COLLIN

Laboratory machines for the processing of polymers

Smoothing Calender Vario G 168

Extraordinarily flexible – unequalled for flexibility of adjustment

The ultimate pilot size machine for development and low-volume production of all types of film, sheets and laminates used as:

Laboratory smoothing calender
Chill-roll system, and
Embossing or laminating unit

From the abstract polymer to the real properties

SMOOTHING CALENDER VARIO G 168

Application

The smoothing calender Vario G 168 is universally applicable in the production of thermoplastic film without and with carrier material, e.g. for:

- Thin film 10 - 200 µm
- Thick film 200 -2000 µm
- Sheets up to 6 mm thickness
- Co-extruded laminates from 2 to 9 layers
- Embossed sheets
- Laminating of plastics, paper, textiles and metals

Special features

Due to its excellent features the **calender Vario G 168** is suitable for universal use in development or in small-scale production. These features are:

- the three-roll unit
- the die with support
- the adapter

Three-roll unit in a version with swivel and height adjustment

In practice the smoothing rolls are either positioned vertically above one another, diagonally or horizontally adjacent. The configuration depends on the thickness of the film or sheet to be produced, the material to be processed and the additional requirements such as, for example, lamination.
In order to adapt to these different tasks, the three-roll smoothing unit can be swivelled to any angle from 0° to 90°. In addition, the complete unit can be adjusted in height, to optimise the distance between the die and the roll gap.

The illustrations opposite show:

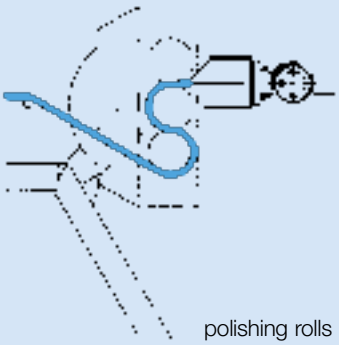
Top: *the rolls positioned vertically (e.g. for PVC, ABS)*
Middle: *the rolls at about 45° (for technical polymers)*
Bottom: *the rolls horizontally adjust (for PA or PET)*

Example of a calender line

Laboratory sheet line with extruder, 45 mm diam. x 25 D, slot die 450 mm on a mobile frame, roll unit in 45° position, motor-driven edge cutting unit, take-off rolls, traversing saw, film winder, edge-strip winder and integrated hot water temperature control units.

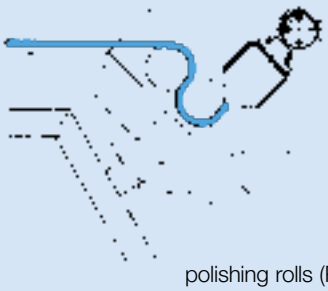
Configuration Options

vertical arrangement



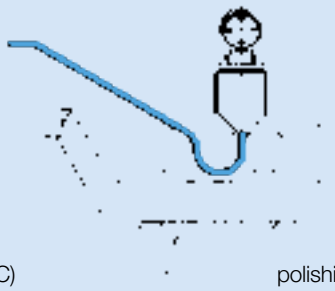
polishing rolls (PVC)

45°-arrangement



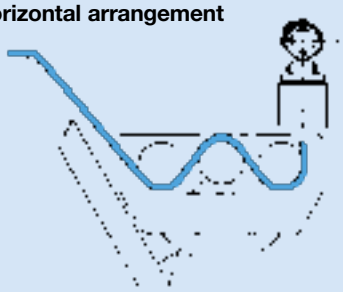
polishing rolls (PET, PC)

horizontal arrangement

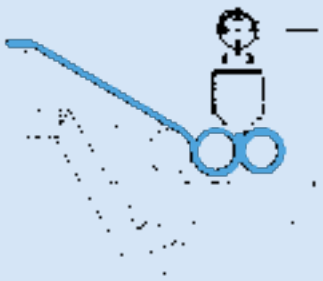


polishing rolls

horizontal arrangement



Chill-roll (Cast-film)



polishing, embossing

laminating

The laboratory extrusion line

The illustration shows a complete extrusion line for the production of film and sheets in all known thermoplastics.

Extruder

The single-screw extruder, 45 mm x 30 D, is fitted with a degassing zone for processing high performance materials. The interchangeable barrel element accommodates dynamic or static mixing elements.

Control

The microprocessor controller on the extruder enables all parameters to be set, with up to 30 temperature zones, speeds and measurement displays. Coupling to a host computer is via an interface RS 485.

Extruder height adjustment

Motorized on a central column, the complete extruder can be adjusted in height. This enables easy positioning when changing the die position or converting from mono to co-extrusion.

Melt pump

A melt pump, also adjustable in height, provides constant feed rates without pulsation, even at high pressures.

Swivel adapter

The continuous adaptation of the die to the calender at an angle from 0° to 90° is achieved with the swivel adapter moved together with the swivelling die frame.

Dies

The range of slot dies available enables the production of all types of film or sheets in single or multi-layer:

- dies for films from 10 µm to 1000 µm
- dies for sheets up to 6 mm
- two and three-layer manifold dies
- 2-7 layer feedblock systems

The Calender 168/600

Roll unit

The main component is the roll group. This consists of a central fixed roll with upper and lower swivelling rolls.
The roll width is either 400 or 600 mm.
The rolls are designed with double walls for uniform temperature regulation using cooling water or external temperature control units. The surface of the rolls is hardened, surface finished, chromium plated and polished.

The roll group can be arranged as

- a stationary unit to be used on a defined task,
- swivelling unit with height adjustment for universal application.

Gap adjustment

a) A hydraulically operated swivel movement on the upper and lower rolls provides a rapid safety opening of 50 mm on each roll.
b) Fine adjustment is by mechanically adjustable setting elements.

Drives

The three rolls are each driven by an individual DC-geared motor. The take-off rolls and the winder each have a separate DC-drive. This enables fine setting of the optimum speeds.

Roller section and take-off
A roller section with a length of 1200 mm and a pair of rubber-covered take-off rolls follow the roll unit.

Winder

The winder device is available as a centrally-driven or surface-driven winder.

Electronic controller

A central microprocessor controller enables the digital setting and display of all speeds, currents and temperatures as well as a link to a host computer by an interface RS 485.

Machine frame
The complete unit is built on a strong steel frame. The temperature control units can be mounted into the frame.

Accessories for the calender

A wide range of optional components and devices lend variability and adaptability to the calender in pilot plant applications. These include:

1. **Drives** with selectable speed for use as
   a) calender
   b) cast-film system

2. **Embossing rolls** for producing embossed sheets

3. **Rubber-covered pressure rolls** for laminating and embossing

4. **Take-off stations** for supporting the fabrics for lamination

5. **Edge cutting,** alternatively
   - with blade cutting for film,
   - with rotating, motor-driven, circular cutter for thick films

6. **Edge-strip winder** with quick-change spools and traversing device

7. **Corona treatment stations** for surface treatment, e.g. for preparation for printing

8. **Traversing saw** for cutting sheets of up to 6 mm thickness to length; with built-on swarf extraction device

9. **Winders**
   These are offered in various forms, such as:
   - surface-driven winder for soft, thin film
   - centrally driven winder for thick film
   - clamping of the winding shafts via axial clamping cones or into hinged bearings
   - friction winding shafts for narrow film strips

Edge cutting with motor-driven circular blades.

Take off with winder for film or traversing saw for cutting sheet.

The slot die with swivel frame

The slot die for film or sheet is the heart of a calender system.
Positioning with respect to the roll gap is simplified by a swivel frame which enables setting from 0° - 90° in 15° steps.

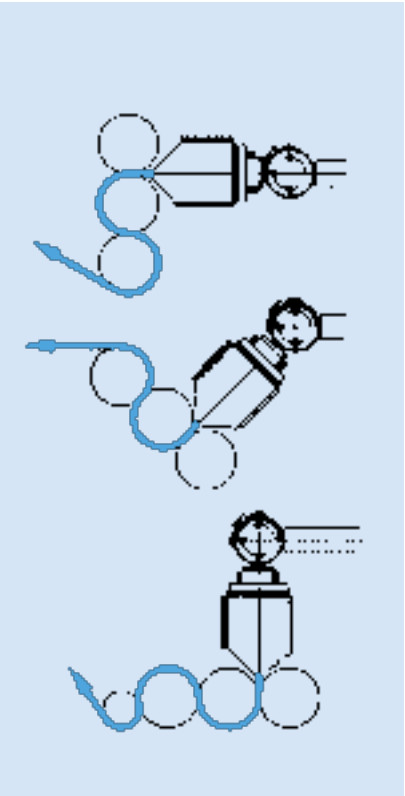
The feedblock needed for co-extrusion is mounted on the die and can also be swivelled.

The swivel adapter

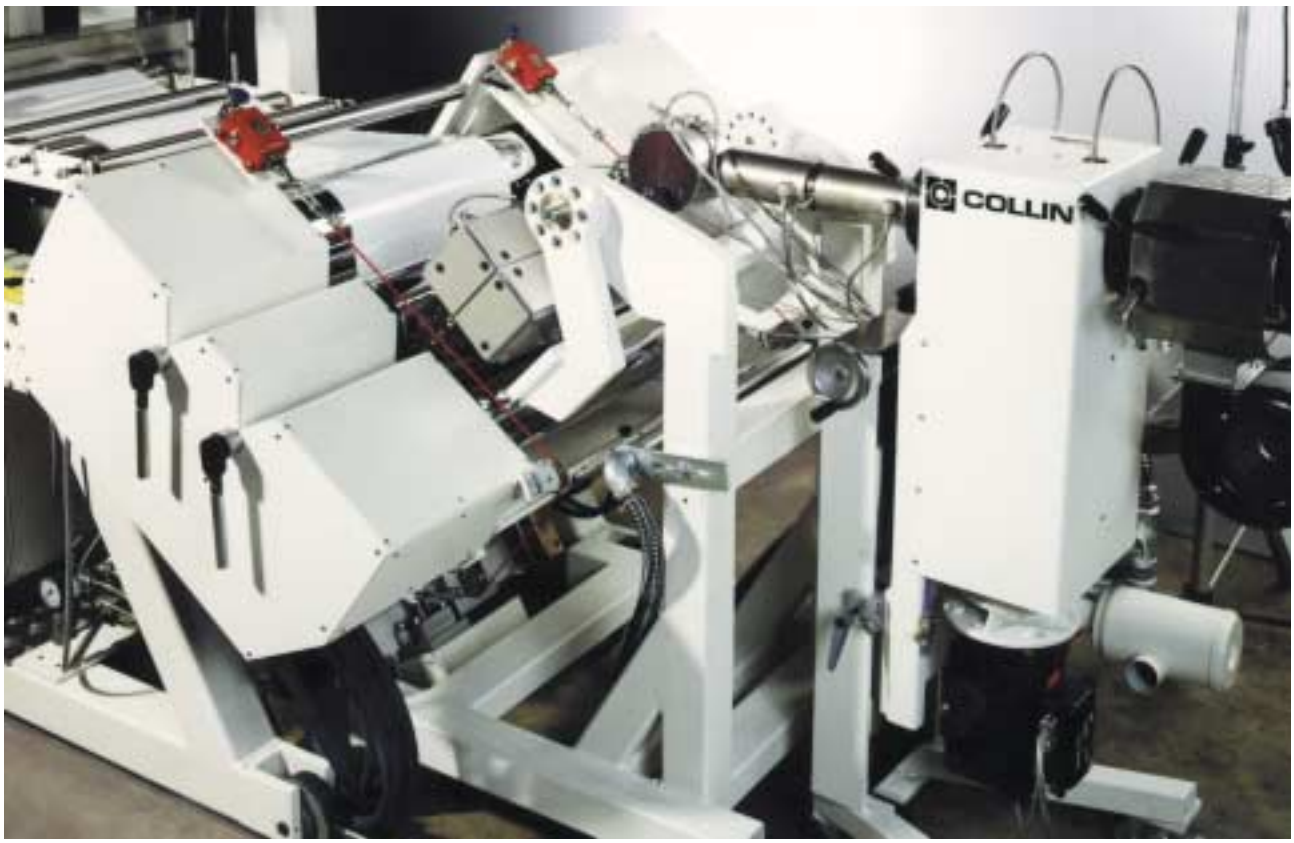
The adapter represents the coupling point between the extruder and the die. A swivel adapter is used to provide free adjustment of the die at angles from 0° to 90°.

The drawing shows the most common variations:

- Horizontally arranged die with vertical calender unit
- Die and roll unit each in a 45° position
- Die vertically above horizontal roll unit



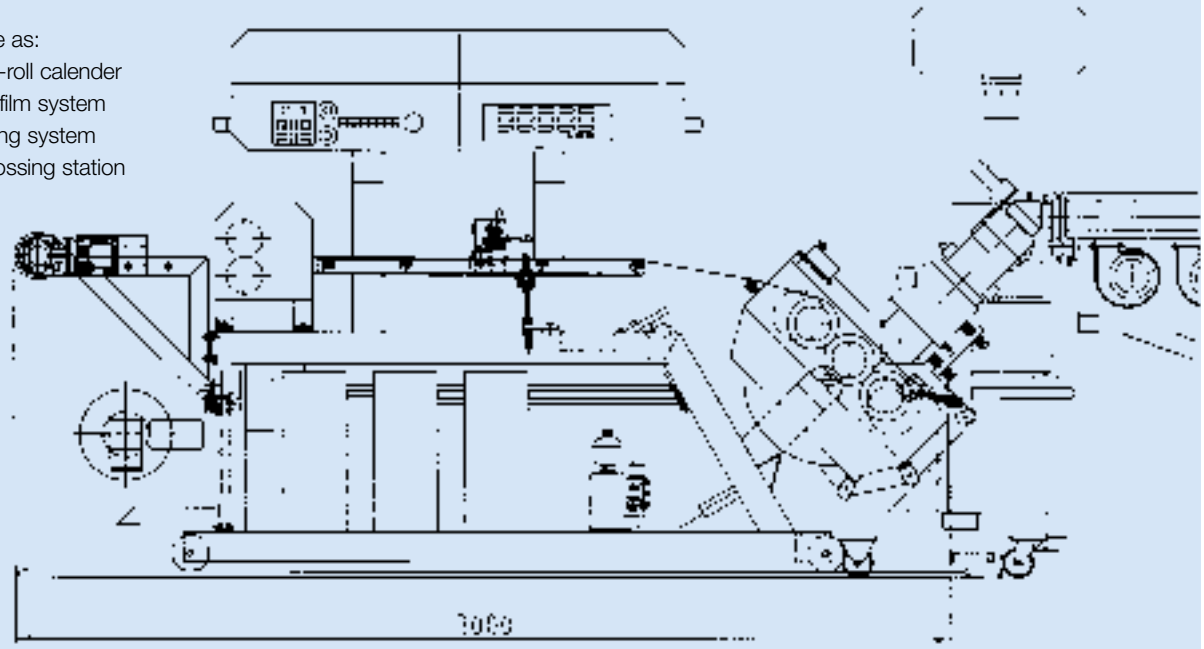
The photograph shows the central part of a sheet line with the last extruder cylinder zone, melt pump – also adjustable in height, swivel adapter, slot die with swivel frame and roll unit in the 45° position.



Dimensions

Combined three-roll take-off
Type A = 168/400
Type B = 168/600

For use as:
- three-roll calender
- cast-film system
- coating system
- embossing station



Technical data

Type		168/400	168/250/400	168/600
Roll width	(mm)	400	3 x 400	600
Max. film width	(mm)	350	350	550
Roll diameter	(mm)	168	168/250/250	168
Max. bearing force per side	(kN)	10	10	10
Max. line pressure	(N/cm)	570	570	360
Drive power, calender	(kW)	3 x 0,5	3 x 0,5	3 x 1
Hydraulic quick opening	(mm)	50	50	50
Gap fine adjustment	(mm)	0,1 - 6	0,1 - 6	0,1 - 6
Inlet height horizontal	(mm)	900 - 1100	1100	1100
vertical	(mm)	750	750	750
Take-off speed	(m/min)	0,5 - 5	0,5 - 5	0,5 - 5
Max. winding diameter	(mm)	500	500	500
Weight	(kg)	1300	1450	1620

Technical modifications reserved. Issued 3/01

Represented by:

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

www.drcollin.de, E-mail: collin@drcollin.de