

**RIFTEK**  
Sensors & Instruments

# Laser Systems for Inner Diameter Control

# RIFTEK

RIFTEK company was founded in 1993. The enterprise specializes in development and fabrication of optoelectronic instruments for measuring of geometrical quantities.

The basic product line includes:

laser triangulation position sensors; 2D and 3D laser scanners; optical micrometers; absolute linear encoders; hardware and software systems for welding robots; specialized systems for measurement dimensions displacements and distance, thickness, diameter, ID and etc.; measurement instruments for railway transport; machine vision systems.

RIFTEK products are delivered in more than 70 countries. Company has representatives in more than 47 countries.

RIFTEK company is certified according to ISO 9001:2015 in the field of management of quality of design and manufacture of optoelectronic measuring instruments.

**We offer integrated solution to control and automation tasks – from measurement sensors to multifunctional measuring and control systems.**

2



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# Automated systems for Inner Diameter Control.



## PURPOSE OF SYSTEMS

The systems are designed for contactless measuring of inner diameter and profiles of cylindrical and taper pipes, gun barrels, extruders, progressive cavity stators, turbodrills and so on.

## MEASURED PARAMETERS

- ID, Ovality, Roundness, Cylindricity, Conicity, Concentricity

We offer systems based on

## TWO WORKING PRINCIPLES

- Multi-sensor measurement by stationary laser sensors
- Inner surface laser scanning with rotating sensors

## SYSTEMS PARAMETERS

- Measured ID – from 9 mm
- Up to  $\pm 2 \text{ }\mu\text{m}$  accuracy
- Up to 32000 measured points on the surface in 3 seconds
- Calculation of ovality, roundness, conicity, cylindricity, wear
- Surface defects detection and measurement
- Construction of a 3D model of the inner surface and its comparison with the ideal one

3



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# The basic elements of ID measurement systems.

## THE SYSTEMS USUALLY CONTAIN:

- Laser measurement head with
  - stationary sensors
  - or
  - rotating sensors (point or 2D)
- Translation module, intended for transportation of measurement head inside the pipe:
  - self propelled or
  - any kind of pulling machine or rod
- Software for PC
- Calibration master-rings

## THE SYSTEMS CAN CONTAIN:

- Centering frame to hold measurement head near pipe axis

## OPTIONS:

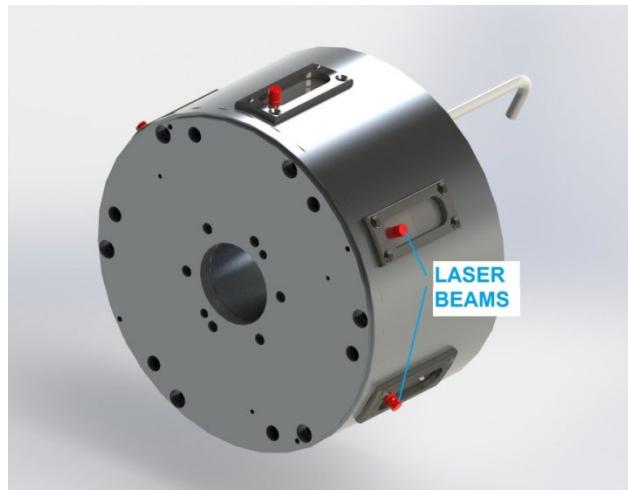
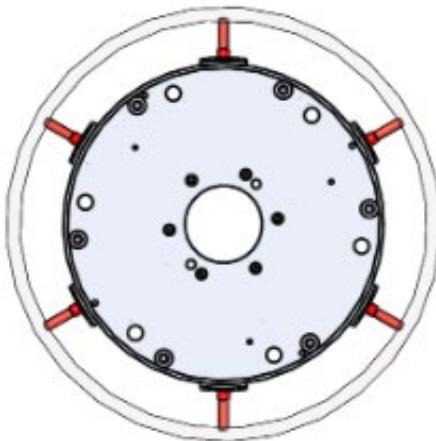
- Pipe straightness measurement module
- Video inspection module
- Wireless connection (Wi-Fi) module

4



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# **Multi-sensor measurement heads, RF040 Series. Structure and operational principle.**



## **THE MEASUREMENT head CONTAINS:**

usually 6 laser triangulation sensors, located circumferentially in one housing at known fixed angles.

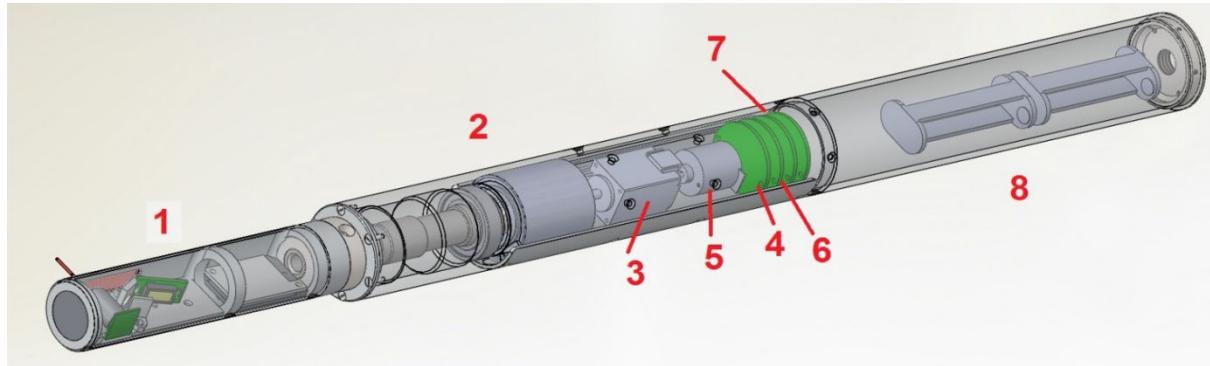
## **THE SYSTEM OPERATES AS FOLLOWS**

The measurement head is inserted into the pipe and moved by translation module to the definite position.

Calibrated laser sensors measure distances to the inner surface

Software calculates inner diameter of the pipe

# Rotating laser measurement head. Structure.



## THE MEASUREMENT HEAD USUALLY CONTAINS:

laser triangulation sensor 1 (one or several pieces with different measurement range and stand-off distance), mounted on rotating platform 2, with motor 3, electronic driver 4 and rotary encoder 5, coupled to the motor 3. The system can also include a tilt sensor 6, intended for control of inclination of rotating platform during measurement.

**Options:** in-built Wi-Fi module 7 is used for communication between the system and PC; the system can be powered from internal batteries 8.

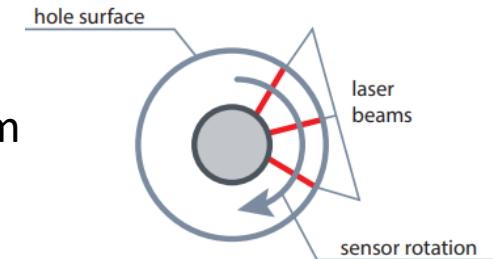
2D laser scanner can be installed instead of points sensor

# Rotating sensors measurement heads RF096 Series. Operational principle.

## THE SYSTEM OPERATES AS FOLLOWS:

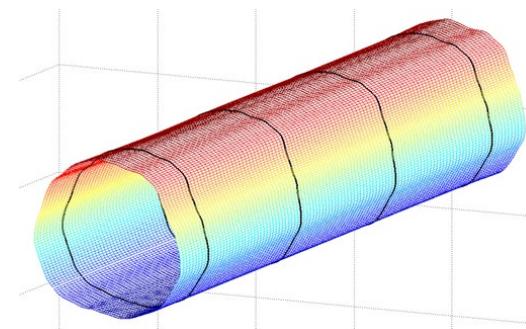
The measurement head is inserted into the pipe and moved to the definite position.

Rotating laser sensor scans inner surface of the pipe and the head transmits polar coordinates of the surface (distance from rotation axis, measured by triangulation sensor and a corresponding angle, measured by encoder).



**Software uses the set of transmitted coordinates  
to calculate:**

- ID of measured pipe
- ovality and roundness  
to find
- surface defects  
to design
- full profile in definite section.
- 3D model of the pipe inner surface.



# **ID measurement by Multi-sensors systems APPLICATIONS.**



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# Multi-sensor laser system for fiberglass pipes deformation measurement.



- Six triangulation sensors inside
- Diameter range – 500...1250 mm
- Accuracy - +\/-2 mm

9



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# Multi-sensors systems.



**Designed for ID measurement of nuclear Power station pipes**

- Four laser sensors inside
- Diameter of the module: 70 mm
- Measured diameters: 95...195 mm (main range), 160...300 mm (extended range)
- Accuracy: 0,05 mm (main range) and 0,2 mm (extended range)



**Designed for robotic measurement of engine cylinders ID**

- Six laser sensors inside
- Diameter of the module: 60 mm
- Measured diameters: 70...80 mm
- Accuracy: 0,005 mm

10



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# Multi-sensors systems.



## Designed for ID measurement of pipes

- Six laser sensors inside
- Diameter of the module: 60 mm
- Measured diameters: 65...115 mm,
- Accuracy:  $\pm 25 \text{ um}$



## Designed for honing machines

- Six laser sensors inside
- In-built battery, Wi-Fi data transfer
- Measured diameters: 100...150 mm,
- Accuracy:  $\pm 25 \text{ um}$

11



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# ID measurement by Laser Scanning. Sensors and Systems.



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# Triangulation laser sensors for ID measurement, RF609 Series.



- Smallest triangulation sensor on the market,  
sensor body diameter = 8.5mm,  
measured ID – from 9 mm
- Sensors with in-built slip-ring
- Sensors with battery supply  
and Wi-Fi data transfer

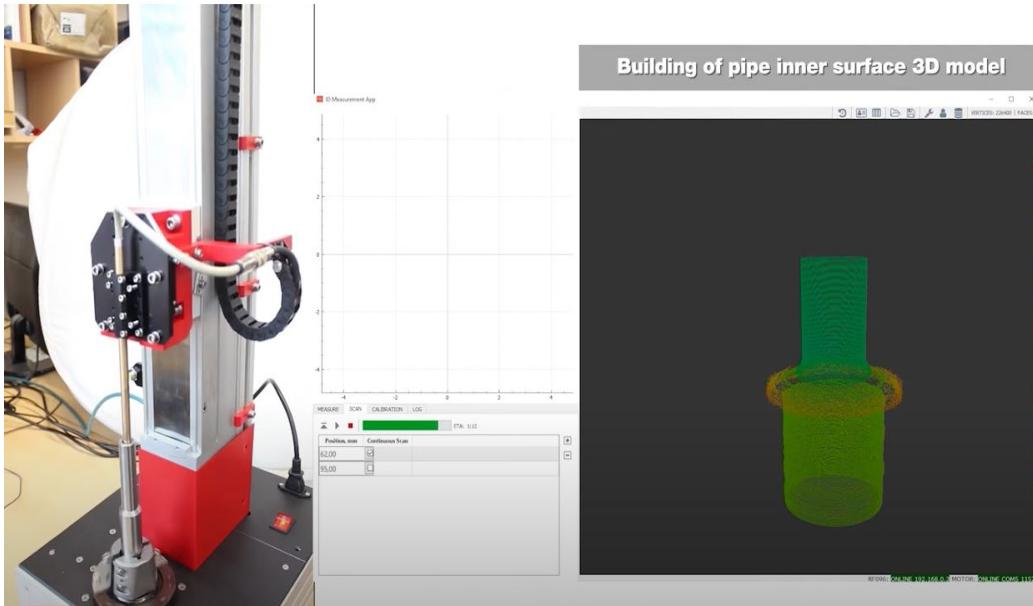
13



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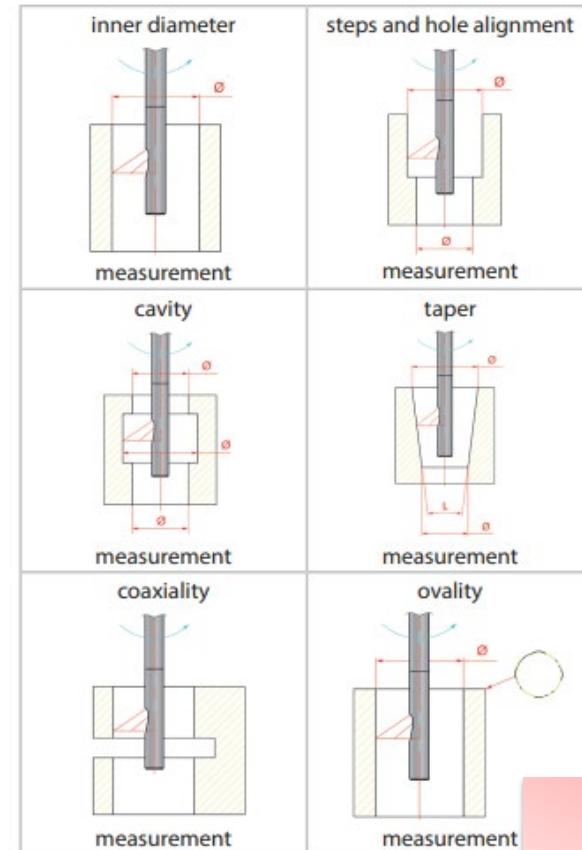
# Triangulation laser sensors for ID measurement, RF609 Series.

Measuring ID from 9 mm with  $\pm 2 \mu\text{m}$  accuracy



<https://youtu.be/r8Z2b5nYNSc>

<https://cloud.riftek.com/s/2jMA6qrBX5nEHzr>



14

# Triangulation laser sensor RF609-Wi-Fi. ID measurement for CNC machines.



- ID range 9...19 mm or customized
- Accuracy  $\pm 2 \mu\text{m}$

Sensor parameters  
can be changed on request

<https://youtu.be/17I7PqTGUpU>

<https://cloud.riftek.com/s/wEinDrs6byotLaS>

15



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# Measurement kit for Heat Exchanger Tube Sheet control on the base of RF609-Wi-Fi sensors.



- ID range 9...19 mm and 16...46 mm
- Accuracy  $\pm 5 \mu\text{m}$  and  $\pm 12 \mu\text{m}$
- Measurement cycle 5 s

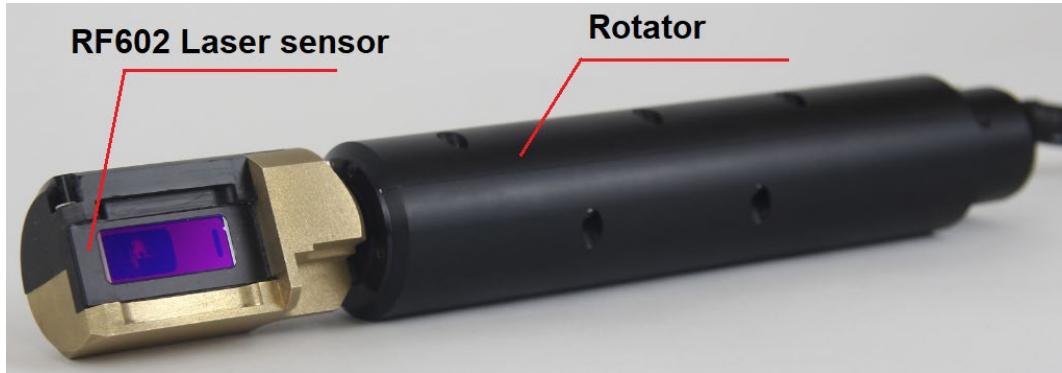
**Sensor parameters  
can be changed on request**

16



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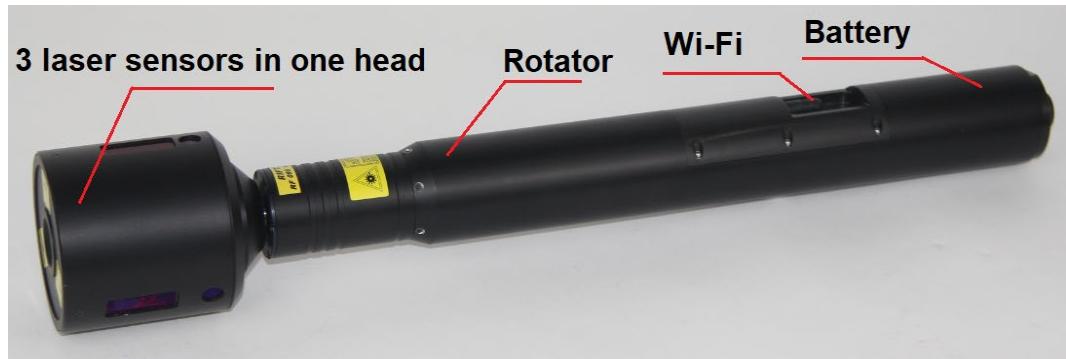
# RF096 systems for ID measurement. Customized versions for stationary or robotic solutions.



- ID range 70...160 mm
- Accuracy  $\pm 0.05$  mm
- Resolution 2048 points for cross-section
- Measurement speed 4 cross-sections/s

<https://youtu.be/UbF1E1Hjz5E>

<https://cloud.riftek.com/s/Kei5yrBLiHefLp8>



- ID range 120...380 mm
- Accuracy  $\pm 0.05$  mm
- Resolution 2048 points for cross-section
- Measurement speed 4 cross-sections/s

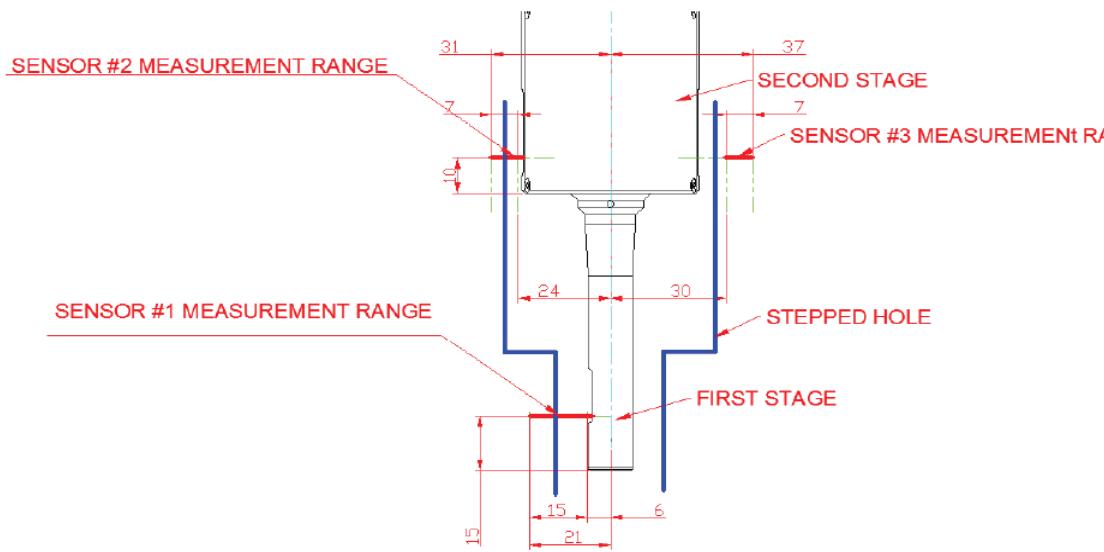
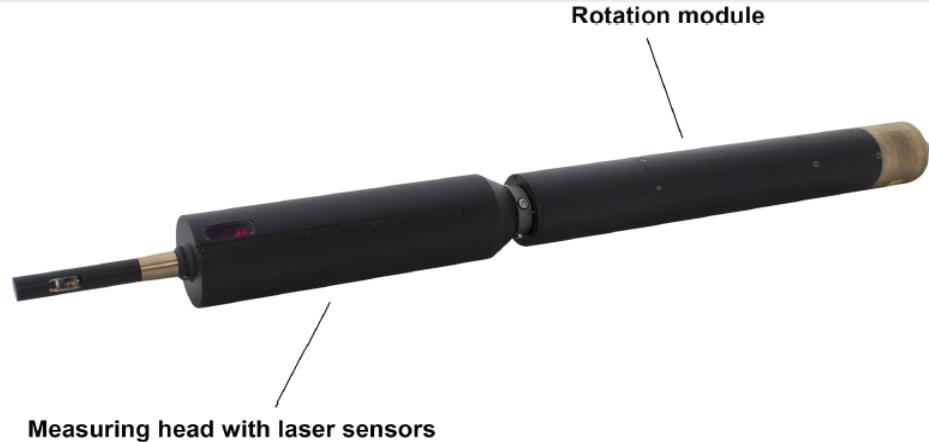
Systems parameters  
can be changed on request

17



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# Robotic measurement of Stepped holes RF096-15/40-50/70 system.



- two stages measuring head with three laser sensors inside
- Range 14...40 mm
- Accuracy  $\pm 20 \mu\text{m}$
- Range 50...70 mm
- Accuracy  $\pm 5 \mu\text{m}$

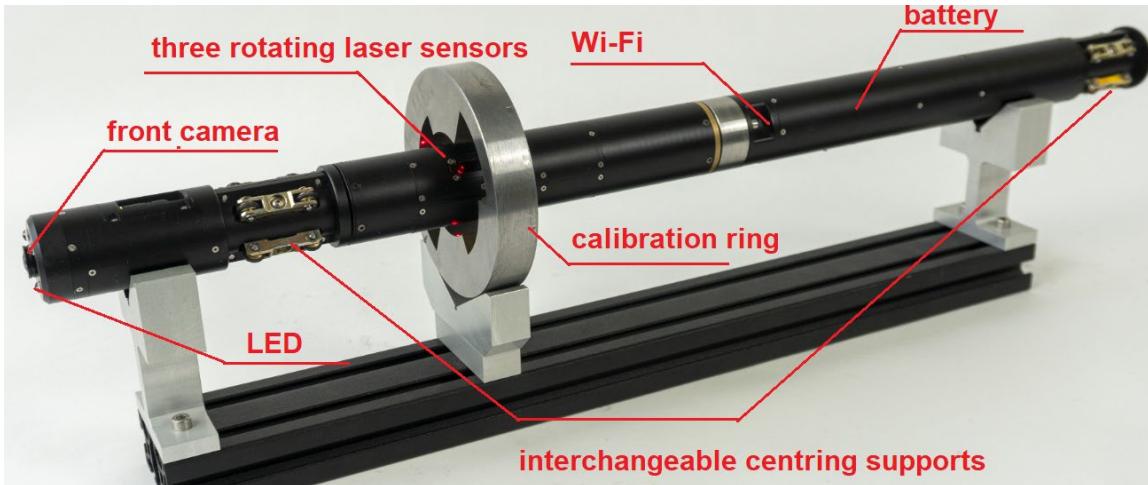


18



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# RF096 systems for ID measurement. Customized versions with centering frames.

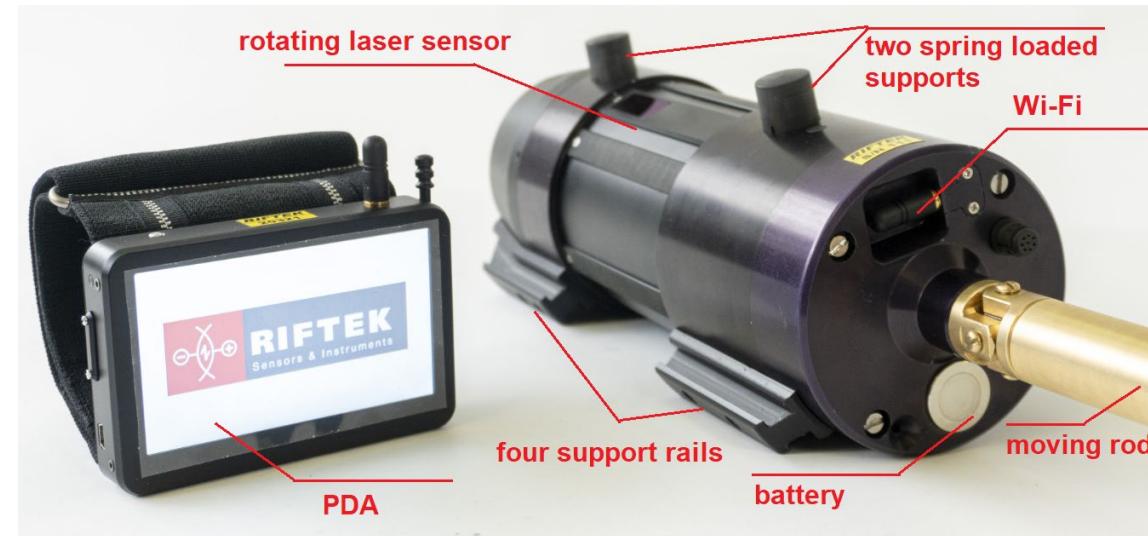


**Designed for extruder barrels inspection**

- ID range 40...95 mm
- Accuracy  $\pm 0.005$  mm
- Control of wearing status, roundness, ID

<https://youtu.be/7dg-XJbSXJE>

<https://cloud.riftek.com/s/dmR5k4MJmytsCn2>



**Designed for tubes inspection**

- ID range 105...130 mm
- Accuracy  $\pm 0.01$  mm
- Resolution (cross-section) 2048 points
- Speed 4 rps

<https://youtu.be/FoGlh14Qpbg>

<https://cloud.riftek.com/s/wk69j9KJHcrcRQw>

19



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# RF096 systems for ID measurement. Customized versions with centering frames.



## Designed for curved pipes inspection

- ID range 145...160 mm
- Accuracy  $\pm 0.005$  mm
- Compact design

<https://youtu.be/lwZNtBtkAiOk>

<https://cloud.riftek.com/s/qp5fRDqGwBBrAQD>



## Designed for curved pipes inspection

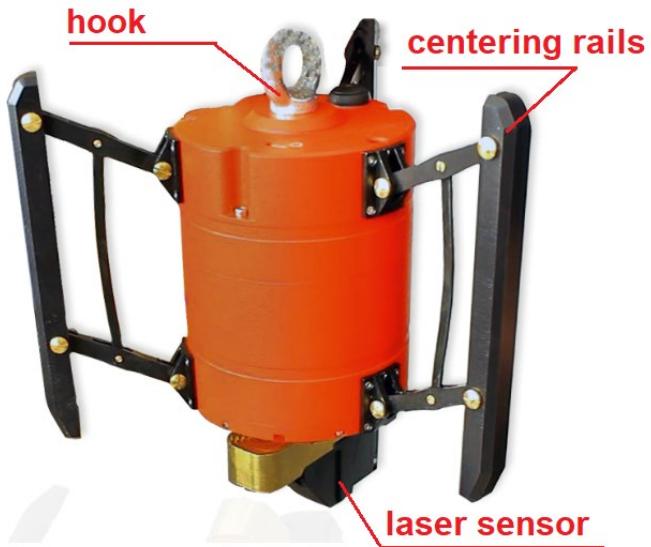
- ID range 65...90 mm
- Accuracy  $\pm 0.005$  mm
- Design with flexible head

20



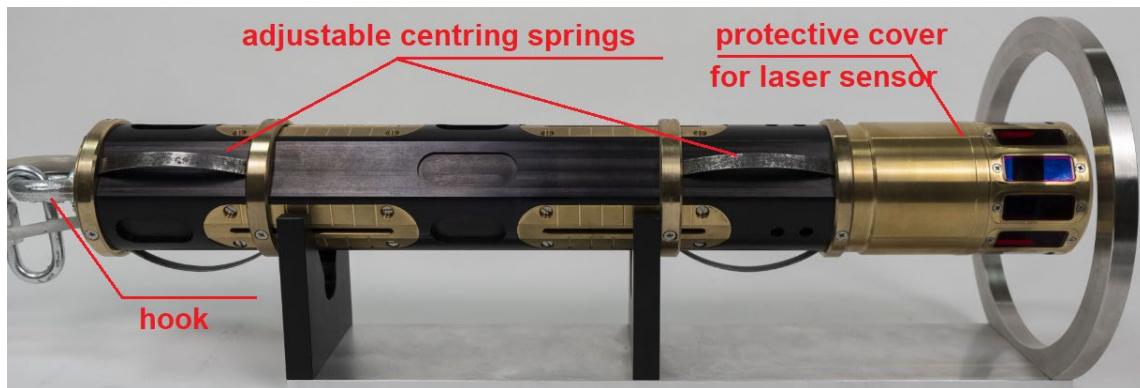
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# RF096 systems for ID measurement. Customized versions with centering frames.



## Designed for pipes inspection

- ID range 40...95 mm
- Accuracy  $\pm 0.005$  mm



## Designed for boreholes inspection

- ID range 105...130 mm
- Accuracy  $\pm 0.01$  mm
- Speed 4 rps
- IP67 rate

21



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# Pipe ID Hand-held Measuring Gauges RF096-...-HH Series.

Quick and precision measurement of Inner Diameters,  
Ovality, Roundness



## RF096-100/250-87-HH

- ID range 100...250 mm
- Accuracy  $\pm 0.05$  mm
- Space resolution 700 points/turnover
- Measurement depth 87 mm

<https://youtu.be/vGm17wVITqU>

<https://cloud.riftek.com/s/aC6PBa4rzPpeqtz>

## RF096-100/250-56/106-HH



## RF096-18/30-155/307-HH

- ID range 18...30 mm
- Accuracy  $\pm 0.05$  mm
- Measurement depth 155/307 mm
- Variable Measurement depth 56...106 mm

[https://riftek.com/products/handheld\\_inner\\_diameter\\_measuring\\_gauge/](https://riftek.com/products/handheld_inner_diameter_measuring_gauge/)

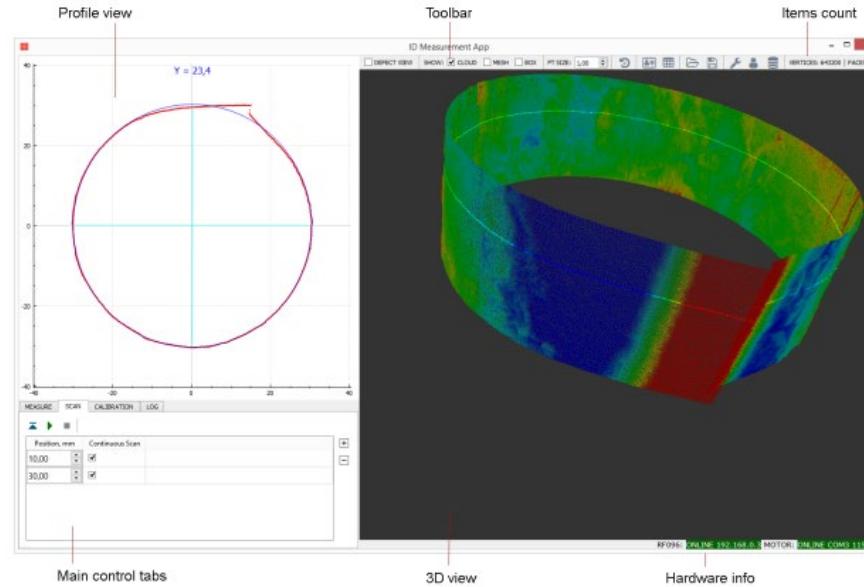


22



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# LEAF SPRINGS HOLES ID MEASUREMENT MACHINE.



## Specification

- ID range 30...75 mm
- Accuracy  $\pm 0.02$  mm
- Depth range 120 mm

Machine parameters can be customised

<https://youtu.be/FqOINs6VMTY>

<https://cloud.riftek.com/s/LwkqzX5gGkAtRZc>

23

# PIPES ID MEASUREMENT MACHINE.



## Specification

- ID range 30...75 mm
- Accuracy  $\pm 0.02$  mm
- Depth range 120 mm

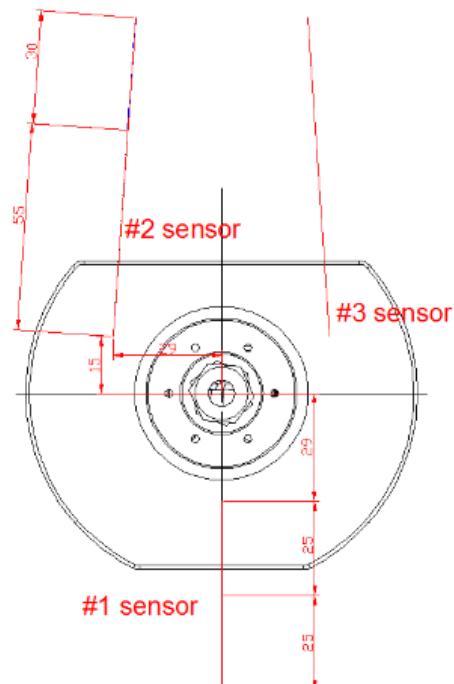
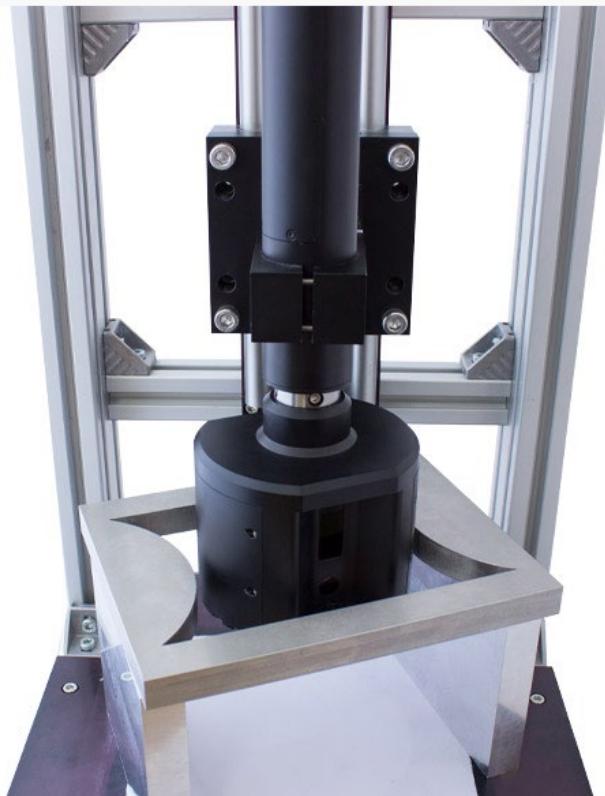
Machine parameters can be customised

<https://youtu.be/wWDE2eXmnZ0>

<https://cloud.riftek.com/s/ADGmDWjo7ZBffZg>

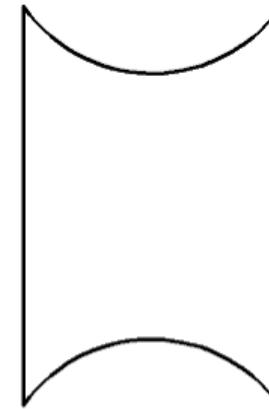
24

# Rectangular inner profile measurement machine.



Measurement head

- three laser sensors inside
- Accuracy  $\pm 20 \text{ }\mu\text{m}$



Measured profile

25



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# Laser Debris Inspection System. RF096-Insp.



## Specification

- Grooves ID range 35...53 mm
- Minimal size of detected debris 0.03x0.1x0.1 mm

<https://youtu.be/ooVtGOonQ5o>

<https://cloud.riftek.com/s/cK5gmnmPoGteRtR>

26



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# Sleeves ID Measurement Machine.



## Specification

- ID range                32...2 mm
- Accuracy               $\pm 0.005$  mm
- Depth range           80 mm

Machine parameters can be customised

<https://youtu.be/QGFFOYDGWHI>

<https://cloud.riftek.com/s/5GRaD7iFmQBBdtN>

27



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# AUTOMATED SYSTEM FOR LAMINATED TUBES GEOMETRY MEASUREMENT.



**The system measures the following parameters:**

- tube length;
- outer diameter;
- inner diameter;
- foil thickness;
- foil thickness at tube seam;
- seam width.

## Specification

- Tube length            200 mm
- ID/OD range        13...50 mm
- Accuracy            ±0.01 mm

**Machine parameters can be customised**

[https://youtu.be/Mw\\_T0BwwoE](https://youtu.be/Mw_T0BwwoE)

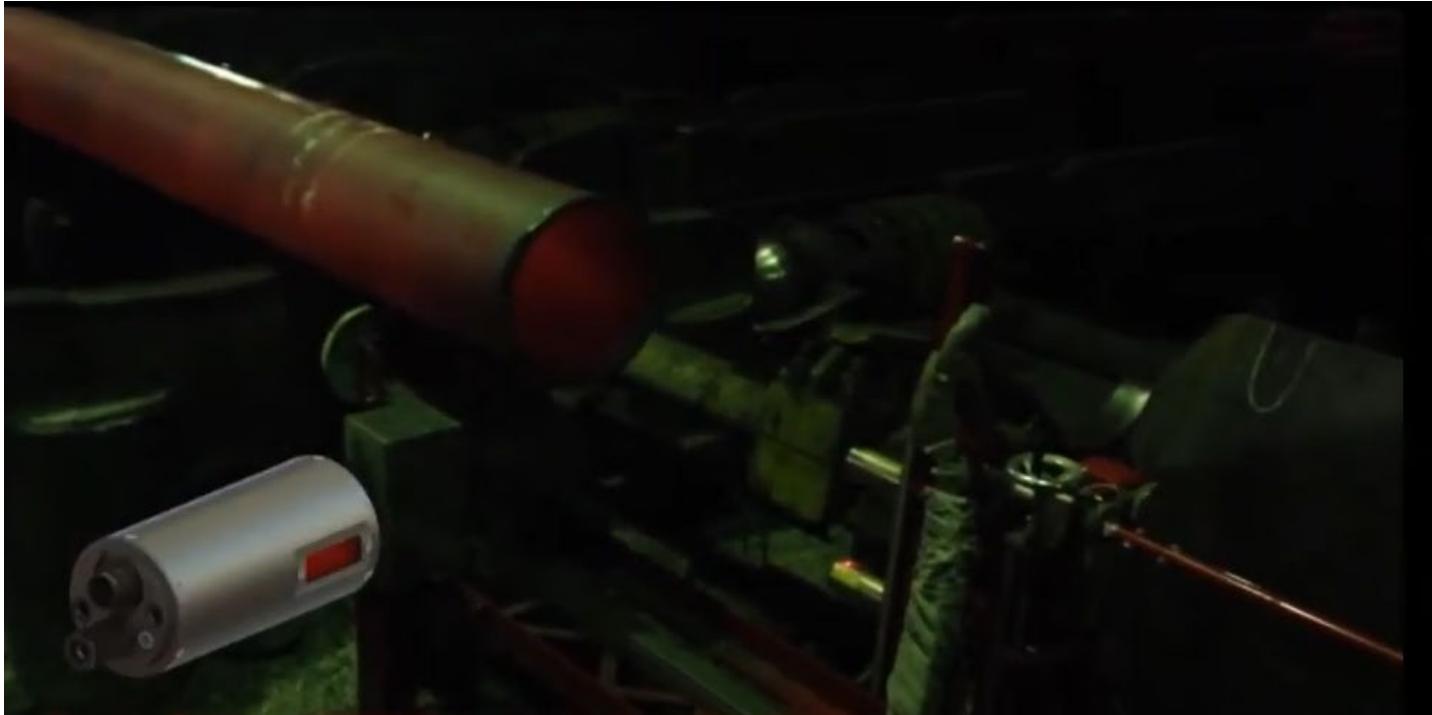
<https://cloud.riftek.com/s/dL5HtfF6CcYW6XP>

28



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# The system for measurement of ID and OD high temperature pipes.



The system includes two triangulation laser sensors, placed inside air cooling housing.

**Measured parameters - on request**

<http://youtu.be/tkf9jYPbr5M>

<https://cloud.riftek.com/s/XWPdPLDojt455b>

29



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# 3D inspection machine for steel band rims.



**The system with rotating 2D profiler  
measures the following parameters:**

- average, maximum and minimum diameter;
- roundness;
- cylindricity;
- height, width and angle of chamfers
- outer diameter

## Specification

- ID range 100...410 mm
- Rim height 70...305 mm
- Accuracy  $\pm 0.05$  mm

<https://youtu.be/gfMf7hBrpqU>

<https://cloud.riftek.com/s/HNKceEn9yxd5DJY>

30



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# Laser measurement (by rotating 2D profilers) of ID and OD of large diameter pipes.



[https://youtu.be/l8P\\_C24kTY0](https://youtu.be/l8P_C24kTY0)

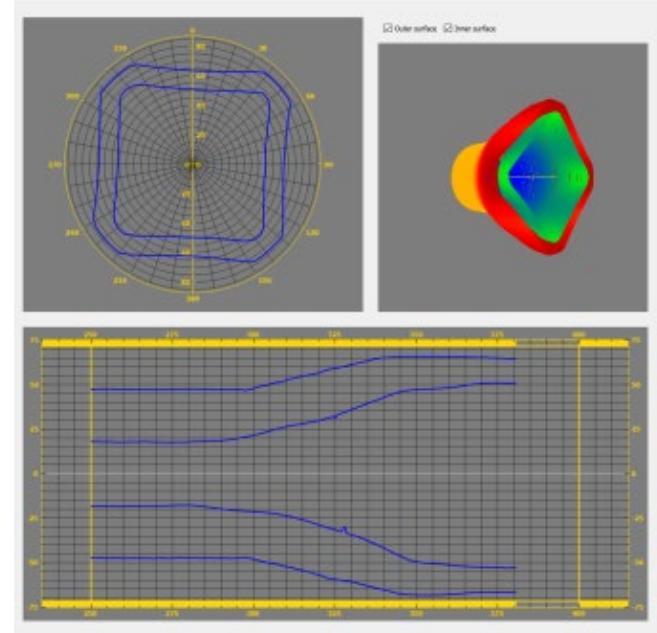
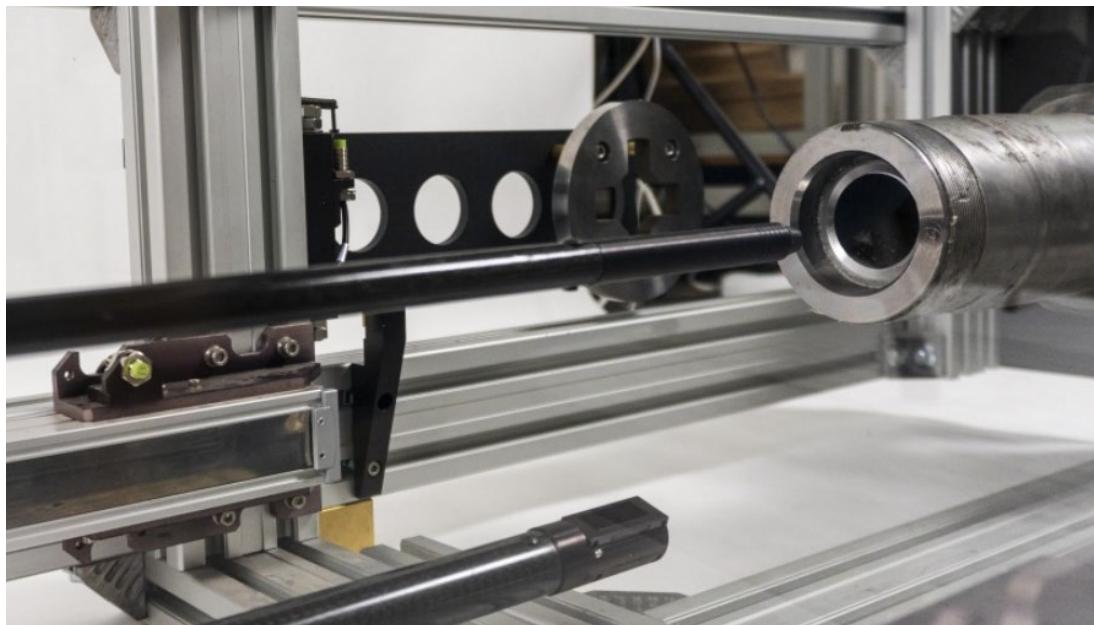
<https://cloud.riftek.com/s/oaf9Hyt7dgK2XH6>

31



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# 3D Laser machine for Hammered Axles shape control.



## Specification

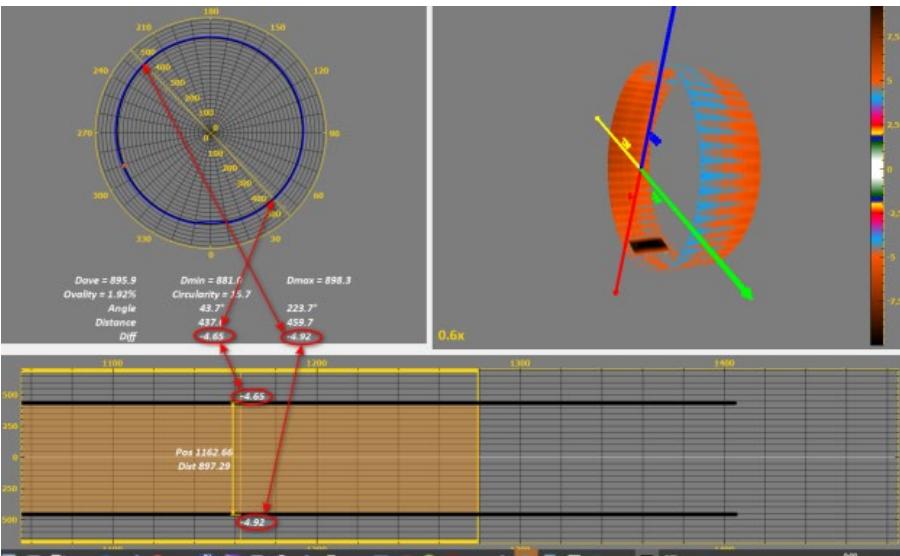
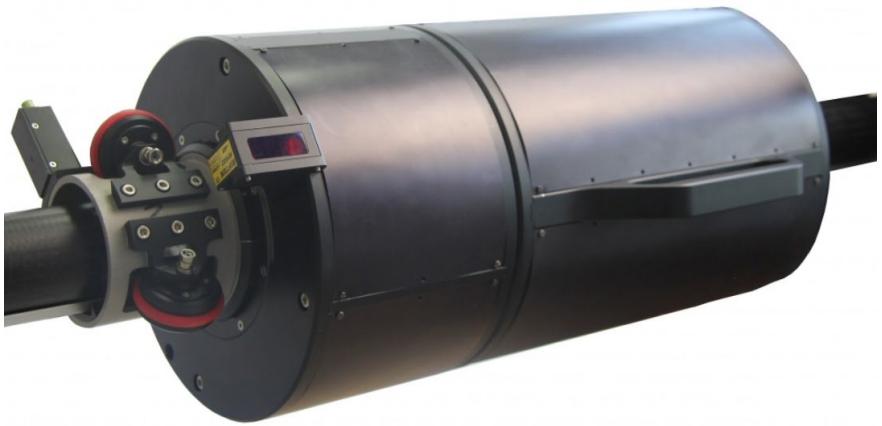
- ID range            30...143 mm
- ID accuracy         $\pm 0.05$  mm
- OD range            62...180 mm
- OD accuracy         $\pm 0.1$  mm
- Depth                500 mm

<https://youtu.be/gSIw6KE20U0>

<https://cloud.riftek.com/s/jcEazDTDgfDp66i>

32

# 3D inspection machine for large objects.



## Specification

- ID range 440...1440 mm
- ID accuracy  $\pm 0.5$  mm
- Scanning depth 2000 mm

<https://youtu.be/V7nUtKGkDfA>

<https://cloud.riftek.com/s/W5f3drsbRGWCqTR>

33

# Distributors.

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34



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35



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