, or matte sheet surfaces
- **Filled and Reinforced Compounds**: compacts filled formulations where nip pressure drives out air and consolidates the melt into void-free sheet
- **Additive and Masterbatch Evaluation**: reveals how pigments, stabilizers, and processing aids behave under the shear and pressure of a nip
- **Recycled Resin Assessment**: forms sheet from reclaimed material so laboratories can judge gel content, surface defects, and consolidation behavior
- **Sheet Sample Cutting for Downstream Work**: delivers cut lengths from 0.1 to 9,999.9 mm directly off the line, ready for conditioning or testing
- **University and Institute Research**: demonstrates nip mechanics, bank formation, and stepwise compaction on a bench-scale stack students can operate
- **Quality Control Reference Sheet**: produces sheet under documented conditions for comparison against incoming supplier material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TorenTRC™ 300
Lab-Scale Three-Roll Calender

FEATURES

Lab-Scale Three-Roll Calender - ToronTRC™ 300 Key Features

The ToronTRC™ 300 combines haul-off, tension control, roll compaction, and cutting on one independent frame, with the drive and thermal control that repeatable sheet forming demands.

- **Modular Secondary Forming Design**: pairs with an extruder and calendering die to build a full extrusion-calendering line, and adapts to both process types without reconfiguration
- **Three-Roll Stepwise Compaction**: splits the reduction across two nips so sheet comes out with even gauge and a flat, smooth surface free of lines and pitting
- **Independent Water Circulation Temperature Control**: holds each roll at setpoint with minimal fluctuation, covering the melt temperatures that different polymers require
- **Synchronized Roll Drive**: keeps all three rolls turning in step and spreads pressure evenly across the roll face, which is what makes sheet consistent end to end
- **Digital Process Parameter Control**: sets and records nip conditions, speeds, and temperatures so a run can be repeated exactly
- **Integrated Tension Control**: holds the sheet steady between the last nip and the cutter, preventing draw marks and gauge drift
- **Electric Guillotine Cutter**: cuts to length from 0.1 to 9,999.9 mm at 30 to 120 pieces per minute, delivering ready specimens without a separate cutting step
- **300 mm Effective Blade Width**: handles the full sheet width the roll stack produces, with margin for trimming
- **Independent Frame with Castors**: stands alone from the extruder, so the unit can be positioned, removed, or shared between lines
- **Pneumatic Roll Loading**: applies nip pressure through a 6 to 8 bar air supply for responsive, repeatable roll closing
- **Compact Vertical Stack**: puts three rolls, drives, and controls into a single small footprint suited to laboratory floor space

THEORY & METHOD

Theory and Method

Calendering shapes a polymer melt by squeezing it through the gap between counter-rotating rolls. Melt entering the first nip forms a rolling bank ahead of the gap, and the drag of the roll surfaces pulls material through as pressure builds in the converging wedge. That pressure does the work, spreading the melt to the roll width and forcing out trapped air. Sheet thickness comes out slightly larger than the mechanical gap, because the melt relaxes once the pressure releases.

Three rolls give two working nips instead of one. The first nip takes most of the reduction and consolidates the melt, while the second corrects the remainder and sets the surface. Splitting the reduction lowers separating force at each nip, which keeps the rolls from deflecting and making sheet thicker at the center than at the edges. The pull roll then draws the sheet away under controlled tension, holding gauge as the material cools and shrinks.

Temperature decides how the melt behaves in the nip. Warmer rolls lower viscosity and reduce the force needed to reach a target thickness, but they also slow solidification and can leave the sheet tacky at the cutter. Cooler rolls set the surface faster and transfer their own finish, which is why polished rolls give gloss and textured rolls give a pattern. Water circulation holds each roll at its setpoint, so the balance stays where the operator put it.

TECHNICAL SPECIFICATIONS

Lab-Scale Three-Roll Calender - ToronTRC™ 300 Technical Specifications

Parameter	Specification
Fixed Roll	Ø120 mm × 260 mm
Movable Roll	Ø120 mm × 260 mm

Parameter	Specification
Pull Roll	Ø80 mm × 260 mm
Effective HSS Blade Width	1 to 300 mm
Cutting Length	0.1 to 9,999.9 mm
Cutting Speed	30 to 120 pcs/min
Roll Temperature Control	Independent water circulation system
Voltage	3-phase, 380 V, 50 Hz
Compressed Air	6 to 8 bar
Cooling Water	Room-temperature purified water (mineral-free)
Supply / Return Pressure Differential	250 to 400 kPa
Machine Type	Secondary forming auxiliary unit with independent frame
Line Modules	Haul-off, tension control, electric cutter, roll pressing structure, electrical control system

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