

APPLICATION NOTE

# How to inspect industrial equipment without taking it apart

Industrial maintenance sometimes requires inspecting and accessing components that are hard to reach or are deep inside large complex pieces of equipment. Whether inspecting turbines, heat exchangers, gear boxes, motors, pumps, valves, compressors, or pipes, maintenance technicians know that what they can't see can cause dangerous, costly, and time-consuming problems. They're constantly looking for ways to inspect heavy industrial equipment without having to take it apart.

Video inspection scopes are just the tool for the job. They can present maintenance technicians with an inside view of pipes, turbines, gearboxes, and motors and hard to reach areas of rotating equipment and valves. Technicians can see what they need to see without disassembling the equipment and they can capture images and video of the target areas for further analysis, reporting, and to establish a baseline and a maintenance history of each asset.

Videoscopes, like the new Fluke DS700 Series, consist of a tablet-type device that connects to a flexible probe equipped with an imager and a light source at the tip. The probe is inserted into a pipe or inspection opening in the component and presents the user with a diagnostic view of what's going on inside. Using the videoscope technicians can inspect:

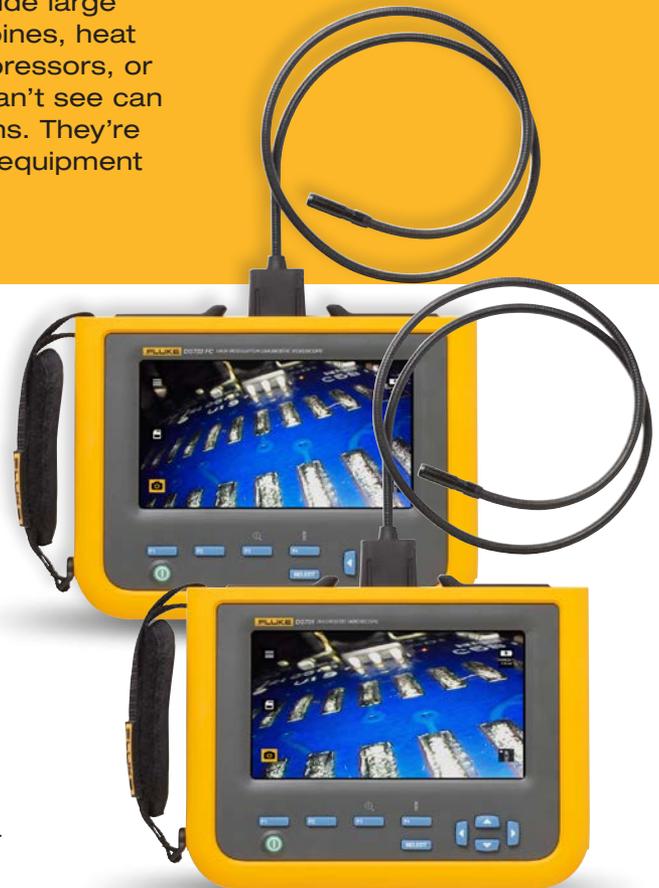
- Pipes and tubes for corrosion, clogging, and blockages
- The inner wall of turbines and containers for cracks, corrosion, and damage
- Rotating machinery for signs of wear or severe damage
- Castings for damage, burrs, or deformities

- Loosening parts (screws, nails, etc.)
- Part number identification of internal components of the equipment

Employing a rugged videoscope in an industrial setting, can significantly reduce machine downtime and enhance productivity by providing a clear, real-time view of what is going on in a specific component. It can also help technicians identify root causes faster and provide evidence for documentation. The team can use the videoscope to inspect the component, capture detailed video or photos, and then review the results to find problems. If they find issues, only then do they have to disassemble the equipment, perform maintenance, and reassemble the machine.

**Video inspection cameras save time and reduce risk**

In industrial facilities, rugged videoscopes enable technicians to quickly navigate pipes and all kinds of hard-to-reach components to find conditions that may have an impact on production, such as:



- Corrosion in rotors and stators
- Cracks or corrosion in cable pullies and pulley slots
- Liquid channel corrosion, blockages, or cracks
- Blocked or leaking HVAC ducts
- Material integrity

Because videoscopes save hours of inspection time, organizations can perform more frequent inspections, resulting in early detection of problems, and better maintenance decisions.

**13 key industrial applications for videoscopes include:**

**1. Heat exchangers**

A videoscope can help you check the integrity of the anticorrosion coating in heat exchanger tubes both during manufacture and once the exchanger is in use.

**2. Pressure pipes and vessels**

Petrochemical facilities have numerous pressure pipes that operate in high temperature and high-pressure conditions. Inspecting these pipes with a videoscope can help you detect internal corrosion or a blockage that might lead to serious consequences up to and including a pipeline explosion.

**3. Superheater header**

Superheated steam can cause material inside steam tubes and superheater headers to degrade or crack. This in turn can cause internal foreign matter to accumulate causing clogging and endangering the long-term safe operation of the boiler. A videoscope inspection can help you find these conditions before they reach a critical point.

**4. Desuperheater header**

A desuperheater is commonly located next to the superheater to keep the steam temperature within acceptable limits and reduce the long-term risk to the boiler. It is thus subject to the same clogging, cracking, and degrading conditions as the superheater. These conditions can be easily detected with a videoscope.

**5. Economizer header**

In the process of absorbing heat from high temperature flue gas and reducing smoke exhaust temperature, the economizer is subject to blockages and clogging from foreign matter and corrosion. A videoscope can detect these conditions before the buildup affects performance.

**6. Lower header of water-cooled wall**

Metal parts sometimes fall off inside the steam pocket and mud can build up and clog the inside of the lower header of the water-cooled wall. A videoscope with a strong lighting source and a probe that can maintain its shape even at high temperatures can easily find clogs and buildup in the header area.

**7. Reheater header**

As with other headers in the boiler, the reheater header is subject to corrosion and clogging. The videoscope can detect foreign material or clogging around the header.

**8. Internal and external furnace pipeline**

A videoscope can be used to check inner wall corrosion and cracking inside internal and external furnace pipes. The probe support tube should be flexible enough to pass through the elbow of the pipe.

**9. Large axis center hole of steam engine**

After the axis plug is removed, the videoscope probe can be inserted into the axis hole to inspect the inner wall of the tank for corrosion and degradation.

**10. Steam turbine interior**

The inner wall of a steam turbine can be inspected for corrosion, cracks, and other damage by inserting a videoscope probe through the observation hole.

**11. Parts castings**

A videoscope is a valuable tool for parts casting quality control inspections. Be sure the videoscope you select has a probe with a diameter small enough and flexible enough to easily insert into parts of various sizes

and shapes. Also look for a high definition imager and display screen to make it easier to see deep, blind, or staggered holes, burrs, and excess material buildup.

**12. Water and sewer infrastructure**

Equipping municipal maintenance workers with videoscopes can increase the speed and quality of sewer and water line infrastructure inspections. Key videoscope requirements for these applications include a waterproof probe, digital zooming capabilities, and a probe length of several meters.

**13. Part numbers**

Locate and identify part numbers for internal components that need to be replaced, order the part before tearing-down the equipment.



## Checklist

### Features to look for in a top quality videoscope

- A probe flexible enough to maneuver around corners and that also has the integrity to hold its shape when inspecting hard-to-reach components
- Intuitive user interface
- Dual view imager (straight ahead and 90° angle)
- An adjustable light source attached to the probe tip
- Multiple probe lengths and diameters
- High quality digital image and video capture
- Digital zoom
- Dustproof and waterproof construction
- Rugged durability



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