CENTERWAVE 6000

Millimeter wave technology for the diameter, ovality and wall thickness measurement of plastic tubes

The CENTERWAVE 6000 is a groundbreaking innovative key technology during the extrusion of big tubes. One or several transceivers, arranged around the circumference of a tube, for continuously sending and receiving frequency modulated millimeter waves measure contactless and µm-precisely the diameter, ovality and wall thickness of big plastic tubes during the extrusion process – without knowledge of material properties and without coupling mediums.

Advantages of the new millimeter wave technology

Even without any knowledge of the properties of the extruded materials and its temperatures, the CENTERWAVE 6000 seamlessly measures the outer dimensions as well as the wall thicknesses for the complete circumference, providing a precision to a previously unknown degree. At least one or several sensors, so-called transceivers, arranged around the circumference of a pipe, continuously send and receive frequency modulated millimeter waves. Boundary layers reflect these waves, which are detected and demodulated by the receiving unit of the regarding transceiver. These receive signals contain information regarding the distance between boundary layers of different materials. After an algorithmic processing of the receive signals of each sensor, the requested measuring values regarding diameter, ovality and wall thickness are ready for visualization and control within only a few milliseconds.

Specifications

Measuring Principle	Non-contact on the basis of FMCW* millimeter wave technology
Application	Extrusion lines for large pipes
Area of Application	- Smooth pipes - Foamcore pipes - Corrugated pipes - Multi-layer pipes
Material	Any kinds of plastics (e.g. PE, HDPE, PP, PA6, PVC), ceramic, glass
Measuring Ranges	CENTERWAVE 6000/250: 32 - 250 mm CENTERWAVE 6000/400: 90 (optional 60) - 400 mm CENTERWAVE 6000/630: 90 - 630 mm CENTERWAVE 6000/800: 160 - 800 mm CENTERWAVE 6000/1200: 250 - 1,200 mm CENTERWAVE 6000/1600: 250 - 1,600 mm (larger measuring ranges on request)
Wall Thickness	Minimum wall thickness: 1.6 mm**
Calibration	The CENTERWAVE 6000 does not require any calibration
Measuring Frequency	80 - 300 GHz
Measuring Rate	370 Hz
Power Supply	200 - 240 V (100 - 460 V) AC ± 10 %, 50/60 Hz
Ambient Temperature	+ 5 to + 45 °C
Interfaces	RS232, USB Optional: industrial field busses such as CANopen, EtherNet/IP, DeviceNet, Profinet IO, Profibus-DP, LAN (Ethernet), OPC DA/UA
	*Frequency Modulated Continuous Wave
	**Smaller wall thicknesses on request

Replacement of conventional technologies

For the development of the technology on the basis of a CW-millimeter wave chip, the goal of creating a non-contact measuring device at the extrusion of pipes that is maintenance-free and durable, was decisive. By

independently identifying the characteristic values of the material, the CENTERWAVE 6000 generates the measuring values with the highest precision, without the need for specifications regarding the material parameters.

The CENTERWAVE 6000 is going to provide highly precise measuring values at different positions of the production line (even in the hot area) as there are no coupling mediums needed, temperatures are not decisive and no calibrations are necessary.

Product spectrum

The millimeter wave technology is suitable for the measurement of all kinds of plastic pipes with a diameter from 60 to 1,600 mm. The industrial PC ECOCONTROL 6000 offers, besides a numeric presentation of the measuring values, also a graphic visualization as well as extensive trend and statistical data features.

The calculation of virtual measuring values at the position of the extruder allows the line manager to react quickly to changes. Even with larger delay times between the position of extrusion and the measurement an effective and fast control of the wall thickness and especially the elimination of excessively consumed material is guaranteed.

Your Benefits

- Measuring of the nominal values, outer diameter, ovality and wall thickness of extruded tube without the knowledge of material properties
- Layer thickness measurement of multi-layer tubes
- Independent of coupling media or material temperatures
- No calibration

Technical Article

Millimeter wave technology for precise measurement of diameter, ovality, wall thickness and sagging during the manufacture of large plastic tubes