

## Endoscopes

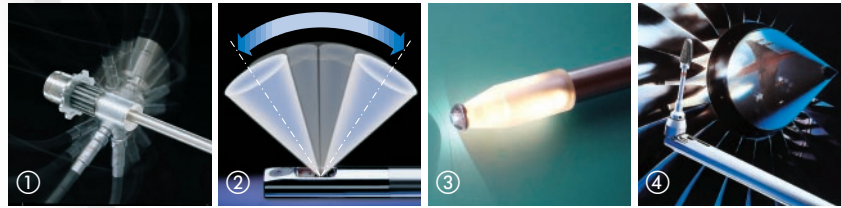
- Fiberscopes
- Borescopes
- Videoscopes

# Endoscopic Perfection

The human eye – one of nature’s miracles – is the most important and often irreplaceable means we have for checking and testing. With the help of endoscopes (borescopes), our sight penetrates into the most hidden spaces – independently of a straight or curved access.

Richard WOLF, being the oldest and one of the biggest endoscope manufacturers in Europe, has paved the way of endoscopy for nearly 100 years. Countless developments, inventions and patents witness the leading position of Richard WOLF – always keeping the focus on investigating and improving optical testing in all branches of the industry.

As representative examples, 5 important milestones in the history of industrial endoscopy may be mentioned: the rotatable light connector ①, the swivel-prism borescope ②, the panoramic borescope ③, the Blending Scope ④, and most recently the Elastoscope ⑤.



## Application area

## Range of employment

Aircraft.....	Engines, structure, turbines
Aviation and astronautics .....	Tightness, tubes, welding seams
Boilers, containers, tanks .....	Chemistry, pharma, heating + air condition
Breweries.....	Pipes, tubes, valves, vats
Building + concrete.....	Overground, underground, redevelopment
Chemistry .....	Boilers, pipes, reactors, valves
Electronics .....	Circuit boards, electrical parts and units
Food production .....	Boilers, pipes, tubes, vats
Foundry.....	Burrs, core rests, cavities
Gear boxes .....	Bearings, contact marks, wear
Heating + air condition.....	Cleanliness, corrosion, leakage
Machinery/machine manufacture.....	Burrs, castings, cavities, gears
Models .....	Architecture, city planing, manufacturing
Monument care .....	Museums, redevelopment, history of art
Motor vehicles.....	Car bodies, engines, gearboxes
Music instruments.....	Age, bodies, cleanliness
Offshore platforms (oil + gas).....	Engines, pipes, pumps, tubes
Pharmaceutical industry .....	Boilers, pipes, reactors, valves
Pipes.....	Burrs, surface, welding
Piston engines .....	Combustion chamber, cylinder, piston, valves
Power stations .....	Boilers, tubes, steam generators, valves
Precision mechanics.....	Grooves, transitions, burrs
Refineries .....	Tubes, valves, welding
Roots and trees .....	Forestry, research
Ships.....	Engines, pipes, tanks, turbines
Steel industry .....	Bearings, machinery, moulds, pipes
Tubes .....	Cleanliness, extrusions, fittings
Turbines.....	Combustion chamber, compressor, turbine
Weapons .....	Barrels, flats & grooves, cartridge chamber

This is but an extract of applications. Many others have been already discovered and some are waiting to be investigated by Richard WOLF endoscopes.



# Endoscopes in Perfection

It is only just that we expect maximum efficiency and absolute reliability from equipment which has to deliver highest quality results.

Endoscopes made by Richard WOLF have been aligned to this maxim at all times. Nearly 100 years of experience and unparalleled know-how in optics and mechanics have created optical systems with unbeatable quality.

All Richard WOLF endoscopes are characterised by highest brightness, sharp images over the complete field of view, true colour rendering and superior mechanical quality. Here, one still meets robust metal design where loads are to be expected.



The long tradition of craftsmanship, a sense of personal responsibility and continuous employee training are the best guarantee for the continued high standards of Richard WOLF endoscopes.

Of course, Richard WOLF was one of the first endoscope manufacturers who implemented a certified quality management system – as early as in 1994 Richard WOLF achieved the ISO 9001 certification.



### Rigid Borescopes TS

Ø 1.9 – 10 mm

Working lengths:

100 – 1300 mm

Directions of view:

0° - 110°

with focusing (Ø > 4 mm)

with rotatable light connector (>= 5 mm)

Stainless steel shafts and metal eyepiece



### Flexible Fiberscopes TF

Ø 2.2 – 11.5 mm

Working lengths:

400 – 3000 mm

Directions of view:

0° fixed or 0°/90° with

exchangeable objective

heads,

2- or 4-way tip articulation



### Elastoscopes TES

Ø 2.4 mm; Working lengths: 270 – 580 mm

Directions of view: 0° and 80°; shaft rigid but bendable; max. resolution (50,000 pixels); fix-focus eyepiece; extremely robust and break-resistant



### Swivel-prism borescopes TSP

Ø 5.5 – 16 mm

Working lengths: 260 – 1590 mm

with focusing, some with revolutionary QuickZoom,

with rotatable light connector



### Videoscopes TVP

various diameters,

various working lengths,

Directions of view:

0° fixed or 0°/90° with

exchangeable objective

heads,

fits to TECAM controllers or video show case



### Light Projectors

Halogen: 20 – 150 W

Xenon: 21 – 300 W

robust metal case, cooling fan, carrying handle

### Further Accessories

Angle adapters, magnifying adapters, light guides, light rods, light adapters, camera adapters for digital cameras, rubber eyepieces, various specialised aluminium cases, supporting arm, video cameras, video lenses, video recorders, printers and monitors.

## Documentation in Perfection

For more than 50 years, the documentation of endoscope images is in continuous progress. The reflex and narrow film cameras of the old days were replaced by electronic video cameras which in turn shrank in size and grew in sensitivity and efficiency. Today, digital technology has replaced the pure analogue technology and revolutionised the world of photography and video.

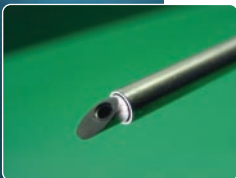
Richard WOLF always followed these developments from scratch, adopting the novel technologies in combination with WOLF equipment for versatile endoscopy documentation systems.



### Video Show Case TVC

12"-LCD-TFT-monitor, miniature video camera, internal memory, digital image storage on memory card, completely integrated in aluminium case with additional storage case for endoscope equipment.

## Specialised Endoscopes in Perfection



### Specialised Light Guiding

for optimised illumination of glaring or highly reflecting surfaces.

By means of the grazing incidence illumination, the contrast is largely enhanced and scratches, dents, unevenness, miniature burrs which remain hidden with standard endoscopes become distinctly visible.



### Panoramic Endoscope

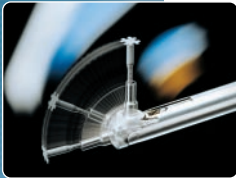
In order to inspect a circular groove or the inner wall of cylindrical object with a standard endoscope, either the part or the endoscope with the video camera need to be rotated.

This clumsy and time consuming procedure becomes obsolete when the unique patented panoramic endoscope is applied which also is ideally suited for automatic image processing.



### Blending Scope

An endoscopic grinder for e.g. "blending" foreign object damages on compressor blades of aircraft turbines. Simple, fast and efficient – a revolutionary patented WOLF product which saves huge amounts of money in aviation operations.



### Contact Measuring Scope

With this most simple piece of instrumentation, a miniature gauge is moved to the object. The damage size is read from the scale – a simple and unambiguous procedure without the need for any electronic or IT-equipment.



### Borescopes for Aircraft Engine and Turbine Inspection

The Richard WOLF delivery range comprises a large variety of specialised borescopes for the customary engines of all the major manufacturers. Each borescope fulfils the stringent requirements of the turbine manufacturers.

Richard WOLF develops, manufactures and sells endoscope equipment to all major airlines and cooperates closely with the engine manufacturers.

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