



MULTI-INSPECTION

POLYTEST·LINE

Collin Multi-Inspection

Comprehensive inspection device for online quality control

The Collin multi-inspection system convinces by its wide range of applications – depending on the customer requirements, the multi-purpose testing device measures optically, mechanically or rheologically.

The line is designed like a modular system. It consists of a chill roll unit with subsequent roll conveyor for optical and mechanical film inspection including film winder and as option an upstream rheological measuring track.

Testing methods

From the melt flow of the production extruder, a side flow is separated, which then flows through the testing modules of the multi-inspection system. Different test methods are possible and can be combined:

- ▶ Viscosity measurement
- ▶ Optical inspection
- ▶ Color measurement
- ▶ Infrared measurement of foreign polymers
- ▶ Tensile test
- ▶ Further modules under development

For the inspection systems (optical, IR, colour measurement, etc.), proven single components are used. The implementation into the system is effected centrally. Thus, the result is a user-friendly menu navigation, which allows a quick overview of the complete system. By means of Ethernet, the integration of the line into an existing line is possible.

However, the multi-inspection system can also be used as laboratory line in combination with a Collin extruder. For quick screening in laboratory operation, the version with the Collin autosampler is suggested.

Components of the Collin Multi-Inspection

Closed chill roll line for optical film inspection system

The chill roll unit has a flat film die with a cross section of 0.5 x 100 mm. With the exception of the entry of the flat film die, the complete unit is completely closed. Via a door, there is access to the roll unit and the optical inspection components.

During operation, there is overpressure in the test chamber in order to avoid the entry of dirt and dust. The access to the slot die is designed as double door system for avoiding any dust on the film.



The chill roll is tempered by an external tempering device. An air knife supports the film extrusion. For better access for maintenance and cleaning purposes, the roller unit is designed as swivelling system.

Optical film inspection

After the roll mill, the film is guided over the optical inspection field consisting of illumination unit and camera. The illumination is effected with any connectable LED lights. The film can be inspected in reflected or transmitted light or in mixed mode.

The film inspection is effected with an area camera with 5 megapixels in order to detect defects and to categorize and analyse them with the Collin software according to size and position. The inspected area reaches a dimension of 50 x 40 mm and, depending on the camera, a resolution of e. g. 30 µm. Additional units are the colour measurement with colour sensor and a NIR measurement system for identifying foreign polymers.

Infrared Measuring Module (IR)

The IR-module allows the determination of different plastics in the film as for example PA in PE. This is especially important in plastics recycling. In the IR-module, a multi-spectral sensor is used. The diodes of the sensor have especially to be selected according to the plastic material to be expected. Here, the accuracy is – because of various influencing factors such as film thickness or surface roughness – between 5 and 10 percentage points.

Mechanical Inspection

Along a measuring track, a defined extension of the film is realized. The traction necessary for that is measured at the line. Thus, a stress-strain ratio can be determined online. In order to calculate the existing stress in the film, before the mechanical test, the film is cut to a pre-defined width and the thickness of the film is measured.

The edge cutting and test film can individually be further treated in a downstream unit.

Online Rheometer

The online rheometer consists of a slot die with defined channel cross section (25 x 1 mm²). The loss of pressure along the measuring section is measured and the apparent shear rate is calculated. Via an upstream melt pump, a constant volume flow is guaranteed.

Colour Measurement

The colour measurement is realized via a CIE L*a*b colour sensor. The sensor is focused on a white background so that also transparent films can be measured, namely the colour values L*, a*, b*. By using a reference colour, the colour difference ΔE can be calculated.

L*a*b:

- ▶ L* lightness
- ▶ a* red/green complementary axis
- ▶ b* yellow/blue opponent axis



Downstream Equipment

For the further processing of the film resp. the edge strips, several options are available:

- ▶ Film winder
- ▶ Cutting device
- ▶ Exhaust



Technical data

Total line	approx. W x D x H: 1050 x 600 x 1600 mm
Chill-Roll	with air knife
Flat film die	0.5 x 100 mm
Film width	max. 100 mm
Film thickness	approx. 30 µm - 100 µm
Roll tempering	10°C - 140°C
Film take-off speed	1 - 5 m/min
Throughput	max. 2.5 kg/h
Optimum film thickness	50 - 70 µm
Ideal line speed	2 - 3 m/min
Area camera	5 megapixels
Defect resolution	30 µm
Colour measurement	L*a*b colour space



Your advantages

- ▶ **Comfortable.** Quick melt and film inspection at the production line.
- ▶ **Compact.** Low space requirements due to the compact design.
- ▶ **Output-raising.** Reduction of the quantity of waste in the production process.
- ▶ **Modular.** Cost-efficient components.



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