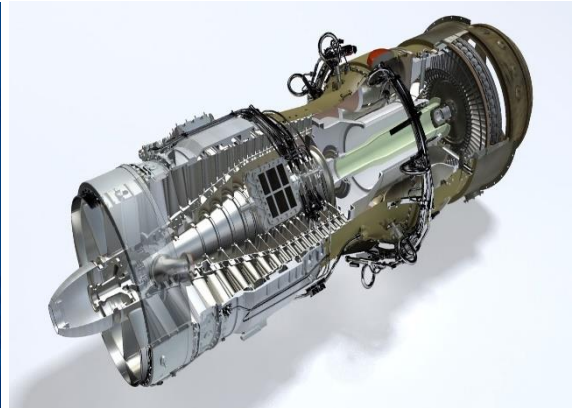


## Inspection Report Rolls Royce Avon

Subject	Inspection report
Gasturbine	Rolls Royce Avon
Customer	Capital Equipment Supply
Location	M.A.R.S Frederikshavn
Purchase order customer	N/A
Customer representative	Jonathan Simms



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# 1. Introduction

## 1.1. General information

This general/borescope inspection will serve as an general overview of condition of the Rolls Royce Avon gasturbine.

The following items will be inspected during this inspection:

- Determine current engine status

## 1.2. Man power

Engineers:

<u>Function</u>	<u>Name</u>
Field Service Engineer	M.Stoevelaar

Customer representative:

<u>Function</u>	<u>Name</u>
N/A	Jonathan Simms

## 1.4. Working time regulation

All activities are performed in 8 (max) hour dayshifts.

## 2. Engine identification and history

Unit No. customer	: N/A
Gas turbine model	: Rolls Royce Avon 1535-122G
Gas turbine s/n	: 38 495
Rating	: N/A
Type of Fuel	: Gas
Type of NOx	: N/A
Total starts	: N/A
Fired hours	: N/A
Starts	: N/A

### 3. Gasturbine inspection

#### 3.1 Geometry

- |                      |                                   |
|----------------------|-----------------------------------|
| • IGV hardware insp. | Visually inspected. See remark(s) |
| • VSV hardware insp. | N/A                               |
| • VSV control insp.  | N/A                               |

#### Remark(s):

- General condition of the hardware on-engine is in typical condition. Found corrosion on IGV actuator, also minor wear on the actuator. IGV hardware arms and bushings found minor wear.

#### Pictures



Picture 01: IGV compressor 6 o'clock corrosion



Picture 02: IGV rods and arms (RHS)

#### 3.2 Compressor section

- |                              |                                   |
|------------------------------|-----------------------------------|
| • Compressor borescope insp. | Visually inspected. See remark(s) |
| • Compressor external insp.  | Visually inspected                |

#### Remark(s):

The rotor of the engine could be turned by hand, static inspection only. During inspection dirt and grease pollution on blades and vanes has been noticed. The inlet door couldn't be opened due missing scaffolding. Only under and RHS/LHS of the IGV and first stage blade of the compressor were inspected by means of the compressor front frame inspection plates 2x. Advice to clean or ice blast the compressor before operational use.

General pictures of the compressor:



Picture 01: Magnesium casing (12 o'clock)



Picture 02: Magnesium casing LHS (minor corrosion)

Borescope inspection record (ports numbers from compressor to exhaust):

Port	Remarks	Picture
1 (Compressor front frame 9 o'clock)	Pollution on blades/IGV	1-6
2 (Compressor front frame 4 o'clock)	Pollution on blades/IGV	7-12
3 P2 tapping LHS	Minor surface corrosion on blades/vanes	13-15
4 Burner port BI plug 2 o'clock	Minor surface corrosion on blades/vanes	16-20

Pictures



Picture 01: stg 1 IGV pollution



Picture 02: stg 2 pollution on blades (root) L.E

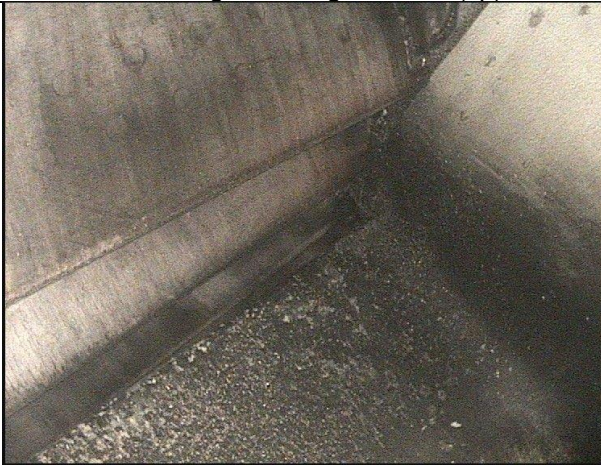




Picture 03: IGV stg 1 and stg 1 blades (tip)



Picture 04: stg 1 IGV and stg 1 blade (middle) L.E



Picture 05: stg iGV (middle & root) L.E



Picture 06: stg 1 IGV L.E root ( dirt pollution)

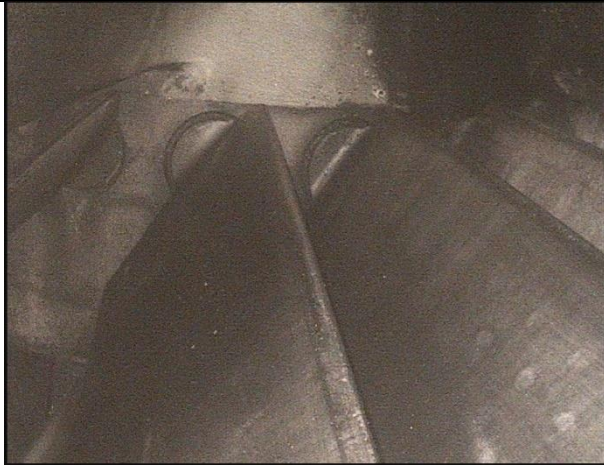


Picture 07: stg 1 IGV (to outer casing)



Picture 08: stg 1 IGV middle (L.E & T.E)





Picture 09: stg 1 IGV (to inner casing)



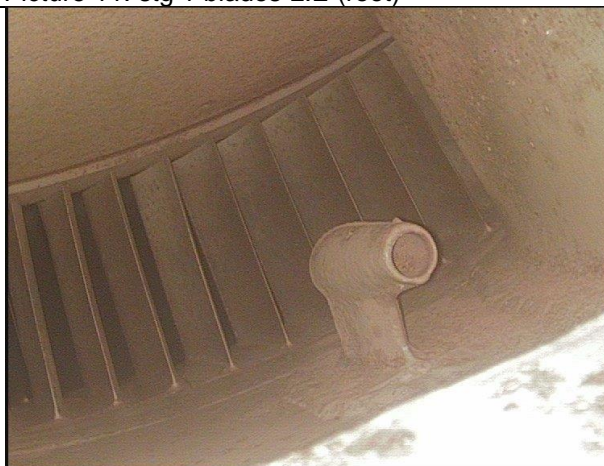
Picture 10: stg 1 IGV L.E



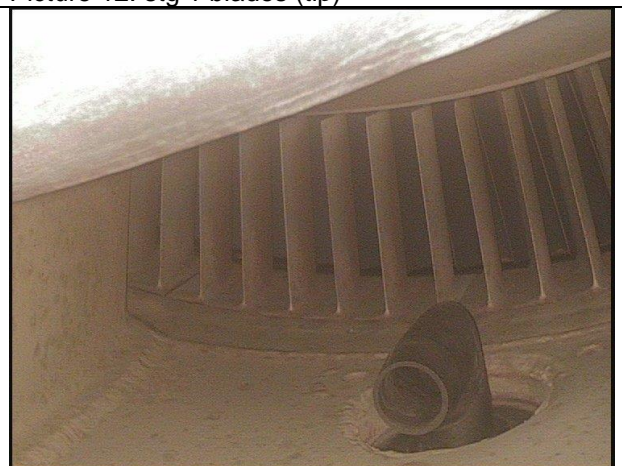
Picture 11: stg 1 blades L.E (root)



Picture 12: stg 1 blades (tip)



Picture 13: Pressure probe & OGV



Picture 14: Pressure probe & OGV

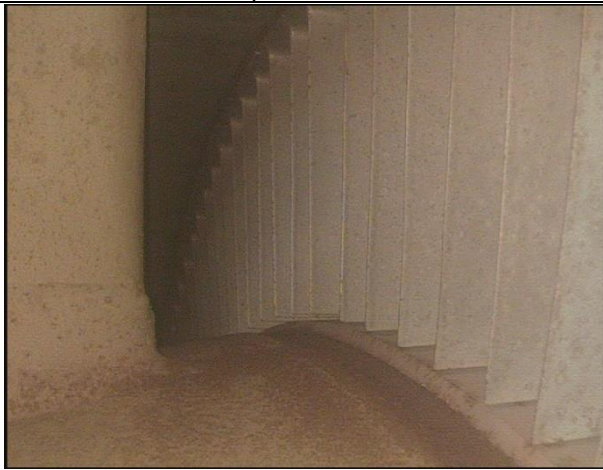




Picture 15: Pressure probe & OGV



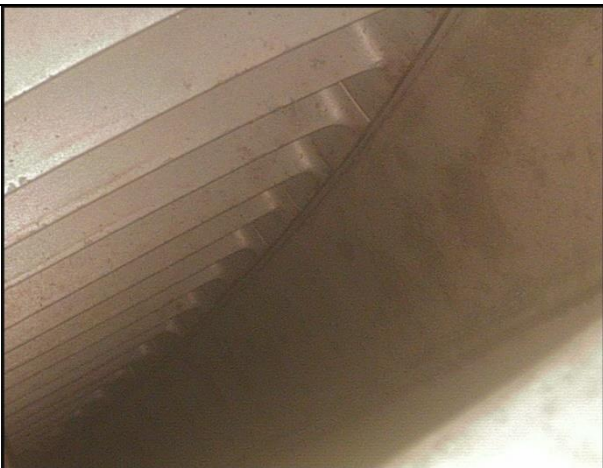
Picture 16: OGV Inner



Picture 17: OGV overview



Picture 18: Stg 15 Blade ( tip) T.E



Picture 19: OGV outer overview



Picture 20: stg 15 blades (root)

### 3.3 Combustor section

- Combustor borescope insp. Visually inspected
- Stage 1 LP nozzle borescope insp. Visually inspected
- Fuel nozzle insp. Visually inspected

#### Borescope inspection record

Port	Remarks	Picture
1 Burner port BI plug 2 o'clock	Visual to fuel nozzle/swirler (found in typical condition)	1-4
Fuel nozzle #3 (9 o'clock)	Visual to combustor and HP turbine nozzle/blades. Found in typical condition. Minor burn spot in combustion chamber	5-7
Fuel nozzle #7 (2 o'clock)	Visual to combustor and HP turbine blades. Found in typical condition. Minor burn spots in combustion chamber	8-12

#### Pictures:



Picture 01: swirler fuel nozzle #3



Picture 02: Fuel nozzle #3



Picture 03: swirler fuel nozzle #7



Picture 04: fuel nozzle #7





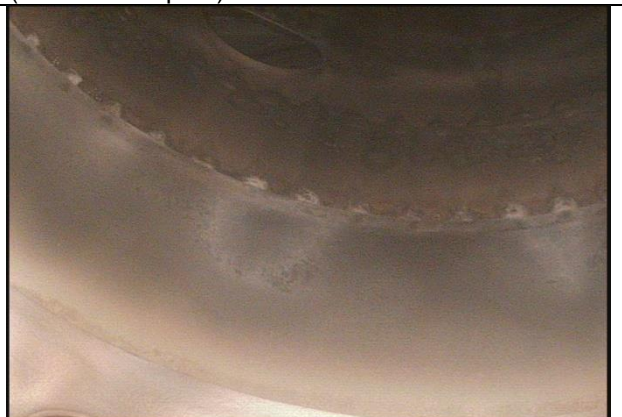
Picture 05: combustion chamber #3 (minor burn spots)



Picture 06: combustor #3 combustion chamber (minor burn spots)



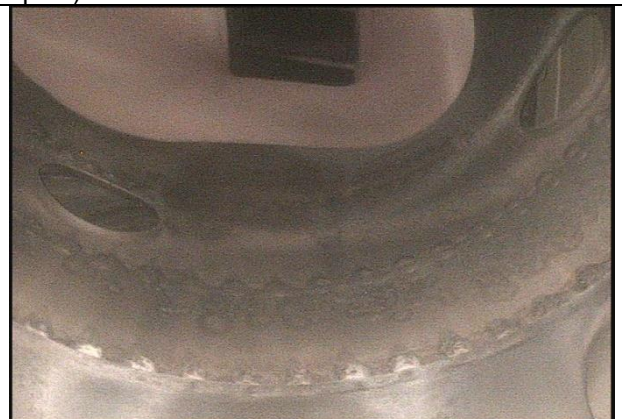
Picture 07: combustion chamber #3 (minor burn spots)



Picture 08: combustion chamber #7 (minor burn spots)

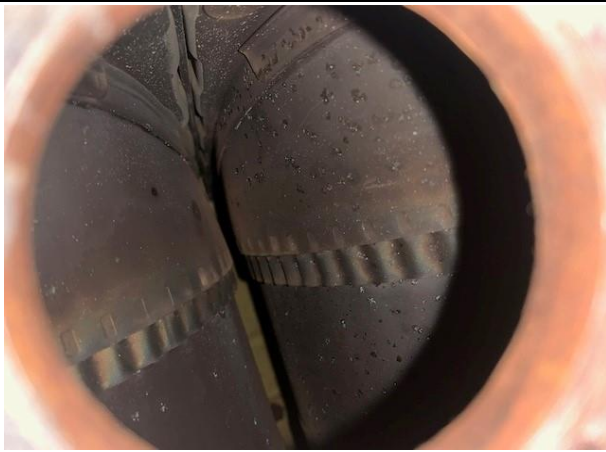


Picture 09: combustion chamber #7 (minor burn spots)



Picture 10: combustion chamber #7 (minor burn spots)





Picture 11: combustor outer liners



Picture 12: combustor outer liners

### 3.4 Turbine section

- |                                     |                    |
|-------------------------------------|--------------------|
| • HP stage 1 nozzle borescope insp. | Visually inspected |
| • HP blades borescope insp.         | Visually inspected |
| • LP blades                         | Visually inspected |
| • T4 thermocouple hardware insp.    | Visually inspected |
| • Functional test thermocouples.    | N/A                |
| • P54 Static pressure probe.        | N/A                |

#### Remark(s):

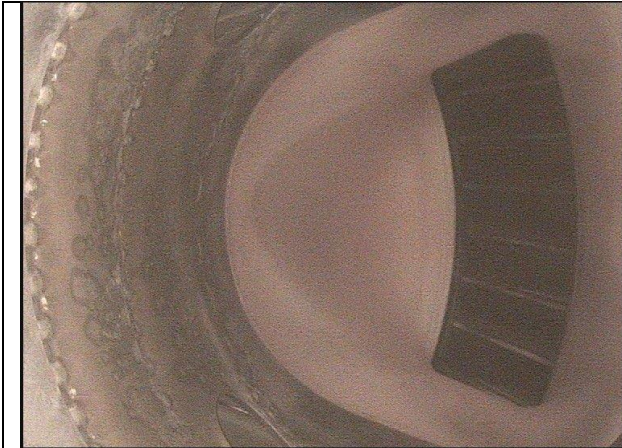
General condition of the HP & LP is good, found no burn away and dirt on the blades and nozzles.

#### Borescope insp. record:

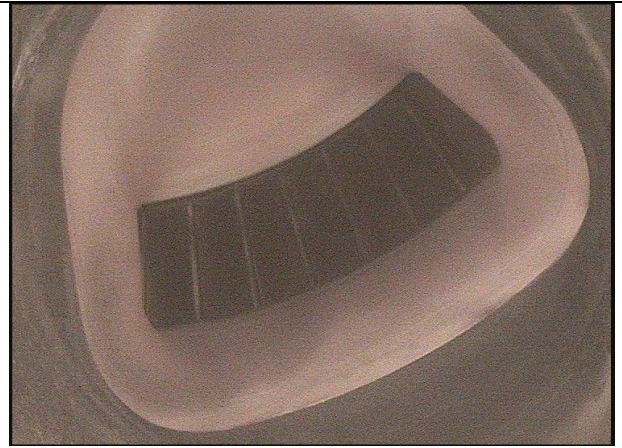
##### HP nozzle/blades:

Port aft flange l/s 9 o'clock	Remarks	Picture
Fuel nozzle #3 (9 o'clock)	Visual to and HP turbine nozzle/blades. Found in typical condition.	1-3
Fuel nozzle #7 (2 o'clock)	Visual to combustor and HP turbine nozzle/blades. Found in typical condition.	4-6

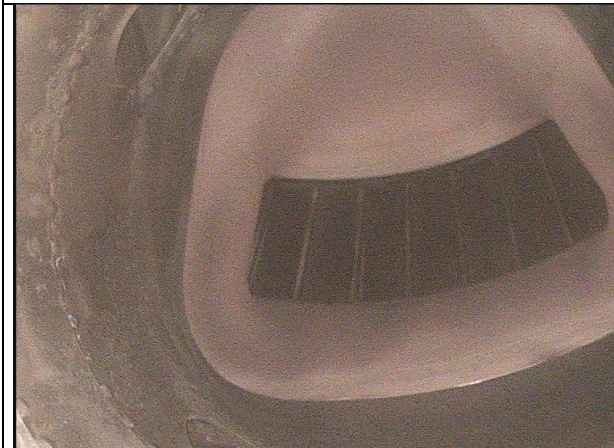
Pictures:



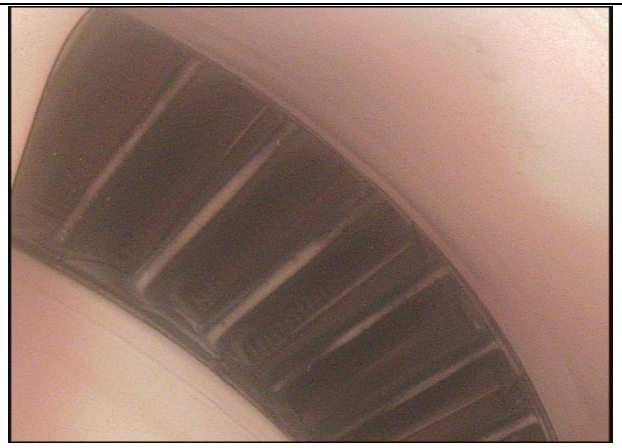
Picture 01: HP turbine nozzle #3



Picture 02: HP turbine nozzle #3



Picture 03: HP turbine nozzle #3



Picture 04: HP turbine nozzle #7



Picture 05: HP turbine nozzle & L.E Blades #7



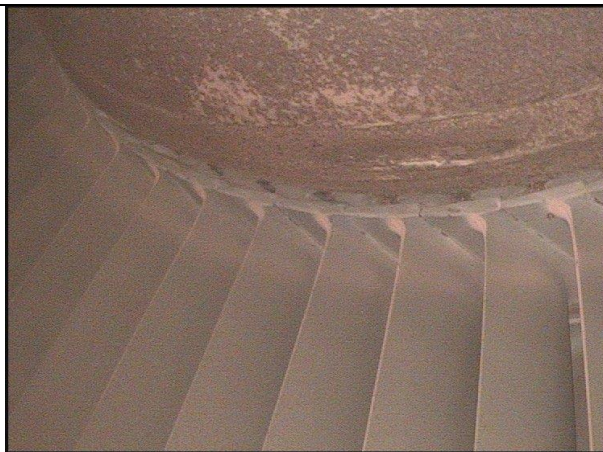
Picture 06: HP turbine nozzles & blades #7



Borescope insp. record:

IP blades:

Port aft flance thermocouples	Remarks	Picture
BI Port thermocouple (11 o'clock)	Visual to LP turbine blades and thermocouple. Found in good condition.	1-4
BI Port Thermocouple (2 o'clock)	Visual to LP turbine blades and thermocouple. Found in good condition.	5-10



Picture 01: LP blades T.E (root) & inner cone



Picture 02: LP blades T.E (outer)



Picture 03: LP blades T.E (outer)



Picture 04: T4 thermocouple

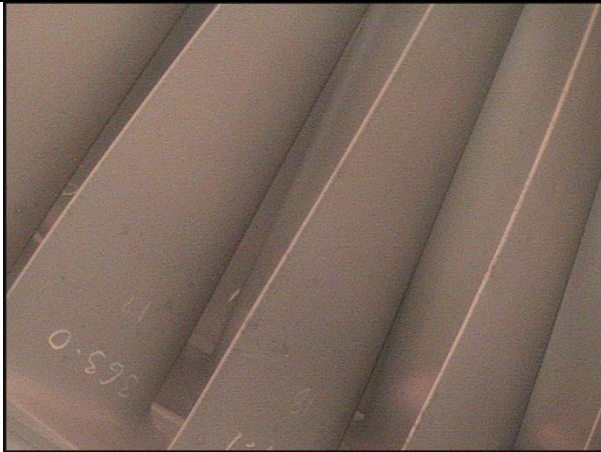


Picture 05: LP blades overview



Picture 06: LP blades T.E (outer)

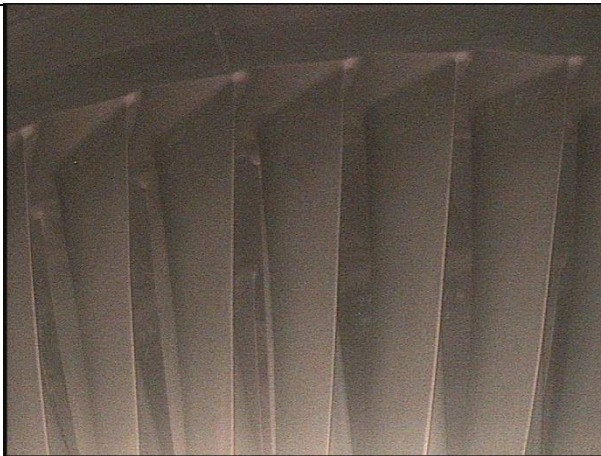




Picture 07: LP blades T.E



Picture 08: LP blades root & inner cone (minor corrosion)



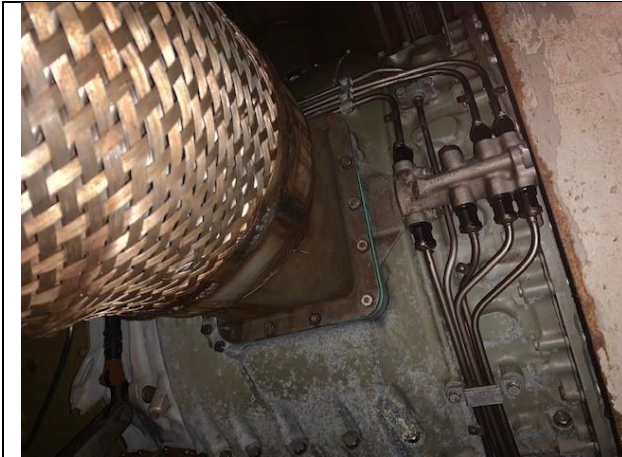
Picture 09: LP blades T.E (outer)



Picture 10: T4 thermocouple

### 3.5 general pictures

Pictures:



Picture 01: RHS stg 4 bleed pip



Picture 02: GT RHS



Picture 03: Fuel manifold



Picture 04: Inlet compressor side (LHS)

#### **4. Conclusions and recommendations**

Due long standstill and no standstill heating in the package, minor corrosion has developed in the machine as also outside of the machine. Found dirt on first stages of the compressor. Advice is to clean the compressor of the GT.