# REMOTE VISUAL INSPECTION – A PICTURE TELLS A THOUSAND WORDS

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# Aviation Market

## Remote Visual Inspection (RVI)

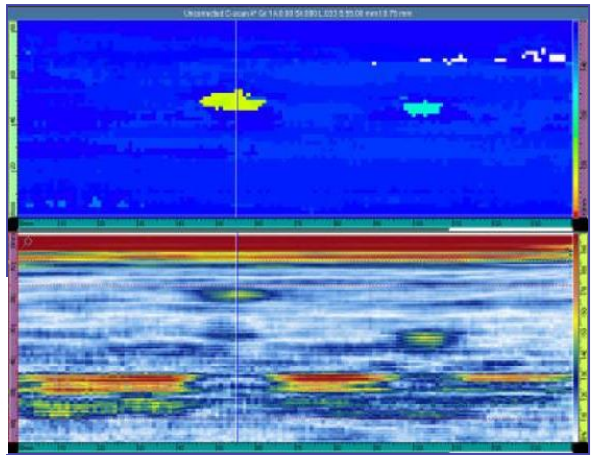
### Background

- **Remote Visual Inspection equipment is one of the mandatory equipment required for inspection in the aviation market.**
- **High resolution image allows defects to be detected with minimum efforts.**
- **The unique 3D Stereo measurement employed in the IPLEX videoscope systems allows for quantifiable measurement of defects detected.**

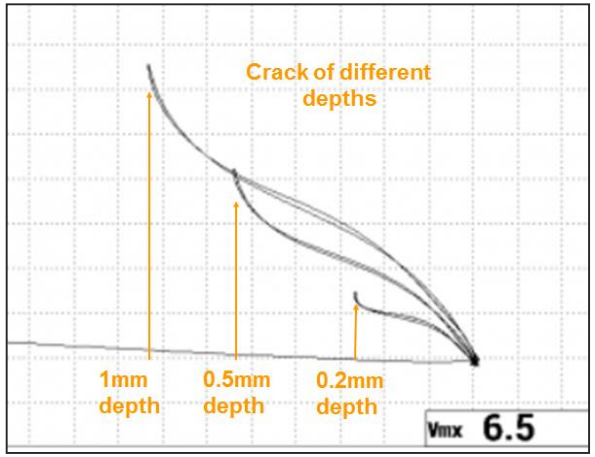
# Aviation Market

## Non Destructive Testing / Inspection

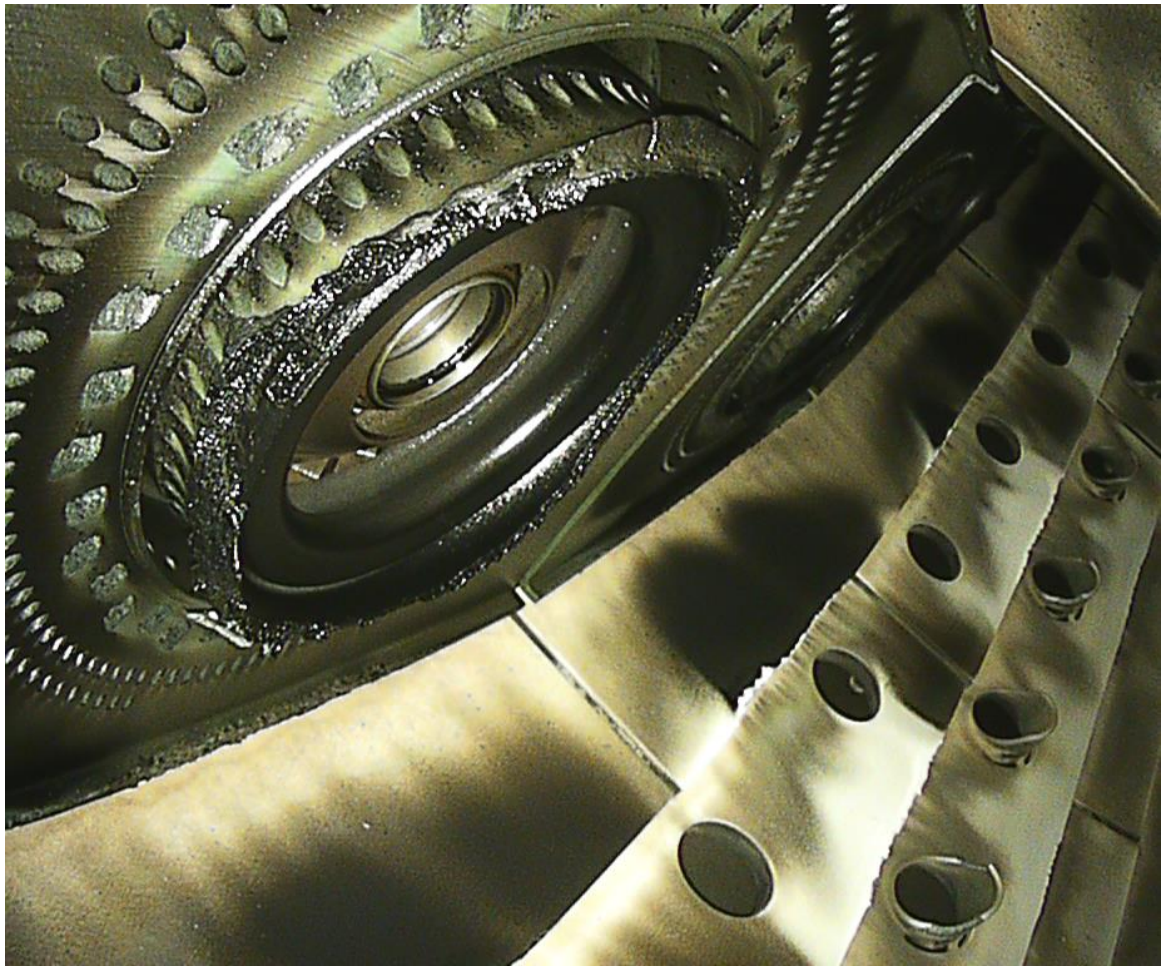
### The differences..



Ultrasonic



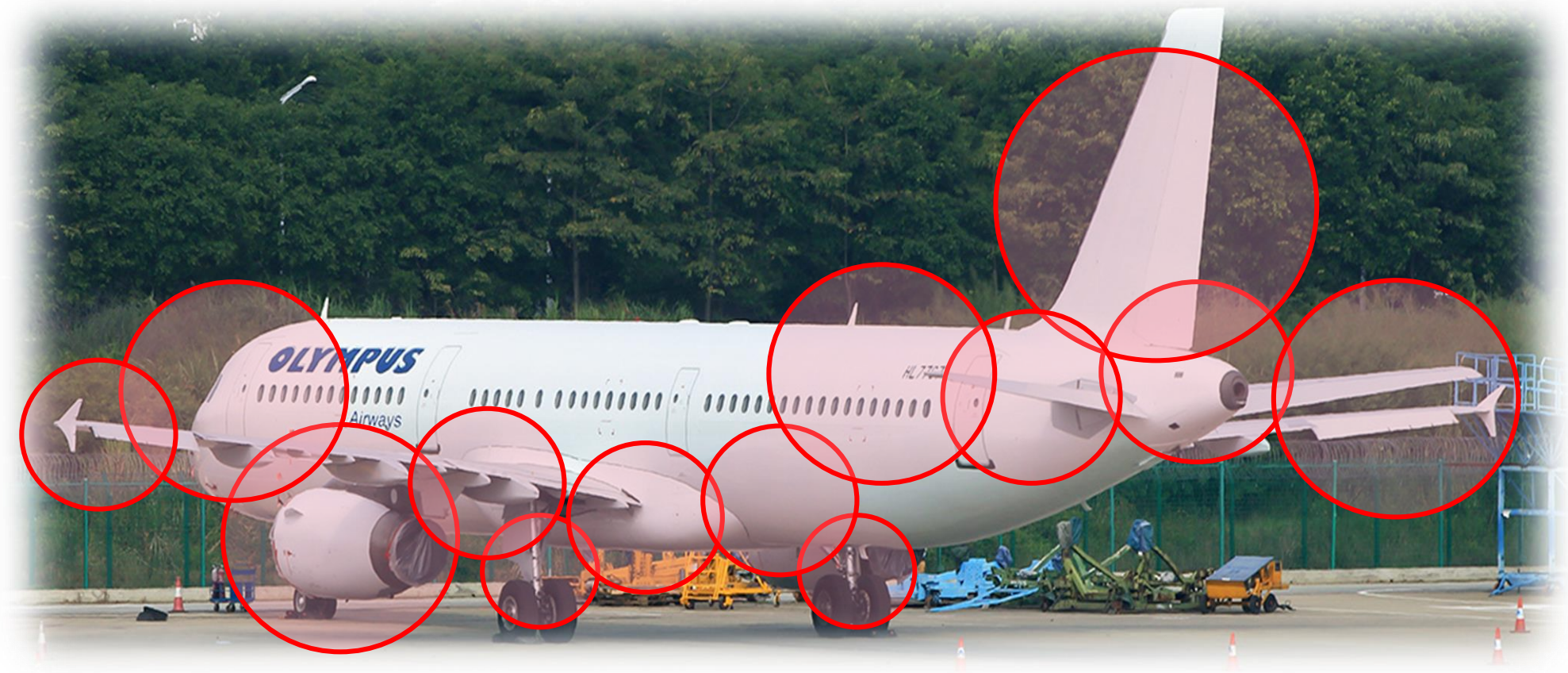

Eddy current



# Aviation Market

## Remote Visual Inspection (RVI)

### Inspection areas – aviation



# Aviation Market

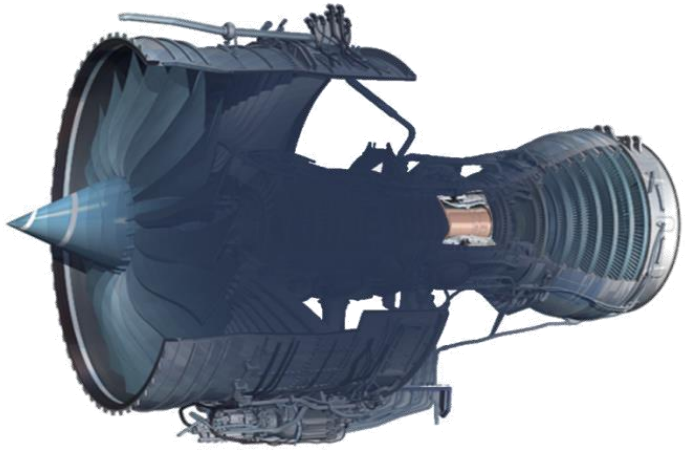
## Combustion chamber inspection

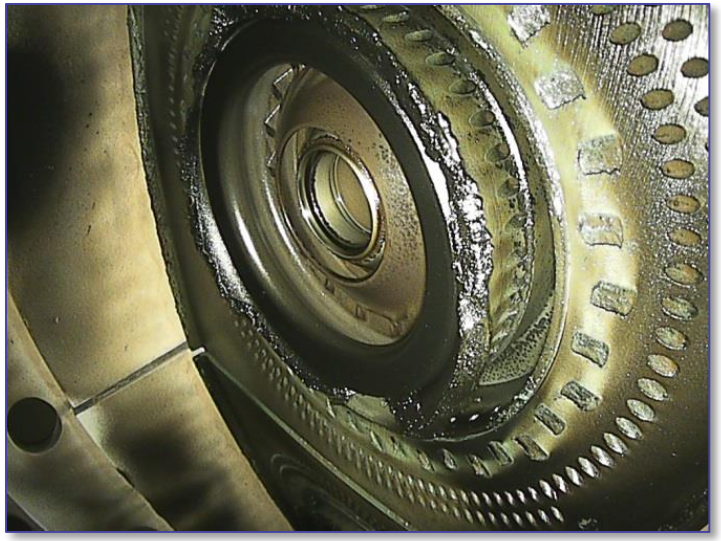
### Concern

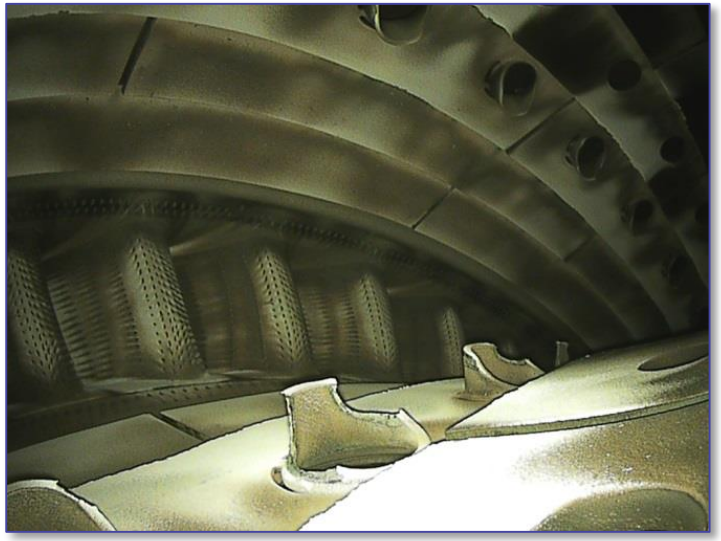
- Internal condition of combustion chamber
- Erosion / corrosion
- Carbon build-up

### Solution

- IPLEX videoscope series
  - Laser illumination
  - PuslarPic™







# Aviation Market

## Combustion chamber inspection

### Concern

- Internal condition of combustion chamber
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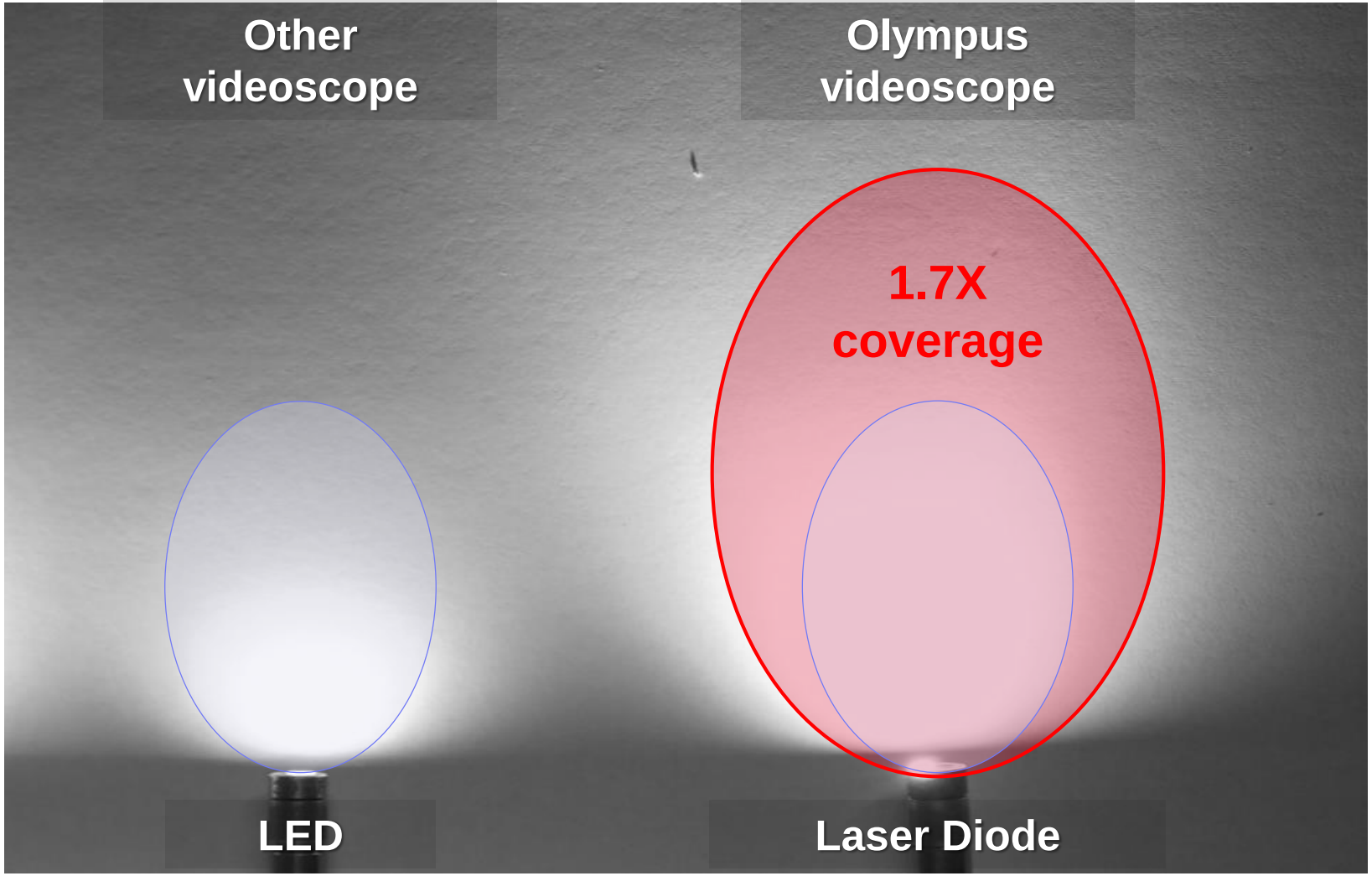
### Solution

- IPLEX videoscope series
  - Laser illumination
  - PuslarPic™

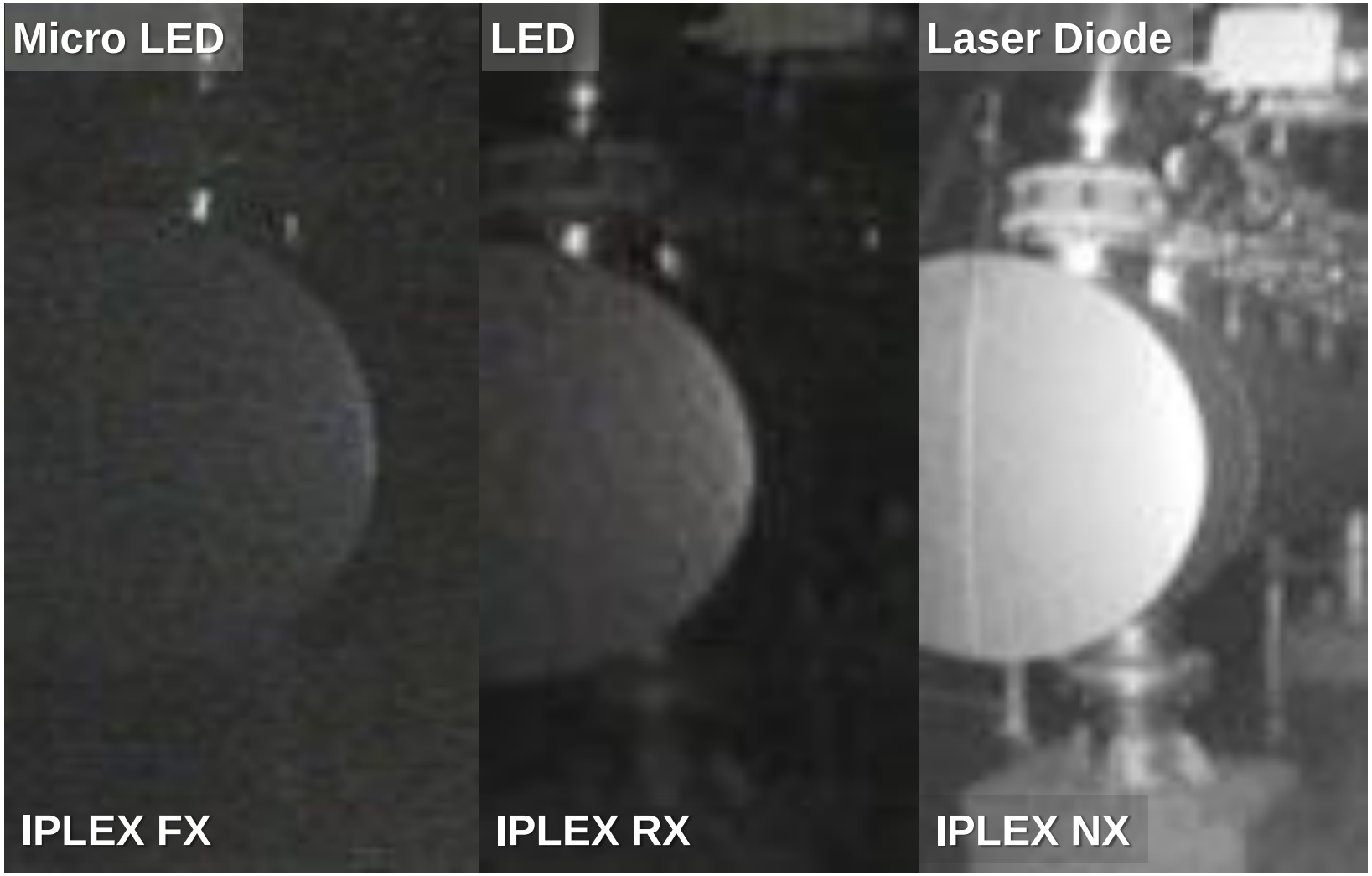
# Aviation Market

## Olympus laser diode illumination



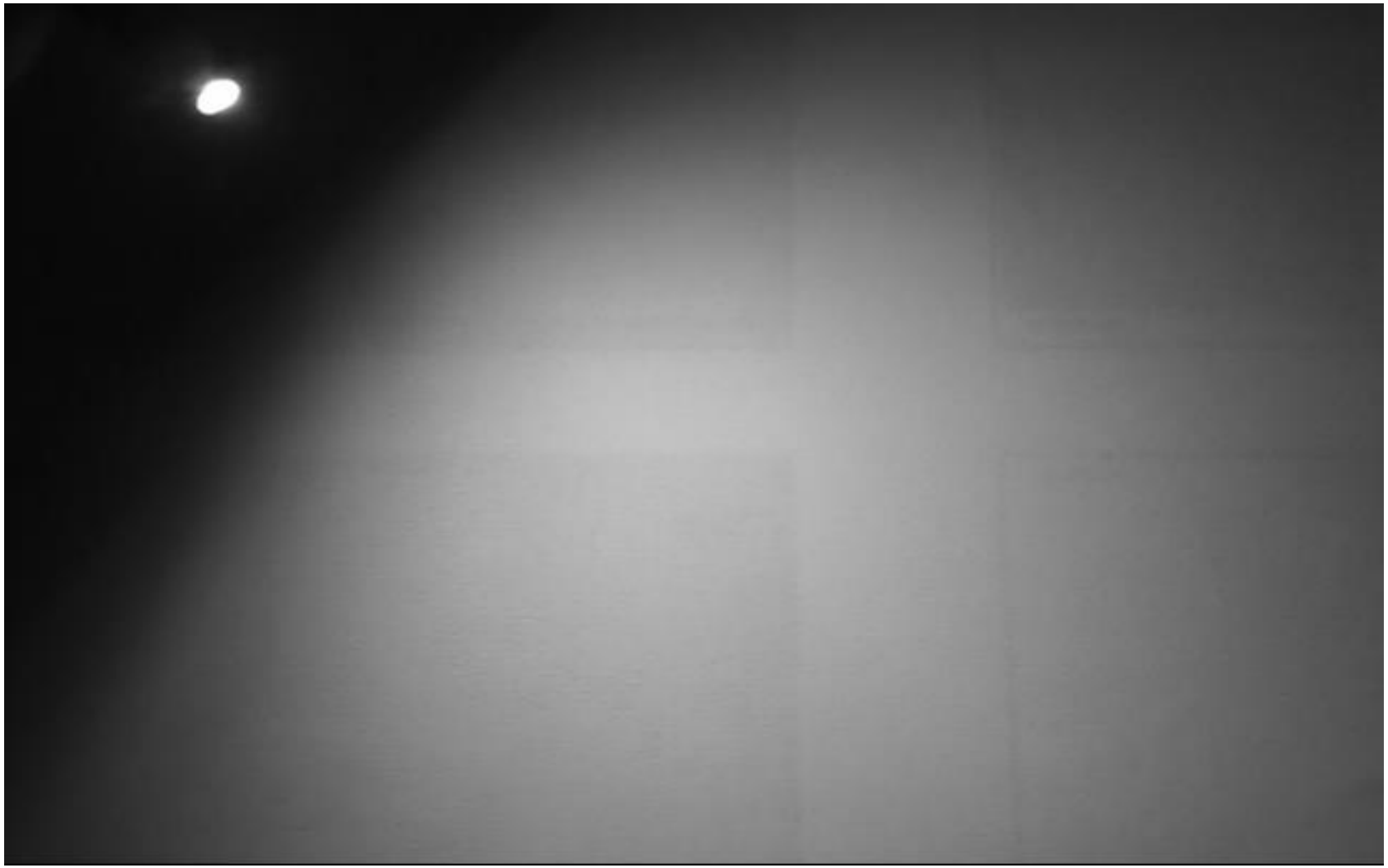

# Aviation Market

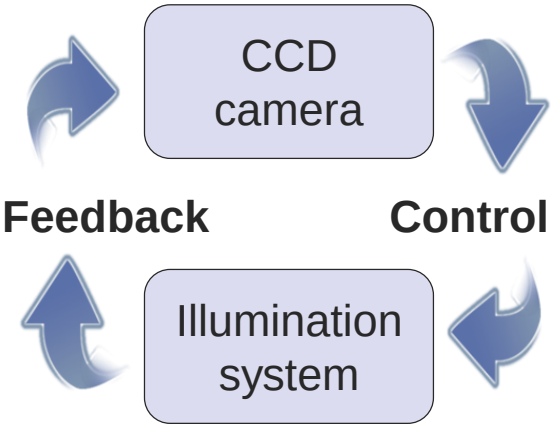
## Olympus laser diode illumination




# Aviation Market

## Olympus PulsarPic™ illumination





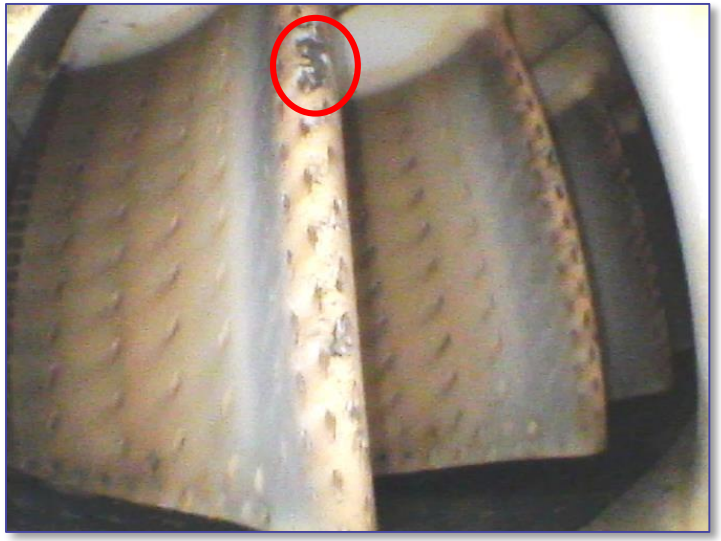

PulsarPic technology

# Aviation Market

## Turbine blades / vanes inspection

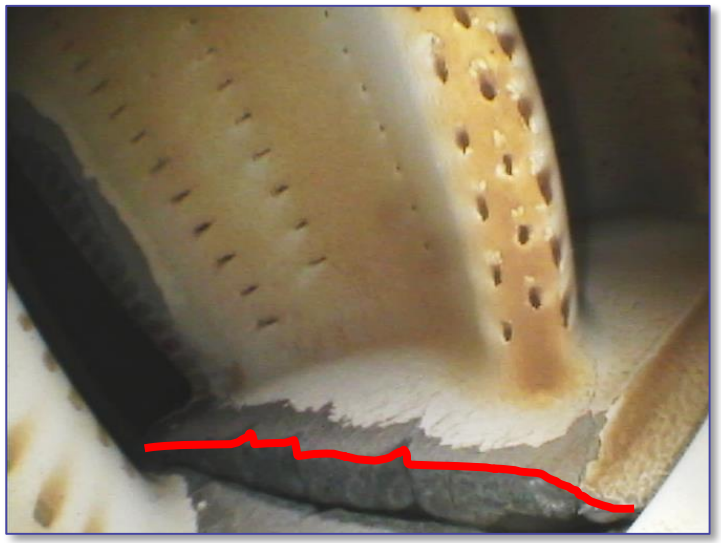
### Concern

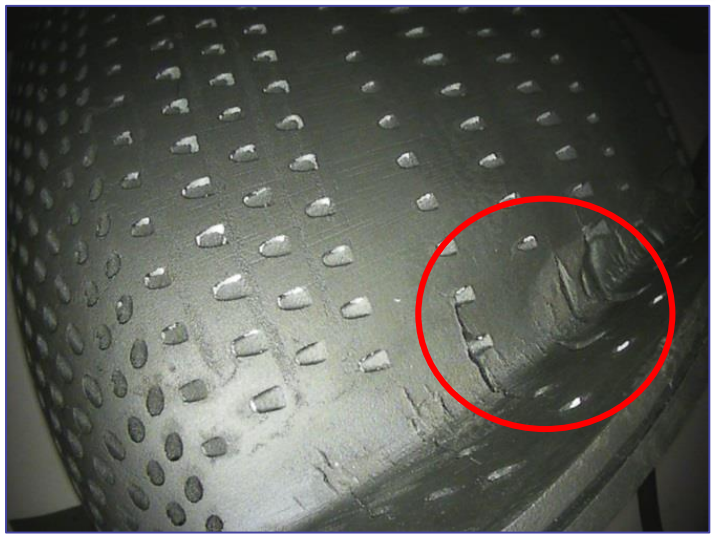
- Heat damage
- Blocked cooling holes



### Solution

- IPLEX videoscope series
  - Saturation control





# Aviation Market

## Airframe inspection

### Concern

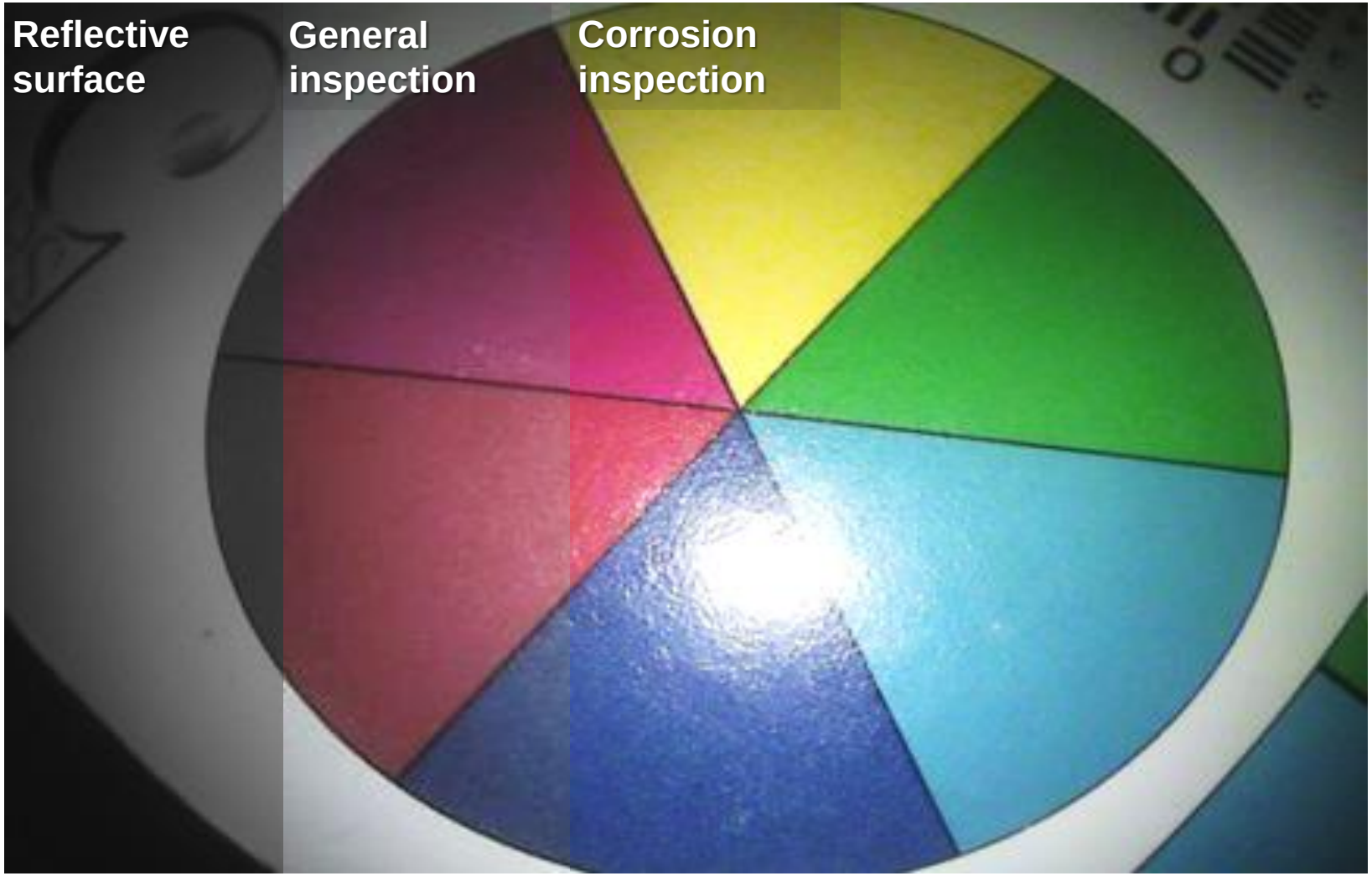
- Airframe internal surface corrosion

### Solution

- IPLEX videoscope
  - Colour tone adjustment

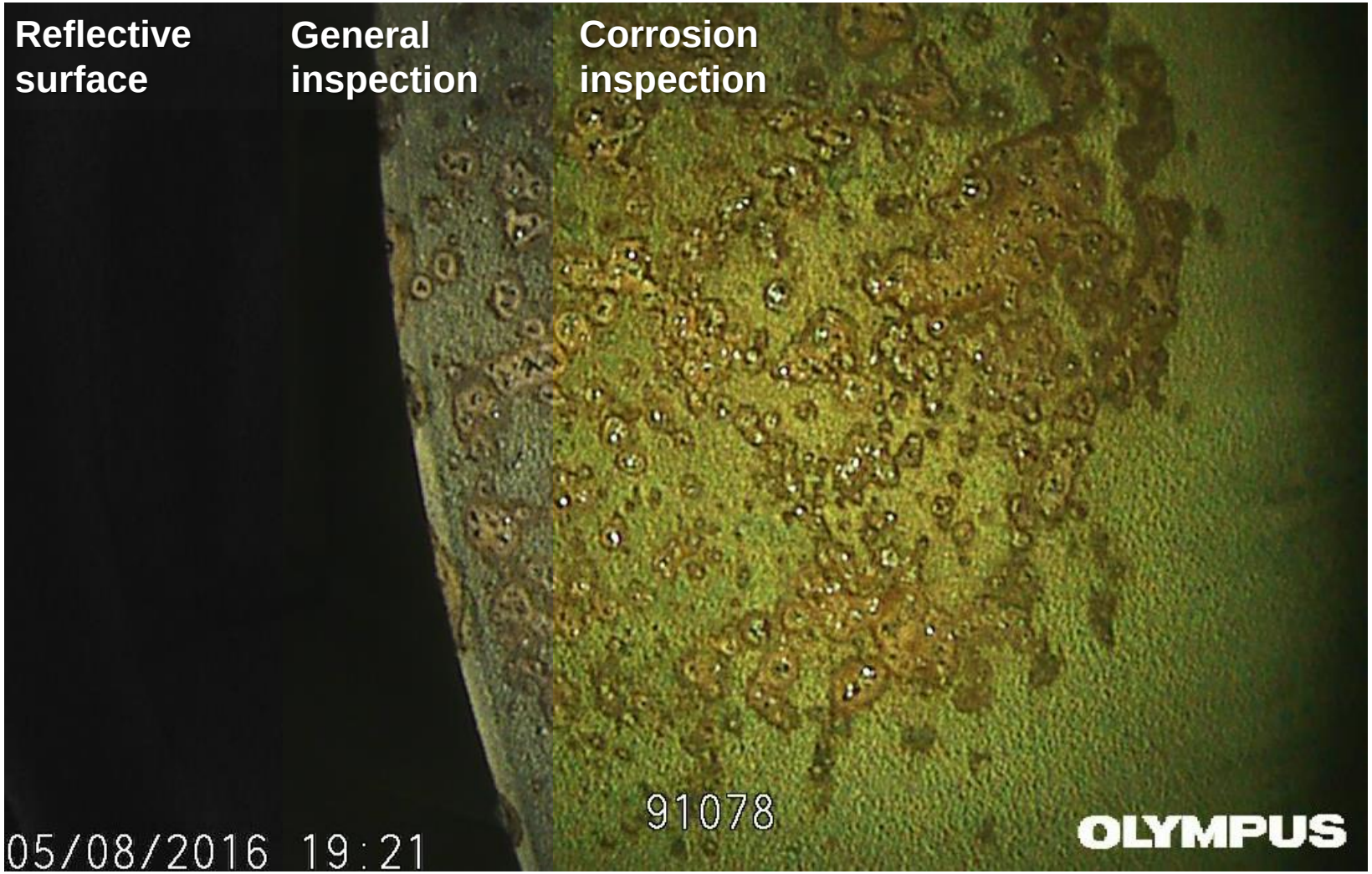
# Aviation Market

## Saturation control




# Aviation Market

## Saturation control



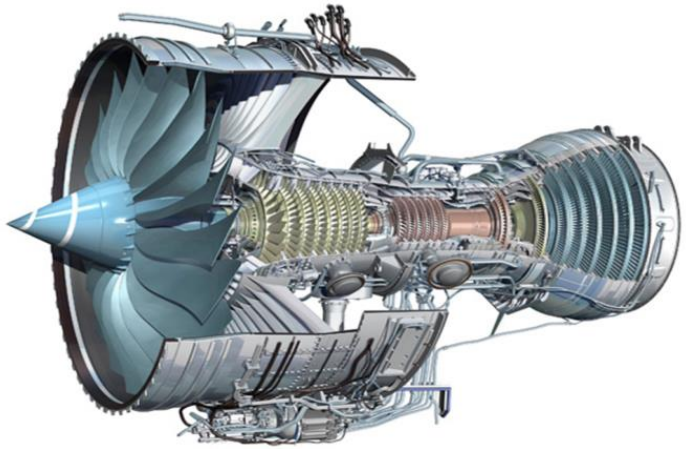

Monotone Natural Vivid

# Aviation Market

## Defect measurement

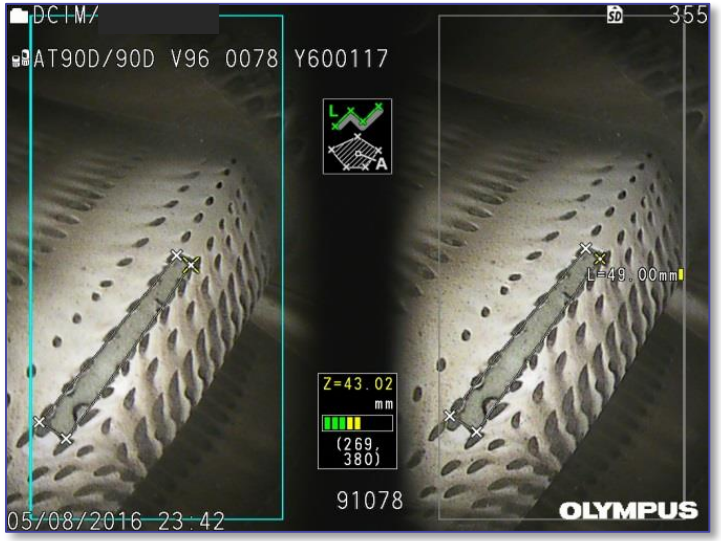
### Concern

- Measurement accuracy
- Repeatability



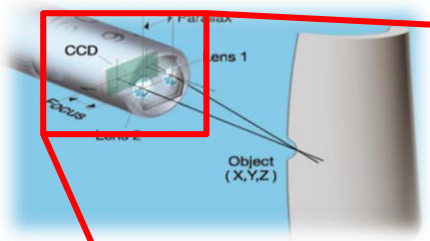

### Solution

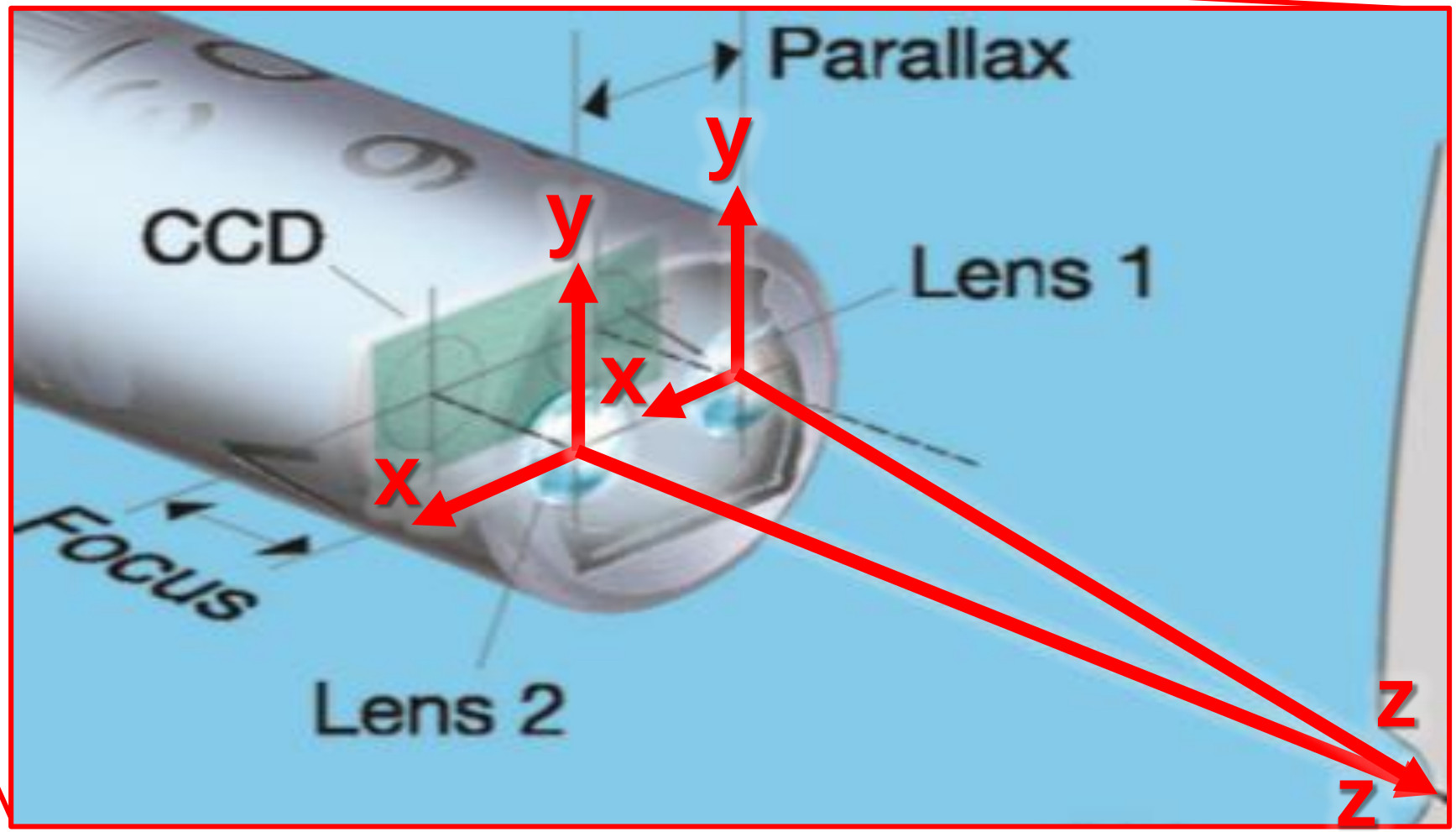
- IPLEX videoscope
  - Stereo measurement

# Aviation Market

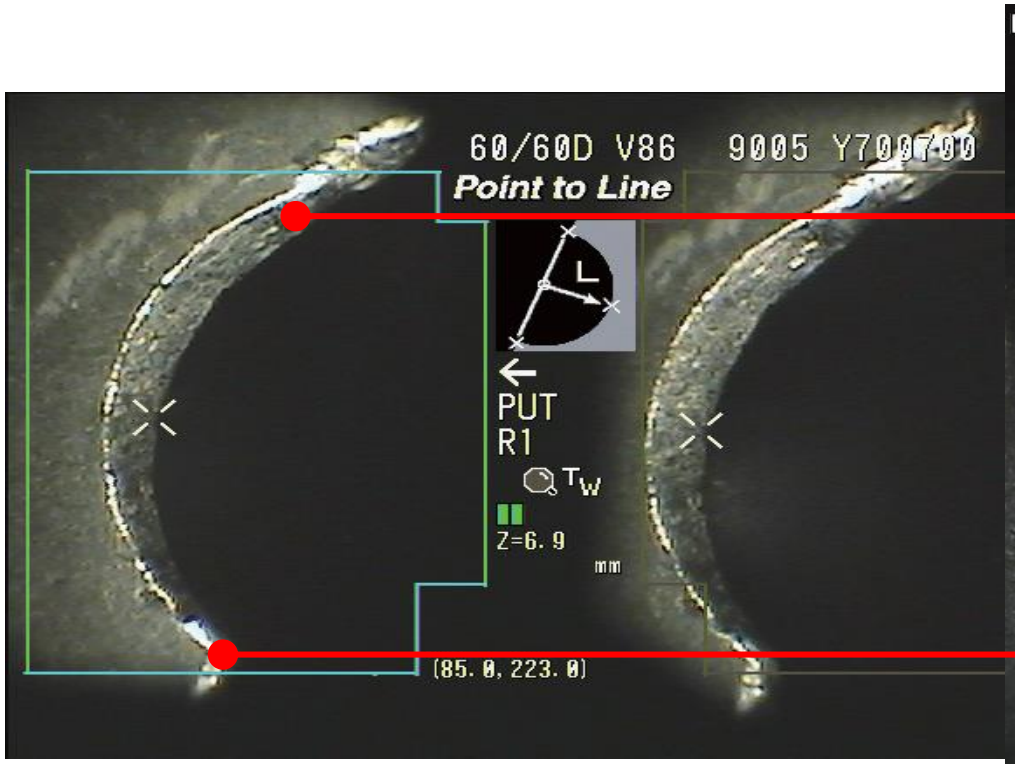
## Super Wide 3D stereo measurement



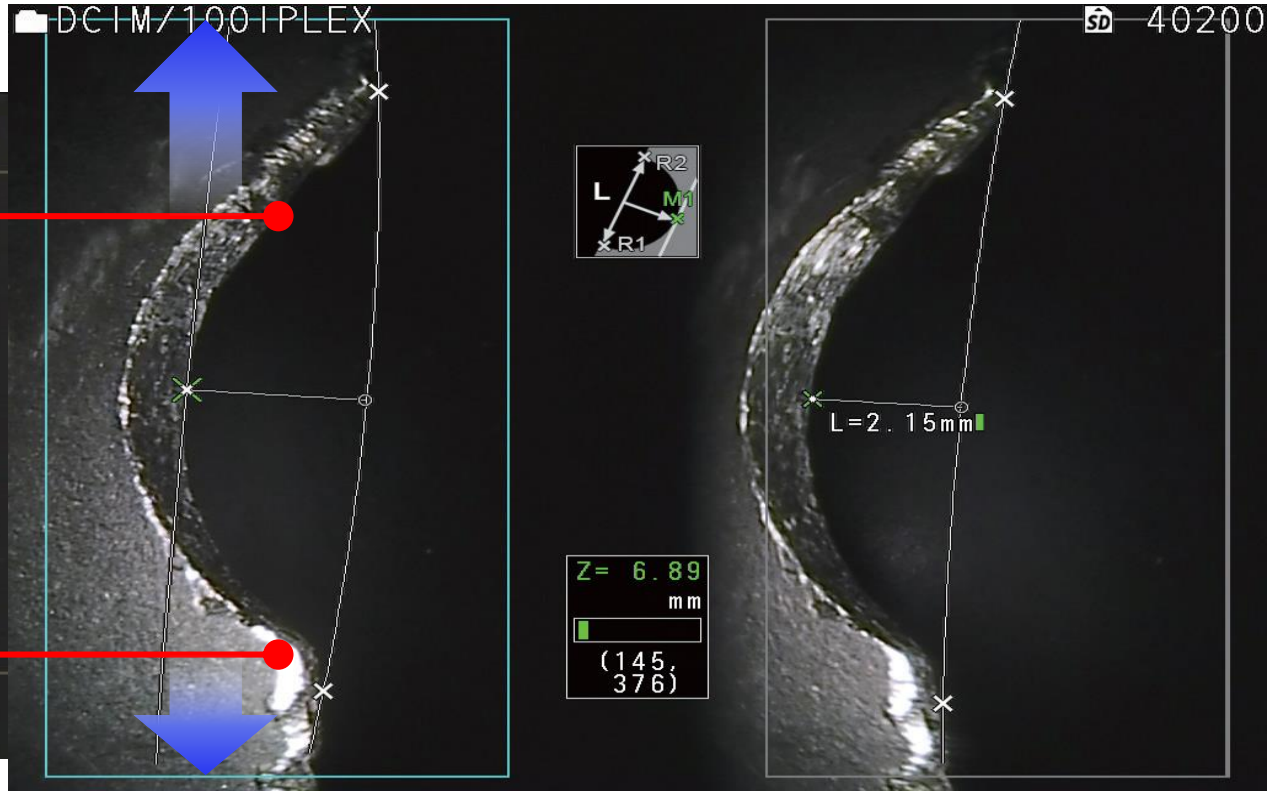




# Aviation Market

## Super Wide 3D stereo measurement



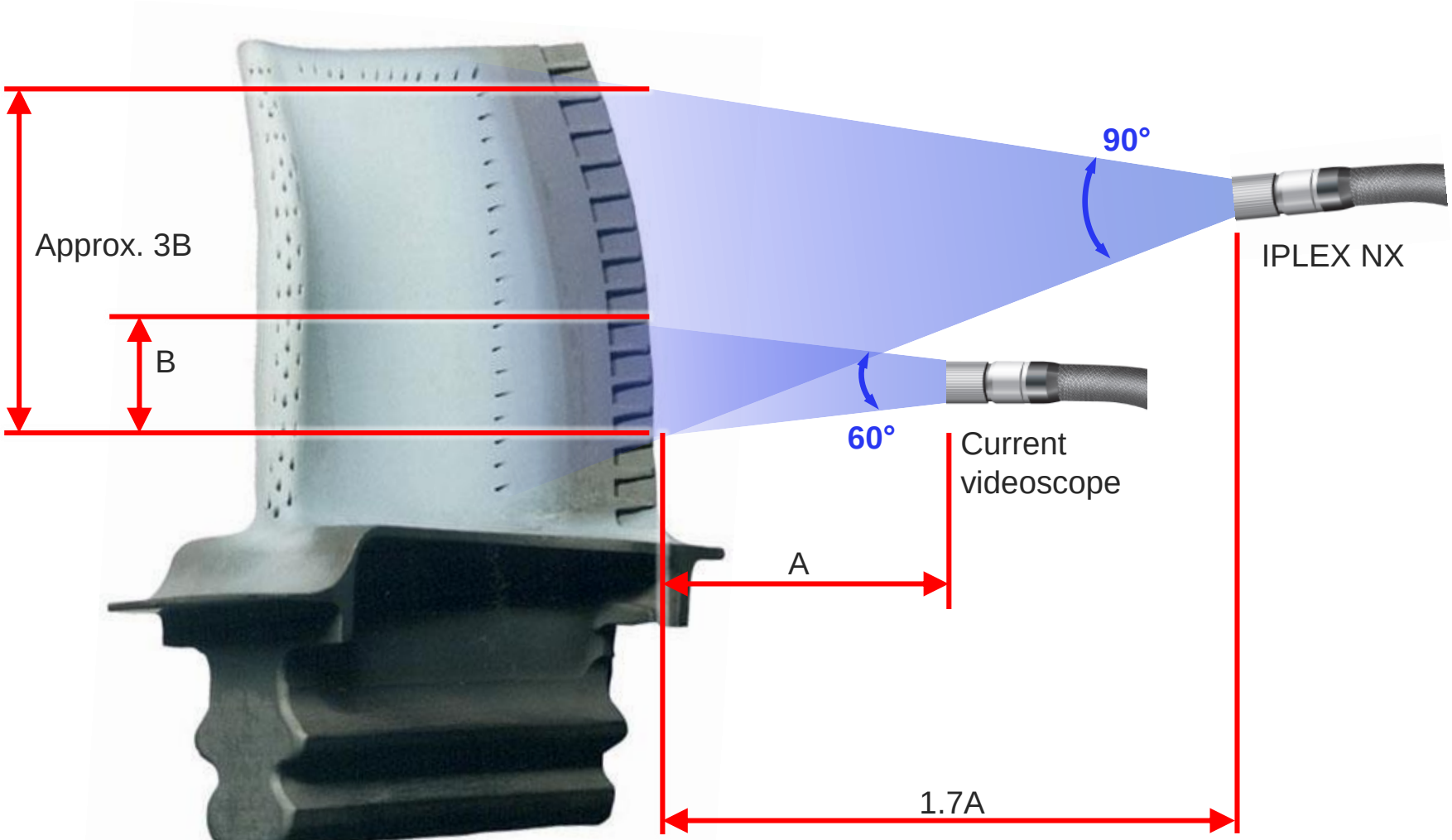

IPLEX FX videoscope




IPLEX NX videoscope

# Aviation Market

## Super Wide 3D stereo measurement

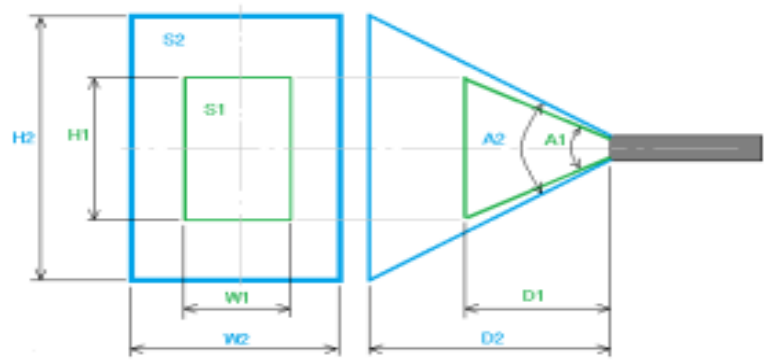



*Under the Yellow zone (+-10%) comparison

# Aviation Market

## Super Wide 3D stereo measurement

Measurement area
of IPLEX NX




Current measurement
area of conventional
videoscope

FOV 1.5 times,
Working Distance 1.7 times,
**Approx. 4 times wider area measureable!!**

## Expanded Measurement Capability

### 1. Measure with Confidence using 3D Visualization (1)

- Instantly Confirm Measurement Object

  - 3D modeling enables you to clearly see the shape and complexity of your target.

- Set Reference Line Where You Want Them

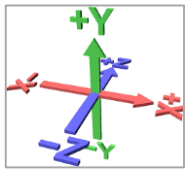
  - 3D images facilitate reliable reference lines on difficult components.

- Make Confident Depth Measurement

  - Confirming reference plane is intuitive.

## Expanded Measurement Capability

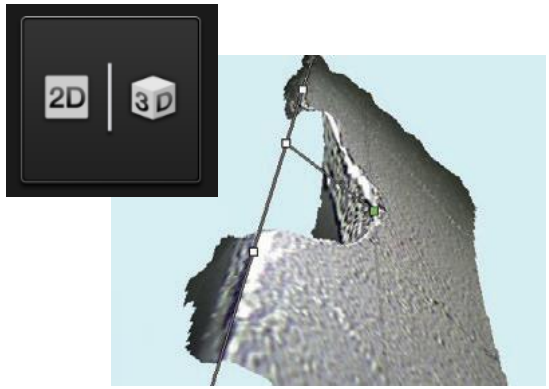
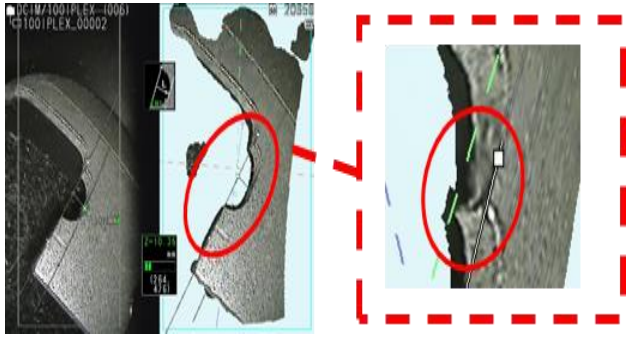
### 1. Measure with Confidence using 3D Visualization (2)
### Instantly Confirm Measurement Object

| KEY FEATURE | EXPLANATION | CUSTOMER VALUE PROPOSITION |
|---|---|---|
| • **3D modeling**<br>• **Zoom function**<br>• **Rotate function**<br>• **Axis rotation (XYZ axis)**<br>  | • Construction of 3D image<br>• Same as iPhone's pinch in and pinch out function, you can do it with your two fingers on the touch panel.<br>• You can rotate the object with your finger on the touch panel.<br>• XYZ axis is visible when you measure the object.<br>  | • Enables you to see the shape and complexity of your target<br>• Faster inspection by choosing the right measurement point<br>  |

For unique operation, click HERE!

## Expanded Measurement Capability

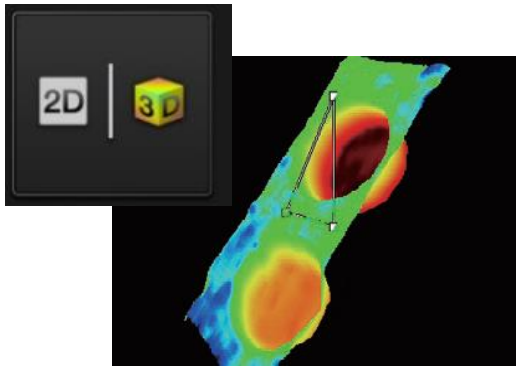
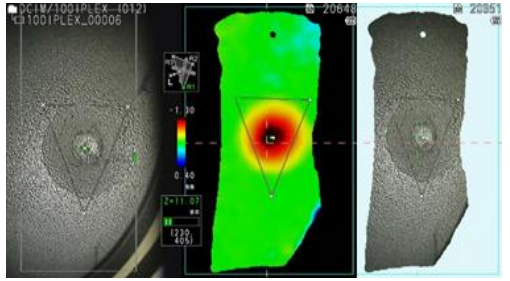
### 1. Measure with Confidence using 3D Visualization (3)
### Set Reference Line Where You Want Them

| KEY FEATURE | EXPLANATION | CUSTOMER VALUE PROPOSISION |
|---|---|---|
| • **Choose the right point with 3D modeling**<br>• **Zoom function**<br>• **Rotate function**<br>  | ▪ Use “Point-to-Line” mode with 3D modeling<br>▪ When you measure, you can easily see the shape and complexity of the object by 3D image. | • 3D images facilitate reliable reference line.<br>• Reduce the time of misalignment<br>  |

For unique operation, click HERE!

## Expanded Measurement Capability

### 1. Measure with Confidence using 3D Visualization (4)
### Make Confident Depth Measurement

| KEY FEATURE | EXPLANATION | CUSTOMER VALUE PROPOSISION |
|---|---|---|
| • **Choose the right point with color map**<br>• **Live cross section**<br>  | ▪ Use “Depth” mode with 3D color map<br>▪ Switching color map (2 patterns)<br>- The distance from distal end to the surface<br>- The distance from reference plane to the surface<br>▪ Live cross section helps you to estimate the deepest point. | • Confirming reference plane is intuitive, and it can be confirmed whether the reference plane is properly positioned on the surface for reliable depth measurements<br>• Easy-to-specify the deepest point<br>  |

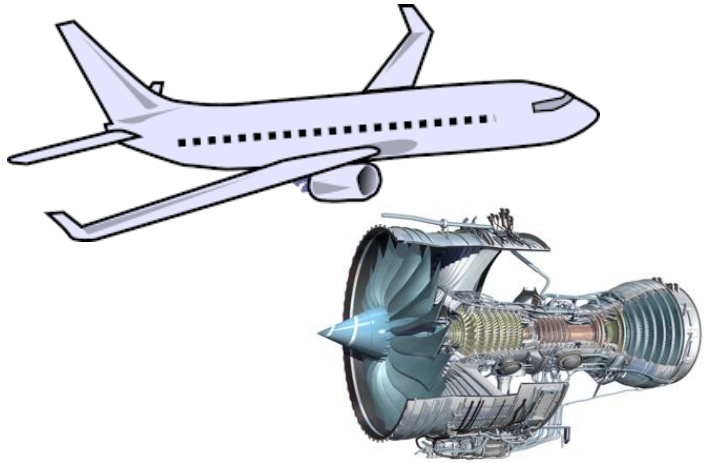
For unique operation, click HERE!

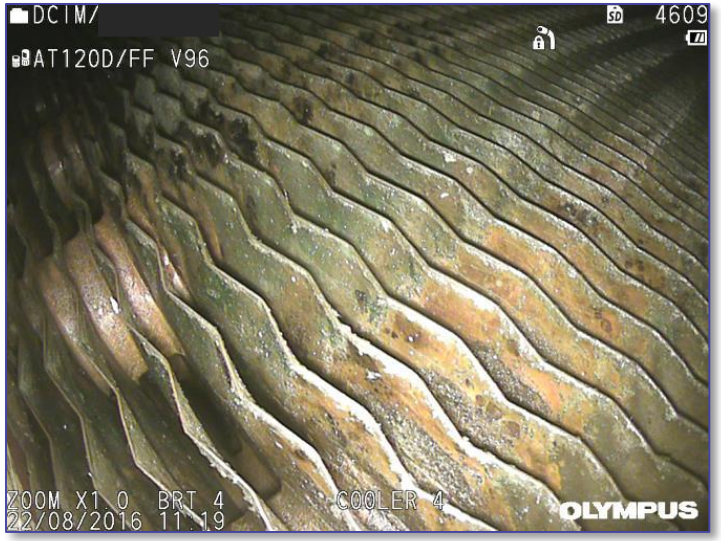
# Aviation Market

## High resolution inspection image

### Concern

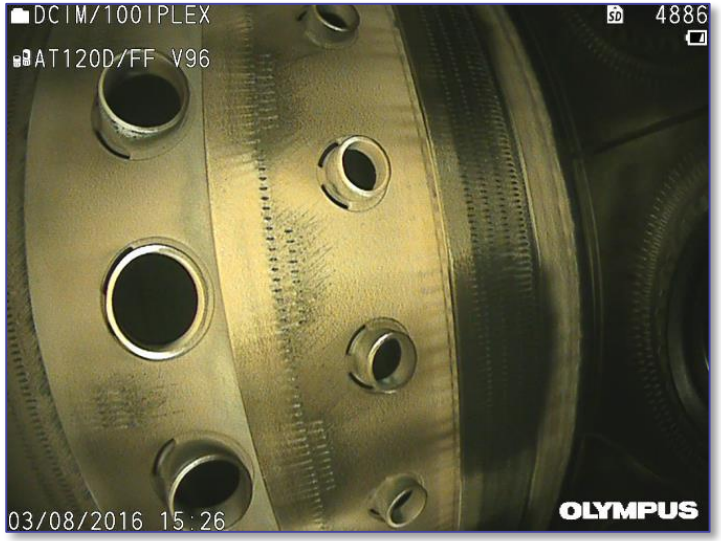
- Some defects are very small
- CCD sensor sensitivity

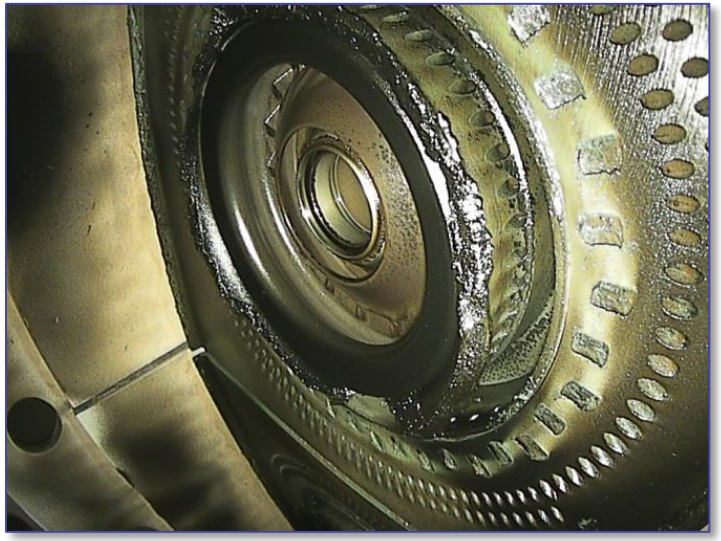


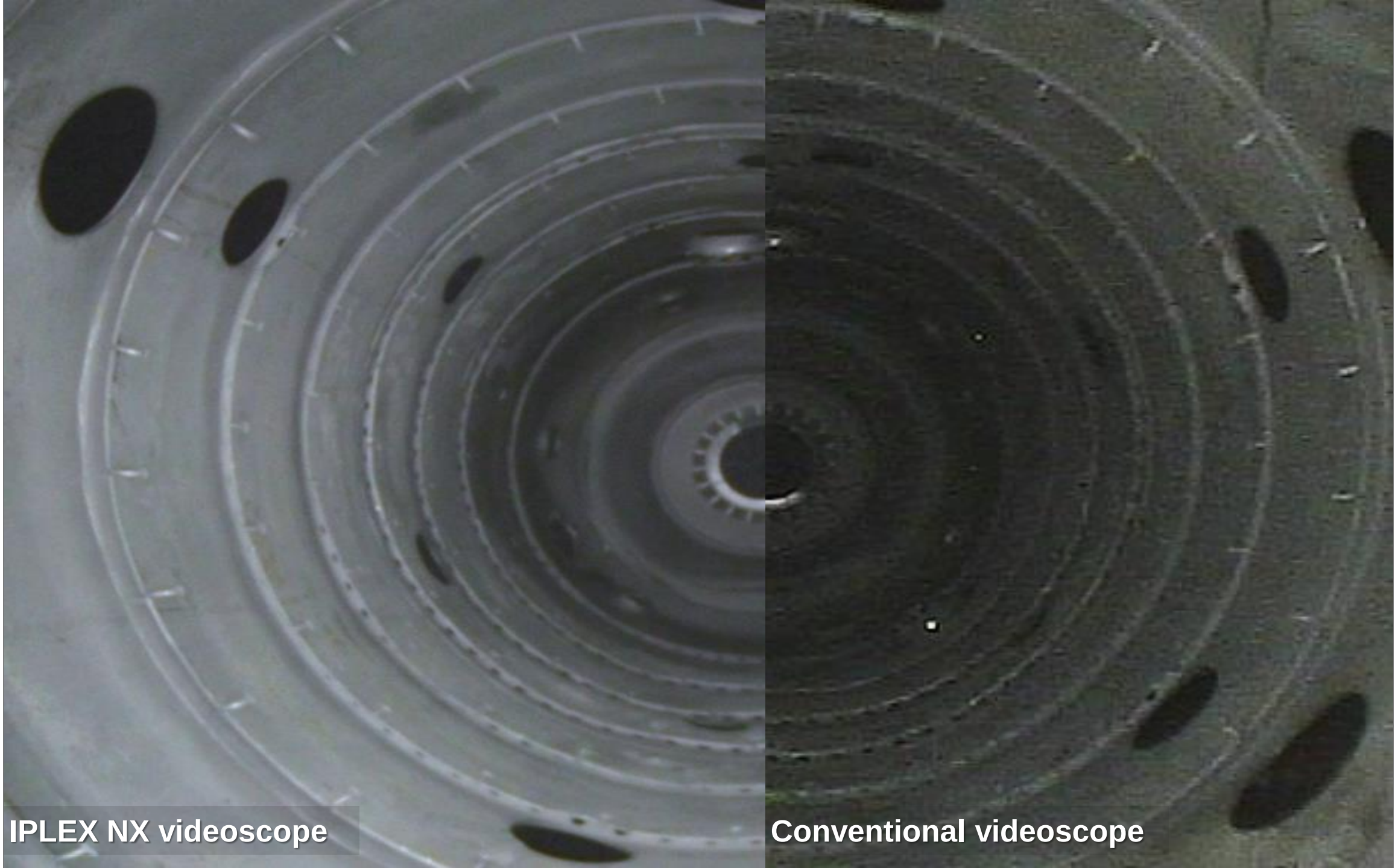



### Solution

- IPLEX videoscope
  - HD resolution
  - PulsarPic™ illumination




IPLEX NX videoscope
Conventional videoscope


IPLEX NX videoscope
Conventional videoscope

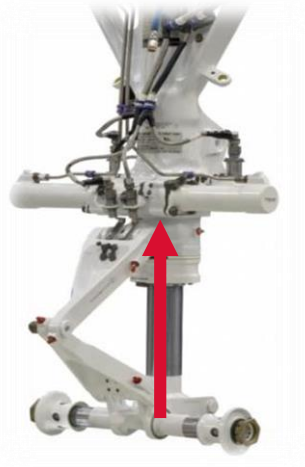

IPLEX NX videoscope
Conventional videoscope

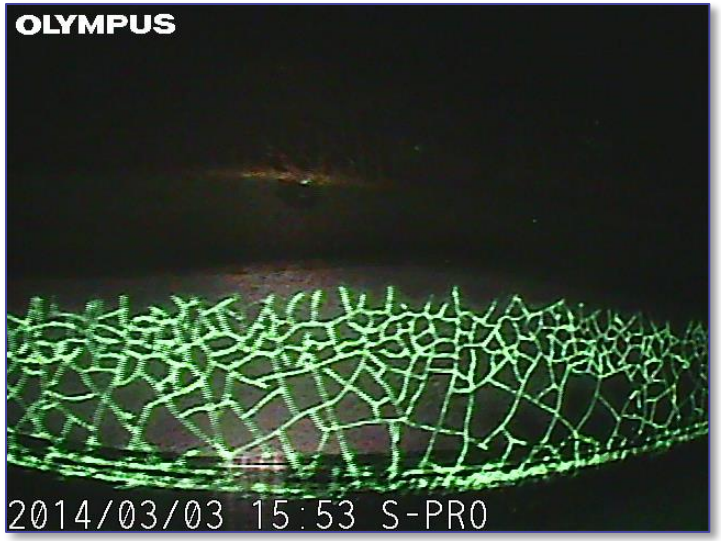
# Aviation Market

## Landing gear UV inspection

### Concern

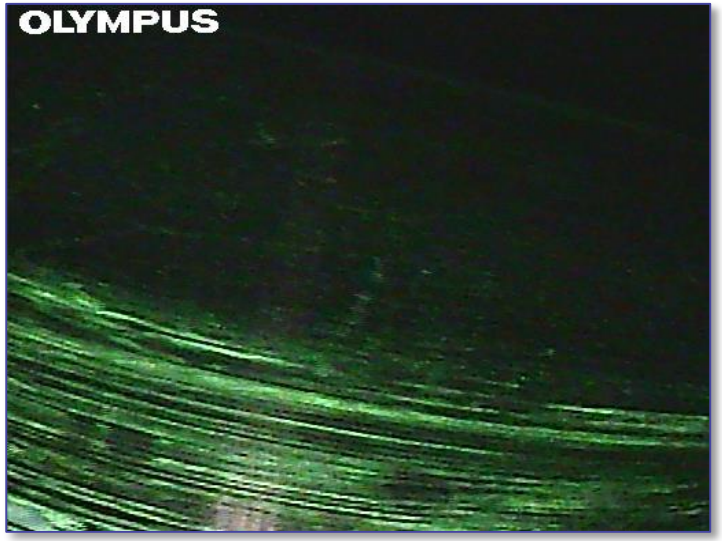
- Crack detection on internal surface of landing gear

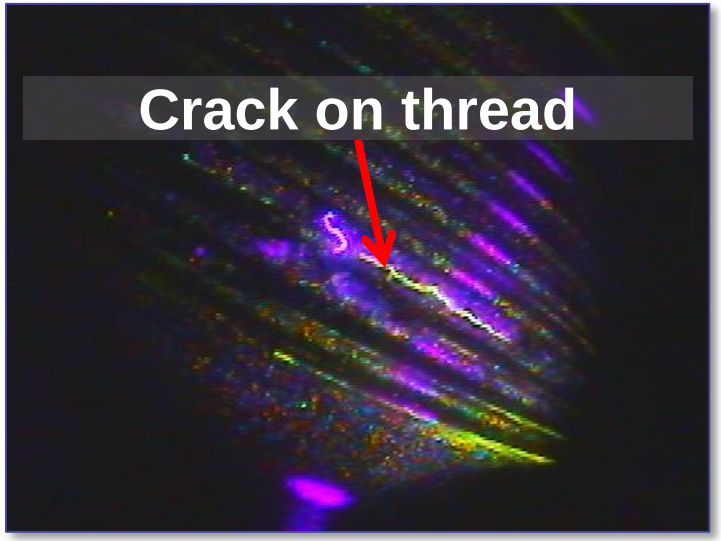





### Solution

- IPLEX videoscope
  - UV light source

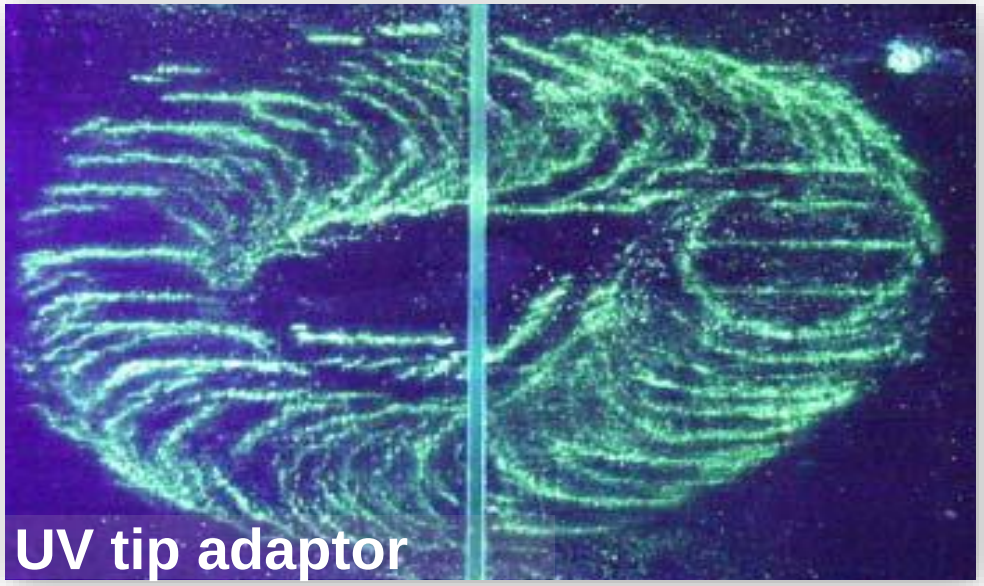


# Aviation Market

## Olympus Ultra-violet (UV) tip adaptors

Interchangeable tips allow user to adapt optics to working conditions

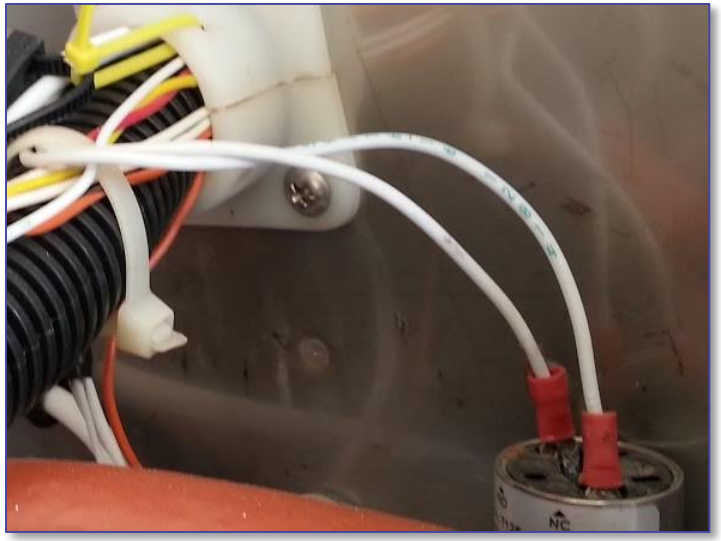



# Aviation Market

## Airframe component inspection

### Concern

- Aircraft components check



### Solution

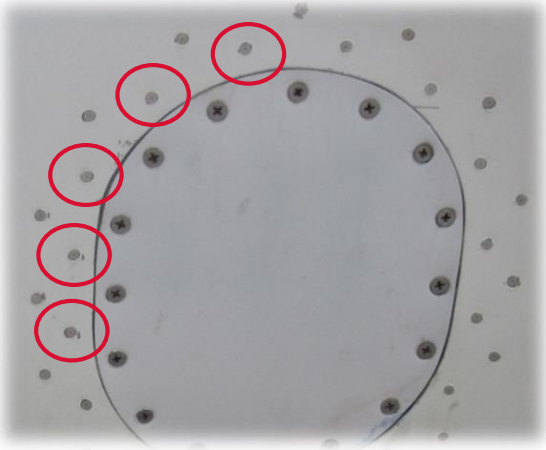
- IPLEX G-Lite


# Aviation Market

## Airframe fasteners inspection

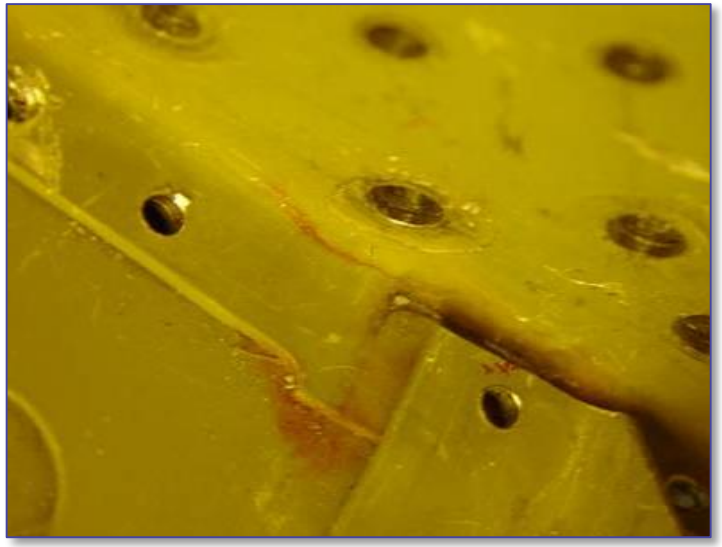
### Concern

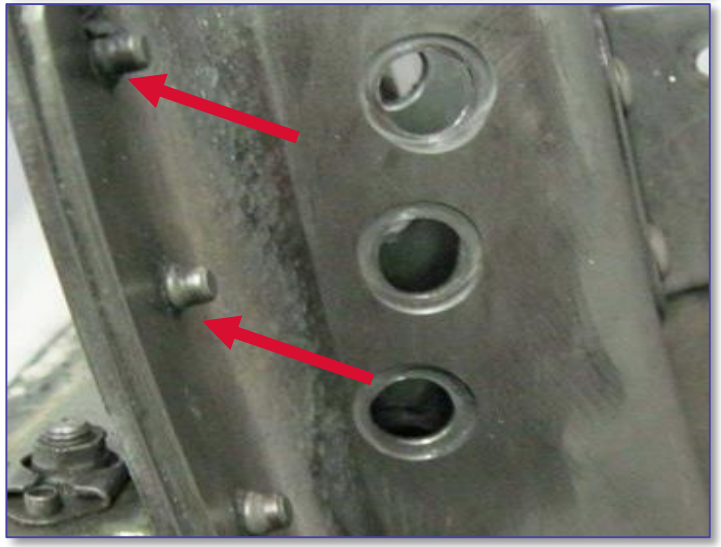
- Fastener check during skin panel repair



### Solution

- IPLEX G-Lite



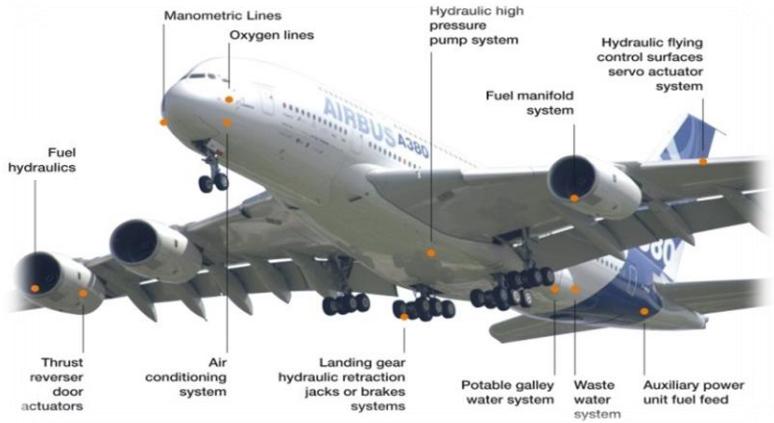


# Aviation Market

## Aircraft tanks and piping inspection

### Concern

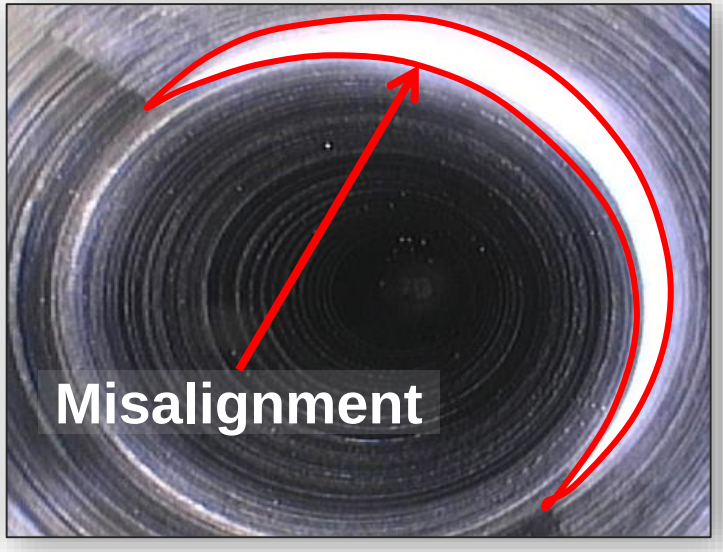
- Aircraft tanks and piping
- Longer length required

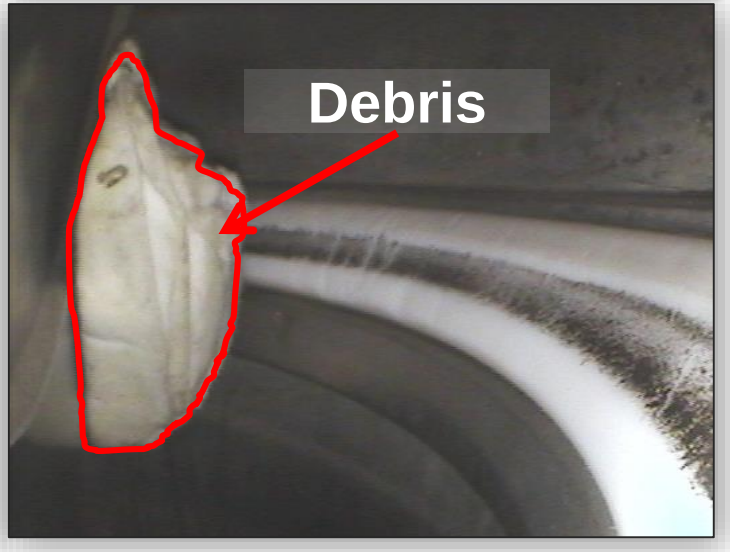




### Solution

- IPLEX videoscope
  - Long scope series



# Aviation Market

## InHelp™ report assist system

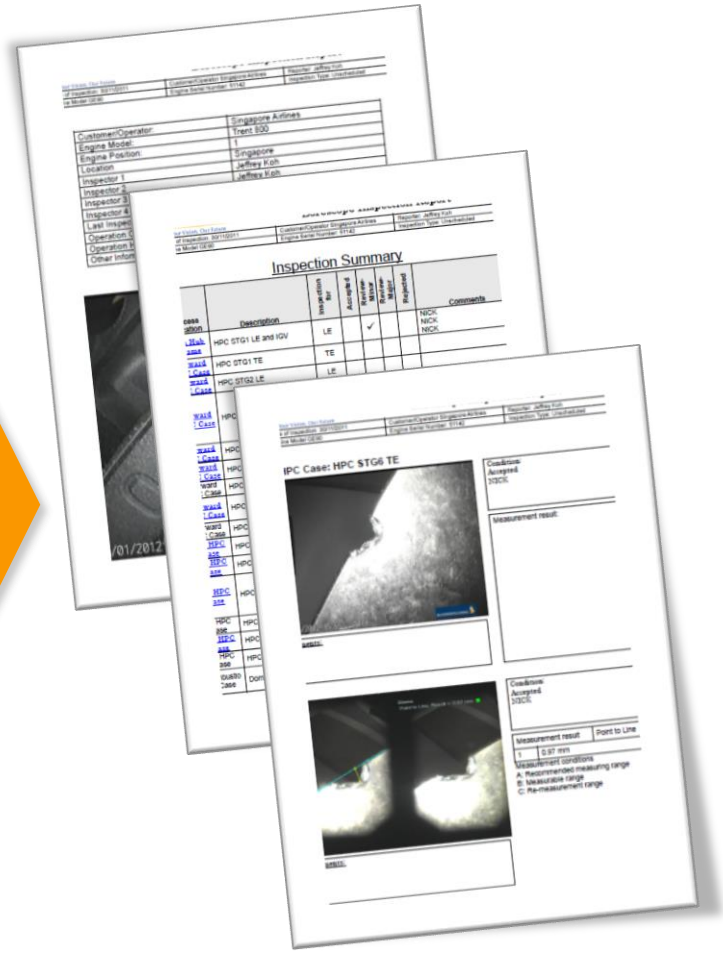
### Concern

- Report generation after inspection
- Defect re-measurement after inspection

### Solution

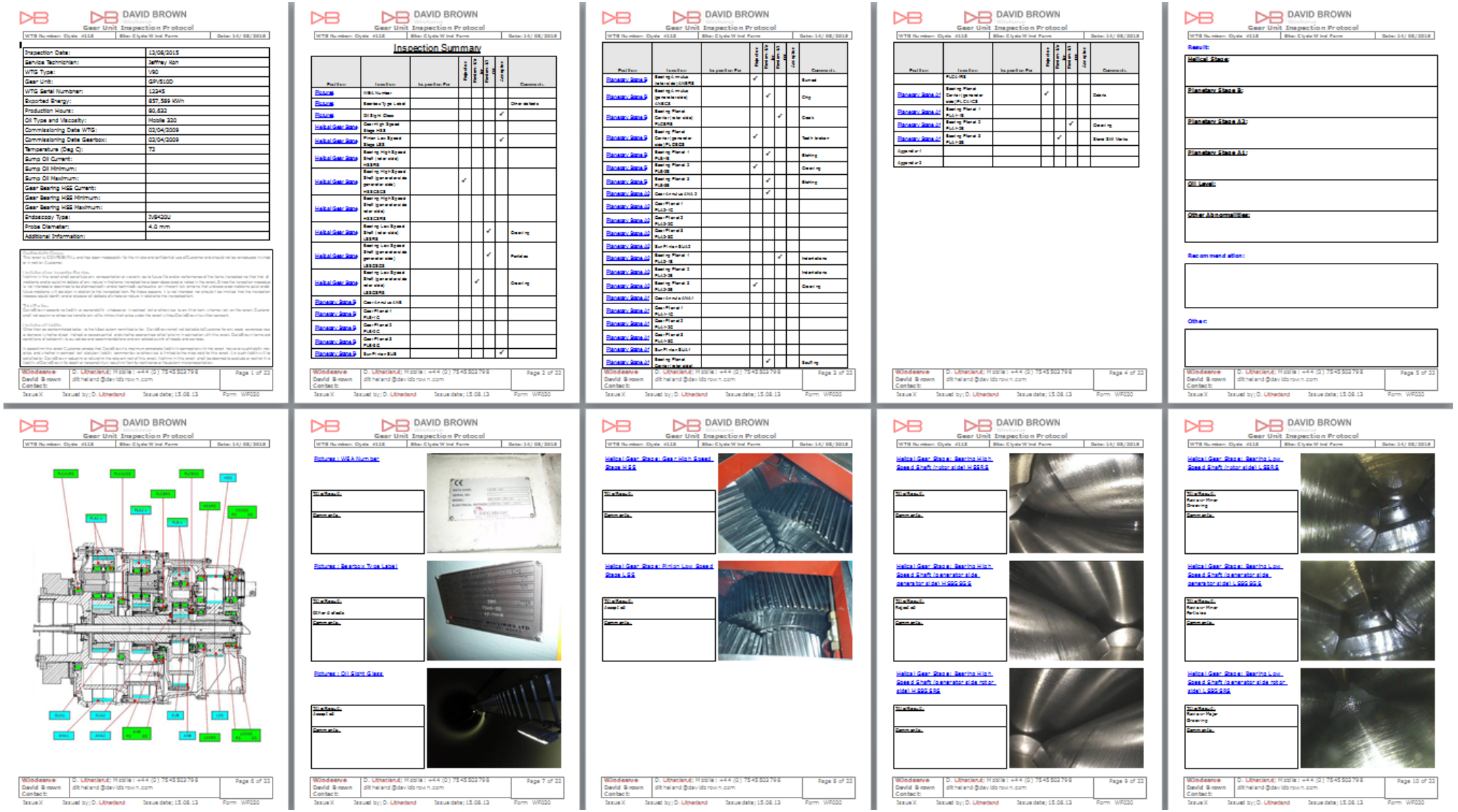
- InHelp report system





# Aviation Market

## InHelp™ report assist system



# Aviation Market

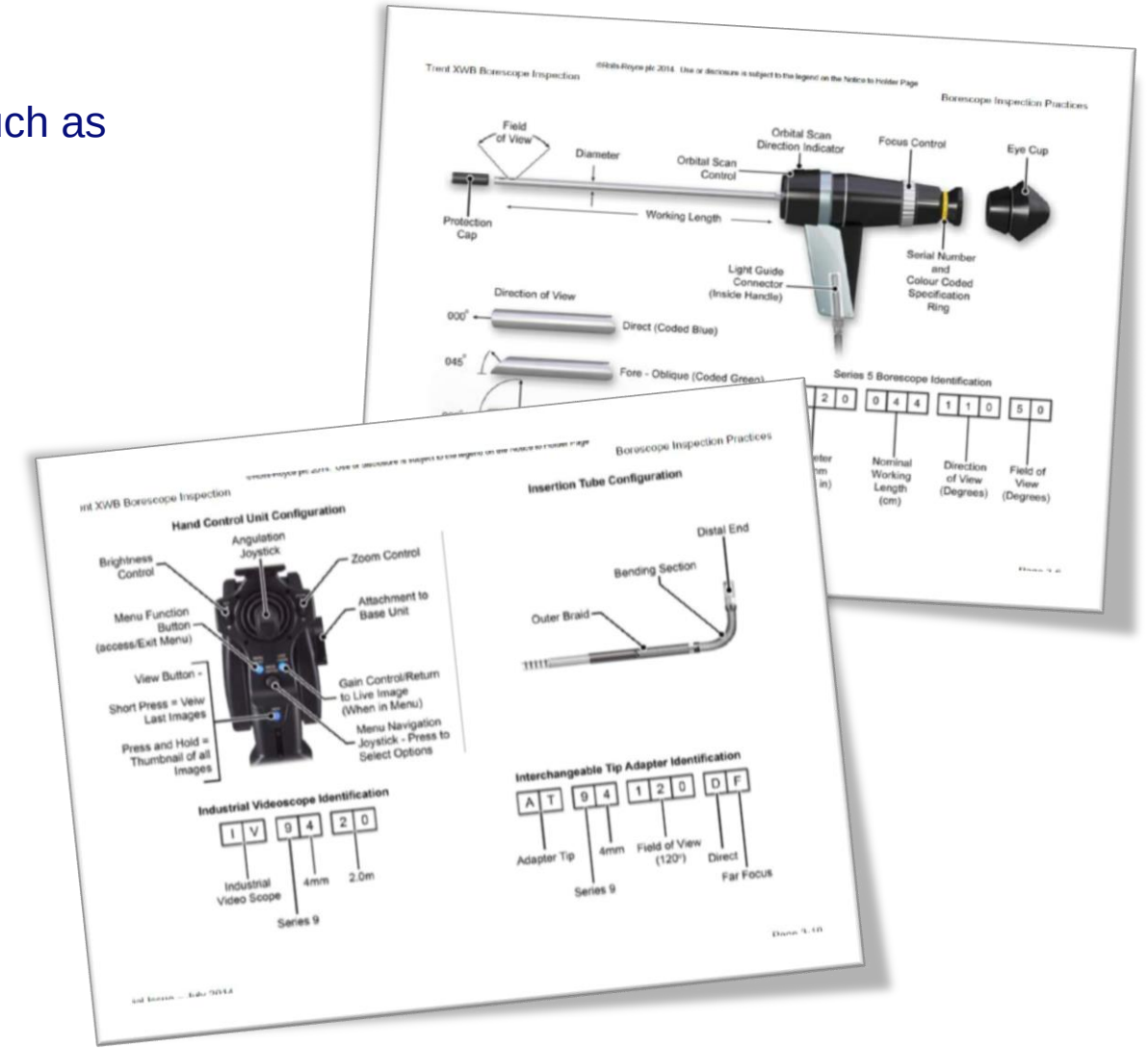
## Borescope specifications

### Currently

- OEMs specify borescope specifications such as
  - Diameter/Length
  - FOV/DOV
  - Resolution

### Olympus

- IPLEX Videoscopes achieve the required specifications of flexible borescopes.



# Aviation Market

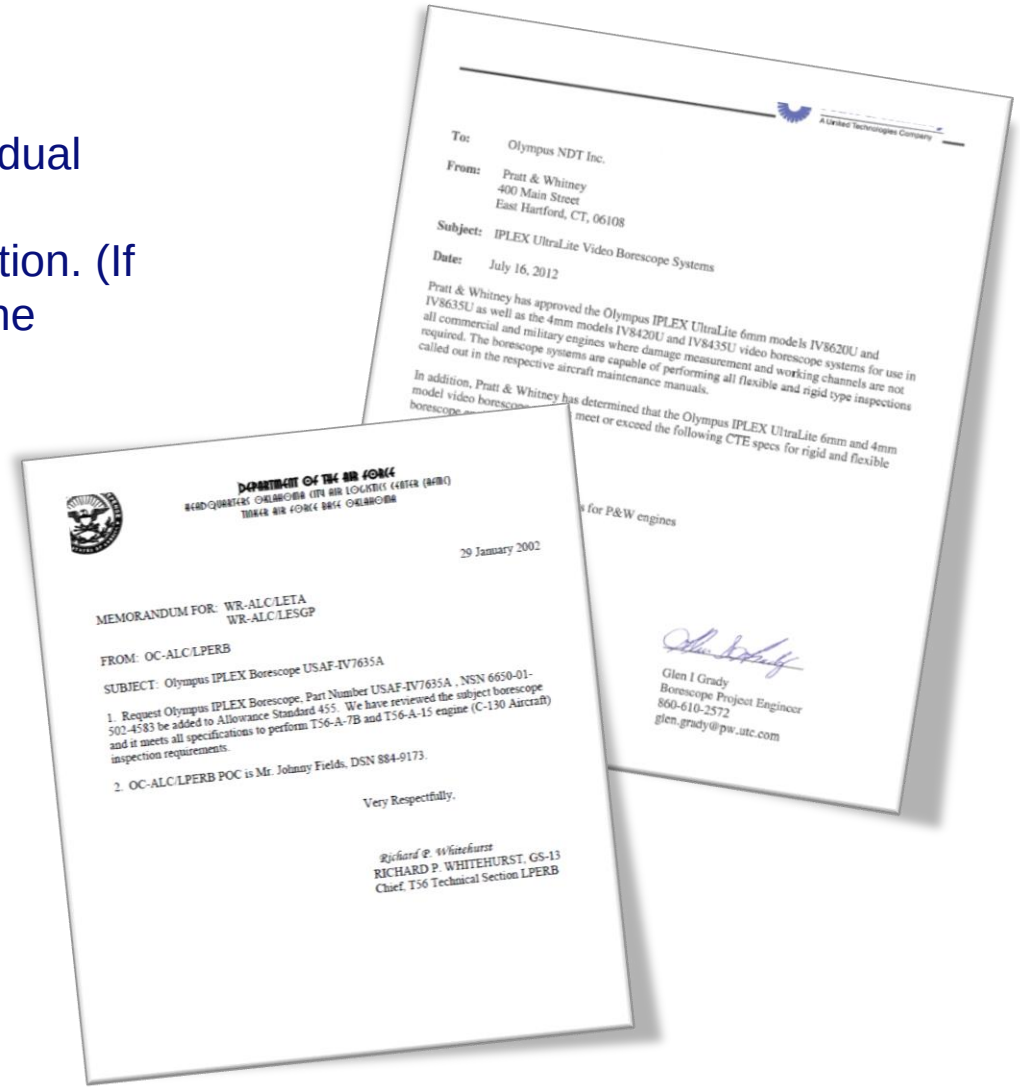
## Engine OEM Approvals

### Currently

- Engine OEMs do not issue any approval letters to individual borescope suppliers.
- Users should decide what to use for their engine inspection. (If users need an approval document, they should talk to the engine OEMs for the approval document.)

### Olympus

- There are the existing approval related materials:-
  - P&W Commercial & Military Engines IPLEX FX-LX-LT
  - P&W Commercial & Military Engines IPLEX UltraLite
  - P&W V2500 IPLEX FX-LX-LT
  - RR AE Series Engines IPLEX FX-LX-LT



To: Olympus NDT Inc.

From: Pratt & Whitney
400 Main Street
East Hartford, CT, 06108

Subject: IPLEX UltraLite Video Borescope Systems

Date: July 16, 2012

Pratt & Whitney has approved the Olympus IPLEX UltraLite 6mm models IV8620U and IV8635U as well as the 4mm models IV8420U and IV8435U video borescope systems for use in all commercial and military engines where damage measurement and working channels are not required. The borescope systems are capable of performing all flexible and rigid type inspections called out in the respective aircraft maintenance manuals.

In addition, Pratt & Whitney has determined that the Olympus IPLEX UltraLite 6mm and 4mm model video borescope[illegible] meet or exceed the following CTE specs for rigid and flexible borescope[illegible] for P&W engines

Glen I Grady
Borescope Project Engineer
860-610-2572
glen.grady@pw.utc.com

29 January 2002

MEMORANDUM FOR: WR-ALC/LETA
WR-ALC/LESGP

FROM: OC-ALC/LPERB

SUBJECT: Olympus IPLEX Borescope USAF-IV7635A

1. Request Olympus IPLEX Borescope, Part Number USAF-IV7635A , NSN 6650-01-502-4583 be added to Allowance Standard 455. We have reviewed the subject borescope and it meets all specifications to perform T56-A-7B and T56-A-15 engine (C-130 Aircraft) inspection requirements.

2. OC-ALC/LPERB POC is Mr. Johnny Fields, DSN 884-9173.

Very Respectfully,

RICHARD P. WHITEHURST, GS-13
Chief, T56 Technical Section LPERB

**Thank you for your time and attention.**