

Olympus Remote Visual Inspection Webinar Series

Episode 3: Image Capture Best Practices

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Previous Episodes

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Olympus Remote Visual Inspection Webinar Series

Episode 1: Fundamentals

Scientific Solutions Division | Bayard Morales

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Olympus Remote Visual Inspection Webinar Series

Episode 2: Videoscope care, maintenance, and cleaning

Scientific Solutions Division | Bayard Morales

What you will learn in this session:

- 01 Probability of Detection (POD)**
- 02 Videoscope Technology & Components**
- 03 Selection of Videoscopes & Tip Adaptors**
- 04 Examples of Bad Images and How to Avoid Them**
- 05 How to Achieve the Best Images**



RVI Industries



Aerospace



Automotive



Oil and Gas



Power Generation



Security

01

Probability of Detection (POD)

Probability Of Detection (POD)

What is POD?

POD is the ability for an inspector to identify abnormalities.

Why is POD important?

Achieving a high POD shall be the goal of any inspection.

What can influence POD?

High POD of a videoscope can be achieved by a combination of the following factors:

1. Suitable level of illumination
2. Suitable image resolution
3. Suitable image exposure
4. Suitable light source wavelength
5. Suitable color representation
6. Suitable direction of view (DOV), field of view (FOV), depth of field (DOF), rigid length at distal end and magnification
7. Easy control of distal end articulation

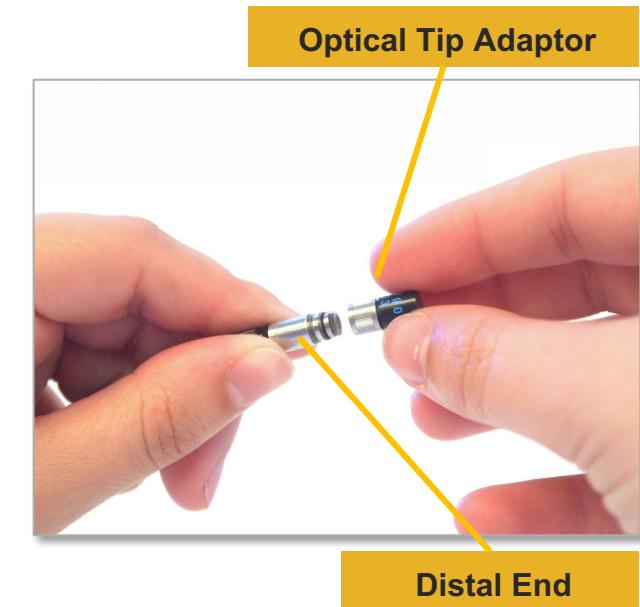
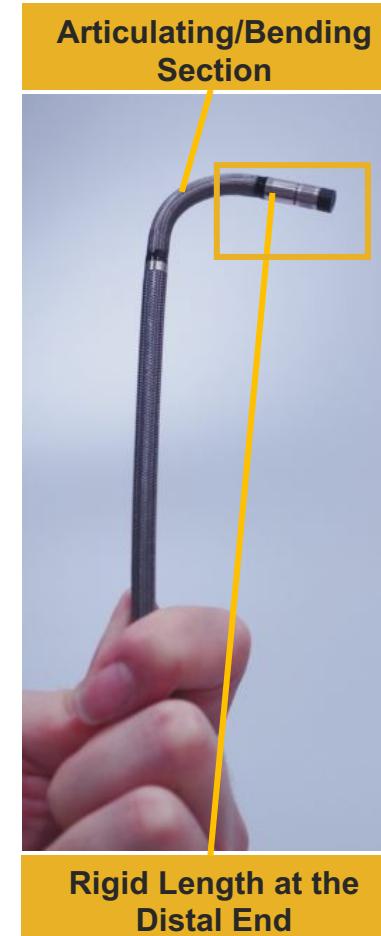


02

Videoscope Technology & Components

Review: The Main Parts of a Videoscope

Videoscopes come in different shapes and forms, but generally they can be broken down into common elements:



Review: Basic Videoscope Technology

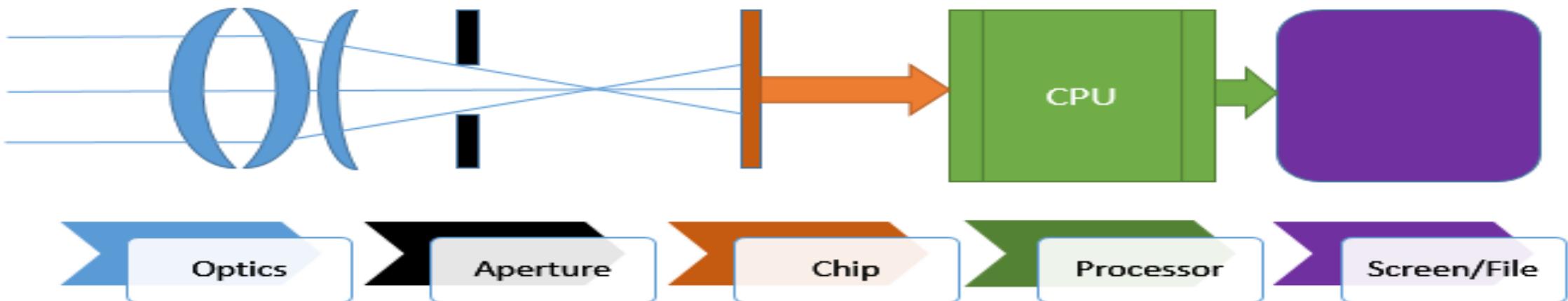
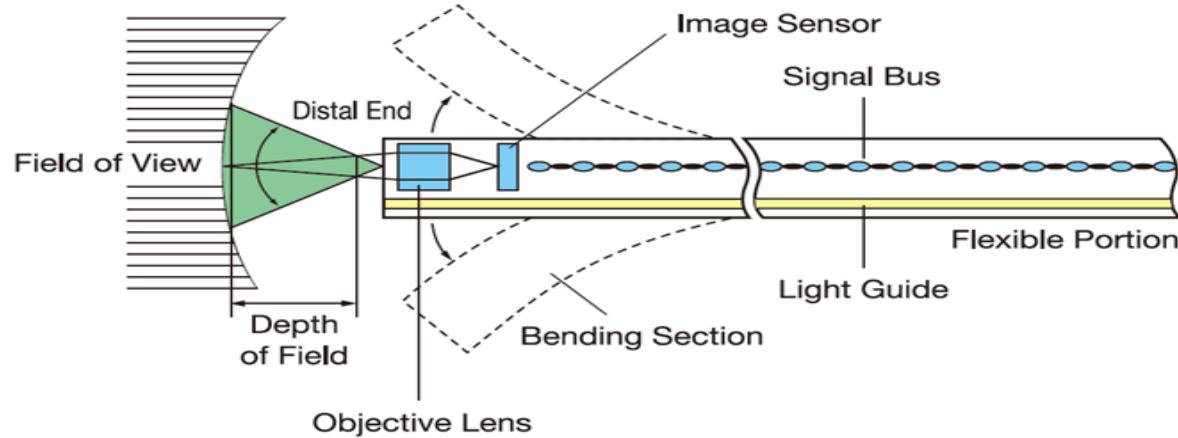


Image Capture Overview

"A good image or video is worth a thousand words...and time...and money"

The videoscope is the camera

- A videoscope is an inspection instrument, more than a “point & shoot” type of camera.
- Better understanding of different optical features will allow better images and inspection.



The inspector is the photographer

- Image capture techniques will impact image/video quality.
- The inspector needs to “frame” the “picture” properly for a good quality image, which is used to make critical decisions.



03

Selection of Videoscopes & Tip Adaptors

Selecting a Videoscope

The best videoscope may be different depending on the application. The following considerations, for example, can be discussed with your videoscope original equipment manufacturer (OEM) to select the most suitable model for your needs:

- ✓ Physical aspects such as portability, modular design, etc.
- ✓ Scope diameter
- ✓ Scope length
- ✓ Illumination level
- ✓ Light wavelength
- ✓ Environmental resistance
- ✓ Accessories
- ✓ Measurement capabilities



Selecting Tip Adaptors

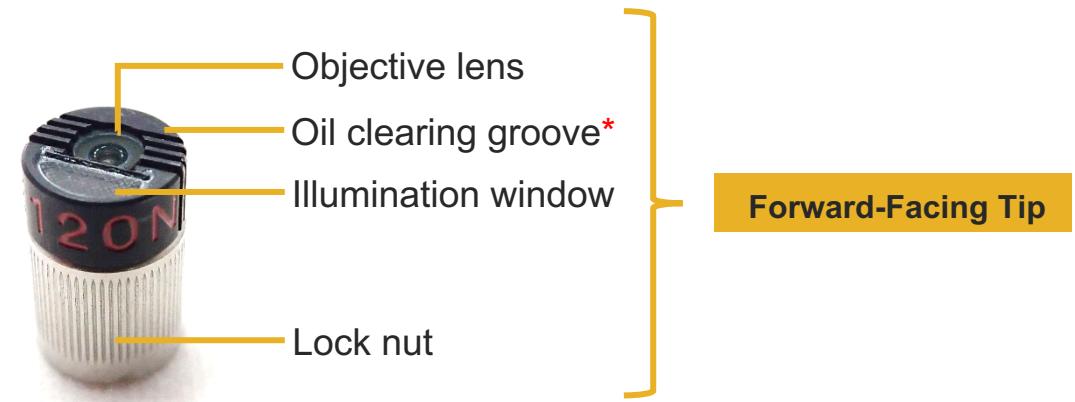
The correct tip adaptor will improve the image quality significantly.

The following considerations, for example, can be discussed with your videoscope OEM:

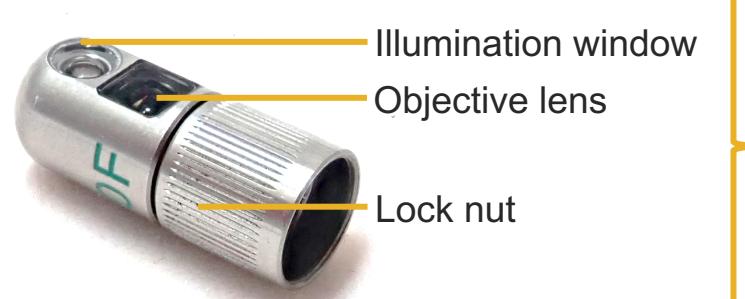
1. Direction of View (DOV)
2. Field of View (FOV)
3. Depth of Field (DOF)
4. Rigid Length at Distal End
5. Magnification
6. Distribution of Light
7. Environmental Resistance
For example: Oil Clearing



Tip Adaptor – Direction of View (DOV)



Direct View



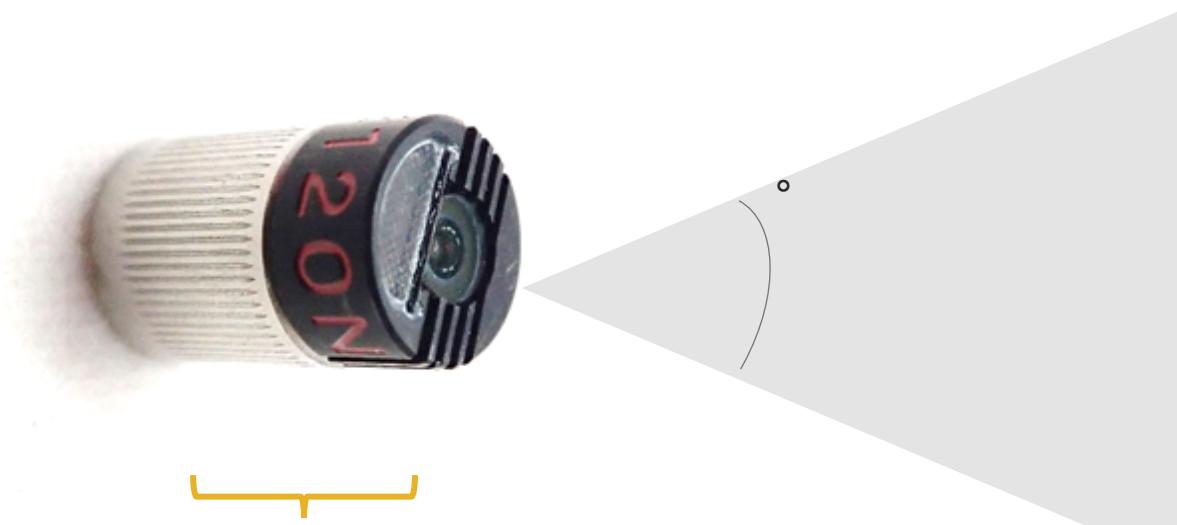
Side View

* Oil clearing design is uniquely available on all Olympus IPLEX G Series videoscopes

Tip Adaptor – Field of View (FOV)

Tip adaptors generally have the following FOV specifications:

- ✓ 220°
- ✓ 120°
- ✓ 100°
- ✓ 80°
- ✓ 50°



Direct-View Tip Adaptor

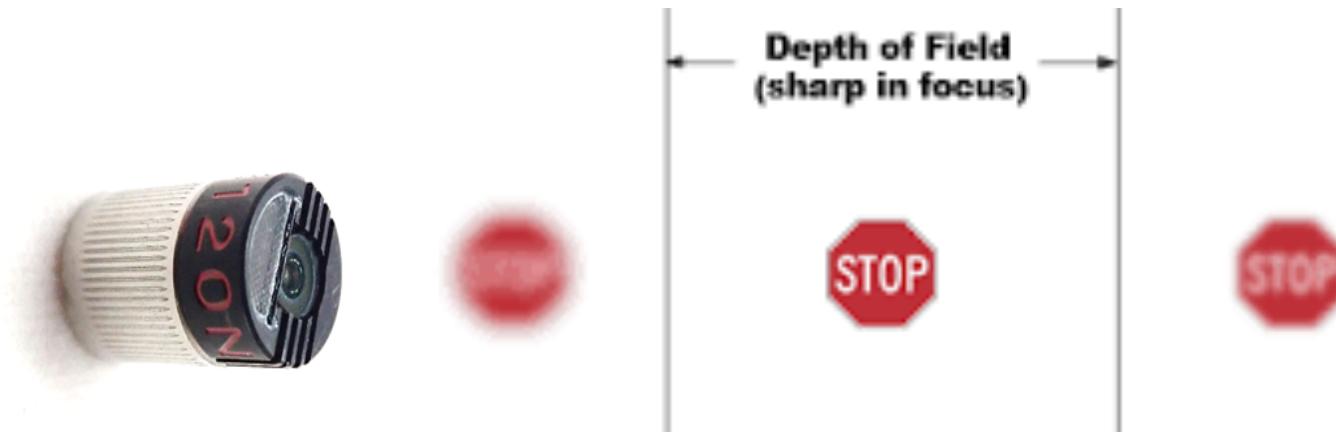
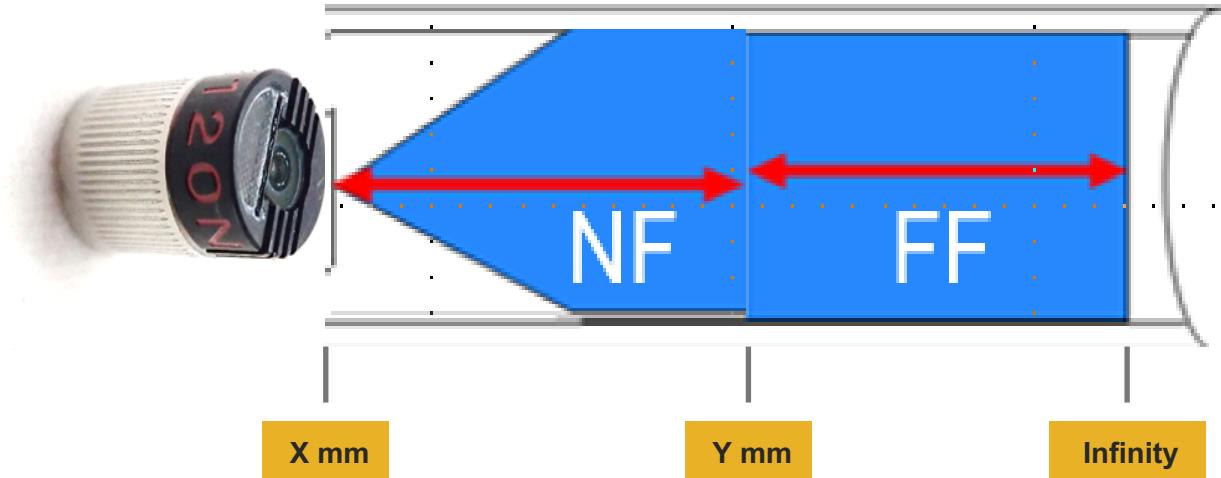


Tip Adaptor – Depth of Field (DOF)

Depth of Field (DOF) is defined as a distance of millimeters (mm) in which an object can be in focus.

Generally, DOF specifications are classified in 2 categories:

- ✓ Near focus (NF): X mm to Y mm
- ✓ Far focus (FF): Y mm to infinity



Tip Adaptor – Rigid Length at Distal End

The rigid length at the distal end is the total length of non-flexible scope material. It is a physical constraint that may determine if you can access the inspection location:

- ✓ Generally, side-view tip adaptors have a longer rigid length at the distal end because of the prism design
- ✓ Retrieval tools will also add to the rigid length, but the benefit will be the capability to remove foreign object debris (FOD), which can be very helpful to reduce downtime.

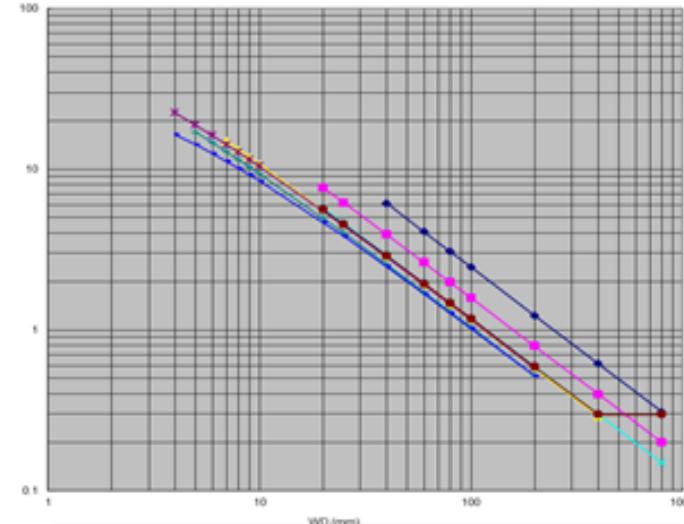


Rigid Length at the Distal End

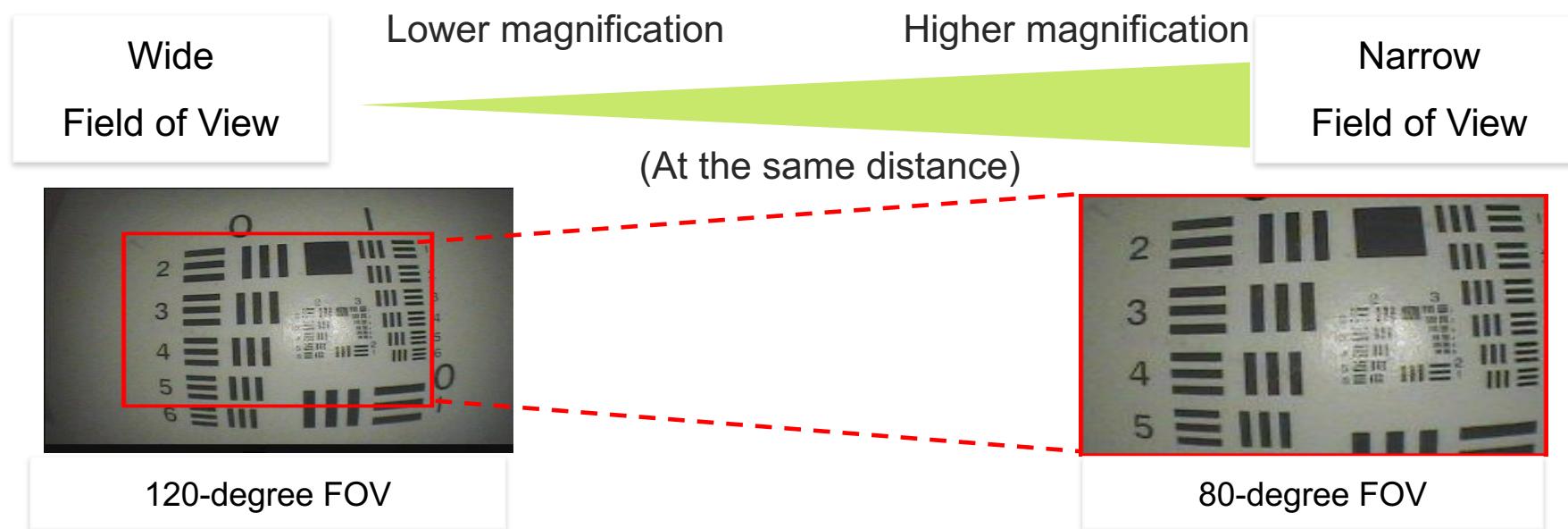


Tip Adaptor – Magnification

- ✓ Depending on FOV selection, please keep in mind the trade-off between FOV and magnification ratio
- ✓ Please refer to the magnification chart provided by your videoscope OEM.



Sample Magnification Chart



04

Examples of Bad Images & How to Avoid Them

Example 1: Foggy or Unclear Images

Q: Why is my image foggy or unclear?

A: Please check the following:

- ✓ Tip adaptor may be dirty
- ✓ Tip adaptor may be not properly attached
- ✓ Oil or water might be inside of tip adaptor
- ✓ Tip adaptor may not be suitable for this inspection
(example: depth of field out of range)
- ✓ Environmental vibration or hand motion of inspector may cause out of focus images
- ✓ Overall videoscope design or quality may be the reason

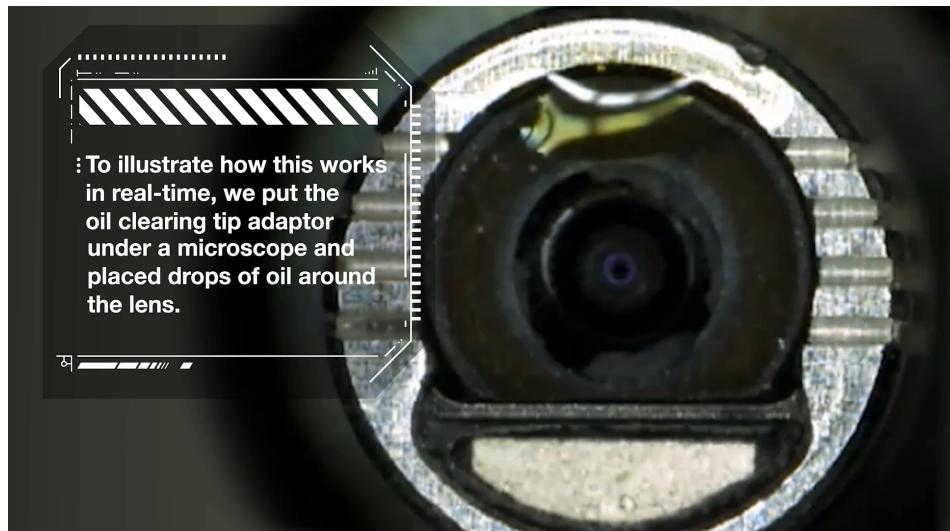
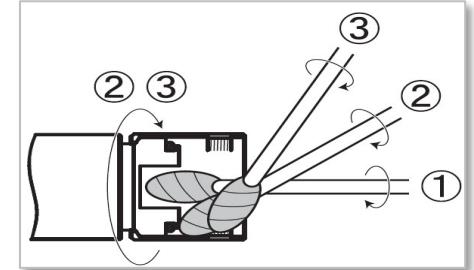
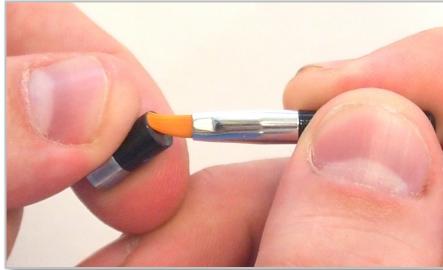


Example 1: Foggy or Unclear Images

Here are some tips to help you avoid foggy or unclear images:

- ✓ Clean the outside and inside of your tip adaptor properly
Reminder: Please refer to Olympus RVI webinar series episode 2 Videoscope Care, Maintenance, and Cleaning
- ✓ Install the tip adaptor to the distal end properly
- ✓ Use accessories to stabilize the distal end
- ✓ Use tip adaptors with an oil clearing design to reduce the frequency of cleaning in oily environments

Cleaning Distal End and Optical Tip Adaptor



Note: the procedures shown in this presentation are valid for Olympus products; other manufacturers will have different procedures and recommendations, so please refer to the instruction manual.

Example 1: Foggy or Unclear Images



Before



After:

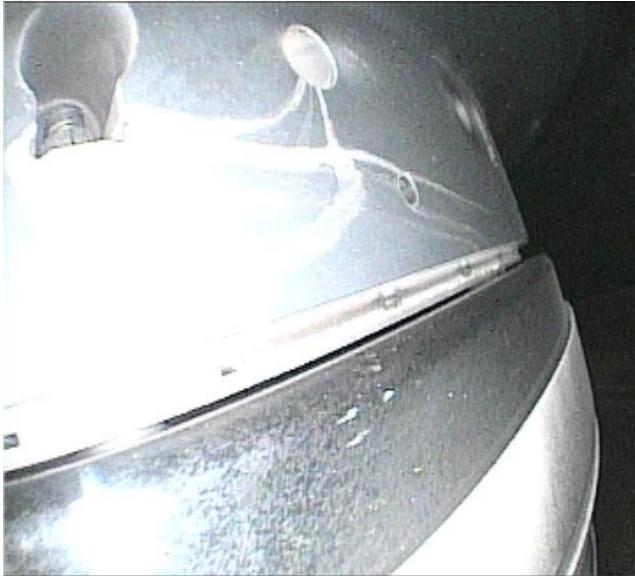
1. Tip adaptor is cleaned properly
2. Tip adaptor is attached properly

Example 2: Image with Excessive Reflection

Q: Why does my image have excessive reflection?

A: Please check the following:

- ✓ Brightness level may be too high
- ✓ Distal end may be too close to the target
- ✓ Angle between the distal end and target surface may be too close to 90 degrees
- ✓ Target surface may be too shiny or oily
- ✓ Exposure and illumination may be not synchronized



Example 2: Image with Excessive Reflection

Here are some tips to help you avoid images with excessive reflection:

- ✓ Choose the suitable optical tip adaptor (direct vs side view)
- ✓ Choose shallow approach angles to the target surface
- ✓ Adjust image processing settings such as:
 - Illumination Brightness
 - Gain Control
 - Exposure
 - Frame Rate in Frames Per Second (FPS)



PulsarPic™ is a uniquely Olympus technology to help reduce reflection on metallic or oily surfaces by automatically adjusting light output in sync with the CCD image capture frame rate.

Example 2: Image with Excessive Reflection



Before
Auto Gain OFF

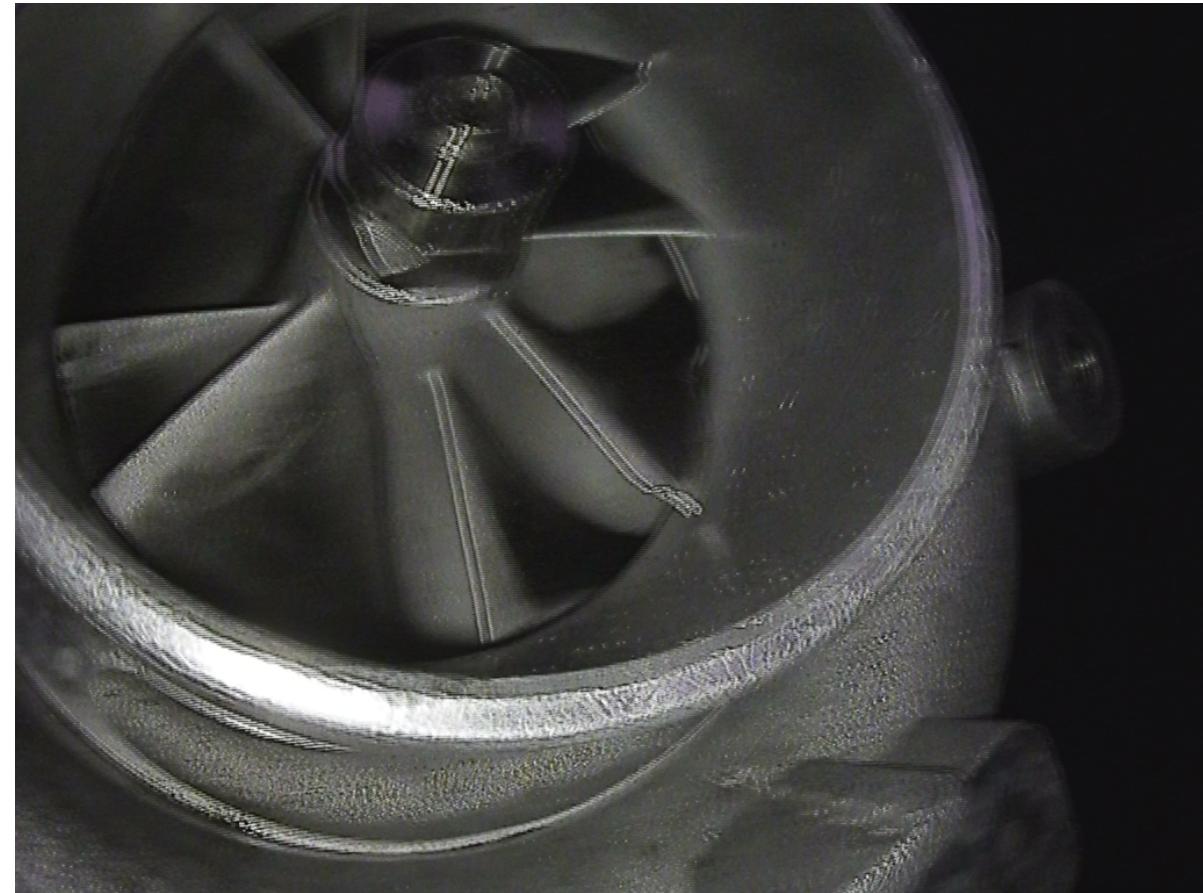
After:
Auto Gain ON

Example 3: Blurred Image

Q: Why is my image blurred?

A: Please check the following:

- ✓ Tip adaptor depth of field may not be suitable for the application
- ✓ Articulation motion may be too fast or unstable
- ✓ Try to freeze the image before image capture
- ✓ Brightness level may be too low and exposure time is too long
- ✓ Image capture frame rate may be slow
- ✓ Tip adaptor or lens may have damage
- ✓ Tip adaptor may have a poor optical design



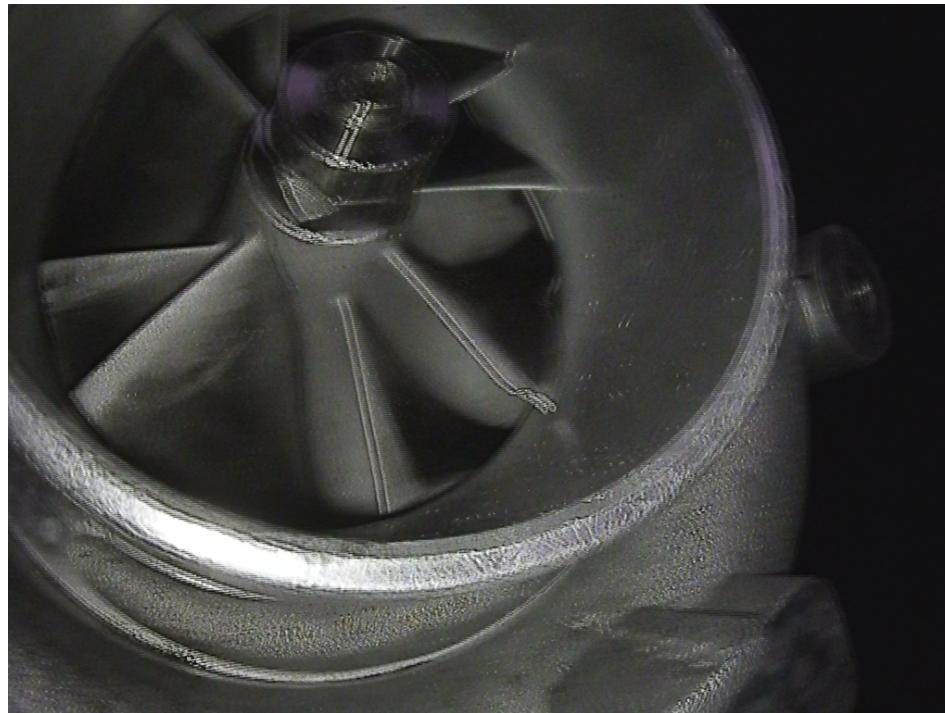
Example 3: Blurred Image

Here are some tips to help you avoid blurred images:

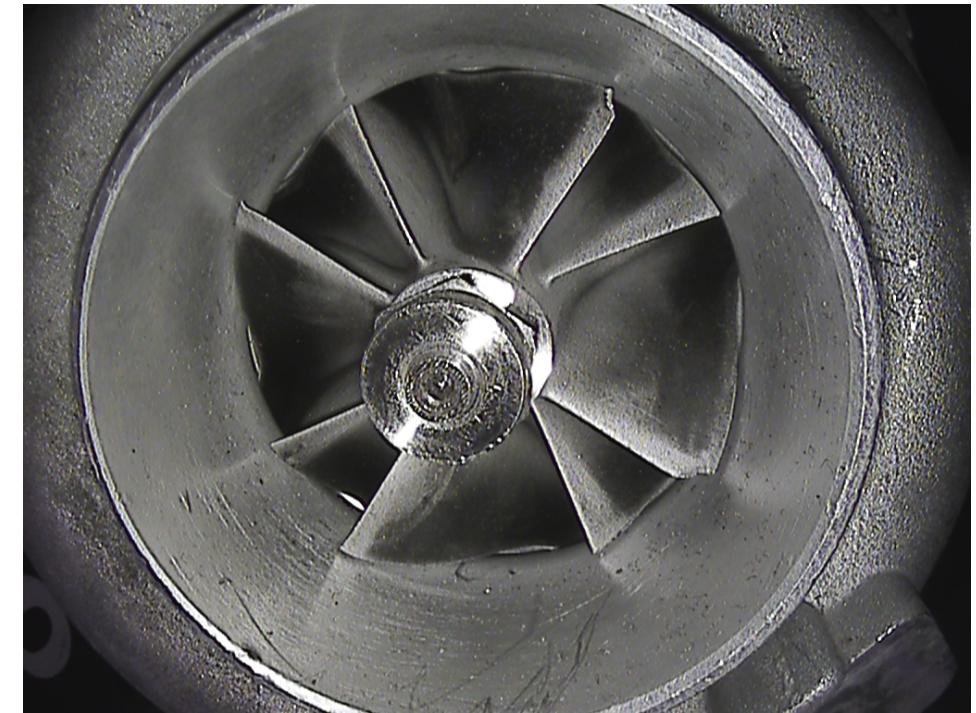
- ✓ Choose a tip adaptor with a suitable depth of field for the application
- ✓ Choose a videoscope with servo-controlled articulation with a function to adjust the articulation speed and set the articulation lock
- ✓ Choose a videoscope with a fast image capture frame rate (60 FPS)
- ✓ Use the freeze image function before image capture, if available
- ✓ Use accessories to stabilize the distal end such as a rigid sleeve or centering device
- ✓ Configure the videoscope to the best ergonomic position to reduce user fatigue



Example 3: Blurred Image



Before



After

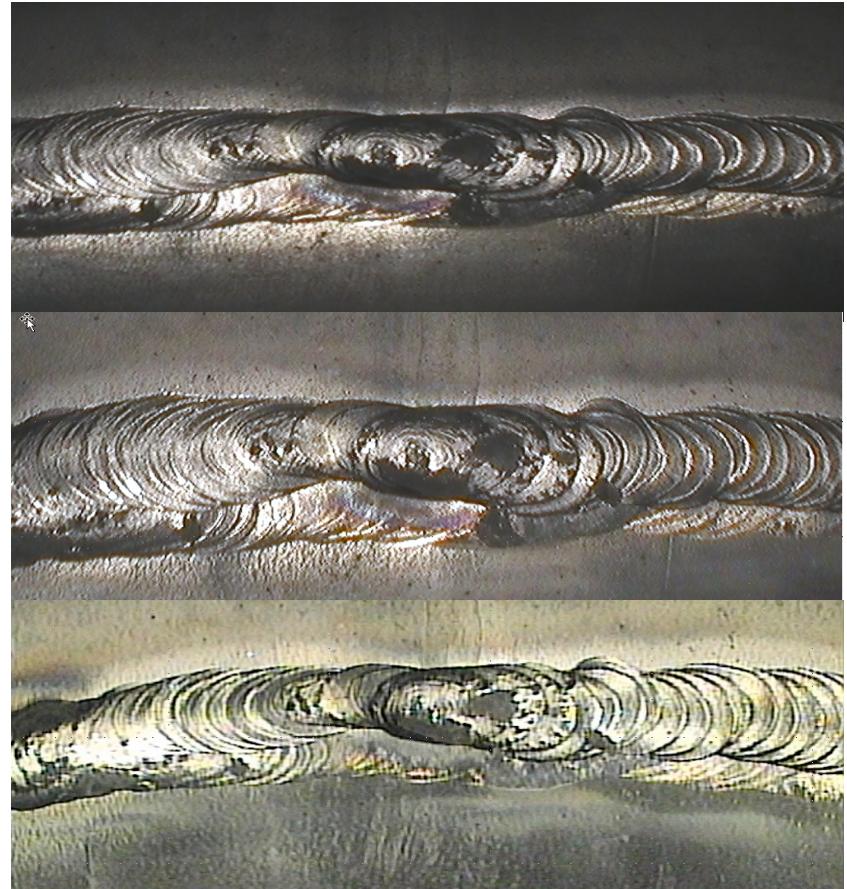
Example 4: True Colors

Q: Does my image have true colors?

A: Please check the following to ensure that the colors represent reality:

- ✓ Inspector may need to perform white balance
- ✓ The image saturation setting may need adjustment
- ✓ The screen display setting may need adjustment
- ✓ The overall videoscope design or quality may be the reason

For example: Chromatic optical aberrations



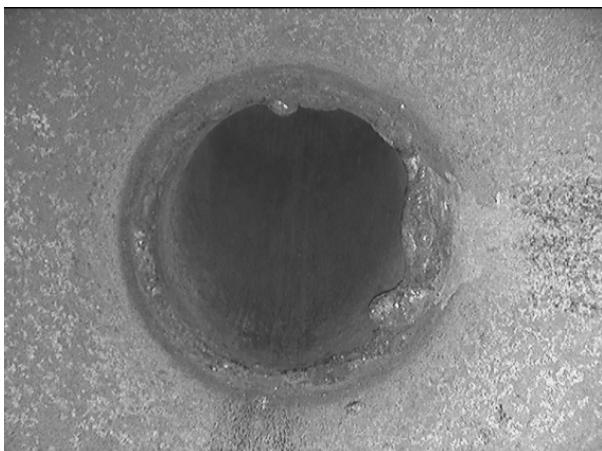
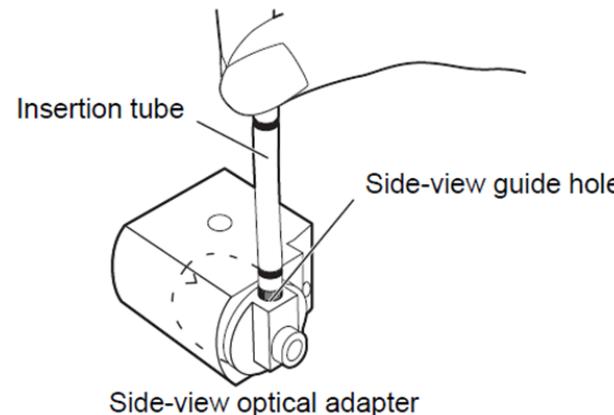
Example 4: True Colors

Here are some tips to help you capture images with true colors:

- ✓ The white balance sets the reference for color temperature, so colors are represented realistically
- ✓ Perform white balance using the OEM check tool or with a matte white surface
- ✓ Select suitable image processing settings for your application needs

For example:

- Monotone: Detect shapes and texture
- Natural: General setting for routine inspection
- Vivid: Enhanced saturation for easier detection of corrosion, thermal barrier coating, or the heat-affected zone



Monotone



Natural

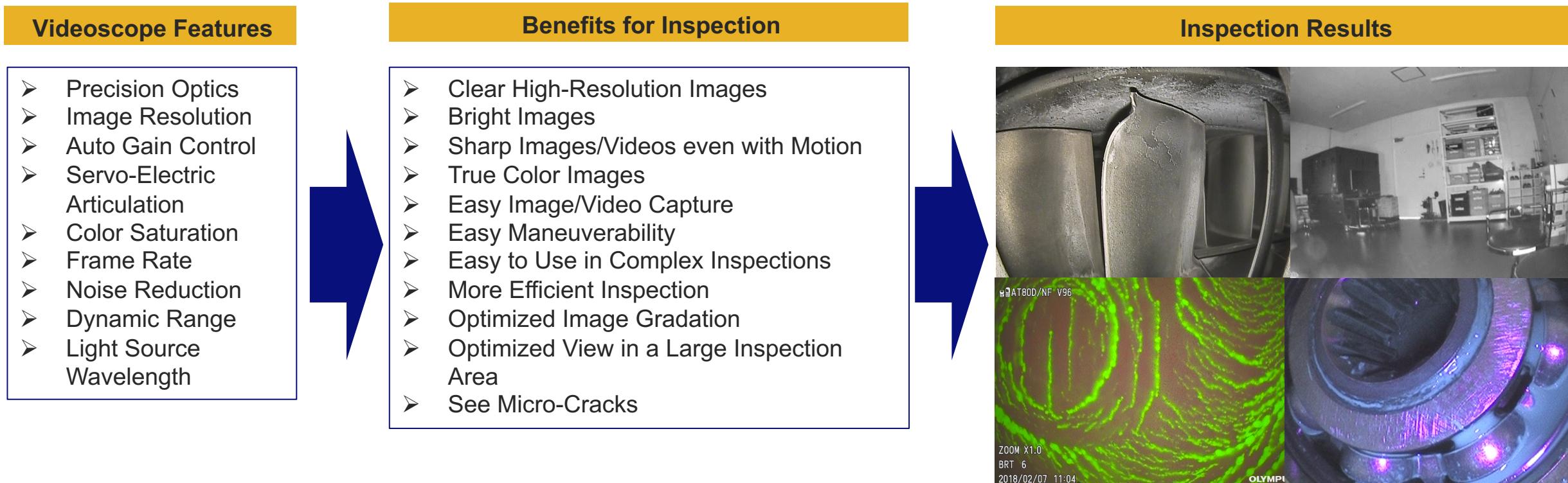


Vivid

05 **How to Achieve the Best Images**

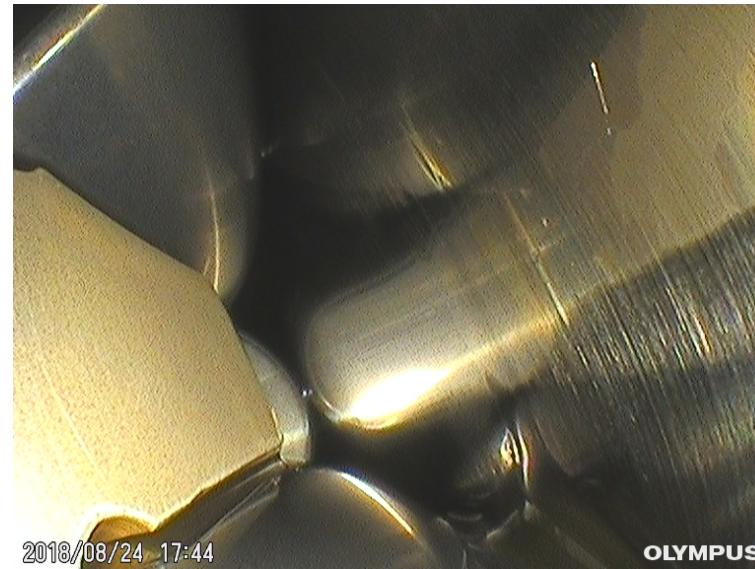
How to Achieve the Best Images

- ✓ The “best” image varies depending on the application.
- ✓ No matter the application or the industry, the videoscope that can deliver the **HIGHEST** probability of detection (POD) is the most **VALUABLE** instrument.



Takeaways

1. The best images are achieved by suitable equipment selection/setting in **combination** with good techniques.
2. Maximize the value of your videoscope by becoming familiar with **ALL** available features and compatible accessories.
3. The probability of detection (POD) is the highest when the **right** videoscope is in **skilled** hands.





Live Questions & Answers

Panel of Specialists:
Hafees Fraisada S. (EMEA)
Bayard Morales (UKI)
Mark Russ (EMEA)

Olympus RVI Webinar Series

Episode 1: Fundamentals
Episode 2: Care, Maintenance, and Cleaning
Episode 3: Image Capture Best Practices

Feedback, Suggestions, and Further Questions:
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