

Advanced Turbine Support, Inc.

**Inspection & Technical
Services**

Industry Leading Inspections and Reports

Our Diversified Borescope
Experience Covers:

- Combustion Turbines
- Steam Turbines
- Generators

Borescope Inspection Uses

- OEM Recommended Inspections
- Condition Trending
- Predictive / Condition Based Maintenance
- Trouble Shooting
- Final Cleanliness After Major Outage

OEM Recommended Inspections

General Electric TILs

- Critical to perform the inspection properly.
- Critical to perform the inspection in a timely manner.
- Important to document findings properly to get correct engineering disposition.

Trending Unit Condition

- Baseline Inspections - Allows for identification of the unit condition after major overhauls. (Proper Component Installation & Warranty Issues)
- Annual / Bi-Annual Inspections - Identify the following conditions that can change due to different operational parameters.
Base Loaded vs. Start Based
(Rubs, Impact Damage, Corrosion Pitting, Deposits, Cracks, Coating Loss, & Component Wear, Movement, or Loss)

Inlet Condition Assessment

General Condition Assessment With Focus On
Inlet Guide Vanes & Stage R-1 Rotor Blades



Inlet Bellmouth & IGV's



IGV's & R-1 Rotor Blades

Compressor Damage

TIL 1132-2R1: IGV Spring & Thrust Washers 'X' Gap Measurement



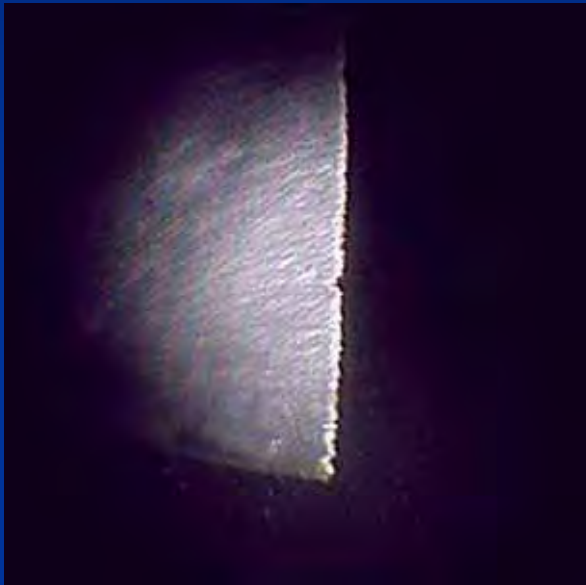
IGV Rubbing Inlet Bellmouth



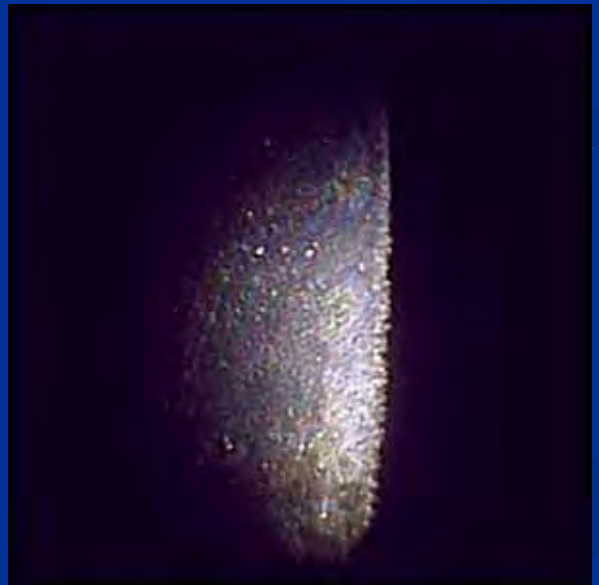
Bent IGV

Compressor Damage

Degraded Rotor Blades



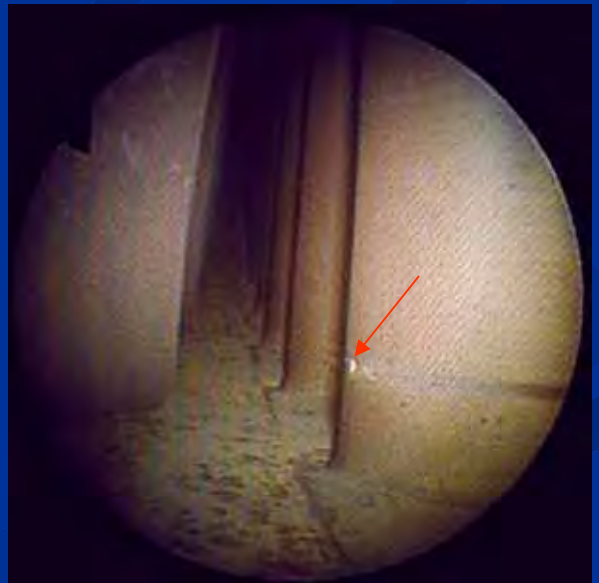
Leading Edge Erosion On A
Stage R-1 Rotor Blade



Leading Edge Erosion On A
Stage R-2 Rotor Blade

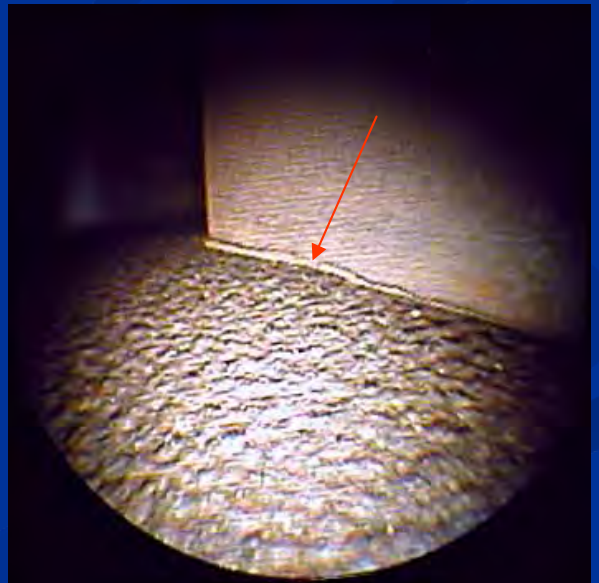
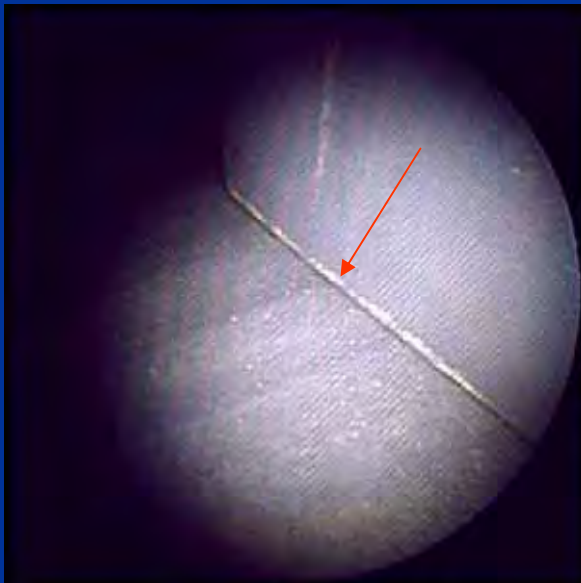
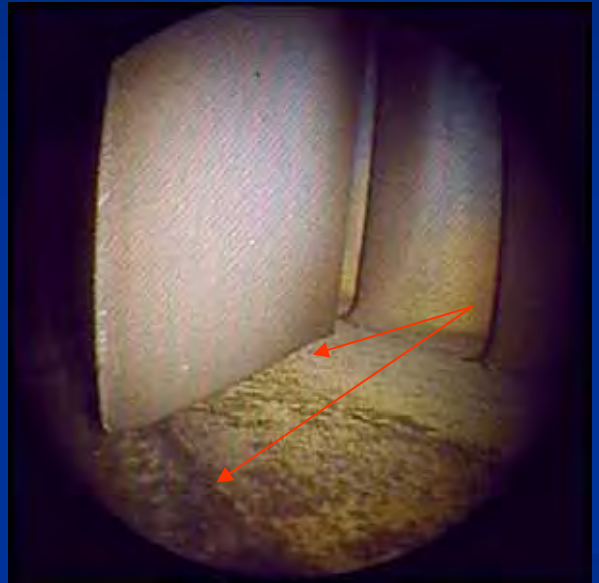
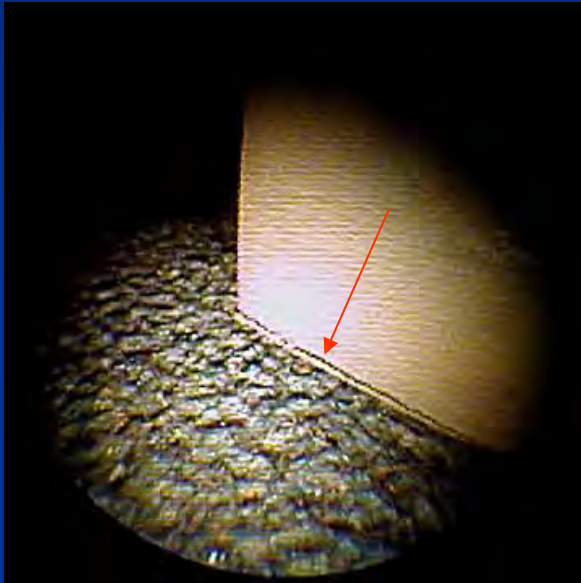
Compressor Damage

Impact Damage On Rotor Blades & Stator Vanes



Compressor Damage

Compressor Rubs & Rotor Blade Tip Damage



Trouble Shooting

- Vibration - Identify conditions that could be the cause of elevated levels.
- Temperature Spread - Identify conditions that could cause low or high spreads.
- NOX Issues - Identify conditions causing trends or compliance issues.
- Unit Trips - Identify the condition that caused the trips or verify that a full load trip didn't cause any damage.

Combustion Inspection

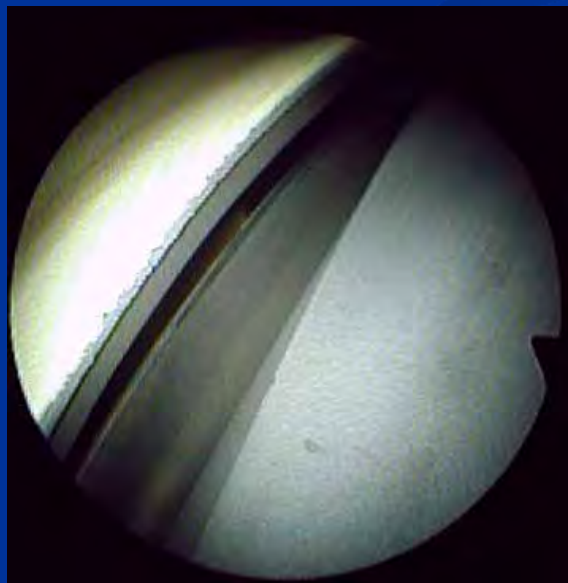
Hardware Failure



Melted Crossfire Tube



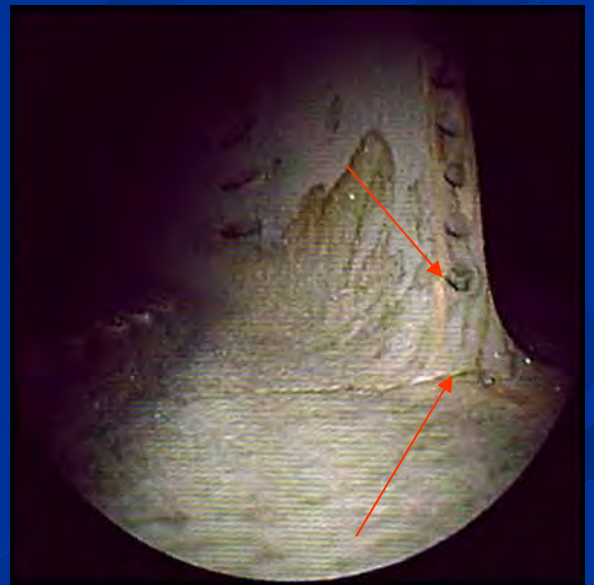
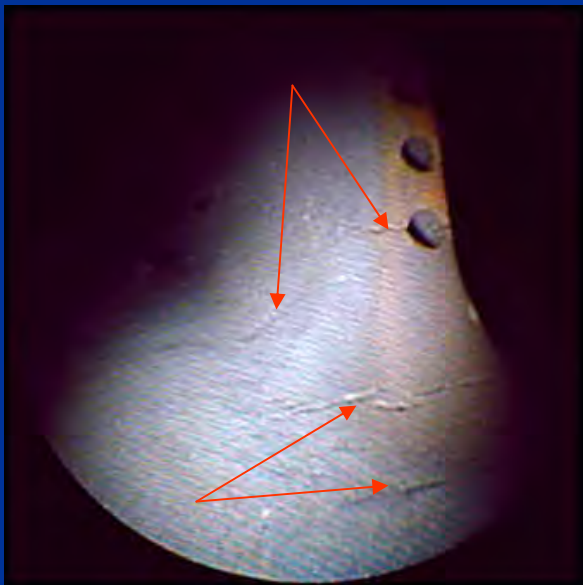
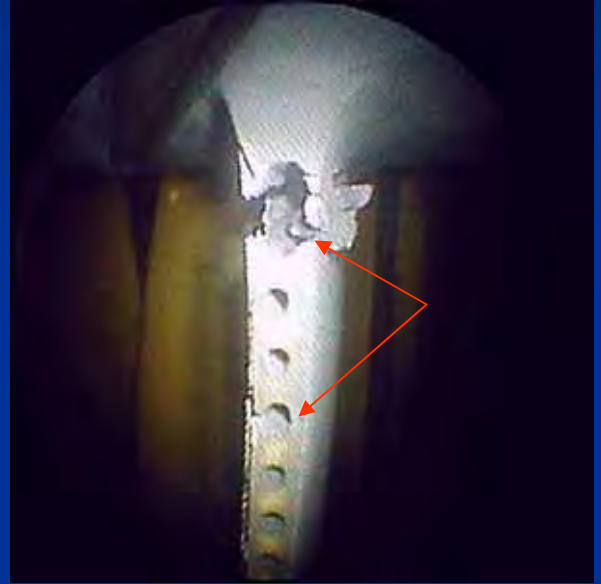
Cracked Transition Piece



Floating Seal Placement

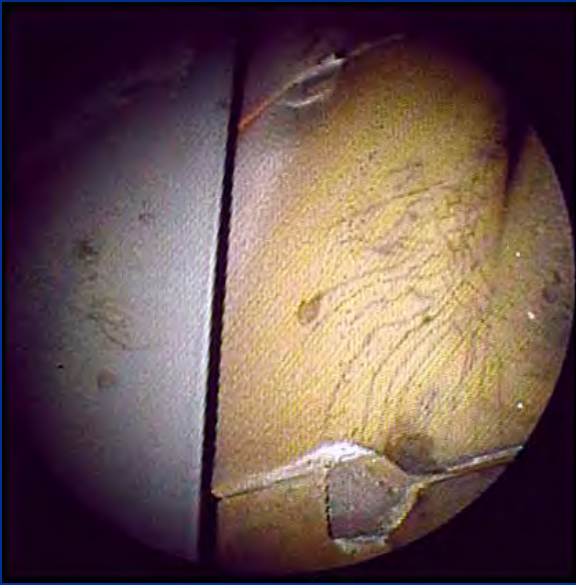
Turbine Inspection

First Stage Nozzle Cracking



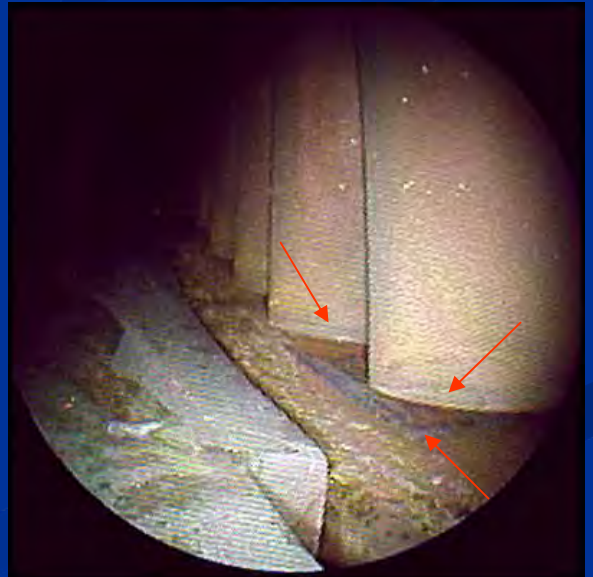
Turbine Inspection

First Stage Bucket



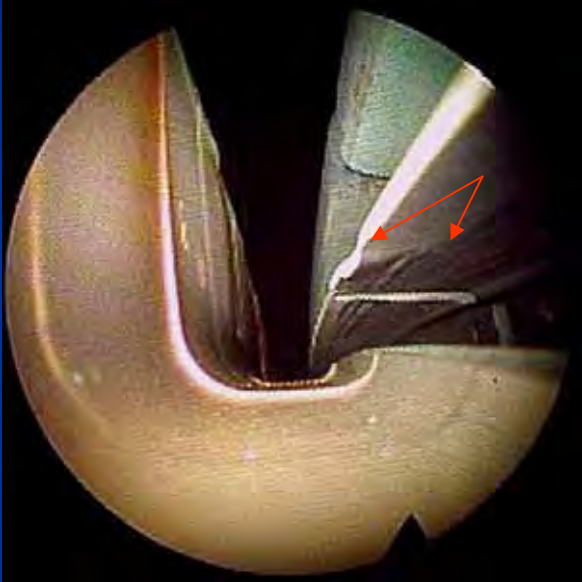
First Stage Bucket Coating
Cracking & Degradation

First Stage Bucket Rubs Against
Shroud Blocks

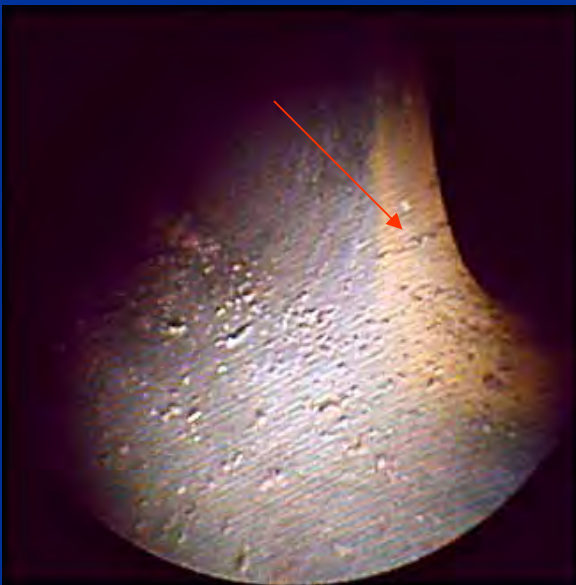


Turbine Inspection

Second Stage Nozzle



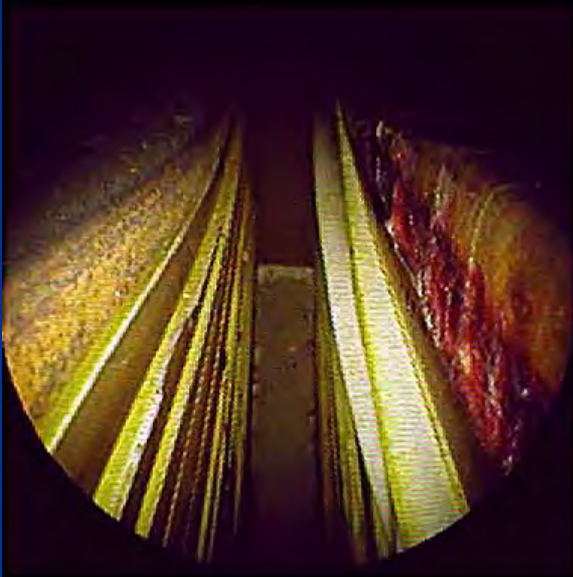
Minor Damage To
Discourager Seal Between
First Stage Buckets & Second
Stage Nozzles



Trailing Edge Cracking On Second Stage Nozzle's
Advanced Turbine Support, Inc.

Generator Inspection

TIL 1308-2R1: Endwinding Insulation Migration



Migration Of Insulation
Between The End Windings
On The Excitor End Of The
Generator Rotor

Damaged Leafs On The
Excitor End Of The
Generator Rotor Main
Lead "A" Where It Goes
Into The Shaft

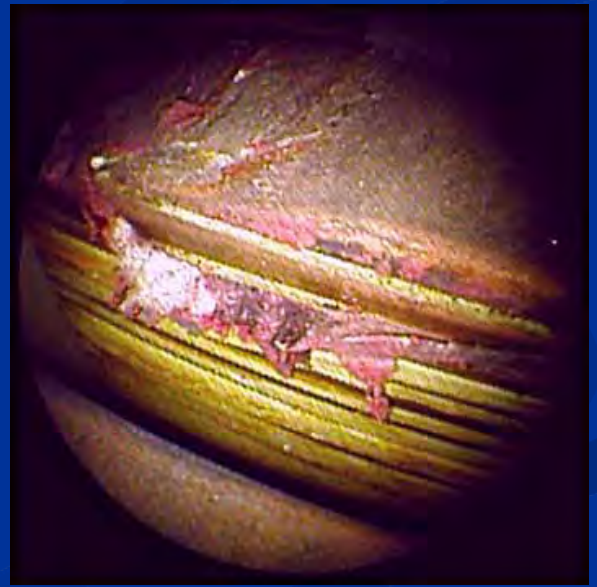


Generator Inspection

TIL 1308-2R1: Generator Field Insulation Migration



Close-up showing damage to the outer leaf of the excitor end of the generator rotor main lead "A".



Dirty End Windings With Torn Wrapping Material

Advanced Turbine Support, Inc.

Unit Trips

- Identify causes of trip.
 - Combustion component & compressor or turbine failure.
- Identify possible damage caused by a trip.
 - Combustion component issues- Burned or melted due to flash back, damage to thermal barrier coating.
 - Compressor surge damage- rubs or bent blades or vanes.
 - Turbine damage- rubs, damage to tips & seals.

Unit Cleanliness

- Final inspection before unit assembly after outage or maintenance work.
- Keeps component cooling passages clean.
- Stops FOD from tooling or fasteners.



Questions?

Open Discussion / Recent Issues