iNOEX
INSPIRE BEYOND MEASUREMENT

WARP
Radar systems

WARP

Radar technology measures a wide variety of pipe products contact-free, precisely, and flexibly and sustainably increases product quality through increased process and quality data transparency. The WARP products are not only suitable for accurately analysing smooth and corrugated pipes directly in the line, but also for mobile quality inspection. The consistent digitization and automation of extrusion lines is a prerequisite for achieving the increasing quality and sustainability targets together with our customers.

INSPIRE
beyond measurement

WE GIVE EXTRUSION TECHNOLOGY A FRESH APPROACH

For more than 40 years, the name „iNOEX" has been associated with pioneering technology and ground-breaking inventions for measurement and control technology. With innovative strength, a willingness to push boundaries and a wide range of products and services, we aim to inspire our customers.

Based on our values and principles, our cooperation is characterized by a clear mission statement and a focus on customer needs. We work on this every day with enthusiasm and passion.

As pioneers and experts, we offer our customers added value in the pipe, hose, film, cable, and profile extrusion industry. Our high-quality products, equipped with outstanding user-friendliness, offer intelligent and innovative solutions that stand as key factors for sustainable success.

WE INSPIRE THROUGH INNOVATIONS

Bringing new technologies to market maturity as a pioneer is part of our company philosophy. iNOEX has therefore been investing in contactless and health-safe radar measurement technology since 2011 to develop a completely new dimension in terms of precision, user comfort and safety. The result is a product portfolio that is uniquely broad on the market - the WARP product series.

iNOEX has reinvented the core of radar, the radar technology itself, with the associated precision electronics and optics, and adapted it to the needs of the plastics market. The radar technology can be used with all common plastics such as PE, L-/HDPE, PP, PA6/-12, PVC, PVDF, etc. without any limitations in measurement accuracy.

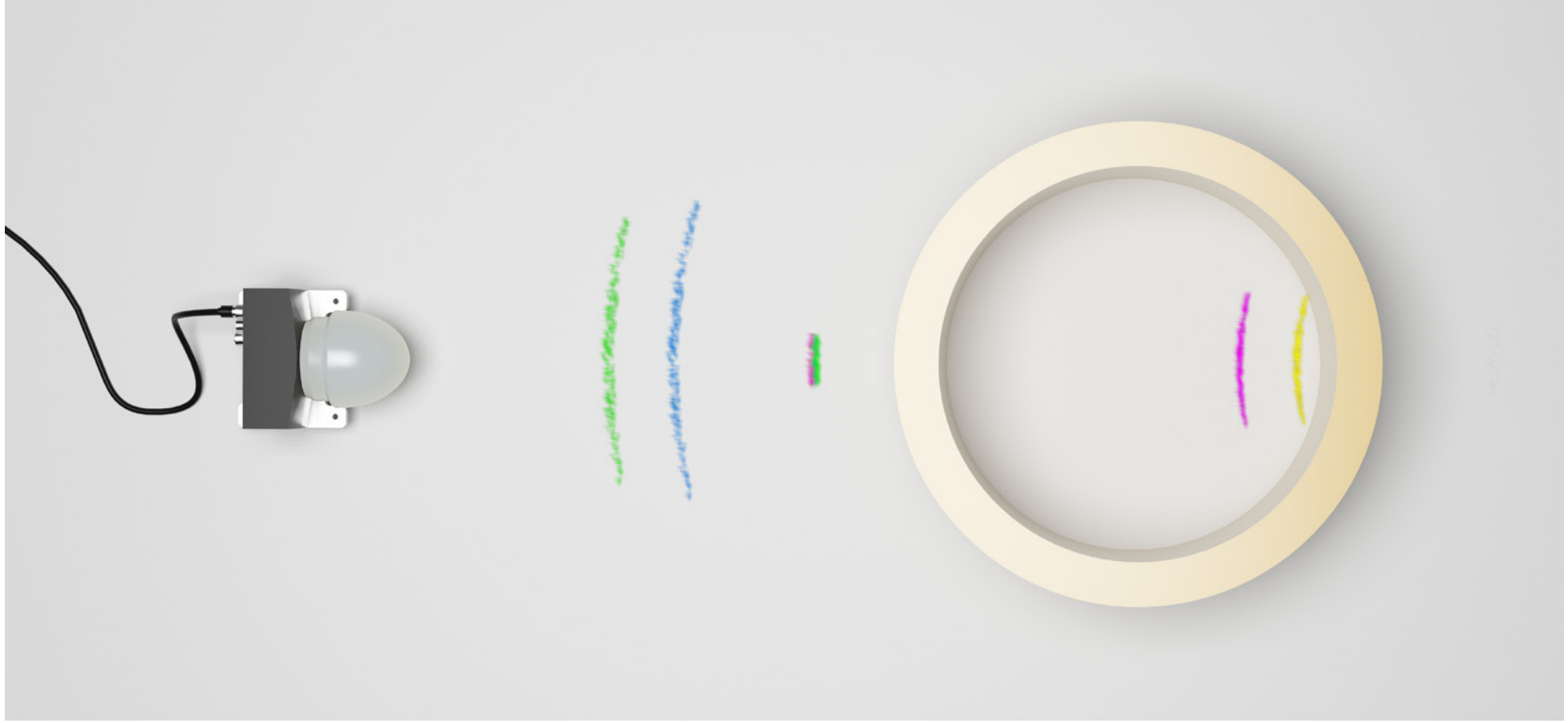
WE ARE COMMITTED TO SUCCESS

When you choose iNOEX, you get not only outstanding products but also individual service solutions. We offer service at the highest level and competent support throughout the entire product life cycle. We are always there for you - worldwide and at any time.

With our manufacturing know-how and experience, we identify potential, determine the most suitable technology, and optimize your processes. With comprehensive services to improve your efficiency and production performance, your success is our target.

Customer satisfaction is our top priority. We always think and act with our customers in mind. Our expert service supports you quickly, reliably, and competently. We are there for you personally - via service hotline or directly on site.

#iNSPIRATION #iNNOVATION #iNTEGRITY



WARP
Radar sensor technology

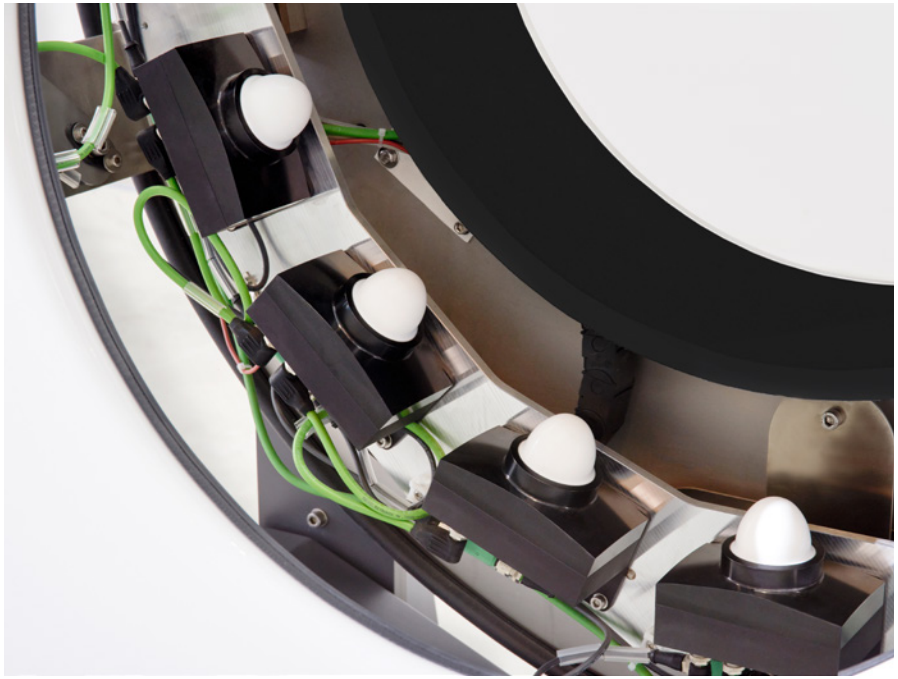
Radar technology relies on intelligent sensor technology based on FMCW micro-chips, with the wave being generated purely electronically on the chip. This allows non-conductive materials such as plastic to be tested non-destructively and without contact.

The speed of the wave in plastic is slower compared to air and can vary between different materials. This difference in speed causes partial reflections of the incoming wave at the material transition. The travel time of these reflected echoes allows the wall thickness of the layer to be determined. In this way, radar sensor technology can be used to determine geometry properties such as wall thickness, pipe diameter and ovality, as well as material properties such as permittivity and carbon black content.

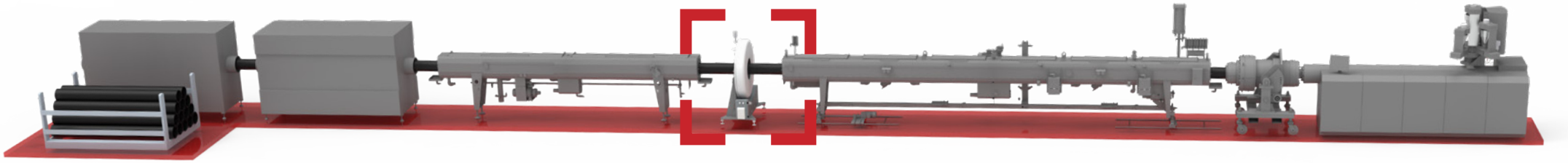
Since no coupling medium is needed to emit and receive the radar waves, this application is very robust, reliable and independent of process fluctuations.

ADVANTAGES AND FEATURES

- High-precision measuring data
- Up to 100 % pipe coverage and diameter measurement
- Thin-point control in combination with SAVEOMAT gravimetric systems
- Process analysis/process automation and complete documentation in the database system
- Standardized process data interface (OPC-UA)
- Simple operation thanks to automatic system centering and automatic calibration
- Maintenance possible during ongoing production
- CE and FCC compliant - certified technology



WARP RADARTECHNOLOGY
PRODUCT VIDEO



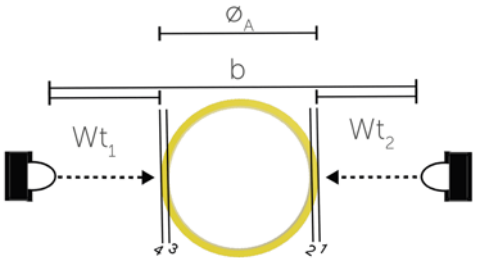
WARP 8

The WARP 8 is an inline pipe measuring system for wall thickness and diameter measurement at 8 points or 4 axes. It provides all important measurement data required for manual or automated process optimization and control. In addition to the short return-of-invest time, the system offers high measurement accuracy as well as process automation and documentation functions.

The static sensors allow a high resolution of the measured values in the extrusion direction. Thus, process fluctuations are precisely recorded and visible, so that effects such as short-term fluctuations in output or backpressure effects during the sawing process can be detected and eliminated. The WARP 8 specializes in large wall thicknesses and diameters and offers a particularly wide range of applications.

WARP 8
Diameter measurement

øA = b - Wt1 - Wt2
øA = Outer diameter
b = Sensors distance



ADVANTAGES AND FEATURES

- Diameter range from 60 to 1200 mm (five sizes)
- Wall thickness range from 2 - 250 mm (depending on material)
- Short ROI period
- Ideal for process optimization

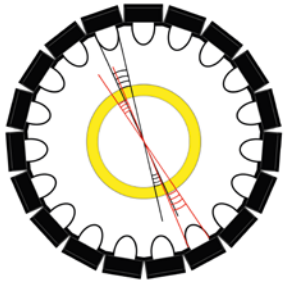
WARP 100

WARP 100 is an inline pipe measuring system for wall thickness and diameter measurement at up to 38 measuring points and 19 axes. More than 1100 measurements per second guarantee a gapless measurement. This is particularly important for pipes with high quality requirements, such as pressure or gas pipes. The maximum line speed for 100% coverage is up to 11.8 m/min.

The static sensors are distributed around the pipe and continuously measure the pipe in parallel. The specially developed optics allow the alignment of the radar wave to be focused on the centre of the pipe. The sensors are arranged in such a way that the measuring spots overlap, thus ensuring close-meshed coverage in the extrusion direction. Measured variables such as wall thickness, diameter, ovality, eccentricity as well as process conditions (e.g. sagging) are precisely recorded, documented, and further used for automatic process control.

WARP 100
Wall thickness measurement

Measurement takes place, depending on size, with 13, 17 or 19 sensors



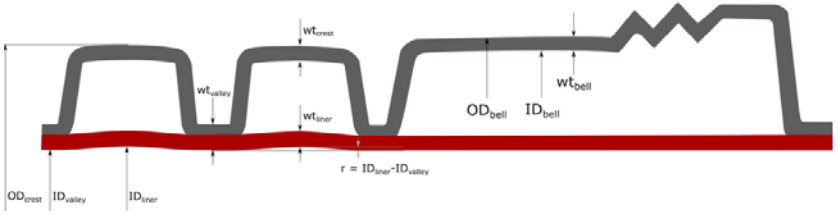
ADVANTAGES AND FEATURES

- Measurement with 100% pipe coverage in diameter range from 25 to 630 mm (three sizes)
- Wall thickness range from 2 - 125 mm (depending on material)
- Detection of thin sections within the pipe
- 100% documentation of production according to specifications

WARP CP

The WARP CP is an inline measuring system with 8 radar-based wall thickness sensors for detecting the various structures of a corrugated pipe. Outer and inner diameters, as well as the wall thicknesses of the bell, crest, liner, and valley can be resolved. The system is available for large, corrugated pipes with diameters from 300 mm.

The 8 sensors around the corrugated pipe scan it continuously. Since the corrugated pipe has different structures, it is therefore necessary to assign the measurement data to the corresponding position on or in the pipe. The WARP-CP algorithms do this automatically and prepare the data for the user in such a way that he receives different graphics and corresponding measurement data for each structure.



ADVANTAGES AND FEATURES

- Non-destructive, contactless, and automated inline measurement of all relevant structures of the corrugated pipe
- Shortened machine run-in time
- Saving of material overweight in the end product
- Continuous process monitoring and documentation

WARP portable

The WARP portable is a mobile, radar-based hand-held gauge for selective wall thickness measurement, specially designed for medium and large pipe extrusion as well as for sheets. The application possibilities are very flexible, whether as a quick centering aid in the start-up process, for final production control or as a stock control device. Not only wall thicknesses at pipe ends can be measured, but also the progression inside a pipe section or a sheet. The measurement itself is performed at the push of a button.

The last 500 measured values including the measuring angle on the pipe as well as the time stamp are stored.

WARP portable
PRODUCT VIDEO

ADVANTAGES AND FEATURES

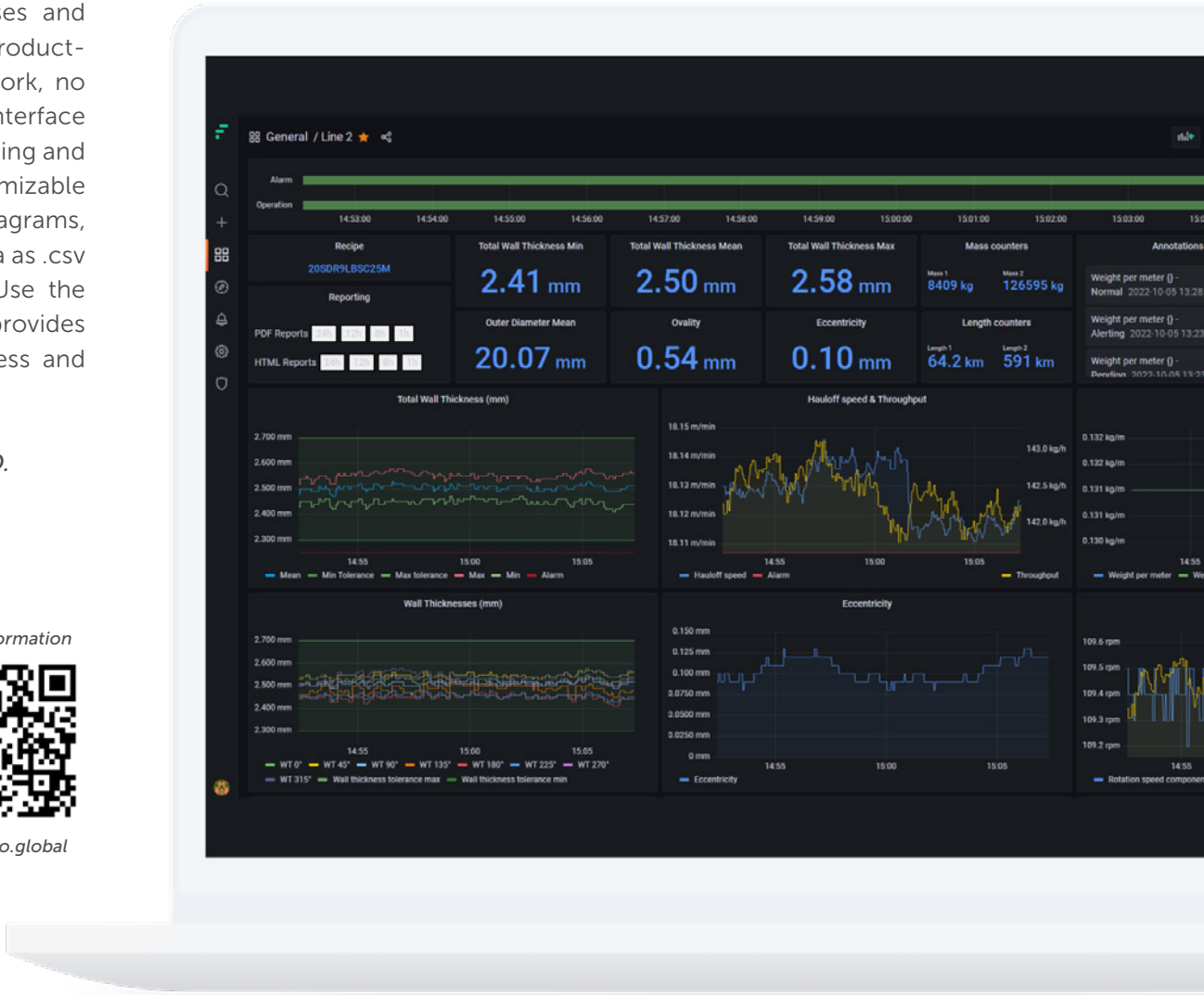
- Hand-held measuring device for wall thicknesses from 2 to 110 mm (depending on material)
- Measured value log including measuring position on the pipe (last 500 measured values)
- Intuitive handling
- Splash-proof housing (IP54)

Industrial Data Manager

powered by iDOO

Our Industrial Data Manager facilitate comprehensive analyses and evaluations to identify optimization potentials and evaluate product-specific indicators. Installed as a virtual machine in your network, no additional hardware is required. The standardized process data interface OPC-UA transfers data from state-of-the-art measuring, controlling and automation solutions. Benefit from preconfigured and customizable dashboards and reports for each connected system and create diagrams, visualizations and data evaluations with Grafana. Export your data as .csv or .xls and keep track of live data on the database server. Use the Industrial Data Manager as a production floor monitor that provides cross-location statistics such as overall equipment effectiveness and process line capability.

Drive digitalization and unlock the value of your data with iDOO.
Experience the future of the industry.



ADVANTAGES AND FEATURES

- Access to all production data
- Easy access via web browser
- Optimized for all mobile devices
- Support of quality assurance
- iDM gateway for integration with almost all types of interfaces
- Runs on almost any existing server hardware
- Data backup in case of network or server failures (up to 1 week)
- Intuitive user interface

More information

www.idoo.global

WARP
Products at a glance

Type	Size	Min. Wall Thickness [mm]	Number of sensors	Pipe dimensions [mm]	Accuracy* [mm]	Measuring frequency [Hz]
WARP 8	250	2 (154 GHz Chip) 5 (80 GHz Chip)	8	25 – 250	± 0,03 (154 GHz Chip) ± 0,05 (80 GHz Chip)	112 – 232
	400			60 – 400		
	630			90 – 630		
	800		8, 16	160 – 900		112 – 232 224 – 464
	1200			250 – 1200		
WARP 100	250		13	25 – 250	± 0,03 (154 GHz Chip) ± 0,05 (80 GHz Chip)	234 – 754
	400		17	60 – 400		306 – 986
	630		19	90 – 630		342 – 1102
WARP portable	–		1	60 mm – any size	± 0,03 (154 GHz Chip) ± 0,05 (80 GHz Chip)	manually (max. 0,5 Hz)
WARP CP	800		8	300 – 900	±0,05	216
	1200			450 – 1200		

*Wall thickness measurement

1984–2024
YEARS OF
MEASUREMENT
EXCELLENCE

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