



GAS TURBINE INSPECTION REPORT

**EON ROTTERDAM HOT
GAS PATH INSPECTION
AND COMPRESSOR
INSPECTION**

for

EON BENELUX NV

ROTTERDAM, Unit 3

Equipment Serial #: 296470

Job Start Date: March 01, 2011

Report Issued:

FSR #: 10080111

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JOB SUMMARY

Customer: EON BENELUX NV
Station: ROTTERDAM
Unit No: 3

Equipment Serial #: 296470
Service Year: 1996
GE Maint Dept:

Turbine Rating: 123
Event ID: 296470

Equipment Model:
Frame Size: MS9001E
Driven Equipment: Generator
Accessory Gear S/N:
Service Type:

Control System: Speedtronic Mark V/TMR
Fuel Type: Natural Gas
Driven Equip S/N:

Office Location: NETHERLAND FIELD SVCS
FSR#: 10080111

Service Manager: ERIC SALVADOR
Other Manager:
Service Director: Cliff Harris
Field Engineer: ZEKERYA TASYUREK
Job Start Date: March 01, 2011
Next inspection Date:

Job Completion Date:

Work Scope:

Gas Turbine **Generator Mechanical** **Support Systems** **Other Systems**

Combustion Inspection
(complete)
Hot Gas Path Inspection
(complete)
Compressor Section
(partial)

	Total Fired Hours:	Fired Starts:	Emergency Stops:	Peak Fired Hours:	Total Starts:
Current:	110178	385	198	0	651



JOB SUMMARY

Site Personnel: GE

Name	Responsibility
TASYUREK ZEKERYA	LEAD FIELD ENGINEER
HARRY LEONG-KEE	CONTROL TA

Site Personnel: Customer

Name	Responsibility
BIJNAGTE HUUB	EON MAINTENANCE ENGINEER

Site Personnel: Contractors

Name	Responsibility
JGDMANN MARCO	GRANITE SUPERVISOR



JOB SUMMARY

Unit was shut down on February 28th and left in turning gear up to March the first at 10 PM. Permit to work available from March the first at 10:30 AM after application of LOTO procedure.

The inspection of the unit commenced on the March 1st. Crew worked dayshift only; working 10hrs per day, Granite supplied the craft labor. The unit was mechanically completed on March 31 rst.

SCOPE OF WORK

The purpose of this outage was to conduct a HGPI on a frame 9EA unit with single fuel capability. The combustion components were removed and inspected, most of the internal components were replaced with hardware refurbished by Sulzer , the primary fuel nozzles have all been sent to Sulzer for flow balance and swirler gas tip replacement however inner old cross fire tube retainer have been reused since customer have no replacement. The flexible and rigid pipework were checked borescoped but no pressure tested as per EON maintenance program.

The 1st and 2nd stage buckets, 1st, 2nd and third stage nozzles with 1st, 2nd shroud blocks were replaced as part of the planned maintenance, these parts will be sent to a repair facility where a full inspection will be conducted.

In addition to the main scope we have conducted a boroscope inspection on compressor at the very beginning of the outage and found heavy damage on R1 as well as during the last major inspection in 2008 customer experienced heavy damage on S17, egv1 and egv2 stator vane hook fit , this time they had applied a quick fix by inserting back shimming to minimize vane excessive rocking as a result we were asked to remove also CDC and compressor upper halves as well as vanes to verify and monitor the integrity of these damaged components. Later on we have carefully checked s17, egv1, egv2 and repaired folded R1 damages once Pac case disposition was given.

Prior to installation of the casings a borescope inspection was conducted on the hot gas path and compressor stages, this was to check for any foreign objects. All casing bolts were torqued to the required value.

MAJOR MECHANICAL ACTIVITIES PERFORMED

- Combustion hardware replacement
- Turbine HGP
- Compressor R1 damage repair as per GE Pac case recommendation.
- Compressor discharge casing s17, egv1 and egv2 hook fit integrity verification.
- Exhaust frame/plenum repair.
- Exhaust frame to turbine aft flex seal reparation done by EON.

MAJOR CONTROL ACTIVITIES PERFORMED

- SVR, GCV AND gas splitter calibration verification
 - IGV calibration verification
- See Control TA report for additional activities and details.

**INSPECTION SUMMARY**

Inspection No.	Shift No.	<u>Section Component</u>	Location	Description	Action
1	1	<u>Combustion Liner Assembly</u>	COMBUSTION	Removed & Inspected	Component Removed And Inspected
2	1	Crossfire Tube	COMBUSTION ASSY,....	Removed & Inspected	Component Removed And Inspected
3	1	<u>Combustion Transition Piece Assembly</u>	COMBUSTION SYSTEM	Removed & Inspected	Component Removed And Inspected
4	1	<u>Transition Piece Hardware Clamp - Support</u>	COMBUSTION SYSTEM	Removed & Inspected	Component Removed And Inspected
9	1	Retainer - Side Seal		Visual Inspection	Good Condition - No Visual Defects
5	1	<u>Combustion Flow Sleeve Assembly</u>	COMBUSTION SYSTEM,..	Removed & Inspected	Component Removed And Inspected
7	1	<u>Combustion Spark Plug Assembly</u>	COMBUSTION SYSTEM	Removed & Inspected	Component Removed And Inspected
8	1	<u>Fuel Nozzle Assembly</u>	COMBUSTION CHAMBER	Removed & Inspected	Component Removed And Inspected
<u>Combustion Cans</u>					



INSPECTION SUMMARY

Inspection No.	Shift No.	Section Component	Location	Description	Action
6	1	Assembly		Removed & Inspected	Component Removed And Inspected
10	1	<u>Outer Wrapper Case</u> Assembly		Leak Test	No Leakage Noted
11	1	<u>Flame Detector (28FD)</u> Assembly	COMBUSTION SYSTEM	Functional Test	Ok - Operating Properly
12	1	<u>Compressor Inner Barrel</u> Casing	BRG#2 ASSY, INNER BR		ASSOCIATED PARTS
19	1	<u>Compressor Discharge Casing</u> Assembly	COMPRESSOR DISCHARGE	Non-Destructive Test	No Indications Found
41	1	Flange	WRAPPER CASING	Leakage	Repaired
20	1	<u>Compressor Rotor Blade(s)</u> Tip		Clearance Check	Clearance Check Was Satisfactory
13	1	<u>Inlet Guide Vane</u> Assembly		Clearance Check	Clearance Check Was Satisfactory
14	1	Bushing - Inner		Clearance Check	Clearance Check Was Satisfactory
16	1	Gear - Rack		Clearance Check	Clearance Check Was Satisfactory
17	1	Vane - IGV		Non-Destructive Test	No Indications Found
15	1	Washer - Thrust		Clearance Check	Clearance Check Was

**INSPECTION SUMMARY**

Inspection No.	Shift No.	<u>Section</u> Component	Location	Description	Action
					Satisfactory
22	1	<u>Turbine Casing</u> Joint - Vertical		Disassembled And Inspected	Good Condition - No Visual Defects
31	1	<u>1st Stage Bucket</u> Assembly	STG1 BUCKET	Disassembled And Inspected	Good Condition - No Visual Defects
32	1	<u>2nd Stage Bucket</u> Assembly	STG2 BUCKET	Disassembled And Inspected	Good Condition - No Visual Defects
33	1	<u>3rd Stage Bucket</u> Assembly	STG3 BUCKET	Disassembled And Inspected	Good Condition - No Visual Defects
35	1	<u>Turbine Rotor</u> Dovetail	DOVETAIL	Cleaned and Inspected	Good Condition - No Visual Defects
34	1	Spacer	SPCER STG1-STG2-STG3	Cleaned and Inspected	Good Condition - No Visual Defects
23	1	<u>Stage 1 Nozzle Arrangement</u> Assembly	TURBINE	Removed & Inspected	Component Removed And Inspected
25	1	<u>Stage 2 Nozzle Arrangement</u> Assembly	NOZZLE 2ND STG	Disassembled And Inspected	Good Condition - No Visual

**INSPECTION SUMMARY**

Inspection No.	Shift No.	<u>Section</u> Component	Location	Description	Action
					Defects
26	1	<u>Stage 3 Nozzle Arrangement</u> Assembly	NOZZLE 3RD STG	Disassembled And Inspected	Good Condition - No Visual Defects
28	1	<u>Stage 1 Turbine Shroud</u> E Seal	STAGE 1 SHROUD	Disassembled And Inspected	ASSOCIATED PARTS
27	1	Assembly			Good Condition - No Visual Defects
29	1	<u>Stage 2 Turbine Shroud</u> Assembly	STAGE 2 SHROUD	Disassembled And Inspected	Good Condition - No Visual Defects
30	1	<u>Stage 3 Turbine Shroud</u> Assembly		Disassembled And Inspected	Good Condition - No Visual Defects
24	1	<u>Stage 1 Support Ring</u> Assembly		Disassembled And Inspected	Good Condition - No Visual Defects
21	1	<u>Journal Bearing</u> Labyrinth	BEARING#2		ASSOCIATED PARTS
18	1	<u>Inlet Plenum</u> Assembly		Cleaned and Inspected	Good Condition - No Visual Defects



INSPECTION SUMMARY

Inspection No.	Shift No.	Section Component	Location	Description	Action
37	1	<u>Exhaust Plenum</u> EXHAUST DIFFUSOR	EXHAUST DIFFUSOR	Cracked	Weld Repaired
36	1	FLEX SEALS FORWARD	EXHAUST PLENUM,....,	Visual Inspection	Good Condition - No Visual Defects
45	1	<u>Piping/Components (GF)</u> Hose - Flexible		Disassembled And Inspected	Good Condition - No Visual Defects
44	1	<u>Control Valve (VGC)</u> CONTROL VALVE	CONTROL VALVE	Calibration Check	Calibration Is At Specified Values
42	1	<u>Filters (LO)</u> Cartridge - Filter	FILTER LUBE OIL	Disassembled And Inspected	Good Condition - No Visual Defects
46	1	<u>Main Pump</u> Assembly	MAIN PUMP	Damaged	Replaced
43	1	<u>Emergency Pump</u> DC LUBE OIL PUMP MARK5 SET UP	MARK5	General Lube System Inspection	Lubrication System Inspected
38	1	<u>Accessory Gear</u> Bearing		Wiped	Replaced
39	1	<u>Accessory Gear - Driven</u> Shaft		Cleaned and Inspected	Good Condition - No Visual Defects



INSPECTION SUMMARY

Inspection No.	Shift No.	<u>Section</u> Component	Location	Description	Action
40	1	<u>Alignment - Coupling</u> ACCESSORY GEAR	ACCESSORY GEAR	Alignment Check	Alignment Acceptable



RECOMMENDATIONS

SHOULD BE DONE IMMEDIATELY...

1. Pump, Main; Assembly; MAIN PUMP

Check main lube oil discharge pressure and temperature to monitor its condition versus time. From now find out replacement spare parts like pump gears and bearing that is to say whole assembly.



RECOMMENDATIONS

SHOULD BE DONE ON A REGULAR MAINTENANCE SCHEDULE...

1. Inlet Plenum; Assembly;

Check inlet plenum cleanliness during the next planned outage and clean if necessary.

2. Combustion Liner; Assembly; COMBUSTION

Check liner hulla seal, TBC coating and x fire tube collar fit and stoppers during the next planned combustion inspection

3. Combustion Liner; Crossfire Tube; COMBUSTION ASSY,....

Check inner cross fire tube collar fit and make sure to install them as following
Inner cross fire tube female should be installed anticlockwise looking downstream
by the way inner cross fire tube male is clockwise looking downstream toward exhaust system

4. Transition Piece, Combustion; Assembly; COMBUSTION SYSTEM

Check TP for any cracks or wear as well as set back clearance which are supposed to be between 240 to 390 mills during the next planned combustion inspection.

5. Transition Piece Hardware; Clamp - Support; COMBUSTION SYSTEM

Check bullhorn general condition for the next planned combustion inspection because this defect may give indication about proper TP set back clearance.

6. Transition Piece Hardware; Retainer - Side Seal;

We recommend checking them during the next combustion chamber and correct TP set back clearance if out of spec.



RECOMMENDATIONS

7. Flow Sleeve, Combustion; Assembly; COMBUSTION SYSTEM,...

Check liner stops wear as well as all welding using Red Dye penetrant during the next planed combustion inspection.

8. Spark Plug, Combustion; Assembly; COMBUSTION SYSTEM

Check spark plug during the next planed combustion inspection

9. Fuel Nozzle; Assembly; COMBUSTION CHAMBER

Check fuel nozzle body to figure out for any potential liquid fuel leakage.

10. Combustion Cans; Assembly;

Cans inside and outside should be inspected for the next planed combustion inspection since this unit is running with steam injection

11. Case, Outer Wrapper; Assembly;

Carry out leak check for the next planed combustion inspection outage

12. Flame Detector (28FD); Assembly; COMBUSTION SYSTEM

Check if this parts operates properly during the next planed combustion inspection

13. Casing, Compressor Discharge; Assembly; COMPRESSOR DISCHARGE

Check any CDC slippage during the next planed major inspection and check all threads repair by inserting new helicoil.



RECOMMENDATIONS

14. Inlet Guide Vane; Assembly;

As per normal maintenance inspection check IGV clearance and their general condition in term of crack or FOD during the next planed HGPI or CI.

15. Inlet Guide Vane; Bushing - Inner;

Check inner bushing clearance during the next planed hot gas path inspection

16. Inlet Guide Vane; Gear - Rack;

Check gear backlash clearance for the next planed combustion inspection or Hot gas path.

17. Filters (LO); Cartridge - Filter; FILTER LUBE OIL

Check differential pressure from filter in and out then change the if they re close to the electrical switch limit.

18. Casing, Turbine; Joint - Vertical;

Check Turbine casing carefully during disassembly for any crack or defect emanating from the casing cooling and shroud pin holes.

19. Bucket, 1st Stage; Assembly; STG1 BUCKET

Check and apply the same inspection procedures in the next HGPI, also borescope inspection will be useful to monitor bucket condition during the next planed combustion inspection.

20. Support Ring, Stage 1; Assembly;

Check for any sign of rub, wear located on inner and outer support ring discourager seal.



RECOMMENDATIONS

SHOULD BE DONE AT THE NEXT OUTAGE...

1. Alignment - Coupling; ACCESSORY GEAR ; ACCESSORY GEAR

Check alignment during the next planed HGPI.

2. Accessory Gear; Bearing;

Remove gear box upper half inspection cover and check any trace or debris of babbitt loss.

3. Accessory Gear - Driven; Shaft;

Check gear shaft teeth during the next planed hot gas path inspection.

4. Blade(s), Compressor Rotor; Tip;

Take rotor position during combustion inspection as well as turbine clearance in case of hot gas path inspection.

5. Inlet Guide Vane; Washer - Thrust;

Check thrust clearance for the next planed combustion inspection or HGPI.

6. Plenum, Exhaust; EXHAUST DIFFUSOR; EXHAUST DIFFUSOR

Check diffusor condition for potential crack and weld repair with proper electrodes or filler, diffusor is made of B7A62A commonly stainless steel 0304 L by the way filler should be 308 L.



RECOMMENDATIONS

7. Piping/Components (GF); Hose - Flexible;

Check TIL 1585 at the next planned combustion inspection in order to avoid any damage on flex hoses during removal and installation.

8. Bucket, 2nd Stage; Assembly; STG2 BUCKET

Check and Remove carefully lock pins and change all second stage buckets during the next planned HGPI also borescope inspection will be required to monitor bucket shrouded tip and cutter teeth condition during the next planned combustion inspection

9. Bucket, 3rd Stage; Assembly; STG3 BUCKET

Perform borescope inspection and first stage nozzle mapping during the next CI.

10. Rotor, Turbine; Dovetail; DOVETAIL

Inspect bucket dovetail condition during the next planned HGPI as well as bucket rock and platform mismatch check.

11. Rotor, Turbine; Spacer; SPCER STG1-STG2-STG3 ,turbine rotor discourager seal

Check spacer condition during the next planned hot gas path inspection.

12. Nozzle Arrangement, Stage 1; Assembly; TURBINE

Perform visual inspection and first stage nozzle mapping during the next CI.

13. Nozzle Arrangement, Stage 2; Assembly; NOZZLE 2ND STG

Boroscope inspection on whole nozzle stages has to be done during the next CI.



RECOMMENDATIONS

14. Nozzle Arrangement, Stage 3; Assembly; NOZZLE 3RD STG

Perform a borescope inspection during the next CI on whole set of nozzle segment first, second and third stage.

15. Shroud, Stage 1 Turbine; Assembly;

We recommend customer to perform boroscope inspection during the next CI in order to track any faulty shroud condition.

16. Shroud, Stage 2 Turbine; Assembly; STAGE 2 SHROUD

Perform a boroscope inspection to check shroud s general condition during the next planed CI.

17. Shroud, Stage 3 Turbine; Assembly;

Perform visual shroud inspection from exhaust plenum through hatch door during the next planed CI.



RECOMMENDATIONS

1. Inlet Guide Vane; Vane - IGV;

Check IGV vanes leading, trailing edges as well as vane s root and head during the next planed outage.

2. Plenum, Exhaust; FLEX SEALS FORWARD; EXHAUST PLENUM,.....

Check flex seal forward and aft condition and change them if necessary during the next planed HGPI.

**PARTS USED AND RECOMMENDED**

Item	Ins Rec	PU	RI	RO	QTY	UM	Parts Description	Cust Stk #	Catalog #	Drawing #
1	4	X			1	SET	Combustion Liner, Collar - Crossfire Tube, LINERS		0703	
2	24	X			14	Each	Combustion Liner, Crossfire Tube,(F) Crossfire Tube		0717	
3	24	X			14	Each	Combustion Liner, Crossfire Tube,(M)Crossfire Tube		0717	
4	6	X			14	Each	Combustion Transition Piece, Picture Frame, TRANSITIONS		0702	
5	7	X			28	Each	Transition Piece Hardware, Retainer - Side Seal,BOLT,T/P		G0717	
6	7	X			14	Each	Transition Piece Hardware, Retainer - Side Seal,BULLHORN,T/P		G0717	
7	7	X			25	Each	Transition Piece Hardware, Retainer - Side Seal,LOCKPLATE, T/P		G0717	
8	7	X			14	Each	Transition Piece Hardware,Retainer - Side Seal,RETAINER,BLOCK,T/P		G0717	
9	7	X			14	Each	Transition Piece Hardware,Retainer - Side Seal,SEALS,END, T/P		G0717	
10	26	X			14	Each	Fuel Nozzle,Assembly,FUEL, NOZZLE		0512	
11	2	X			1	Each	Compressor Inner Barrel,Assembly,BARREL,INNER		0805	
12	25	X			1	SET	1st Stage Bucket,Assembly,BUCKETS,1st Stg		1307	
13	10	X			1	SET	2nd Stage Bucket,Assembly,BUCKETS,2nd Stg		1307	
14	11	X			1	SET	3rd Stage Bucket,Assembly,BUCKETS,3rd Stg		1302	
15	12	X			1	SET	Stage 1 Nozzle Arrangement,Assembly,Nozzle,1st Stg		1401	
16	13	X			1	SET	Stage 2 Nozzle Arrangement,Assembly,Nozzles,2nd Stg		1402	

PU=Part Used During the Inspection

RI=Part Recommended for Immediate Restock

RO=Part Recommended for the Next Inspection



PARTS USED AND RECOMMENDED

Item	Ins Rec	PU	RI	RO	QTY	UM	Parts Description	Cust Stk #	Catalog #	Drawing #
17	14	X			1	SET	Stage 3 Nozzle Arrangement,Assembly,Nozzle,3rd Stg		1409	
18	15	X			6	Each	Stage 1 Turbine Shroud,Assembly, 'E' SEAL		G0705	
19	15	X			1	SET	Stage 1 Turbine Shroud,Assembly,SHROUD 1st Stg		1401	
20	16	X			1	SET	Stage 2 Turbine Shroud,Assembly,SHROUD ASSY		1402	
21	17	X			1	SET	Stage 3 Turbine Shroud,Assembly,SHROUD 3rd Stg		1409	
22	18	X			6	Each	Exhaust Expansion Joint,Assembly,EXPANSION JOINT		0706	
23	18	X			6	Each	Exhaust Expansion Joint,Assembly,METAL GASKET		0706	
24	22	X			4	Each	Filters (LO),Cartridge - Filter,Filter,Cartridge		1010	
25	23	X			1	Each	Accessory Gear - Driven,Shaft,Accy Shaft		1313	

PU=Part Used During the Inspection

RI=Part Recommended for Immediate Restock

RO=Part Recommended for the Next Inspection



TIL/ECN ACTIVITY

TIL # 1049-3 GAS TURBINE WHEEL DOVETAIL WEAR MEASUREMENT

Bucket stg1 , stg2 and stg3 were removed and dovetails were carefully cleaned with WD 40 by protecting rotor cooling slots. Dovetails found in pretty much good condition no corrosion were to be seen dovetails were ready for bucket installation by a qualified GE bucket specialist. Wheel dovetail material loss TIL 1049-3R1 was checked and found satisfactory since rock check was within GE parameter.

Inspect bucket dovetail condition during the next planned HGPI as well as bucket rock and platform mismatch check.

TIL # 1068-2R1 VARIABLE INLET GUIDE VANE ASSMBLY-INNR BUS

A clearance check was performed as per TIL 1068-2R1 and results were compared to design values. All measurements indicate clearance is within the recommended tolerance. The results of the inspection are documented on the following pages.

Check inner bushing clearance during the next planned hot gas path inspection.

TIL # 1132-2 VAR INLET GUIDE VANE INSP, THRST WASH CORR

A clearance check was performed, as per GE TIL 1132-2R1 results were compared to design values. All measurements indicate clearance is within the recommended tolerance. The results of the inspection are documented on the following pages.

Check thrust clearance for the next planned combustion inspection or HGPI.

TIL # 1473-2 MARK5 SPEEDTRONIC CONTROL VALVE CALIBRATION

A calibration check was performed, and the device was satisfactory with little or no adjustment necessary.



TIL/ECN ACTIVITY

TIL # 1585 PROPER USE AND CARE OF FLEXIBLE METAL HOSE

All piping flex hose were disassembled ,cleaned and inspected with borescope . No problem areas were found on these components. All parts were returned to service.

Also we check the TIL 1585 related to the proper use and care of flexible metal hoses.

Check TIL 1585 at the next planed combustion inspection in order to avoid any damage on flex hoses during removal and installation.

TIL # 517-CR1 VARIABLE INLET GUIDE VANE SEIZING

A clearance check was performed as per GE TIL 517CR1 and results were compared to design values. All measurements indicate gear backlash clearance within the recommended tolerance. The results of the inspection are documented on the following pages.

Check gear backlash clearance for the next planed combustion inspection or Hot gas path.

Combustion Liner

Assembly; COMBUSTION

This component was visually inspected. The liners were found in good condition, no missing leaves from the spring seal or plugging of the cooling holes. There was light wear at the cap collar where it comes into contact with the fuel nozzle as well as inner cross fire tube collar fit was normally worn without any serious failure. As a common defect they all show sign of light hot spot on the body and inside surface where in pretty good condition with TCB coating almost intact. 5 out of 14 liners were showing severe wear due to heavy rubbing on their liner stopper. Serial numbers have been all recorded on the relevant inspection sheet and liners will be sent to a GE certified workshop for refurbishment.

Check liner hula seal, TBC coating and x fire tube collar fit and stoppers during the next planned combustion inspection

Combustion Liner

Crossfire Tube; COMBUSTION ASSY,....

The components retainers and inner cross fire tube both male and female were visually inspected. The retainers were in good condition with a little insignificant wear while the majority of the crossfire tubes show heavy wear at the interface of the tube and combustion liner collar fit. The components were replaced as part of the planned maintenance program.

Check inner cross fire tube collar fit and make sure to install them as following
--inner cross fire tube female should be installed anticlockwise looking downstream
--by the way inner cross fire tube male is clockwise looking downstream toward exhaust system

Combustion Transition Piece

Assembly; COMBUSTION SYSTEM

The transition pieces were all removed and visually inspected; the components were inspected for signs of cracking, bulging and wear. There was heavy wear on the floating seals and at the picture frame; the side seals were also found in poor condition. The thermal barrier coating was intact on all of the components; there was no cracking on the welds of the forward or aft support brackets. There was wear on the side seal slots, the general condition of the components was medium. The transition pieces were replaced as part of the planned maintenance, the serial numbers are recorded on the inspection sheet.

A set of nozzle setback clearances was recorded before disassembly and after installation of the components, the dimensions are recorded on the relevant inspection sheets. Set back clearance are all between 240 to 390 mills which is design tolerance therefore no grinding was carried on the blocks neither on the bullhorns.

Transition Piece Hardware

Clamp - Support; COMBUSTION SYSTEM

The forward support clamps (bullhorns) were removed and visually inspected. There was Heavy wear on the loaded faces of the support clamps, the components were replaced with Extensor Life Hardware. The transition piece hardware as well were replaced as per GE best practices

Check bullhorn general condition for the next planed combustion inspection because this defect may give indication about unproper TP set back clearance.

Transition Piece Hardware

Retainer - Side Seal;

This component was visually inspected and found in a very poor condition heavy wear , missing material, burnt and warped. This is an indication about the fact that TP set back were apparently to tight in their slot and not on the same plane.

We recommend checking them during the next combustion chamber and correct TP set back clearance if out of spec.

Combustion Flow Sleeve

Assembly; COMBUSTION SYSTEM,..

Flow sleeves were removed and inspected, no evidence of cracks or distortion noted.

Further inspection performed on the sleeve for body or weld cracks, out-of-roundness, burn-through,

Missing metal and wear have been found. Inspections of flange to body weld for cracks or cracks in the flange were completed with no abnormalities .In total 7 (#3,13,9,12,14,8,10)out of 14 flow sleeves have been repaired by SULZER therefore EON got the full repair report about job carried out on flow sleeves

- Weld repair worn areas on liner stops
- Weld repair worn flange bolt holes
- Dye penetrant inspection flow sleeve stops/flange bolt holes
- Final dimensional checks
- Aluminum oxide clean all components
- Final visual inspection
- Certificate of compliance
- Reporting

Check liner stops wear as well as all welding using Dye penetrant during the next planed combustion inspection.

Combustion Spark Plug

Assembly; COMBUSTION SYSTEM

The component was removed and inspected. No serious problems were discovered. Checked and returned to service.

Check spark plug during the next planed combustion inspection

Fuel Nozzle

Assembly; COMBUSTION CHAMBER

The removed components were visually inspected; there were light carbon deposits on The nozzle tips. No evidence of erosion or other damage. Components were replaced as part of the planned maintenance program. Serial numbers are recorded on the relevant Inspection sheet

Check fuel nozzle body to figure out for any potential liquid fuel leakage.

Combustion Cans

Assembly;

This component was visually inspected; components were in good condition with no Hot spots or bulging. There was slight oxidation of the internal surfaces, this was Removed. All faces were cleaned and gasket residue removed, bolt holes were checked and cleaned, retapped for cross threading. The components were reinstalled back to the unit for further service.

Cans inside and outside should be inspected for the next planed combustion inspection since this unit is running with steam injection

Outer Wrapper Case

Assembly;

Following the outage, the compressor, combustion and turbine sections of the turbine were tested for leaks. No problems were found.

Bearing #2 upper half radiation pipe packing gland gasket were checked with no indication.

Flame Detector (28FD)

Assembly; COMBUSTION SYSTEM

This component was functionally electrically tested and found to be operating properly. The component was removed and inspected. No serious problems were discovered. Checked and returned to service.

Check if this parts operates properly during the next planed combustion inspection



Fuel nozzle collar light wear

liner hula seal in medium condition

liner stopper 5 of them were severe

MS9001

Liner – General Condition

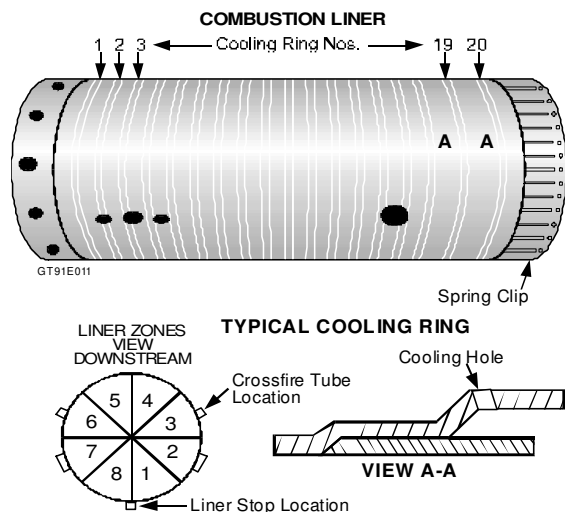
Date _____
FSR # _____

Turbine S/N _____
Sketches Enclosed? _____
Data Type meas+visu

Prepared by ZEKERYA TASYUREK
Photos Enclosed? YES

Part Number Out* 108E4242

Part Number In* 108E4240



*** NOTE:** If part number IN is different than part number OUT, check with customer service.

DEFECT CODES

BU - Burned
CO - Corroded
C - Crack
BK - Buckled
H - Hot Spots
W - Worn
PH - Plugged Cooling Holes
RD - (Liner) Ring Distortion
RC - (Liner) Ring Cracking
BR - Broken
BT - Bent
M - Missing

DISPOSITION CODES

N - No repair or replacement necessary.
RG - Repaired by GE
RC - Repaired by Customer
RO - Repaired by Other
RN - Replaced with new component.
RR - Replacement Recommended

Chamber		Serial No.	DEFECTS (LINER)			X-FIRE TUBE COLLAR		SPRING SEAL	
			Liner Zone	Cooling Holes	Cooling Ring	Liner Disposition	Location	Thickness Meas.	Defect Code Location
1	Out	SN FLN 1060	1-20	OK	OK	RN		0.050	W, BU, H
	In	44896-E1							
2	Out	SN FLN 1052	1-20	OK	OK	RN		0.045	W, BU, H
	In	44896-E2							
3	Out	SN FLN 1053	1-20	OK	OK	RN		0.054	W, BU, H
	In	44896-E3							
4	Out	SN FLN 1054	1-20	OK	OK	RN		0.041	W, BU, H
	In	44896-E4							
5	Out	SN FLN 1088	1-20	OK	OK	RN		0.055	W, BU, H
	In	44896-E5							
6	Out	SN FLN 1086	1-20	OK	OK	RN		0.050	W, BU, H
	In	44896-E6							
7	Out	SN FLN 1057	1-20	OK	OK	RN		0.057	W, BU, H
	In	44896-E7							
8	Out	SN FLN 1087	1-20	OK	OK	RN		0.053	W, BU, H
	In	44896-E8							
9	Out	SN FLN 1059	1-20	OK	OK	RN		0.051	W, BU, H
	In	44896-E9							
10	Out	SN FLN 1062	1-20	OK	OK	RN		0.053	W, BU, H
	In	44896-E10							
11	Out	SN FLN 1063	1-20	OK	OK	RN		0.058	W, BU, H
	In	44896-E11							
12	Out	SN FLN 1061	1-20	OK	OK	RN		0.052	W, BU, H
	In	44896-E12							
13	Out	SN FLN 1065	1-20	OK	OK	RN		0.051	W, BU, H
	In	44896-E13							
14	Out	SN FLN 1064	1-20	OK	OK	RN		0.049	W, BU, H
	In	44896-E14							

GT3150 LINER GEN COND SN(a)



INNER CROSS FIRE TUBE COMMON DEFECT



INNER CROSS FIRE TUBE RETAINER GENERAL CONDITION



FLOATING AND SIDE SEAL SLOT HEAVY RUB EVIDENCE

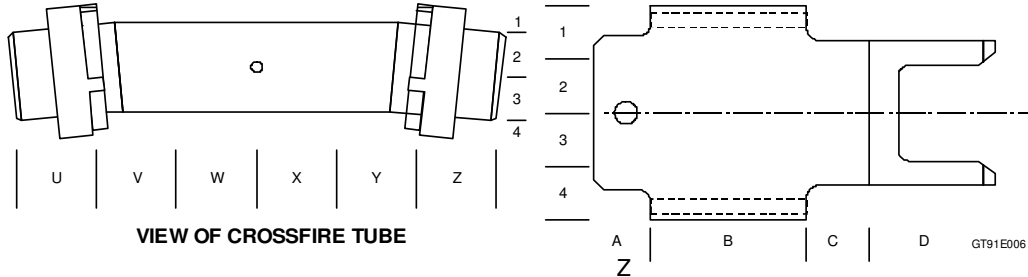


INSPECTION REPORT
Gas Turbine Maintenance

MS9001

Combustion
Crossfire Tube & Retainer

Date _____ Turbine S/N _____ Prepared by Z.TASYUREK
FSR # _____ Sketches Enclosed? _____ Photos Enclosed? YES



DEFECT CODES

W - Wear
BT - Bent
H - Hot Spots
CR - Cracked
BU - Burned

DISPOSITION CODES

N - No repair or replacement necessary
RG - Repaired by GE
RC - Repaired by customer
RO - Replaced by other
RN - Replaced with new component
RR - Replacement recommended

Crossfire Tube Holes (qty)

X Four
Six

Crossfire Tube

Retainer

Chambers	Defect & Location	Disposition	Chamber End	Defect & Location	Disposition
1-2	WUZ,HVWXY,BUVWXY	RN	1	W ,A, B	RN
	WUZ,HVWXY,BUVWXY	RN	2	W ,A, B	RN
2-3	WUZ,HVWXY,BUVWXY	RN	2	W ,A, B	RN
	WUZ,HVWXY,BUVWXY	RN	3	W ,A, B	RN
3-4	WUZ,HVWXY,BUVWXY	RN	3	W ,A, B	RN
	WUZ,HVWXY,BUVWXY	RN	4	W ,A, B	RN
4-5	WUZ,HVWXY,BUVWXY	RN	4	W ,A, B	RN
	WUZ,HVWXY,BUVWXY	RN	5	W ,A, B	RN
5-6	WUZ,HVWXY,BUVWXY	RN	5	W ,A, B	RN
	WUZ,HVWXY,BUVWXY	RN	6	W ,A, B	RN
6-7	WUZ,HVWXY,BUVWXY	RN	6	W ,A, B	RN
	WUZ,HVWXY,BUVWXY	RN	7	W ,A, B	RN
7-8	WUZ,HVWXY,BUVWXY	RN	7	W ,A, B	RN
	WUZ,HVWXY,BUVWXY	RN	8	W ,A, B	RN
8-9	WUZ,HVWXY,BUVWXY	RN	8	W ,A, B	RN
	WUZ,HVWXY,BUVWXY	RN	9	W ,A, B	RN
9-10	WUZ,HVWXY,BUVWXY	RN	9	W ,A, B	RN
	WUZ,HVWXY,BUVWXY	RN	10	W ,A, B	RN
10-11	WUZ,HVWXY,BUVWXY	RN	10	W ,A, B	RN
	WUZ,HVWXY,BUVWXY	RN	11	W ,A, B	RN
11-12	WUZ,HVWXY,BUVWXY	RN	11	W ,A, B	RN
	WUZ,HVWXY,BUVWXY	RN	12	W ,A, B	RN
12-13	WUZ,HVWXY,BUVWXY	RN	12	W ,A, B	RN
	WUZ,HVWXY,BUVWXY	RN	13	W ,A, B	RN
13-14	WUZ,HVWXY,BUVWXY	RN	13	W ,A, B	RN
	WUZ,HVWXY,BUVWXY	RN	14	W ,A, B	RN
14-1	WUZ,HVWXY,BUVWXY	RN	14	W ,A, B	RN
	WUZ,HVWXY,BUVWXY	RN	1	W ,A, B	RN

Comments:

Retainers whole set have been found worn medium while all cross fire tube collar were severely worn and body discoloration was showing evidence of hot spot.

GT3055xfire tube&retainer gen cond(a)



TCB GENERAL GOOD CONDITION EXPECTED DISCOLORATION IN ACCORDANCE WITH UNIT TOTAL FIRED HOURS



INSPECTION REPORT
Gas Turbine Maintenance
MS 9001E, 9001FA

Combustion
Transition Piece – General Condition

Date _____ Turbine S/N _____ Prepared by Z.TASYUREI
FSR# _____ Sketches Enclosed? _____ Photos Enclosed? YES
Data Type VISUAL

Part Number Out* 108 E4242 _____

Part Number In* 101E2571G001 _____

*** NOTE:** If part number IN is different than part number OUT, check with customer service.

DEFECT CODES

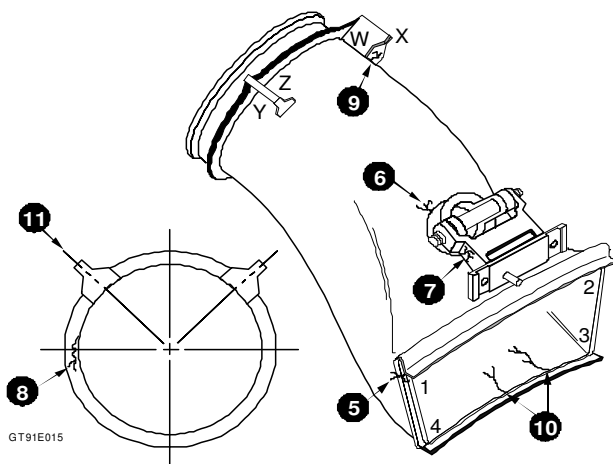
W - Wear
C - Cracked
H - Hot Spots

CRACK LOCATION CODE

W,X,Y,Z - Positions on Forward Bracket
1,2,3,4 - Positions of Aft Corners
5 - Picture Frame Corner Cracks
6 - Aft Mount Weld Cracks
7 - Aft Mount Body Cracks
8 - Forward Ring Weld Cracks
9 - Forward Support Lug Cracks
10 - Transition Body Cracks
11 - Forward Mount Lugs

DISPOSITION CODES

N - No repair or replacement necessary
RG - Repaired by GE
RC - Repaired by Customer
RO - Repaired by Other
RN - Replaced with new component
RR - Replacement Recommended



Chamber	Serial No.		CRACKS			DEFECTS		
	Out	In	Cracks	Location	Length	Code	Location	Disposition
1	SERIAL NUMBER IN AND OUT ARE ALL RECORDED ON A SEPARATE SPREAD SHEET		NONE	NONE	NONE	W,H	WXYZ,5	RN
2			NONE	NONE	NONE	W,H	WXYZ,6	RN
3			NONE	NONE	NONE	W,H	WXYZ,7	RN
4			NONE	NONE	NONE	W,H	WXYZ,8	RN
5			NONE	NONE	NONE	W,H	WXYZ,9	RN
6			NONE	NONE	NONE	W,H	WXYZ,10	RN
7			NONE	NONE	NONE	W,H	WXYZ,11	RN
8			NONE	NONE	NONE	W,H	WXYZ,12	RN
9			NONE	NONE	NONE	W,H	WXYZ,13	RN
10			NONE	NONE	NONE	W,H	WXYZ,14	RN
11			NONE	NONE	NONE	W,H	WXYZ,15	RN
12			NONE	NONE	NONE	W,H	WXYZ,16	RN
13			NONE	NONE	NONE	W,H	WXYZ,17	RN
14			NONE	NONE	NONE	W,H	WXYZ,18	RN
15								
16								
17								
18								

GT3205 TP gen cond(a)



INSPECTION REPORT
Gas Turbine Maintenance

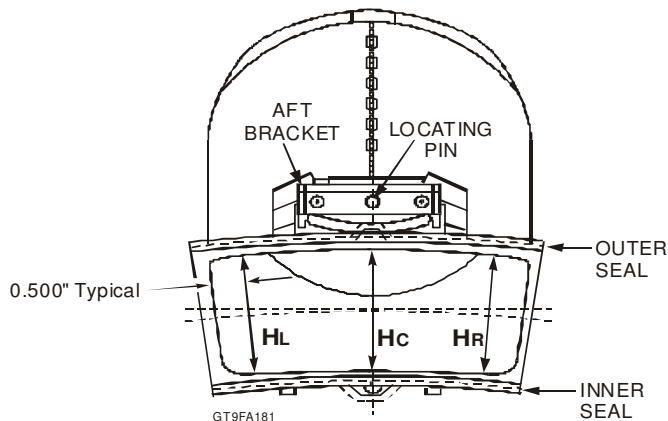
MS 3002, 5001, 5002, 6001F, 7001, 7001F, 9001, 9001F

Transition Piece
Picture Frame Distortion

Date _____
FSR # _____

Turbine S/N _____
Sketches Enclosed? _____
Data Type meas in mm

Prepared by ZEKERYA TASYUREK
Photos Enclosed? YES



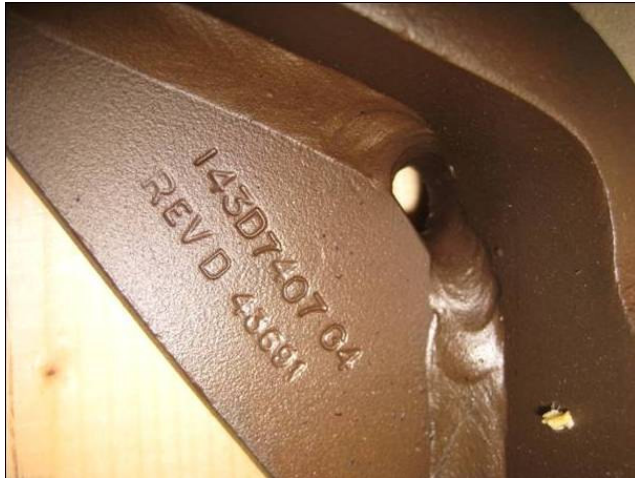
Note: Measurements for H_L, H_c, and H_R should be taken 0.500 inches from the inside picture frame walls and at the center of the picture frame.

Measurements recorded in mils

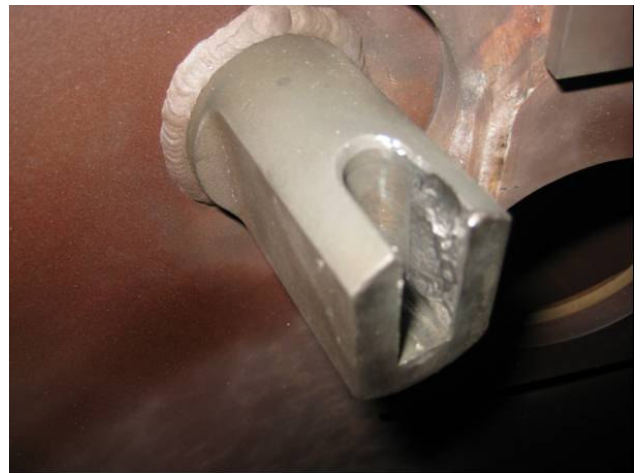
CHAMBER #	H _L	H _c	H _R
1	205.140	204.880	206.180
2	203.860	202.080	203.780
3	205.580	203.740	205.460
4	204.680	203.080	204.120
5	204.060	201.060	204.120
6	204.520	202.320	204.820
7	205.920	205.240	205.440
8	206.800	204.800	205.820
9	205.500	203.500	204.300
10	204.300	203.580	250.600
11	203.740	202.000	205.500
12	204.520	204.000	206.140
13	206.120	206.020	206.980
14	204.340	202.160	203.920
15			
16			
17			
18			

Comments
All Tp s show picture frame distortion nearly 80 mils--2mm which is the maximum allowable. Anyway they will be replaced with new set as per GE maintenance plan procedure.

GT3231tp s picture frame parts out(a)



BULLHORN TYPICAL FRETTING WEAR



FLOW SLEEVES LINER STOPPER FIT FRETTING WEAR



FLOW SLEEVES FORWARD FLANGE REPAIR BEFORE AND AFTER

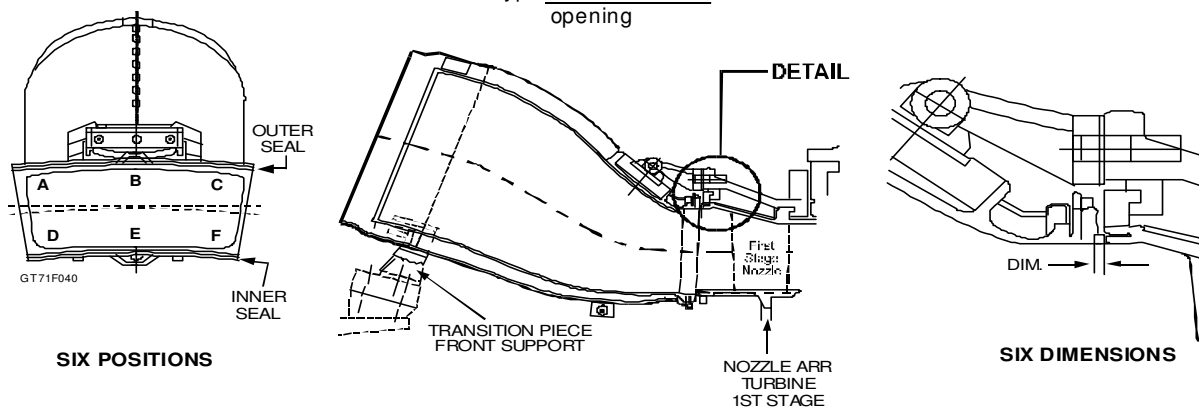
Combustion

Transition Piece to Nozzle Setback

Date	<u>05/08/08</u>
FSR #	87HU0016

Turbine S/N	296973
Sketches Enclosed?	
Data Type	mills
	opening

Prepared by Z.TASYUREK
Photos Enclosed? YES



NOTE: Dimension is taken between the 1st stage nozzle sidewall and the transition piece aft end frame.
Measurement is to be taken with feeler gauges or vernier

CHAMBER NO.	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F
1	0.260	0.265	0.240	0.256	0.260	0.256
2	0.246	0.271	0.278	0.270	0.245	0.253
3	0.243	0.232	0.245	0.251	0.255	0.248
4	0.241	0.241	0.290	0.231	0.278	0.257
5	0.256	0.238	0.280	0.272	0.276	0.320
6	0.268	0.890	0.276	0.289	0.248	0.298
7	0.241	0.252	0.260	0.260	0.255	0.249
8	0.286	0.260	0.262	0.252	0.255	0.254
9	0.317	0.300	0.350	0.309	0.333	0.315
10	0.236	0.282	0.289	0.287	0.283	0.301
11	0.241	0.331	0.313	0.264	0.307	0.310
12	0.264	0.296	0.314	0.266	0.316	0.318
13	0.239	0.267	0.249	0.258	0.244	0.248
14	0.258	0.258	0.277	0.281	0.266	0.247
15						
16						
17						
18						
Comments:	All TP s set back clearance are found mainly within GE design criteria.Indeed set back clearances should be greater than 240 mills and lower than 390 mills.					

GT3225 set back clearance CLOSING(a)



INSPECTION REPORT

Combustion

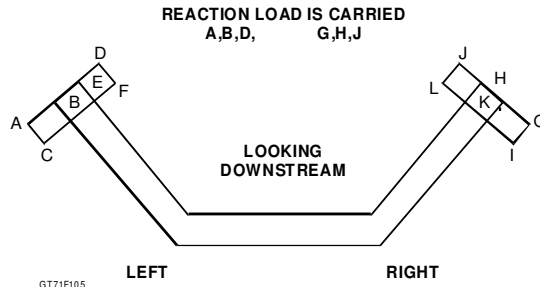
MS 7001F, 9001F

Transition Piece Front Support Clamp - General Condition

Date _____
FSR # _____

Turbine S/N _____
Sketches Enclosed? yes
Data Type visual inspection

Prepared by zekerya tasyurek
Photos Enclosed? yes



CONDITION CODES

N - Normal
W - Worn
CR - Cracked
BT - Bent
M - Missing Metal
BR - Broken
AJ - Adjustment Required

DISPOSITION CODES

NR - No repair or replacement necessary.
RG - Repaired by GE
RC - Repaired by Customer
RO - Repaired by Other
RN - Replaced with new component.
RR - Replacement Recommended

		MEASUREMENT LOCATION AND CONDITION											
CHAMBER	DISP.	A	B	C	D	E	F	G	H	I	J	K	L
1	RN	N	25.000	N	N	15.000	N	N	N	N	N	N	N
2	RN	N	10.000	N	N	20.000	N	N	N	N	N	N	N
3	RN	N	20.000	N	N	10.000	N	N	N	N	N	N	N
4	RN	N	10.000	N	N	10.000	N	N	10.000	N	N	N	N
5	RN	N	N	N	N	N	N	N	5.000	N	N	N	N
6	RN	N	15.000	N	N	N	N	N	10.000	N	N	10.000	N
7	RN	N	25.000	N	N	N	N	N	N	N	N	20.000	N
8	RN	N	10.000	N	N	N	N	N	N	N	N	10.000	N
9	RN	N	N	N	N	N	N	N	N	N	N	N	N
10	RN	N	N	N	N	N	N	N	N	N	N	N	N
11	RN	N	N	N	N	N	N	N	N	N	N	N	N
12	RN	N	N	N	N	N	N	N	10.000	N	N	N	N
13	RN	N	45.000	N	N	20.000	N	N	20.000	N	N	25.000	N
14	RN	N	40.000	N	N	40.000	N	N	10.000	N	N	10.000	N
15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

NOTE: Wear measurement is approximate (visual, feel). Wear depth in MILS.

Comments:	
All bullhorns show very severe rub and wear , we need to change them all since they have exceeded their service limit in term of thickness.	

GT3215 old bullhorn(a)



SIDE SEAL CONDITION



INSPECTION REPORT
Gas Turbine Maintenance

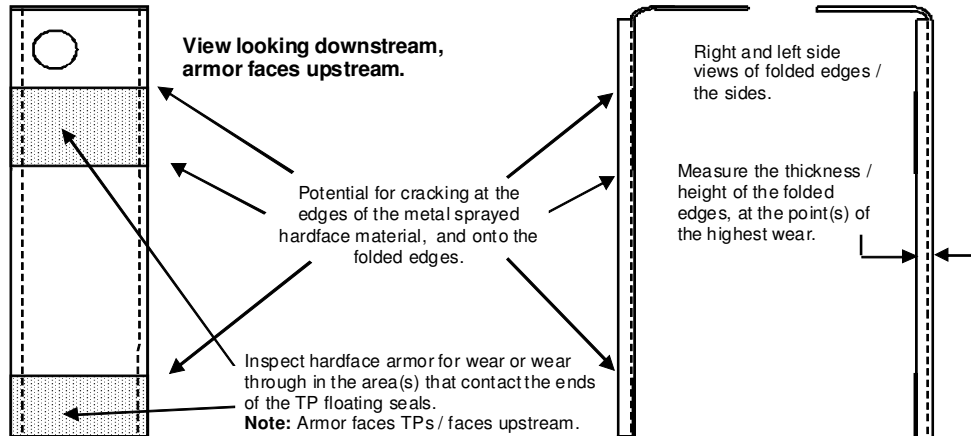
MS 7001F, 9001F

Combustion

Transition Piece Side Seal Condition

Date _____ Turbine S/N _____
FSR # _____ Sketches Enclosed? _____
Data Type visual inspect

Prepared by ZEKERYA TASYURE
Photos Enclosed ? YES



CONDITION CODES:

N - Normal
CR - Cracked
BT - Bent
BR - Broken

M - Missing Metal
BA - Breeched (Hardfaced) Armor
W1 - Wear Less Than 50%
W2 - Wear More Than 50%

DISPOSITION CODES

NR - No repair or replacement necessary.
RN - Replaced with new component.
RR - Replacement Recommended

Location Between	Condition	Disposition
1-2	M,BA,W1	RN
2-3	M,BA,W1	RN
3-4	M,BA,W1	RN
4-5	M,BA,W1	RN
5-6	M,BA,W1	RN
6-7	M,BA,W1	RN
7-8	M,BA,W1	RN
8-9	M,BA,W1	RN
9-10	M,BA,W1	RN
10-11	M,BA,W1	RN
11-12	M,BA,W1	RN
12-13	M,BA,W1	RN
13-14	M,BA,W1	RN

Comments:

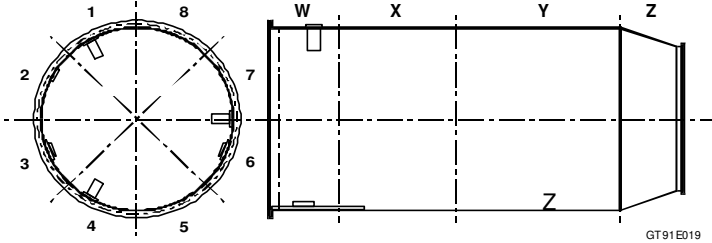
Seal have been checked visually and found in a very poor condition. By the way they will all be replaced by new set.



INSPECTION REPORT
Gas Turbine Maintenance
MS9001

Combustion
Flow Sleeve - General Inspection (DLN-1)

Date _____ Turbine S/N _____ Prepared by Z.TASYUREK
FSR # _____ Sketches Enclosed? _____ Photos Enclosed? YES



DEFECT CODES:

CR - Cracked
D - Distortion
W - Wear
B - Blockage (Fuel Drain)
PW - Liner Stop Pin Wear
SW - Liner Stop Side Wear

DISPOSITION CODES:

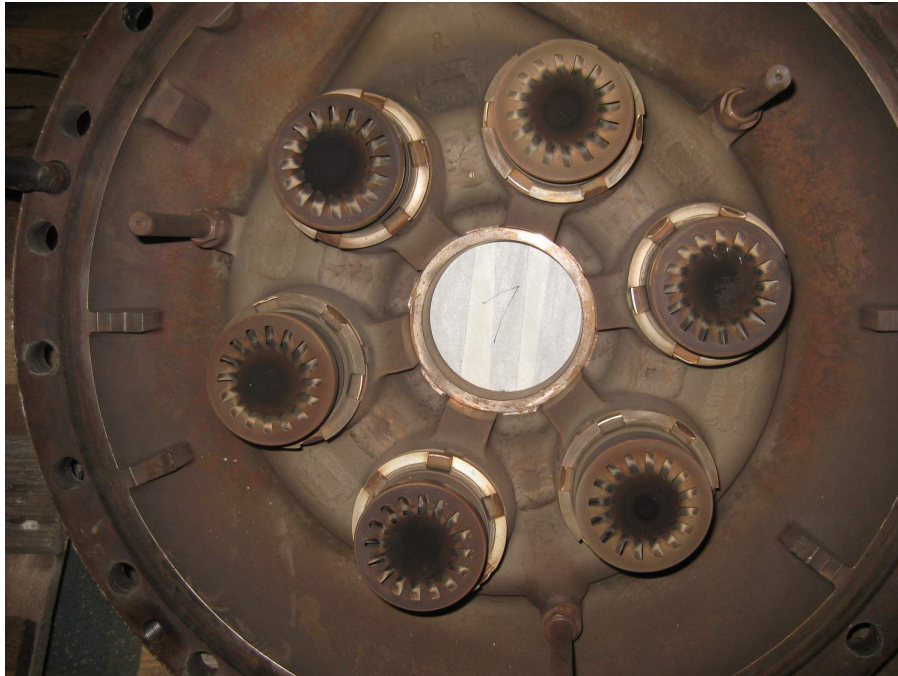
N - No Repair or Replacement
R - Repaired (by whom)
RN - Replace with new

Chamber #	Shell Defects		Flange Defects		
	Code	Location	Code	Location	Disposition
1	NO	NO	NO	NO	N
2	NO	NO	NO	NO	N
3	PW,SW	liner stopper	NO	NO	REPAIR BY SULZER
4	NO	NO	NO	NO	N
5	NO	NO	NO	NO	N
6	NO	NO	NO	NO	N
7	NO	NO	NO	NO	N
8	PW,SW	liner stopper	NO	NO	REPAIR BY SULZER
9	PW,SW	liner stopper	NO	NO	REPAIR BY SULZER
10	PW,SW	liner stopper	NO	NO	REPAIR BY SULZER
11	NO	NO	NO	NO	N
12	PW,SW	liner stopper	NO	NO	REPAIR BY SULZER
13	PW,SW	liner stopper	NO	NO	REPAIR BY SULZER
14	NO	NO	NO	NO	N
15					
16					
17					
18					

Comments:

Flow sleeves have been visually inspected and found without defect except fretting wear on the liner stoppers without any serious issue. Discoloration was to be noticed as well due to corrosion and deposit very light. By the way these flow sleeves will be repaired and returned back to the unit for another service until the next planned inspection

GT3077FLOW SLEEVE INSPECTION(a)



PRIMARY GAS FUEL NOZZLE GENERAL CONDITION



INSPECTION REPORT
Gas Turbine Maintenance
MS7001 E/EA

Combustion
Fuel Nozzle, Primary (DLN-1)

Date _____ Turbine S/N _____
FSR # _____ Sketches Enclosed? _____
Data Type INSPECTION

Prepared by Z.TASYUREK
Photos Enclosed? YES

DRAWING NO. OUT _____
IN _____
COMBUSTION
CHAMBER NO. _____

CONDITION CODES

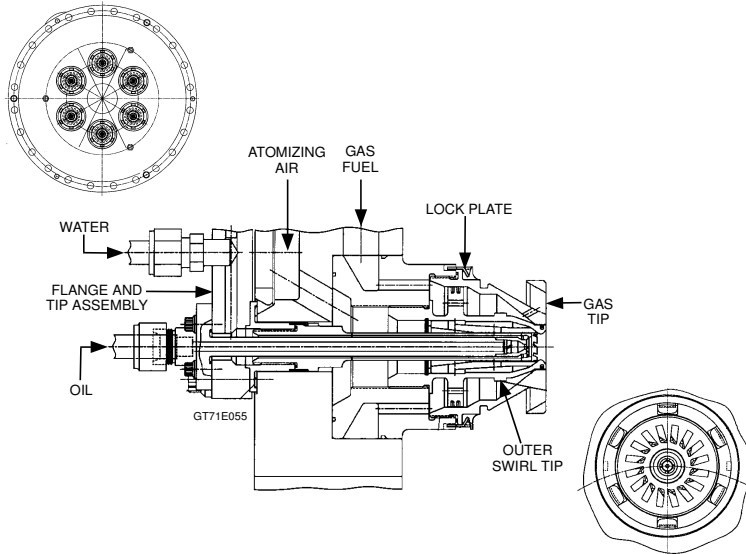
C - Carboned
GA - Galled
ER - Erosion
NK - Nicks
BU - Burned
CR - Cracked

DISPOSITION CODES

N - No repair or replacement necessary
RG - Repaired by GE
RC - Repaired by Customer
RO - Repaired by Other
RN - Replaced with new component
RR - Replacement Recommended

DEPOSIT CODES

N - None
L - Light
M - Medium
H - Heavy



PRIMARY FUEL NOZZLE INSPECTION

Primary Nozzle Number	Condition		Gas Tip Wear Codes	Atomizing Air Tip Erosion		Primary Fuel Tube Assembly Plugging (Code)	Disposition
	Codes	Item		Yes	No		
1	C	GAS TIP	L	N/A	N/A	N	RO
2	C	GAS TIP	L	N/A	N/A	N	RO
3	C	GAS TIP	L	N/A	N/A	N	RO
4	C	GAS TIP	L	N/A	N/A	N	RO
5	C	GAS TIP	L	N/A	N/A	N	RO
6	C	GAS TIP	L	N/A	N/A	N	RO

Comments:	



INSPECTION REPORT
Gas Turbine Maintenance

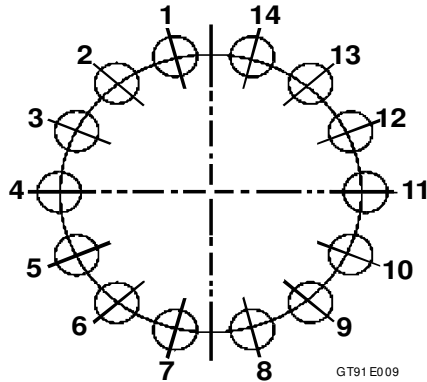
MS9001

Combustion
Chambers – General Condition

Date _____ Turbine S/N _____
FSR # _____ Sketches Enclosed? _____
Data Type visual

Prepared by ZEKERYA TASYUREK
Photos Enclosed? YES

COMBUSTION LINER ORIENTATION
LOOKING DOWNSTREAM



PROCEDURE

1. Make inspection of Combustion Casing (Cans), Inner Shields, and Covers.
2. Report Evidence of:
 - a. **CORROSION** Make quantitative judgment of the degree (light, medium, heavy)
 - b. **CRACKING** Report directional (axial or circumferential) length in inches, location (weld or parent metal) and disposition (repair or replace)
 - c. **OVERHEATING** Look for and report discoloration, bulging (inward) or holes burned through.

Chamber No.	Describe Condition and Disposition
1	LIGHT EVIDENCE OF CORROSION INSIDE AND PAINT PEEL OFF ON THE OUTSIDE
2	LIGHT EVIDENCE OF CORROSION INSIDE AND PAINT PEEL OFF ON THE OUTSIDE
3	LIGHT EVIDENCE OF CORROSION INSIDE AND PAINT PEEL OFF ON THE OUTSIDE
4	LIGHT EVIDENCE OF CORROSION INSIDE AND PAINT PEEL OFF ON THE OUTSIDE
5	LIGHT EVIDENCE OF CORROSION INSIDE AND PAINT PEEL OFF ON THE OUTSIDE
6	LIGHT EVIDENCE OF CORROSION INSIDE AND PAINT PEEL OFF ON THE OUTSIDE
7	LIGHT EVIDENCE OF CORROSION INSIDE AND PAINT PEEL OFF ON THE OUTSIDE
8	LIGHT EVIDENCE OF CORROSION INSIDE AND PAINT PEEL OFF ON THE OUTSIDE
9	LIGHT EVIDENCE OF CORROSION INSIDE AND PAINT PEEL OFF ON THE OUTSIDE
10	LIGHT EVIDENCE OF CORROSION INSIDE AND PAINT PEEL OFF ON THE OUTSIDE
11	LIGHT EVIDENCE OF CORROSION INSIDE AND PAINT PEEL OFF ON THE OUTSIDE
12	LIGHT EVIDENCE OF CORROSION INSIDE AND PAINT PEEL OFF ON THE OUTSIDE
13	LIGHT EVIDENCE OF CORROSION INSIDE AND PAINT PEEL OFF ON THE OUTSIDE
14	LIGHT EVIDENCE OF CORROSION INSIDE AND PAINT PEEL OFF ON THE OUTSIDE

Comments

Outer combustion cans are in pretty good condition except the fact that they have slight discoloration and light corrosion. They all return back to the unit until the next planned outage.

GT3020 comb chamb gen condi(a)



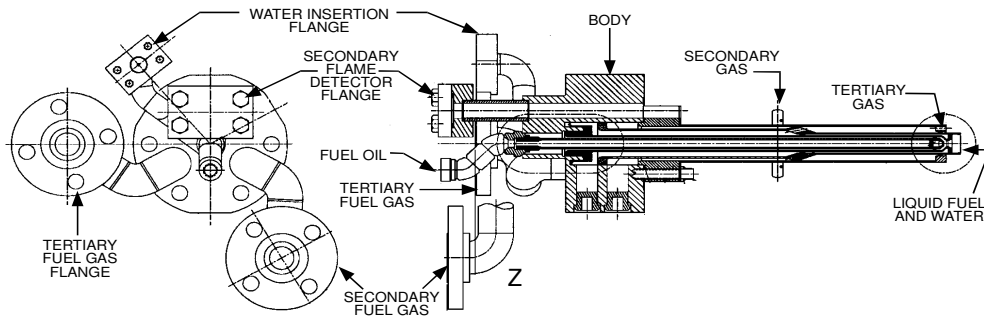
INSPECTION REPORT

MS 7001E/EA, 7001F, 9001E, 9001F

Combustion Secondary Fuel Nozzle (DLN- 1)

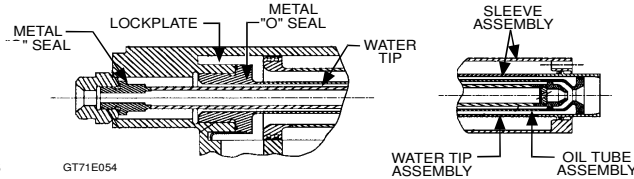
Date _____ Turbine S/N _____
FSR # _____ Sketches Enclosed? _____

Prepared by Z.TASYUREK
Photos Enclosed? YES
Part In 119E9660G001
Part Out 1094693G001



Defect Codes

W - Wear
CR - Cracked
BT - Bent
BU - Burned
H - Hot Spots



Disposition Codes

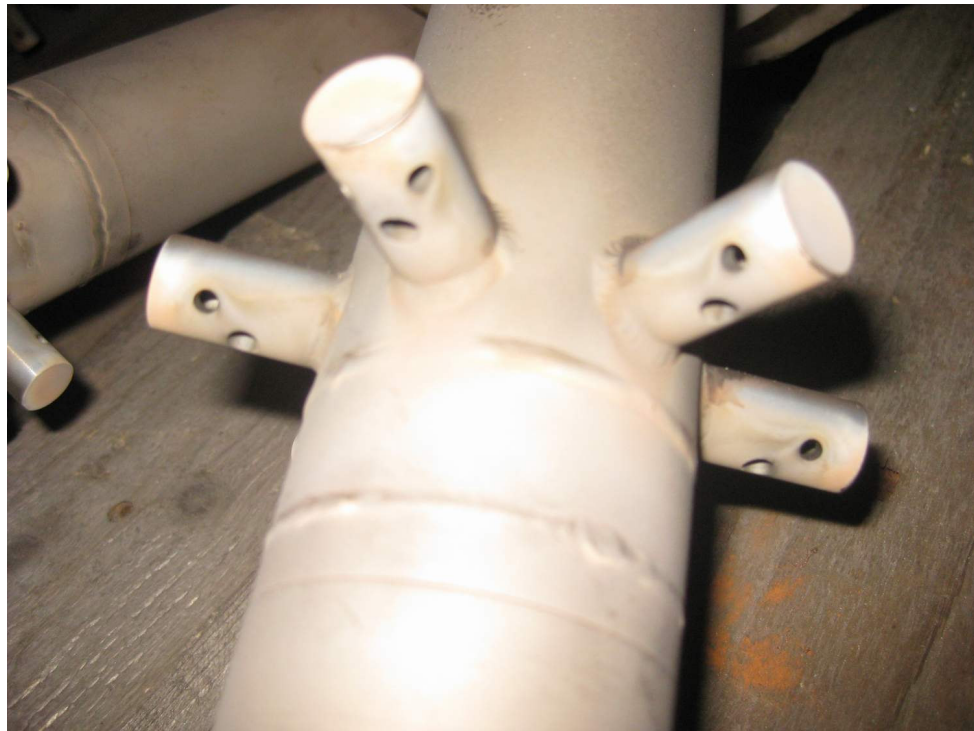
N - No repairs or replacement necessary
R - Repaired (On-site, GE Service Shop)
RN - Replaced with new component

Chamber Number	Serial Number	Describe Condition	Disposition
1	N/A	LIGHT CARBON DEPOSIT AND DISCOLORATION	RN
	N/A		
2	N/A	LIGHT CARBON DEPOSIT AND DISCOLORATION	RN
	N/A		
3	N/A	LIGHT CARBON DEPOSIT AND DISCOLORATION	RN
	N/A		
4	N/A	LIGHT CARBON DEPOSIT AND DISCOLORATION	RN
	N/A		
5	N/A	LIGHT CARBON DEPOSIT AND DISCOLORATION	RN
	N/A		
6	N/A	LIGHT CARBON DEPOSIT AND DISCOLORATION	RN
	N/A		
7	N/A	LIGHT CARBON DEPOSIT AND DISCOLORATION	RN
	N/A		
8	N/A	LIGHT CARBON DEPOSIT AND DISCOLORATION	RN
	N/A		
9	N/A	LIGHT CARBON DEPOSIT AND DISCOLORATION	RN
	N/A		
10	N/A	LIGHT CARBON DEPOSIT AND DISCOLORATION	RN
	N/A		

Comments:



SECONDARY GAS FUEL NOZZLE WITH LIGHT CARBON DEPOSIT AND DISCOLORATION ON ITS TERTIARY TIP



SECONDARY GAS FUEL NOZZLE WITH LIGHT CARBON DEPOSIT AND DISCOLORATION ON ITS SECONDARY TIP

Compressor Inner Barrel

Casing ASSY, INNER BR

Inner barrel was inspected from outside without its upper half being removed, no defect neither indication was to be noticed.

Compressor Discharge Casing

WRAPPER CASING

Outer piping of vent line was removed and checked without finding any indication new gasket was fitted after cleaning.

Also both sides horizontal seal keys were checked for better sealing during the rebuilt.

Compressor Discharge Casing

Assembly; COMPRESSOR DISCHARGE

Visual inspection on compressor discharge casing was performed without any findings. Also casing misalignment was checked visually to find out any potential CDC slippage. No indication was seen.

As well as mid compressor to compressor discharge casing horizontal and vertical flanges were perfectly aligned.

During the last major overhaul of unit Sulzer was in charge that time they discovered S17 hook fit damage then they proposed to make a back shimming which was checked and found still in condition to be kept as is. However we removed four S17 vanes from each side and each halves in order to check stator vane platform blocks and hook fit wear condition and compared with what was found last major disassembly and indeed these defect areas worsened slightly bit.

Also we found a broken S17 vane stuck right after EGV2 with no serious incidence on unit integrity, therefore we just replace it with a spare and carried on a red dye penetrant inspection on 5 each sides on each half from S15, S16 and S17 stator vane .

Check any CDC slippage and S17 hook fit during the next planned major inspection and check all threads repair by inserting new helicoil.

Compressor Rotor Blade(s)

Tip:

Prior to start the hot gas path inspection we carried out a complete compressor boroscope inspection in order to monitor an existing defect which was discovered last inspection done by Sulzer. Indeed we found heavy damage on the compressor R1 blades then pac case #20110303-0040 was raised for a repair disposition which was given the repair was performed accordingly.

BIP+

EON

ROTTERDAM

PAC: 20110303-0040

SN: 296470

9E

15/03/2011

105001746

Unit Hours: 119178

Unit Starts: 1302

Unit Trips: 198

The following blend instructions were created strictly for the unit identified in the PAC case above. No blends in this document should be applied any other unit or airfoil without documented Product Service approval. In addition, if the blends are not applied during the current outage please notify GE Product Service via the PAC case above.

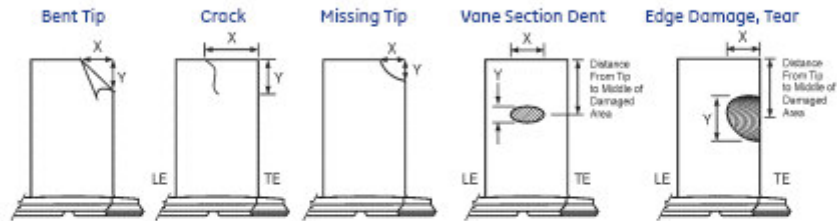


imagination at work

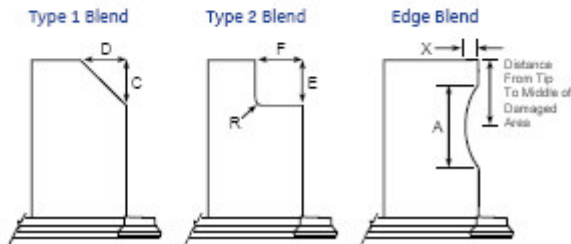
Version: 1.1.0

EON - ROTTERDAM

Damage Definitions:



Blend Repair Definitions:



Nomenclature:

LE – Leading Edge (FWD)
TE – Trailing Edge (AFT)
PS – Pressure Side (CC)
SS – Suction Side (CV)

EON - ROTTERDAM

Blend Instructions:

- Do not induce temperatures above 650°F, use of heat chalk recommended.
- Final surface finish should be 32 RMS or better, check with a profilometer.
- Remove as little coating as necessary for coated blades.
- NDT inspect all repaired areas per P3A-AG2 (red dye) or P3A-AG4 (FPI).
- If LE is blended, re-contour the blended LE to the original shape.
- Flapper peening is required anytime the blend is within 1" of the root fillet.
- Break edges of the blend, if required.

EON - ROTTERDAM

Stage	Blade	Location	Damage Type	Tip Dist (mm)	X (mm)	Y (mm)	Repair Type	Repair X (mm)	Repair Y (mm)
R1	11	LE	Bent Tip	0	20	20	Type I	21	21
R1	14	LE	Bent Tip	0	15	15	Type I	16	16
R1	16	LE	Bent Tip	0	10	10	Type I	11	11
R1	17	LE	Bent Tip	0	10	10	Type I	11	11
R1	18	LE	Bent Tip	0	10	10	Type I	11	11
R1	19	LE	Bent Tip	0	15	15	Type I	16	16
R1	22	LE	Bent Tip	0	10	10	Type I	11	11
R1	23	LE	Bent Tip	0	20	20	Type I	21	21

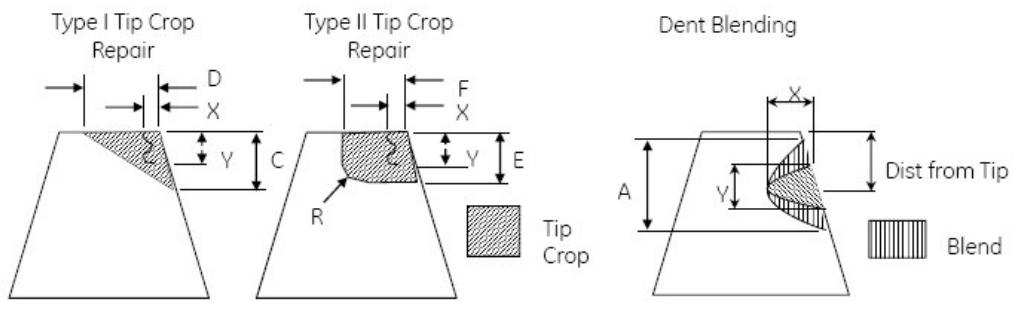


Disposition Summary - S/N 296470 (I)

- Unit has 119178 Hrs, 1302 Starts, and 198 Trips at time of failure.
- PAC Case = http://gaatli17psge.psamer.ps.ge.com/bu_intranets/energy_serv/ps/commit_tracking/printable_case_detail.jsp?x_id_number=20110303-0040-1
- Note: All damage blades dispositioned via BIP can be found in the PAC case. Blades in this presentation did not pass the BIP Wizard

Unless otherwise noted in the Clarify,
additional aerodynamic evaluation is not
required.

Blend Repair Definitions



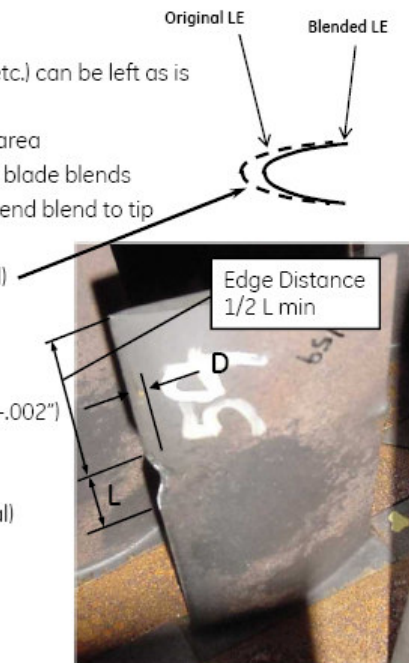
Blend Guidelines

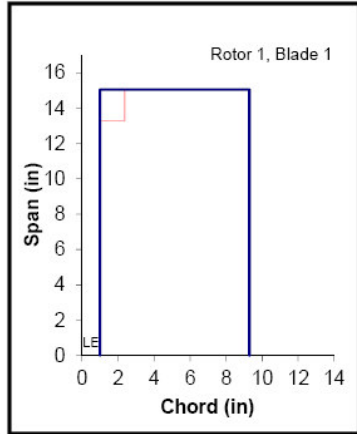
Unless Otherwise Noted Follow Procedure Below:

- Any blade damage that is a smooth dent (no creases, sharp edges, etc.) can be left as is
- Minimize material removal but remove all damaged material
- Generous radius (~.250") min. to be used on either side of damaged area
- Maintain approx. 3:1 or greater (length:depth) aspect ratio on typical blade blends
- Desired edge distance from blade tip 1/2 L minimum - otherwise extend blend to tip
- Highly polish all blended surfaces and edges
- If LE is blended, contour similar to LE shape (blend is new LE of airfoil)
- FPI blended areas after blending/polishing

For Stages Showing Blade Tip Rub:

- Polish all blade tips on stages showing rub (remove additional ~.001-.002")
- Remove rolled over material at blade tip
- FPI tips after polishing
- Blend burrs, etc. in rubbed areas of cases (minimize material removal)





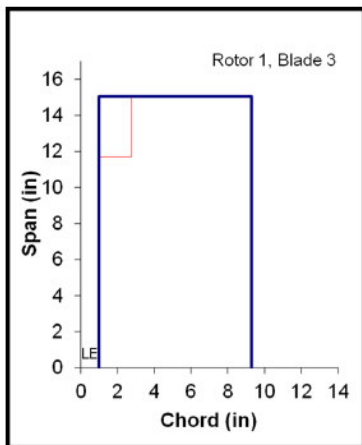
Frame	9E	Stage	1	Blade	1
Damage	Edge	D	X	Y	Type
1	LE	0.00	1.38	1.77	Bent Tip



R1-B1.JPG

Damage 1:

Damage requires analysis of blade.
Disposition to follow.



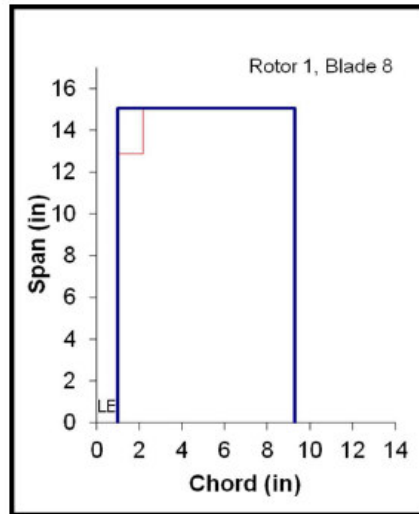
Frame	9E	Stage	1	Blade	3
Damage	Edge	D	X	Y	Type
1	LE	0.00	1.77	3.35	Bent Tip



R1-B3.JPG

Damage 1:

Damage requires analysis of blade.
Disposition to follow.



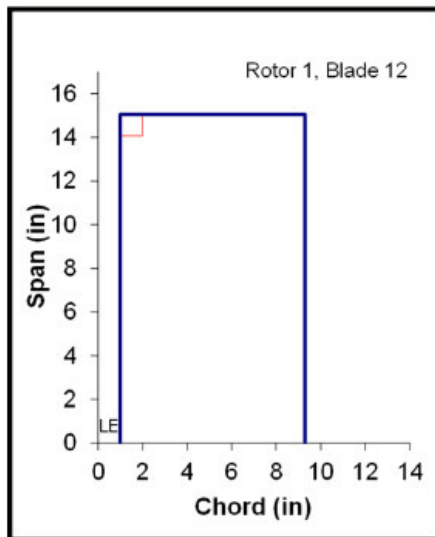
Frame	9E	Stage	1	Blade	8
Damage	Edge	D	X	Y	Type
1	LE	0.00	1.18	2.17	Bent Tip



R1-B8.JPG

Damage 1:

Damage requires analysis of blade.
Disposition to follow.



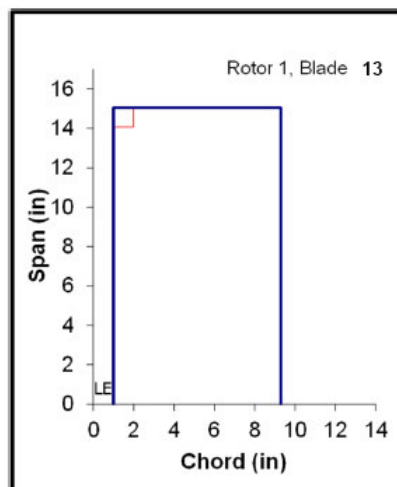
Frame	9E	Stage	1	Blade	12
Damage	Edge	D	X	Y	Type
1	LE	0.00	0.98	0.98	Bent Tip



R1-B12.JPG

Damage 1:

Type I blend repair to remove damage. Only remove as much material as necessary.
Use D=0.99 inch, C=0.99 inch.
FPI post blend.



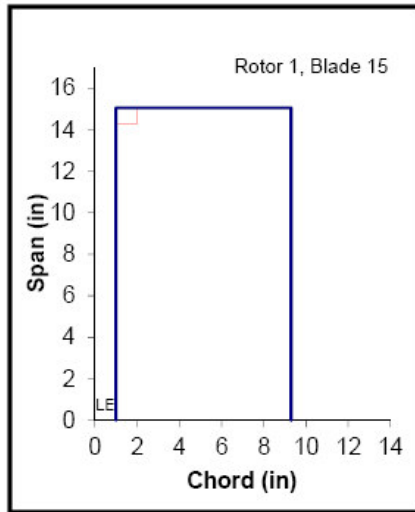
Frame	9E	Stage	1	Blade	13
Damage	Edge	D	X	Y	Type
1	LE	0.00	0.98	0.98	Bent Tip



R1-B13.JPG

Damage 1:

Type I blend repair to remove damage. Only remove as much material as necessary.
Use D=0.99 inch, C=0.99 inch.
FPI post blend.



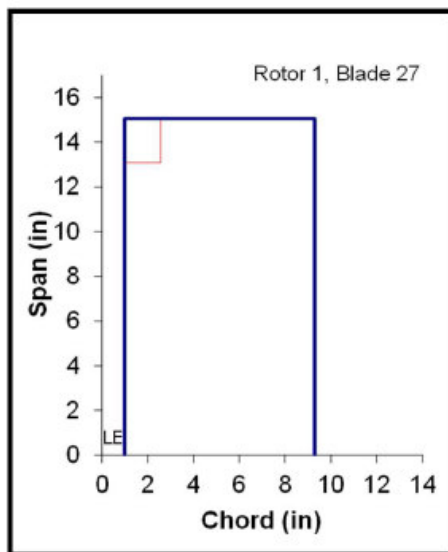
Frame	9E	Stage	1	Blade	15
Damage	Edge	D	X	Y	Type
1	LE	0.00	0.98	0.79	Bent Tip



R1-B15.JPG

Damage 1:

Type I blend repair to remove damage. Only remove as much material as necessary.
 Use D=0.99 inch, C=0.8 inch.
 FPI post blend.



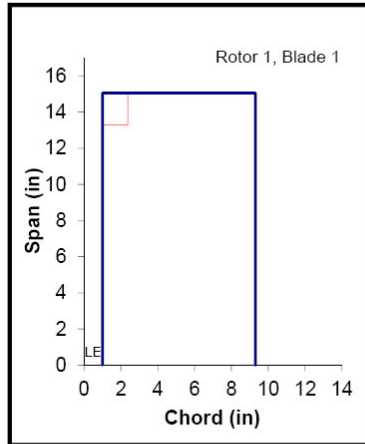
Frame	9E	Stage	1	Blade	27
Damage	Edge	D	X	Y	Type
1	LE	0.00	1.57	1.97	Bent Tip



R1-B27.JPG

Damage 1:

Damage requires analysis of blade.
 Disposition to follow.



Frame	SE	Stage	1	Blade	1
Damage	Edge	D	X	Y	Type
1	LE	0.00	1.38	1.77	Bent Tip



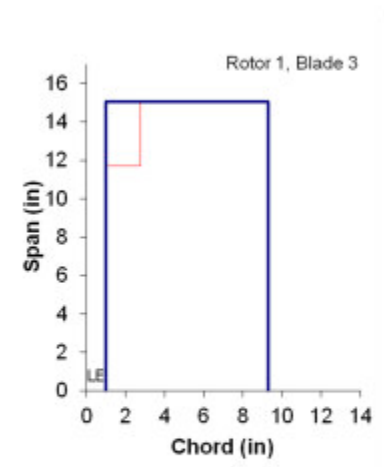
R1-B1.JPG

Damage 1:

Type II blend repair to remove damage. Make sure radius is at least 0.250 inch.
Use F=1.39 inch, E=1.78 inch.

Make sure all radii are smooth.

FPI post blend.



Frame	SE	Stage	1	Blade	3
Damage	Edge	D	X	Y	Type
1	LE	0.00	1.77	3.35	Bent Tip



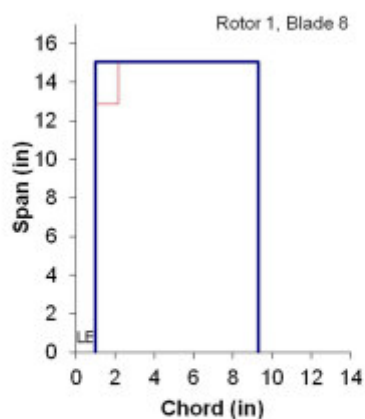
R1-B3.JPG

Damage 1:

Type II blend repair to remove damage. Make sure radius is at least 0.250 inch.
Use F=1.78 inch, E=3.36 inch.

Make sure all radii are smooth.

FPI post blend.



Frame	SE	Stage	1	Blade	8
Damage	Edge	D	X	Y	Type
1	LE	0.00	1.18	2.17	Bent Tip



R1-B8.JPG

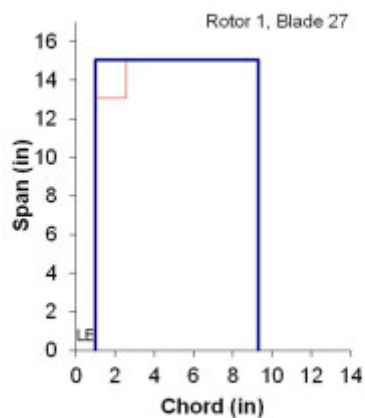
Damage 1:

Type II blend repair to remove damage. Make sure radius is at least 0.250 inch.

Use F=1.19 inch, E=2.18 inch.

Make sure all radii are smooth.

FPI post blend.



Frame	SE	Stage	1	Blade	27
Damage	Edge	D	X	Y	Type
1	LE	0.00	1.57	1.97	Bent Tip



R1-B27.JPG

Damage 1:

Type I blend repair to remove damage. Only remove as much material as necessary.

Use D=1.58 inch, C=1.98 inch.

FPI post blend.

Aero performance losses

As these tip crops are fairly large and they are all grouped together (including minor ones-15 blades), this will lead to aero performance losses as mentioned below. Customer should be informed about these losses.

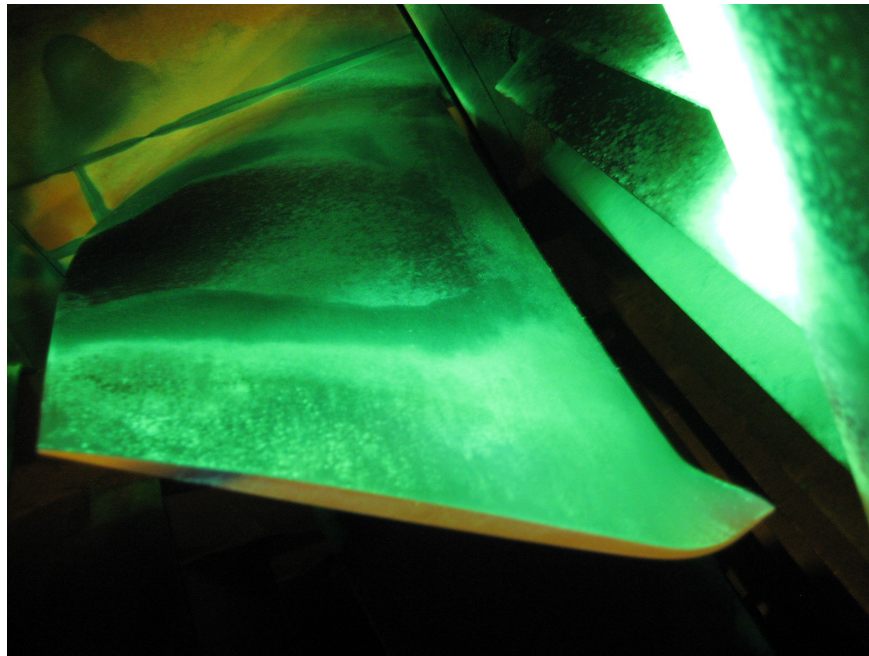
Change in Flow: -0.5%

Change in Efficiency: -0.1 points

Change in ISO Day Stall Margin: -0.5%

Change in Hot Day Stall Margin: -3.0%

•Airfoil COE recommends to open a new subcase for aero team to obtain a updated IGV schedule for protecting the compressor on hot day



Fluorescent dye penetrant before GE repair

Inlet Guide Vane

Assembly:

A clearance check was performed, and results were compared to design values.

All measurements indicate clearance is within the recommended tolerance.

Also IGV vane visual inspection was carried out to figure out any damage or cracks emanating from the root , head , leading and trailing edges without indication.

All IGV vanes upper and lower halves as a HGPI inspection duty scope we took inlet guide vanes backlash, Xgap and bushing clearances in accordance with TIL#517-CR1,TIL#1068-2,TIL#1132-2.

The results of the inspection are documented on the following pages.

As per normal maintenance inspection check IGV clearance and their general condition in term of crack or FOD during the next planed HGPI or CI.

Inlet Guide Vane

Bushing - Inner:

A clearance check was performed as per TIL 1068-2R1 and results were compared to design values.

All measurements indicate clearance is within the recommended tolerance. The results of the inspection are documented on the following pages.

Check inner bushing clearance during the next planed hot gas path inspection

Inlet Guide Vane

Gear - Rack:

A clearance check was performed as per GE TIL 517CR1 and results were compared to design values. All measurements indicate clearance is within the recommended tolerance. The results of the inspection are documented on the following pages.

Check inner bushing clearance during the next planed hot gas path inspection

All measurements indicate gear backlash clearance within the recommended tolerance. The results of the inspection are documented on the following pages.

Check gear backlash clearance for the next planed combustion inspection or Hot gas path.

Inlet Guide Vane

Vane - IGV;

IGV vanes have all been visually checked for any cracks or failure mode by customer NDT team on various areas such like root, head, leading and trailing edges. No cracks or nick, dents, Foreign object damage neither were found. Vanes are in a very good condition except the fact that they were a little greasy with light black deposit.

They all have been checked cleaned and got ready for another service until the next planed outage.

Check IGV vanes leading, trailing edges as well as vane's root and head during the next planed outage.

Inlet Guide Vane

Washer - Thrust;

A clearance check was performed, as per GE TIL 1132-2R1 results were compared to design values.

All measurements indicate clearance is within the recommended tolerance. The results of the inspection are documented on the following pages.

Check thrust clearance for the next planed combustion inspection or HGPI.

Date _____ Turbine S/N _____ Prepared by Z.TASYUREK
 FSR # _____ Sketches Enclosed? _____ Photos Enclosed? NO
 Data Type mills

Rotor Tip Clearances are to be measured and recorded below. All views with turbine flow.

Opening Positioning Checks (Disassembly) **O** ☐
 Closing Positioning Checks (Reassembly) **C** ☐

	O 61.000 C 69.000		O 85.000 C 87.000	
O 67.000 C 78.000	1st Stage Compressor Clearance	78.000 O 82.000 C	72.000 O 74.000 C	7th Stage Compressor Clearance
O 53.000 C 69.000		71.000 O 74.000 C		65.000 O 63.000 C
	O 46.000 C 49.000		O 62.000 C 68.000	
	Probe Hole Check O 82.000 C 84.000	All axial clearances are measured with rotor against the loaded thrust face. Refer to EM5260 to confirm rotor position.	Probe Hole Check O 124.000 C 98.000	
O 68.000 C 78.000	13th Stage Compressor Clearance	97.000 O 85.000 C	70.000 O 68.000 C	17th Stage Compressor Clearance
	O 58.000 C 63.000			98.000 O 86.000 C
				O PLUG BROKEN C PLUG BROKEN

Comments:	
Rotor position taken and found satisfactory according to MLI 404 clearance diagram. 17th stage compressor lower half clearancometer plug found broken so it has to be replaced during the next planed major inspection	

GT1045 rotor position open&clos(a)

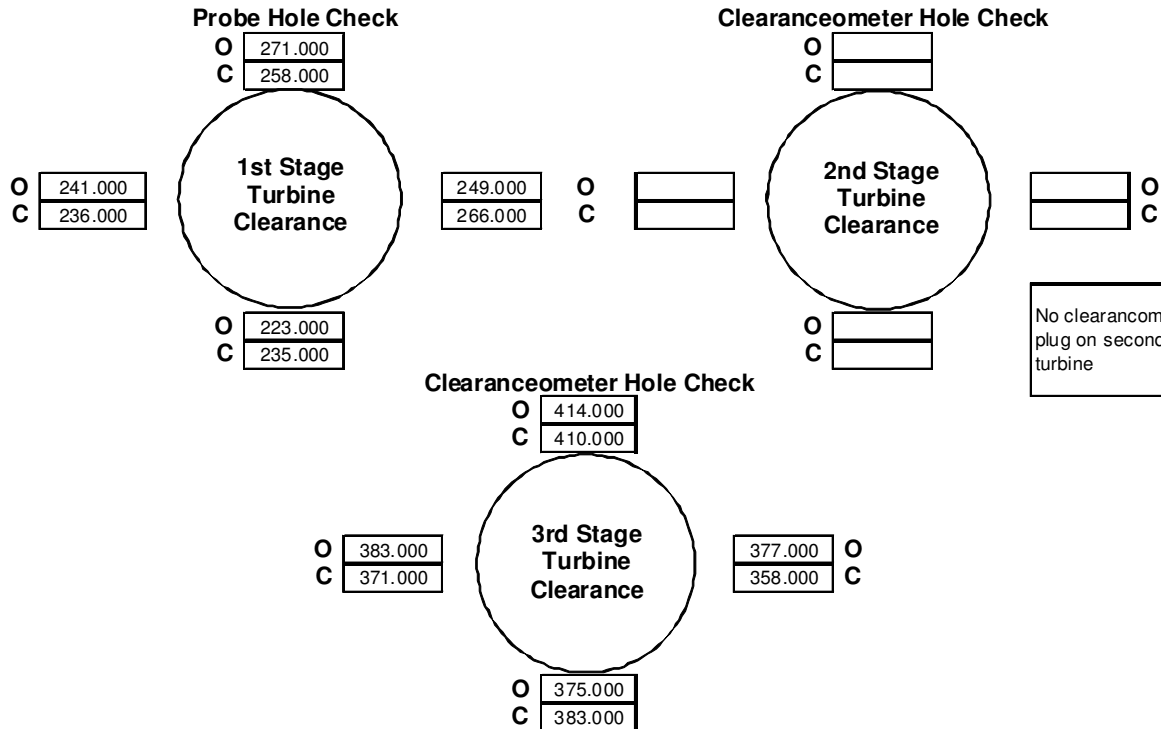
Date _____
FSR # _____

Turbine S/N _____
 Sketches Enclosed? _____
 Data Type _____ mills

Prepared by Z.TASYUREK
Photos Enclosed? NO

Rotor Tip Clearances are to be measured and recorded below. All views with turbine flow.

Opening Positioning Checks (Disassembly)	O	
Closing Positioning Checks (Reassembly)	C	

**Comments:**

ROTOR BUMP CHECK WAS DONE AND FOUND 0.6MM

GT1045 rotor position open&clos(b)
open(a)



INSPECTION REPORT
Gas Turbine Maintenance

Compressor

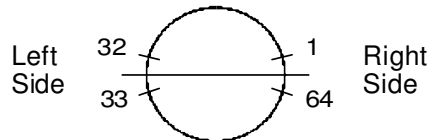
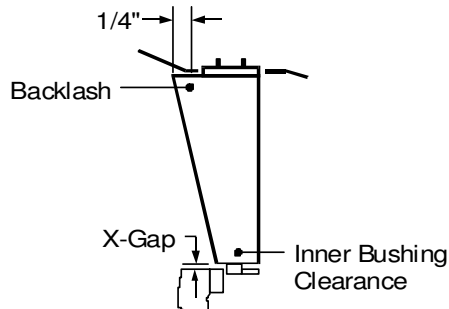
MS 7001, 9001

Inlet Guide Vane Clearances – Variable

FSR # _____

Turbine No. _____
Sketches Enclosed? NO

Prepared by Z.TASYUREK
Photos Enclosed? NO



All axial clearances are measured with rotor against the loaded thrust face. Refer to EM5260 to confirm rotor position.

Position	Backlash	Inner B'ing Clr	X-gap Cir
1	31	6	19
2	26	5	19
3	13	9	19
4	15	7	19
5	25	15	21
6	14	7	21
7	12	7	20
8	16	8	21
9	14	9	22
10	18	7	21
11	19	10	17
12	15	4	17
13	10	11	16
14	8	6	16
15	14	8	16
16	14	6	16
17	12	7	16
18	15	5	16
19	11	10	16
20	11	4	16
21	14	5	25
22	16	4	25
23	17	10	25
24	26	12	25
25	10	13	25
26	17	12	25
27	12	11	25
28	14	3	25
29	11	5	25
30	10	10	25
31	16	12	25
32	19	4	25

Position	Backlash	Inner B'ing Clr	X-gap Cir
33	8	7	24
34	22	11	24
35	10	8	23
36	18	7	24
37	17	10	24
38	21	12	24
39	28	13	20
40	23	14	20
41	29	9	20
42	24	18	20
43	18	6	20
44	20	9	19
45	21	8	19
46	31	8	19
47	29	9	19
48	26	13	20
49	31	7	19
50	19	10	19
51	32	13	18
52	26	12	18
53	15	9	19
54	24	7	19
55	18	16	18
56	32	8	17
57	18	11	19
58	14	7	19
59	17	9	19
60	11	13	19
61	10	16	19
62	12	15	19
63	14	8	19
64	17	9	19

517CR - Backlash TIL 1068-2 - Inner Bushing Clearance TIL 1132-2 - Thrust Washer Clearance

Comments:
TIL s have been all checked , Xgap found within clearance since minimum xgap should be above 8 mills.Maximum gear backlash was found to be 32 which is fine as well because maximum allowance is 40 mills.Bushing clearance also checked and found to be all within GE spec.All measurment have been taken in mills(Thousands of an inch)

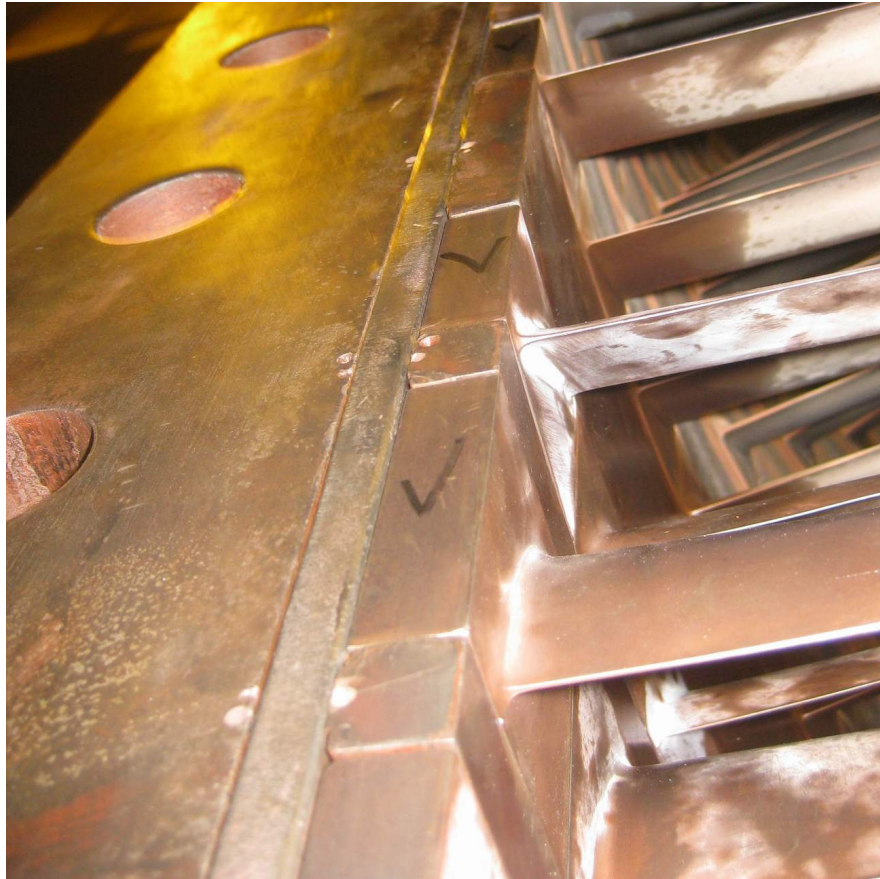
GT4050 opening &closing igv clearance(a)



IGV GENERAL CONDITION



CDC COMPRESSOR STATOR VANE GENERAL GOOD CONDITION



COMPRESSOR STATOR VANE MID JOINT DROP CHECK SET UP AS GE DESIGN VALUES



TURBINE SECTION

Turbine Casing

Joint - Vertical:

Turbine casing bolts were disassembled and cleaned, and routine inspection was performed. No problem areas were found on the casing. During disassembly we had one bolt broken between CDC forward flange and wrapper casing forward flange. We machined it and took off wrapper casing out without problem.

Turbine casing lower and upper half was both checked carefully after all hardware nozzles, shrouds were removed. No cracks no defects were to be noticed. All vertical and horizontal flanges have been stoned cleaned and got ready for reassembly.

Check Turbine casing carefully during disassembly for any crack or defect emanating from the casing cooling and shroud pin holes.

1st Stage Bucket

Assembly; STG1 BUCKET

First stage bucket has been removed completely under an I&RS technician supervision. This last has been carefully done visual inspection for signs of cracks, dents, missing materials, rubs and other anomalies'. When inspecting bucket squealer tip, material loss and cooling holes, the only defect we could noticed is squealer tip rub and heavy discoloration. Bucket pressure and suction surfaces have been found free of cracks and FOD.

Bucket s areas have been inspected such like dovetails, platforms and angel wings, all have been found to be in pretty condition. All of them show light corrosion, burned TCB and oxidation build up mostly around the airfoil surfaces, which are typical.

First stage bucket set all removed replaced with refurbished set as part of customer and GE maintenance scope. Serial numbers have been all recorded, old set packed and ready to be shipped to a certified GE workshop for refurbishment.

Check and apply the same inspection procedures in the next HGPI, also borescope inspection will be useful to monitor bucket condition during the next planed combustion inspection.



TURBINE SECTION

2nd Stage Bucket

Assembly; STG2 BUCKET

Bucket stg2 set was disassembled and cleaned, and routine inspection was performed. Indeed Z lock were showing evidence of fatigue and rub since they have already reached their life expectancy. Also cutter teeth were gone and seem they don't work anymore since missing material is to be seen on shroud tips as shown on the following relevant picture.

Bucket set will be replaced with refurbished one as per customer preventive maintenance plan by a qualified I&RS bucket specialist accordingly to the moment weight chart. The old 2nd stage buckets were packed and ready to be shipped to a certified GE workshop for refurbishment.

Check and Remove carefully lock pins and change all second stage buckets during the next planed HGPI also borescope inspection will be required to monitor bucket shrouded tip and cutter teeth condition during the next planed combustion inspection

3rd Stage Bucket

Assembly; STG3 BUCKET

Bucket stg3 wasn't disassembled and routine inspection was performed. No problem areas were found on this component except slight discoloration. By the way as per customer preventive maintenance plan, we have kept them in place as is since they will be replaced at the first opportunity.

During removal operation we had to cut forward D twist lock head in order to remove old bucket without taking out exhaust casing, by doing so we have saved exhaust plenum removal operation which takes quite a bite time.

Old parts have been packed and got ready to be sent to a certified GE workshop for refurbishment.

Perform borescope inspection and first stage nozzle mapping during the next CI.



TURBINE SECTION

Turbine Rotor

Dovetail; DOVETAIL

Bucket stg1, stg2 were removed and dovetails were carefully cleaned with WD 40 by protecting rotor cooling slots. Dovetails found in pretty much good condition no corrosion were to be seen dovetails were ready for bucket installation by a qualified GE bucket specialist.

Wheel dovetail material loss TIL 1049-3R1 was checked and found satisfactory since rock check was within GE parameter.

Inspect bucket dovetail condition during the next planed HGPI as well as bucket rock and platform mismatch check.

Turbine Rotor

Spacer; SPCER STG1-STG2-STG3 and discourager seal stg2-stg3 condition

Rotor spacer between stg1-stg2-stg3 were cleaned and carefully inspected for any potential damage, cracks or just simply nozzle diaphragm radial teeth rubbing on spacer teeth. No defect was found spacer was in a very good condition.

Hovewer we have noticed damaged , broken corroded and missing material on the discourager seal right after bucket stg2 aft side. A pac case engineering was opened and advised us to keep this part as is since planed start up could have not be met on time. Technical meeting was hold with customer and discussion ended up by leaving this part as is as well. As the result this part will be re inspected and replaced at the next planed outage Major inspection.

Check spacer condition and turbine discourager seal condition at the next planed hot gas path or major inspection.



TURBINE SECTION

Stage 1 Nozzle Arrangement

Assembly; TURBINE

We removed first stage nozzle for visual general condition and dimensional checks like ellipticity during which we reassembled both halves and take diametrical measurements vertical and two horizontal. Prior to any first stage nozzle removal we took radial concentricity check, We all found both satisfactory in accordance with GE design specification.

We found first stage nozzle segments condition poor, most of the segments were showing cracks on the outer side wall on the leading and trailing edge near by the cooling air holes. See attached pictures, which show clearly defects.

We replaced first stage nozzle with refurbished as the part of the customer preventative maintenance schedule and HGPI scope . Support block both sides didn't require to be machined following correct E dimension and ellipticity.

Old parts have been packed and got ready to be sent to a certified GE workshop for refurbishment.

Perform visual inspection and first stage nozzle mapping during the next CI.

Stage 2 Nozzle Arrangement

Assembly; NOZZLE 2ND STG

We removed all second stage nozzle segments for visual inspection some of them came off with difficulties, indeed they were stuck due to burs and corrosion between shrouds slots. We also have found some thin cracks on the trailing edge near by the outer sidewalls, Aft and forward discourager seal were found burn, bent with severe corrosion and erosion as mentioned on the following pictures. Important discoloration was noticed Forward and AFT wheel space cooling nozzle were corroded as well.

New Nozzle incorporates GTD-222 non pressurized S2N brush seals

We replaced old nozzle set with new as customer and GE HGPI inspection scope scheduled maintenance.

Old nozzles have been properly packed and get ready to be sent to a certified GE workshop for refurbishment. See attached pictures and inspection forms regarding nozzle segments general conditions.

Boroscope inspection on whole nozzle stages has to be done during the next CI.



TURBINE SECTION

Stage 3 Nozzle Arrangement

Assembly; NOZZLE 3RD STG

As per customer planned Hot gas path inspection scope third stage nozzle were all removed from the turbine casing Inspection carried out for defect such like FOD cracks , erosion and corrosion. We found third stage nozzles free of cracks but evidence of nick FOD were obvious to notice during inspection.

Those defects are normal .Cooling holes were still within acceptable limit and non clogged.

However all third stage nozzle segments have been replaced with reburshied set as per maintenance schedule. We ve packed the old set and get them ready to be sent to a certified GE workshop for refurbishment.

Perform a borescope inspection during the next CI on whole set of nozzle segment first, second and third stage.

Stage 1 Turbine Shroud

E Seal; STAGE 1 SHROUD

Refurbished set of 1st Stg Shroud Blocks installed with proper drop and clearance accordignly to GE design parameters.

New ext pressurized E-seal, Part # 361 A 2407 P001,fitted into slot on shrouds [between shrouds & 1st Stg Nozzle body] during final re-assembly

Check E seal general condition during the next planed hot gas path inspection.



TURBINE SECTION

Stage 1 Turbine Shroud

Assembly:

We removed all first stage shrouds and visually inspected for any sign of crack, burn , missing material TCB loss. Generally speaking these first stage shrouds were in a medium condition.

We could noticed cracks emanating from the clearancometer holes , burn of TCB and bucket rub was easily observable as shown on attached pictures.

Shrouds cooling holes were for some them burned , we also found seal slot burned and severe rub on their body due to first stage nozzle seal contact.

As the part of the preventive maintenance schedule of customer and GE HGPI scope we replaced all shrouds with new set S1S abradable coating according. Following document are related to Shrouds general condition inspection and serial number tracking which couldn't be taken due to missing stamps.

We recommend customer to perform boroscope inspection during the next CI in order to track any faulty shroud condition.



TURBINE SECTION

Stage 2 Turbine Shroud

Assembly; STAGE 2 SHROUD

We removed all second stage shroud. These components were visually inspected for cracks, missing material, hot spot and other potential abnormalities. All of them show evidence of hot spot and medium worn.

Shrouds seal teeth observed to be in good condition with beginning of tiny cracks due to thermal stress. Shrouds surfaces were found slightly burned on their bucket stage2 runway as shown on the following attached pictures.

We replaced all set of second stage shroud with refurbished ones predrilled as the part of customer and GE Hot gas path inspection scope preventive maintenance.

Prior to permanently install shrouds we had to locate proper lock pin holes position by installing them in both halves turbine cases, afterward we checked their drop regarding horizontal upper and lower half this in accordance with GE design drawing clearances and installed them without any issues. Also once all installed both upper and lower halves bucket stg2 tip to shroud2 was taken and found within GE design parameter.

Old shrouds have been packed and tidied up so to get them ready to be sent at a certified GE workshop for refurbishment. Both new set and old ones were not stamped with Serial Numbers.

Following documents are related to pictures, SN and inspection forms.

Perform a boroscope inspection to check shroud's general condition during the next planned CI.

Stage 3 Turbine Shroud

Assembly;

The third stage shrouds haven't been removed because of their total fired hours plus their pretty good general condition.

A visual inspection of components was carried out. Shroud Seal teeth were found in very good condition. Forward face was just a little worn. Shroud aft face was found slightly burnish with light hot spot. Generally speaking these shrouds are in a very pretty condition and could be left as is.

Perform a visual shroud inspection from exhaust plenum through hatch door during the next planned CI.



TURBINE SECTION

Stage 1 Support Ring

Assembly:

Support ring was disassembled and cleaned, and routine inspection visual was performed for any rub evidence on the discourager inner and outer seal which were just fine. No problem areas were found on this component. Support Ring was returned to service.

Check for any sign of rub, wear located on inner and outer support ring discourager seal.



STG1 BUCKET DISCOLORATION AND HOT SPOT

STG1 BUCKET TIP RUBBING



TURBINE SECTION



STG1 BUCKET TIP RUBBING
AND GENERAL CONDITION



INSPECTION REPORT
Gas Turbine Maintenance

MS9001

Turbine
Buckets, 1st Stage

Date _____
FSR # _____

Turbine S/N _____
Sketches Enclosed? _____
Data Type visual

Prepared by ZEKERYA TASYUREK
Photos Enclosed? yes

Part Number Out 887E980P2
Part Number In 116E1068 P001

BUCKET S/N & POSITION

Serial number from bottom of bucket (if available) and position of bucket in wheel.

CRACKS

State if crack is:

AX - AXIAL **RD - RADIAL**

Use letters to indicate crack location and give length of crack.

TIP RUBS

Indicate tip rub severity as:

N - Normal **L - Light**

M - Moderate **H - Heavy**

EROSION / CORROSION

Enter dimension from tip to edge of corrosion. Use letters to indicate principle zone affected by corrosion. Enter Height, width, & estimated depth of corrosion / erosion spot.

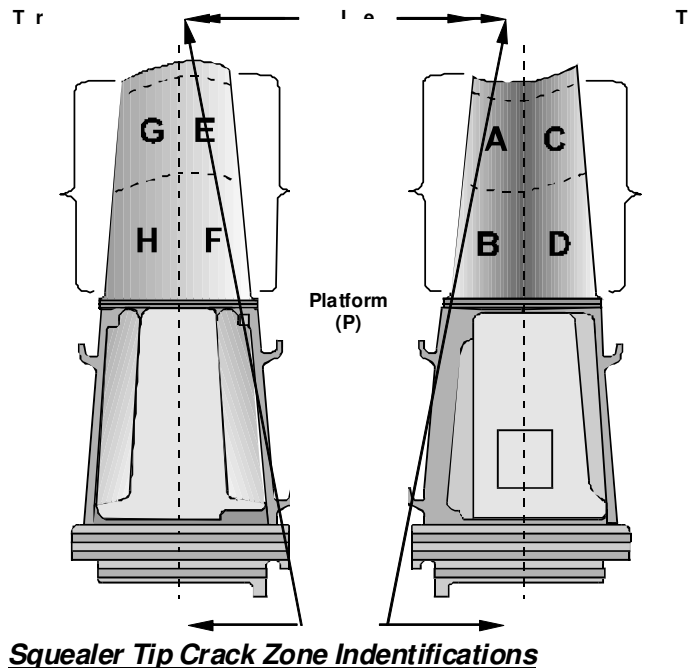
FOREIGN OBJECT DAMAGE

Use letters to indicate location of damage.

CR - Cracked **M - Missing Metal**

P - Punctured **BT - Bent**

T - Torn



DISPOSITION CODES

N - No repair or replacement necessary.

RG - Repaired by GE

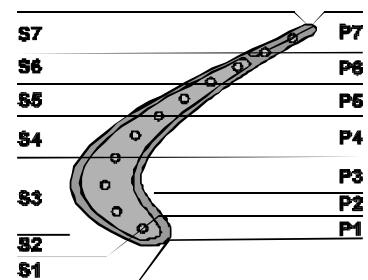
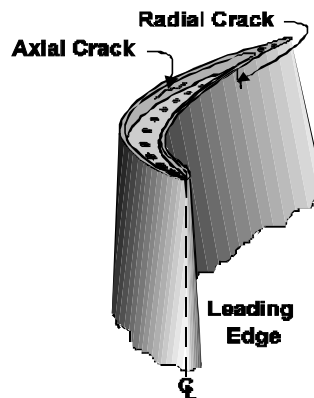
RC - Repaired by Customer

RO - Repaired by Other

RN - Replaced with new component.

RR - Replacement Recommended

NOTE: Include serial number of replacement buckets if disposition is "RN."



Comments:

First stage bucket was found in good condition without any FOD evidence or failure except the fact that it has significant discoloration. All set will be replaced with new as part of this outage scope since they will not last until the next HGPI. We noted squealer tip light rubbing on buckets with no serious consequences.

GT9025 FIRST STAGE BUCKET GEN CONDITION(a)



INSPECTION REPORT
Gas Turbine Maintenance

MS9001

Turbine
Buckets, 1st Stage

Date _____ Turbine S/N _____
FSR # _____ Sketches Enclosed? _____
Data Type _____

Prepared by ZEKERYA TASYUREK
Photos Enclosed? YES

Bucket Conditions (Enter codes)

Bucket Position S/N	Location	Crack		Tip Rubs	Erosion Corrosion			Foreign Object Damage	Disposition
		Code	Length		Height	Width	Depth		
no	no	no	no	yes LIGHT	no	no	no	no	RN
no	no	no	no	yes LIGHT	no	no	no	no	RN
				yes LIGHT					
no	no	no	no	yes LIGHT	no	no	no	no	RN
no	no	no	no	yes LIGHT	no	no	no	no	RN
				yes LIGHT					
no	no	no	no	yes LIGHT	no	no	no	no	RN
no	no	no	no	yes LIGHT	no	no	no	no	RN
				yes LIGHT					
no	no	no	no	yes LIGHT	no	no	no	no	RN
no	no	no	no	yes LIGHT	no	no	no	no	RN
				yes LIGHT					
no	no	no	no	yes LIGHT	no	no	no	no	RN
no	no	no	no	yes LIGHT	no	no	no	no	RN
				yes LIGHT					
no	no	no	no	yes LIGHT	no	no	no	no	RN
no	no	no	no	yes LIGHT	no	no	no	no	RN
				yes LIGHT					
no	no	no	no	yes LIGHT	no	no	no	no	RN
no	no	no	no	yes LIGHT	no	no	no	no	RN
				yes LIGHT					
no	no	no	no	yes LIGHT	no	no	no	no	RN
no	no	no	no	yes LIGHT	no	no	no	no	RN
				yes LIGHT					
no	no	no	no	yes LIGHT	no	no	no	no	RN
no	no	no	no	yes LIGHT	no	no	no	no	RN
				yes LIGHT					
no	no	no	no	yes LIGHT	no	no	no	no	RN
no	no	no	no	yes LIGHT	no	no	no	no	RN
				yes LIGHT					
no	no	no	no	yes LIGHT	no	no	no	no	RN
no	no	no	no	yes LIGHT	no	no	no	no	RN
				yes LIGHT					

Comments:

Light Rubing evidence on squealer tips

GT9025 FIRST STAGE BUCKET GEN CONDITION(b)

1e stage buckets in machine placed 2011

E No.	Part No.	Serial No.	Previous Repair No.
1	103E5522P007 980 P2H1	T-47377-5 FIEM 163228 VAF 398 GTI W8434 C,F	46861 E 87 33265 E04
2	103E5522P007 980 P2H1	W-930012 FIEM166189 VAF403 GT W8805 C,F	46861 E88 33265 E13
3	103E5522P007 980 P2H1	W930010 FIEM 135909 VAF 332 GT W8805 C,F	46861 E92
4	103E5522P007 980 P2H1	W 930011 FIEM 166014 VAF 403 GTI WG 8837 C,F	46861 E90 33265 E11
5	103E5522P007 980 P2H1	W 930010 FIEM 162930 VAF 398 GTI W8428 C,F	46861 E91 33265 E15
6	103E5522P007 980 P2H1	W 930012 FIEM 166464 VAF 403 GTI W 8819 C,F	46861 E89 33265 E19
7	103E5522P007 980 P2H1	W 930003 FIEM 157112 VAF369 GTI W 7847 C,F	46861 E01 33265 E12
8	103E5522P007 980 P2H1	W 930010 FIEM 133604 VAF 337 GTI W 5438 C,F	46861 E02 33265 E84
9	103E5522P007 980 P2H1	W030012 FIEM 165441 VAF 408 GTI W8719 C,F	46861 E03 33265 E38
11	103E5522P007 980 P2H1	T-47377-3 FIEM 161543 VAF397 GTI W 8354 C,F	46861 E05 33265 E83
12	103E5522P007 980 P2H1	T-47372-4 FIEM 162523 VAF 391 GTI W 8381 C,F	46861 E52 33265 E52

E No.	Part No.	Serial No.	Previous Repair No.
13	103E5522P007 980 P2H1	T-47377-2 FIEM 157384 VAF 358 GTI W 7811 C,F	46861 E07 33265 E74
14	103E5522P007 980 P2H1	W 930011 FIEM 157139 VAF 369 GTI W 7768 C,F	46861 E08 33265 E48
15	103E5522P007 980 P2H1	T-47372-2 FIEM 161713 VAF 397 GTI W 8364 C,F	46861 E09 33265 E85
16	103E5522P007 980 P2H1	W9300010 FIEM 156523 VAF 368 GTI W 7490 C,F	46861 E10 33265 E82
17	103E5522P007 980 P2H1	T-47369-1 FIEM 162558 VAF 391 GTI W8420 C,F	46861 E11 33265 E21
18	103E5522P007 980 P2H1	T-47372-3 FIEM 164275 VAF 399 GTI W 6609 C,F	46861 E13 33265 E23
19	887E980 P2H1	W-79209-B FIEE 002466 GTIB WH 1ECD1 GTD111 FF081	46861 E12 33265 E87
20	103E5522P007 980 P2H1	W 930011 FIEM 164941 VAF 403 GTI W 8766 C,F	46861 E14 33265 E42
21	103E5522P007 887E980 P2H1	W 930006 FIEE004331 GTIB WH 2AD0 1ECD1 GTD111 FF45	46861 E15 33265 E35
22	103E5522P007 980 P2H1	T-47383-5 FIEM 157759 VAF 368, GTI WG7878,C,F	46861 E16 33265 E22
23	103E5522P007 980 P2H1	T-47377-4 FIEM 160857 VAF 395 GTI W 8263 C,F	46861 E17 33265 E17

E No.	Part No.	Serial No.	Previous Repair No.
24	103E5522P007 980 P2H1	W-030010 FIEM 160660 VAF 399 GTI 8281 C,F	46861 E18 33265 E71
25	103E5522P007 980 P2H1	W-930011 FIEM166804 VAF 404 GTI W8887 C,F	46861 E39 33265 E47
26		02252A 1 2002B 0925 EEQ111 47653	
27	103E5522P007 980 P2H1	W 930012 FIEM 167428 VAF 404 GTI W 8948 C,F	46861 E58 33265 E37
28	103E5522P007 980 P2H1	T 47372-3 FIEM 159123 VAF 380 GTI WG 8150 C,F	46861 E22 33265 E88
29	103E5522P007 980 P2H1	T-47372-4 FIEM 159670 VAF 373 GTI W7912 C,F	46861 E23 33265 E40
30	103E5522P007 887E980 P2H1	T-47400-2 FIEE 003506 GTIB WH 3ACH 1ECD1 GTD 111 FF116	46861 E24 33265 E76
31	103E5522P007 887E980 P2H1	W-930010 FIEE 001189 GTI 1ECD1 FF50 C	46861 E55 33265 E77
32	103E5522P007 980 P2H1	W-930011 FIEM 164399 VAF 399 GTI W8566 C,F	46861 E32 33265 E55
33	103E5522P007 980 P2H1	T-47372 FIEM 162841 VAF 398 GTI W 8465 C,F	46861 E27 33265 E49
34	103E5522P007 980 P2H1	T-47372-2 FIEM 162604 VAF 395 GT W 8413 C,F	46861 E28 33265 E03

E No.	Part No.	Serial No.	Previous Repair No.
35	103E5522P007 980 P2H1	W 930008 FIEM 160997 VAF 397 GTI W8265 C.F	46861 E29 33265 E61
36	103E5522P007 980 P2H1	T-47377-4 FIEM 162426 VAF 391 GTI W7834 C.F	46861 E30 33265 E46
37	103E5522P007 980 P2H1	T-47372-5 FIEM 157279 VAF369 GTI W 7834 C.F	46861 E51 33265 E73
38	103E5522P007 980 P2H1	W 930011 FIEM 166154 VAF 403 GTI W 8816 C.F	46861 E26 33265 E29
39	103E5522P007 980 P2H1	T-47369-2 FIEM 161233 VAF 395 GTI W8262 C.F	46861 E33 33265 E91
40	103E5522P007 980 P2H1	W 930011 FIEM 166006 VAF 403 GT W8834 C.F	46861 E34 33265 E41
41	103E5522P007 980 P2H1	T-47372-2 FIEM 161683 VAF 397 GTI W8376 C.F	46861 E35 33265 E27
42	103E5522P007 980 P2H1	W-930010 FIEM 163368 VAF 399 GTI GW 8502 C.F	46861 E36 33265 E50
43	103E5522P007 980 P2H1	T-47387-5 FIEM 162345 VAF 339 GTI W 8200 C.F	46861 E37 33265 E32
44	103E5522P007 980 P2H1	W-310447 FIEM 160318 VAF372 GTI 7967, C.F	46861 E38 33265 E33
45	103E5522P007 887E980 P2H1	W-9300015 FIEE 003787 GT1B WH 1ECD1 GTD111 FF126, C	46861 E19 33265 E59

E No.	Part No.	Serial No.	Previous Repair No.
46	103E5522P007 980 P2H1	T-47416-5 FIEM 152439 VAF 354 GTI W7468 C,F	46861 E40 33265 E36
47	103E5522P007 980 P2H1	T-47377 FIEM 162884 VAF 398 GTI GW 8435 C,F	46861 E41 33265 E45
48	103E5522P007 980 P2H1	T-47377-1 FIEM 161373 VAF 395 GTI W8350 C,F	46861 E42 33265 E56
49	103E5522P007 980 P2H1	T-47377-3 FIEM 162434 VAF 391 GTI W8350 C,F	46861 E43 33265 E30
50	103E5522P007 980 P2H1	W 030011 FIEM 166863 VAF 404 GTI W8895 F	46861 E44 33265 E28
51	103E5522P007 980 P2H1	W 930005 FIEM 164356 VAF 399 GTI W8583 C,F	46861 E45 33265 E26
52	103E5522P007 980 P2H1	W 930003 FIEM 151041 VAF 358 GTI W7210 C,F	46861 E46 33265 E31
53	103E5522P007 980 P2H1	W 930005 FIEM 151610 VAF 357 GTI W 7274 C,F	46861 E47 33265 E44
54	103E5522P007 887E980 P2H1	T-47416-1 FIEE 001641 GTIB 1AAB GTD111, 1EACD1 FF076 C,SP	46861 E48 33265 E34
55	103E5522P007 980 P2H1	W-030011 FIEM 166588 VAF 403, GTI W8846, C,F	46861 E66 33265 E62
56	103E5522P007 980 P2H1	T-47372-5 FIEM 164437 VAF 399 GTI W 8564 C,F	46861 E50 33265 E57
57	103E5522P007 887E980 P2H1	W 930010 FIEE 002664 GTIB WHB3AAE	46861 E51 33265 E81

E No.	Part No.	Serial No.	Previous Repair No.
		1ECD1, GTD1	
58	103E5522P007 980 P2H1	T-47567-4 FIEM 162817 VAF 398 GTI W8494 F	46861 E06 33265 E64
59	103E5522P007 980 P2H1	T47372-1 FIEM 163724 VAF 398 GTI GW8440 C,F	46861 E53 33265 E39
60	103E5522P007 980 P2H1	T-47567-4 FIEM 163165 VAF 398 GTI W8488 C,F	46861 E54 33265 E43
61	103E5522P007 980 P2H1	T-4738521 FIEM 159271 VAF 388 GTI 8171 C,F	46861 E25 33265 E92
62	103E5522P007 980 P2H1	T-47377-5 FIEM 161799 GTI W 8331 C,F	46861 E56 33265 E51
63	103E5522P007 980 P2H1	T-47377-2 FIEM 161462 VAF 397 GTI GW8337 C,F	46861 E57 33265 E65
64	103E5522P007 980 P2H1	W-030012 FIEM 158577 VAF 373 GTI W7939 C,F	46861 E21 33265 E78
65	103E5522P007 980 P2H1	W-930011 FIEM 166766 VAF 404 GTI W8880 C,F	46861 E49 33265 E02
66	103E5522P007 980 P2H1	W930010 FIEM 164704 VAF 400 GTI W8624 C,F	46861 E60 33265 E01
67	103E5522P007 980 P2H1	T-47369-2 FIEM 161950 VAF 399 GTI W8209 C,F	46861 E61 33265 E67
68	103E5522P007 980 P2H1	W-030012 FIEM 158798 VAF 373 GTI W8019 C,F	46861 E62 33265 E86

E No.	Part No.	Serial No.	Previous Repair No.
69	103E5522P007 980 P2H1	T-47377-3 FIEM 162280 VAF 397 GTI W 83DA C,F	46861 E63 33265 E07
70	103E5522P007 980 P2H1	W930008 FIEM 150452 VAF 357 GTI W 3189 C,F	46861 E64 33265 E60
71	103E5522P007 887E980 P2H1	T-47377-5 FIEE004016 GT1B WH2ADF 1ECD1 GTD111 FF33	46861 E65 33265 E58
72	103E5522P007 980 P2H1	W 9300K FIEM 156633 VAF 368 GTI W7882 C,F	46861 E49 33265 E54
73	103E5522P007 980 P2H1	W 030012 FIEM 165093 VAF 408 GTI W8694 C,F	46861 E67 33265 E63
74	103E5522P007 980 P2H1	T 47372-5 FIEM 163015 VAF 398 GTI GW 8492 C,F	46861 E68 33265 E66
75	103E5522P007 980 P2H1	T47372-5 FIEM 159263 VAF 388 GTI 8175 C,F	46861 E69 33265 E53
76	103E5522P007 887E980 P2H1	W930010 FIEE001856 GTD 111 GTIB WH 1ECD1 2AAB, FF 078	46861 E70 33265 E80
77	103E5522P007 980 P2H1	T-47385-4 FIEM 163252 VAF 398 GT W8486 C,F	46861 E71 33265 E08
78	103E5522P007 887E980 P2H1	W 930003 FIEE 003877 GTD111, FF26 GTIB WH1ACW C,P3	46861 E72 33265 E79
79	103E5522P007 980 P2H1	T-47377-3 FIEM 161129 VAF 397 GTI W 8306 C,F	46861 E73 33265 E68

E No.	Part No.	Serial No.	Previous Repair No.
80	103E5522P007 980 P2H1	T-47327-3 FIEM 161659 VAF 397 GTI WG 8362 C.F	46861 E74 33265 E06
81	103E5522P007 980 P2H1	T-47374-1 FIEM 160628 VAF 395 GTI 8281	46861 E75 33265 E69
82	103E5522P007 980 P2H1	W 930008 FIEM 152676 VAF 355 GTI W 7397 C.F	46861 E76 33265 E72
83	103E5522P007 980 P2H1	W 930012 FIEM 164933 VAF 408 FTI W 8739 F	46861 E77 33265 E16
84	887E980 P2H1	PPST-60, 856 ACG 0255 HTCC 2 GTIB, FF029	46861 E78 33265 E14
85	103E5522P007 980 P2H1	T-47372 FIEM 157953 VAF 370 GTI GW 8102 C.F	46861 E79 33265 E90
86	103E5522P007 980 P2H1	T-47283-3 FIEM 161624 VAF 397 GTI W 8334 C.F	46861 E80 33265 E10
87	103E5522P007 980 P2H1	T-47377-1 FIEM 163457 VAF 399 GTI W 8559 C.F	46861 E81 33265 E05
88	103E5522P007 980 P2H1	T-47419-5 W 78242 FIEM 105899 VAF 284 GTI W 2699, SP, CE	46861 E82 33265 E70
89	103E5522P007 980 P2H1	W 930011 FIEM 164763 VAF 400 GTI WG 8613 C.F	46861 E83 33265 E18
90	103E5522P007 980 P2H1	W 930010 FIEM 147923 VAF 345 GTI W 6797 C.F	46861 E84 33265 E09
91	103E5522P007 980 P2H1	W930005 FIEM 152188 VAF 363 GTI W7093	46861 E85 33265 E20

E No.	Part No.	Serial No.	Previous Repair No.
92	103E5522P007 887E980 P2H1	W 930005 FIEE 004215 GTD 111 GTIB WH 3ADO, 1ECD1 FF149	46861 E86 33265 E24



Definitions

- Assembly Dwg. No. -** The higher level drawing above the individual part drawing
- Part Dwg. No. Out -** The design identification number of each part removed from the gas turbine during an outage or inspection.
- Part Dwg. No. In -** The design identification number of each part installed on the gas turbine during an outage or inspection.
- Serial No. Out -** A unique number assigned to each individual part removed from the gas turbine.
- Serial No. In -** A unique number assigned to each individual part installed on the gas turbine.

Bucket Quantities

	TURBINE BUCKETS - 1st, 2nd, 3rd STAGE		
	1st Stage	2nd Stage	3rd Stage
6001B	92	92	92
6001FA	92	92	92
7001EA	92	92	92
7001EC	92	92	92
7001FA	92	92	92
7001FA+	92	92	92
7001FA+e	92	92	92
9001E	92	92	92
9001EC	92	92	92
9001FA	92	92	92
9001FA+	92	92	92
9001FA+e	92	92	92



STG2 BUCKET SHROUDED TIP AND CUTTER TEETH DEFECTS



INSPECTION REPORT
Gas Turbine Maintenance

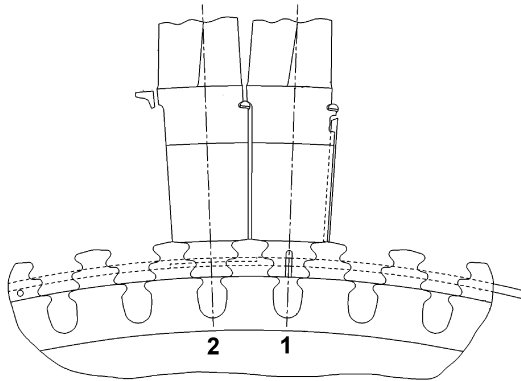
FRAME SIZE: 9001e

Turbine
Second Stage Buckets

Date _____
FSR # _____

Turbine S/N _____

Prepared by ZEKERYA TASYUREK



View looking down stream

To Be Installed Moment

Weigh Chart Number: _____

** Place X in box if moment weigh data sheet
is submitted in lieu of these entries.



Select Frame Type

9001E

Number of Slots:

92

Wheel Slot No.	Dwg. No. Out	Dwg. No. In	Serial No. Out	Serial No. In.**
1	103E3501P001	103E3501P001	A1884	
2	103E3501P001	103E3501P001	A1883	
3	103E3501P001	103E3501P001	A1683	
4	103E3501P001	103E3501P001	A2306	
5	103E3501P001	103E3501P001	A1923	
6	103E3501P001	103E3501P001	A2355	
7	103E3501P001	103E3501P001	A2033	
8	103E3501P001	103E3501P001	A2375	
9	103E3501P001	103E3501P001	A1487	
10	103E3501P001	103E3501P001	A1743	
11	103E3501P001	103E3501P001	A1974	
12	103E3501P001	103E3501P001	A2286	
13	103E3501P001	103E3501P001	A2506	
14	103E3501P001	103E3501P001	A2084	
15	103E3501P001	103E3501P001	A2272	
16	103E3501P001	103E3501P001	A2081	
17	103E3501P001	103E3501P001	A1979	
18	103E3501P001	103E3501P001	A1877	
19	103E3501P001	103E3501P001	A2361	
20	103E3501P001	103E3501P001	A1911	
21	103E3501P001	103E3501P001	A1968	
22	103E3501P001	103E3501P001	A2390	
23	103E3501P001	103E3501P001	A2335	
24	103E3501P001	103E3501P001	A2315	

GT7102 S2B SN(a)



INSPECTION REPORT
Gas Turbine Maintenance

FRAME SIZE : 9001e

Turbine
Second Stage Buckets

Date _____
FSR # _____

Turbine S/N _____

Prepared by ZEKERYA TASYUREK

Wheel Slot No.	Dwg. No. Out	Dwg. No. In	Serial No. Out	Serial No. In.**
25	103E3501P001	103E3501P001	A1903	
26	103E3501P001	103E3501P001	A2283	
27	103E3501P001	103E3501P001	A2443	
28	103E3501P001	103E3501P001	A2370	
29	103E3501P001	103E3501P001	A2241	
30	103E3501P001	103E3501P001	A1673	
31	103E3501P001	103E3501P001	A2107	
32	103E3501P001	103E3501P001	A1926	
33	103E3501P001	103E3501P001	A1331	
34	103E3501P001	103E3501P001	A2321	
35	103E3501P001	103E3501P001	A1927	
36	103E3501P001	103E3501P001	A2501	
37	103E3501P001	103E3501P001	A1915	
38	103E3501P001	103E3501P001	A2103	
39	103E3501P001	103E3501P001	A1955	
40	103E3501P001	103E3501P001	A2237	
41	103E3501P001	103E3501P001	A1899	
42	103E3501P001	103E3501P001	A1924	
43	103E3501P001	103E3501P001	A2293	
44	103E3501P001	103E3501P001	A2486	
45	103E3501P001	103E3501P001	A1806	
46	103E3501P001	103E3501P001	A2284	
47	103E3501P001	103E3501P001	A2324	
48	103E3501P001	103E3501P001	A2246	
49	103E3501P001	103E3501P001	A2490	
50	103E3501P001	103E3501P001	A2504	
51	103E3501P001	103E3501P001	A1869	
52	103E3501P001	103E3501P001	A1563	
53	103E3501P001	103E3501P001	A1794	
54	103E3501P001	103E3501P001	A1971	
55	103E3501P001	103E3501P001	A1879	
56	103E3501P001	103E3501P001	A2488	
57	103E3501P001	103E3501P001	A1772	
58	103E3501P001	103E3501P001	A1940	
59	103E3501P001	103E3501P001	A2362	

GT7102 S2B SN(b)



INSPECTION REPORT
Gas Turbine Maintenance

FRAME SIZE: 9001e

Turbine
Second Stage Buckets

Date _____
FSR # _____

Turbine S/N _____

Prepared by ZEKERYA TASYUREK

Wheel Slot No.	Dwg. No. Out	Dwg. No. In	Serial No. Out	Serial No. In.**
60	103E3501P001	103E3501P001	A2369	
61	103E3501P001	103E3501P001	A2502	
62	103E3501P001	103E3501P001	A2314	
63	103E3501P001	103E3501P001	A2301	
64	103E3501P001	103E3501P001	A1912	
65	103E3501P001	103E3501P001	A1914	
66	103E3501P001	103E3501P001	A2505	
67	103E3501P001	103E3501P001	A2353	
68	103E3501P001	103E3501P001	A2357	
69	103E3501P001	103E3501P001	A2294	
70	103E3501P001	103E3501P001	A2290	
71	103E3501P001	103E3501P001	A2240	
72	103E3501P001	103E3501P001	A1715	
73	103E3501P001	103E3501P001	A1919	
74	103E3501P001	103E3501P001	A2442	
75	103E3501P001	103E3501P001	A1913	
76	103E3501P001	103E3501P001	A2026	
77	103E3501P001	103E3501P001	A1890	
78	103E3501P001	103E3501P001	A2491	
79	103E3501P001	103E3501P001	A2296	
80	103E3501P001	103E3501P001	A1925	
81	103E3501P001	103E3501P001	A1716	
82	103E3501P001	103E3501P001	A1796	
83	103E3501P001	103E3501P001	A1878	
84	103E3501P001	103E3501P001	A2074	
85	103E3501P001	103E3501P001	A1528	
86	103E3501P001	103E3501P001	A2030	
87	103E3501P001	103E3501P001	A2277	
88	103E3501P001	103E3501P001	A1917	
89	103E3501P001	103E3501P001	A2239	
90	103E3501P001	103E3501P001	A1863	
91	103E3501P001	103E3501P001	A1238	
92	103E3501P001	103E3501P001	A1676	

GT7102 S2B SN(c)



Definitions

- Assembly Dwg. No. -** The higher level drawing above the individual part drawing
- Part Dwg. No. Out -** The design identification number of each part removed from the gas turbine during an outage or inspection.
- Part Dwg. No. In -** The design identification number of each part installed on the gas turbine during an outage or inspection.
- Serial No. Out -** A unique number assigned to each individual part removed from the gas turbine.
- Serial No. In -** A unique number assigned to each individual part installed on the gas turbine.

Bucket Quantities

TURBINE BUCKETS - 1st, 2nd, 3rd STAGE			
	1st Stage	2nd Stage	3rd Stage
2 6001B	92	92	92
3 6001FA	92	92	92
4 7001EA	92	92	92
5 7001EC	92	92	92
6 7001FA	92	92	92
7 7001FA+	92	92	92
8 7001FA+e	92	92	92
9 9001E	92	92	92
10 9001EC	92	92	92
11 9001FA	92	92	92
12 9001FA+	92	92	92
13 9001FA+e	92	92	92

GT7102 S2B SNDefinitions



INSPECTION REPORT

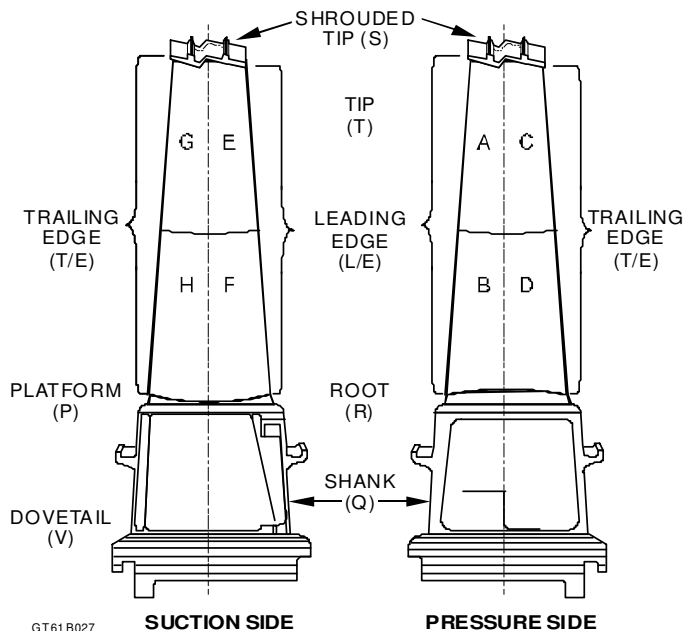
MS9001

Turbine Buckets, 2nd Stage

Date _____
FSR # _____

Turbine S/N _____
Sketches Enclosed? _____
Data Type visual

Prepared by ZEKERYA TASYUREK
Photos Enclosed? YES



BUCKET S/N & POSITION

Serial number from bottom of bucket (if available) and position of bucket in wheel.

CRACKS

State if crack is:

AX - AXIAL **RD - RADIAL**

Use letters to indicate crack location and give length of crack.

TIP RUBS

Indicate tip rub severity as:

N - Normal **L - Light**
M - Moderate **H - Heavy**

EROSION / CORROSION

Enter dimension from tip to edge of corrosion. Use letters to indicate principle zone affected by corrosion. Enter Height, width, & estimated depth of corrosion / erosion spot.

FOREIGN OBJECT DAMAGE

Use letters to indicate location of damage.

CR - Cracked **M - Missing Metal**
P - Punctured **BT - Bent**
T - Torn

DISPOSITION CODES

N - No repair or replacement necessary.
RG - Repaired by GE
R - Repaired by Customer
RO - Repaired by other
RN - Replaced with new component
RR - Replacement recommended

Comments

Bucket second stage found in a very pretty condition all over their pressure suction leading trailing dovetails and shank surface. However shrouded tips were worn and cutter teeth weren't sharp anymore. All set of second stage bucket is to be renewed as planned maintenance.

GT9065 2nd stage bucket gen

Date	<u>5/2/2008</u>
FSR #	<u>87HU0016</u>

Turbine S/N	296973
Sketches Encl?	
Data Type	VISUAL

Prepared by ZEKERYA TASYUR
Photos Enclosed? YES

Bucket Conditions

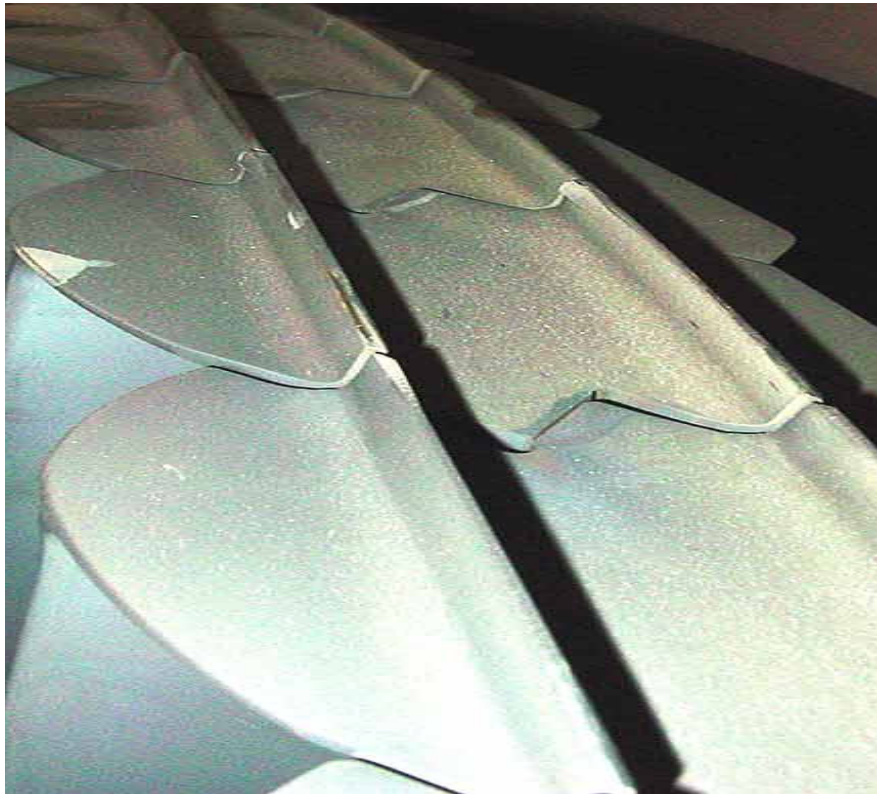
(Enter codes)

Bucket Position	Location	Crack		Tip Rubs	Erosion Corrosion			Foreign Object Damage	Disposition
		Code	Length		Height	Width	Depth		
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
no	no	no	no	YES, M	no	no	no	no	RN
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cond(a)

5 2nd stage bucket gen cond(b)

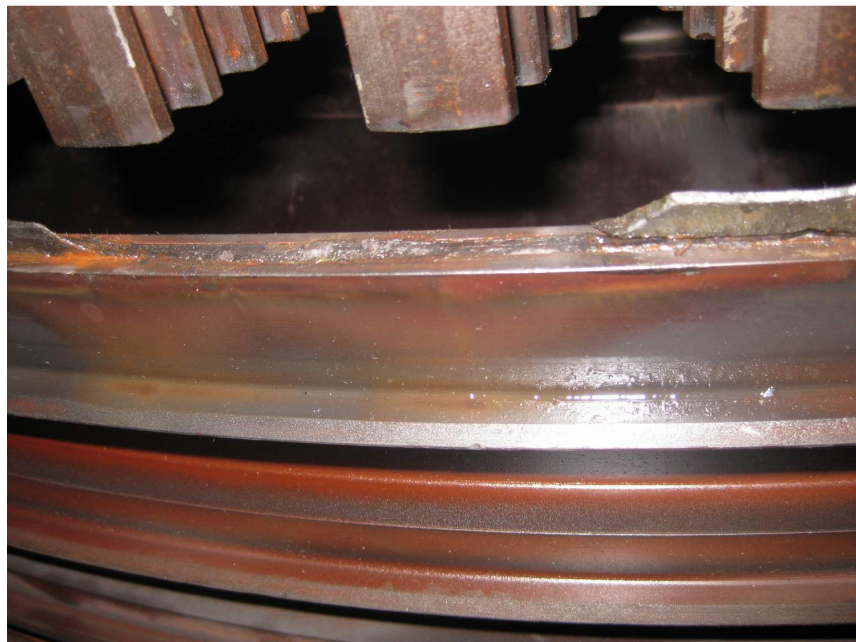
GT906



STG3 BUCKET SHROUDED TIP AND CUTTER TEETH WEAR



STAGE 2 BUCKET GENERAL CONDITION



TURBINE ROTOR DISCOURAGER SEAL HEAVY DAMAGE , MISSING MATERIAL CORROSION , CRACKS



EVIDENCE OF HOT SPOT DISCOLORATION ON THE SPACER DUE TO FAULTY DISCOURAGER SEAL WHICH LEAKS HOT GAS



INSPECTION REPORT

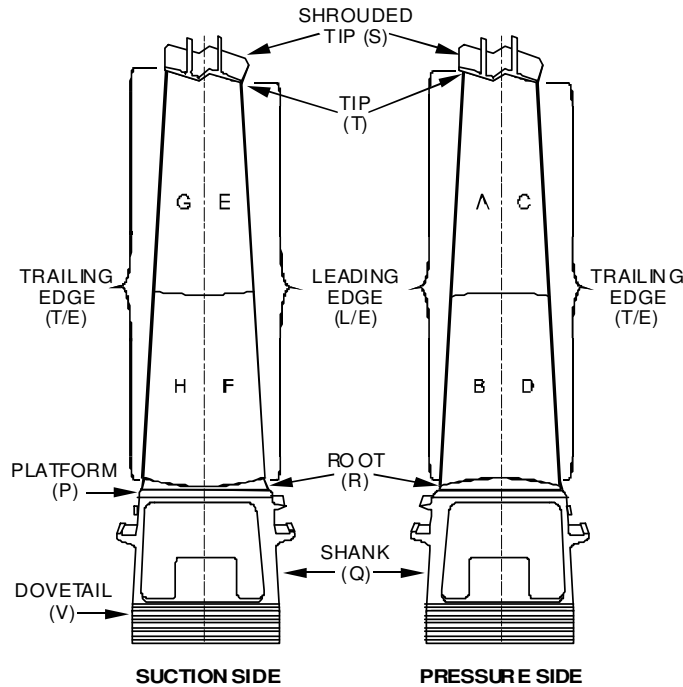
MS 6001, 9001

Turbine Buckets, 3rd Stage

Date _____
FSR # _____

Turbine S/N _____
Sketches Enclosed? _____
Data Type VISUAL

Prepared by ZEKERYA TASYUREK
Photos Enclosed? YES



GT 61B 059

BUCKET S/N & POSITION

Serial number from bottom of bucket (if available) and position of bucket in wheel.

CRACKS

State if crack is:

AX - AXIAL **RD - RADIAL**

Use letters to indicate crack location and give length of crack.

TIP RUBS

Indicate tip rub severity as:

N - Normal **L - Light**
M - Moderate **H - Heavy**

EROSION / CORROSION

Enter dimension from tip to edge of corrosion. Use letters to indicate principle zone affected by corrosion. Enter Height, width, & estimated depth of corrosion / erosion spot.

FOREIGN OBJECT DAMAGE

Use letters to indicate location of damage.

CR - Cracked **M - Missing Metal**
P - Punctured **BT - Bent**
T - Torn

DISPOSITION CODES

N - No repair or replacement necessary.
RG - Repaired by GE
R - Repaired by Customer
RO - Repaired by other
RN - Replaced with new component
RR - Replacement recommended

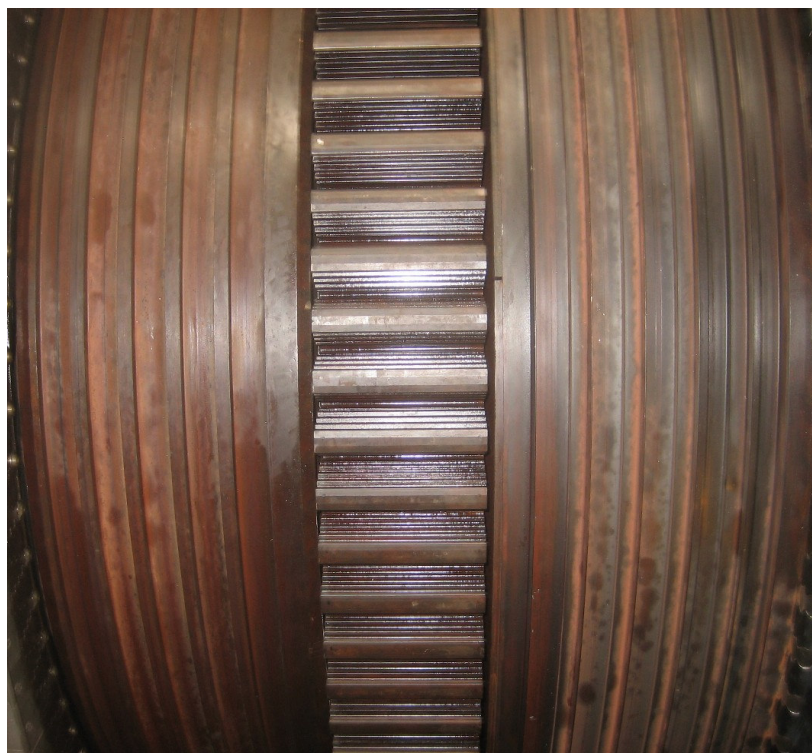
Comments

Bucket third stage found in a very pretty condition all over their pressure suction leading trailing dovetails and shank surface. However shrouded tips were worn and cutter teeth weren't sharp anymore. All set of third stage bucket is to be renewed as planned maintenance.

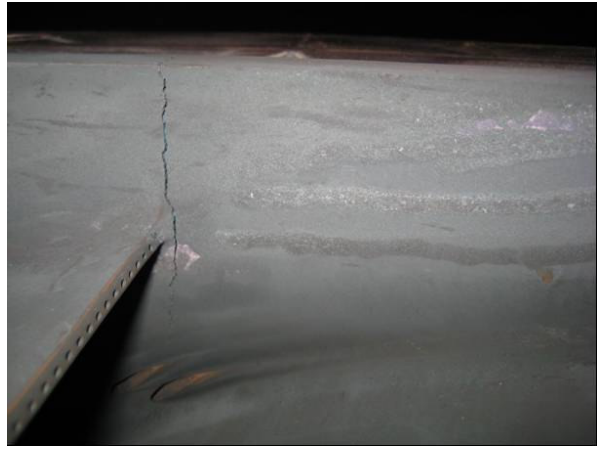
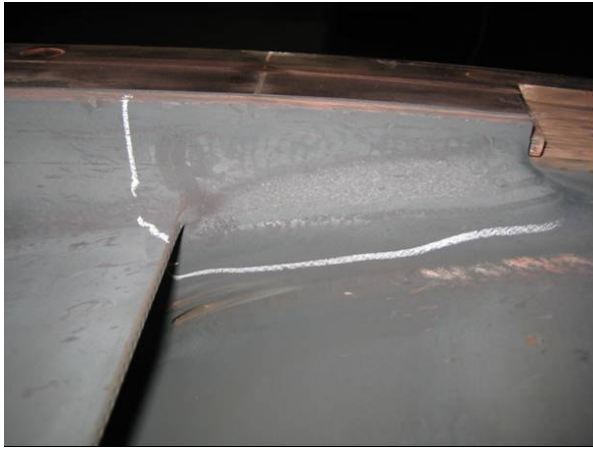
GT9075 third stage bucket gen cond(a)



STG2 BUCKET DOVETAIL SLIGHTLY CORRODED



STG1-STG2-STG3 ROTOR SPACER GOOD CONDITION



FIRST STAGE NOZZLE TYPICAL CRACK ON LEADING EDGE OUTER SIDE WALL
SEVERE CRACK ON S1N INNER WALL



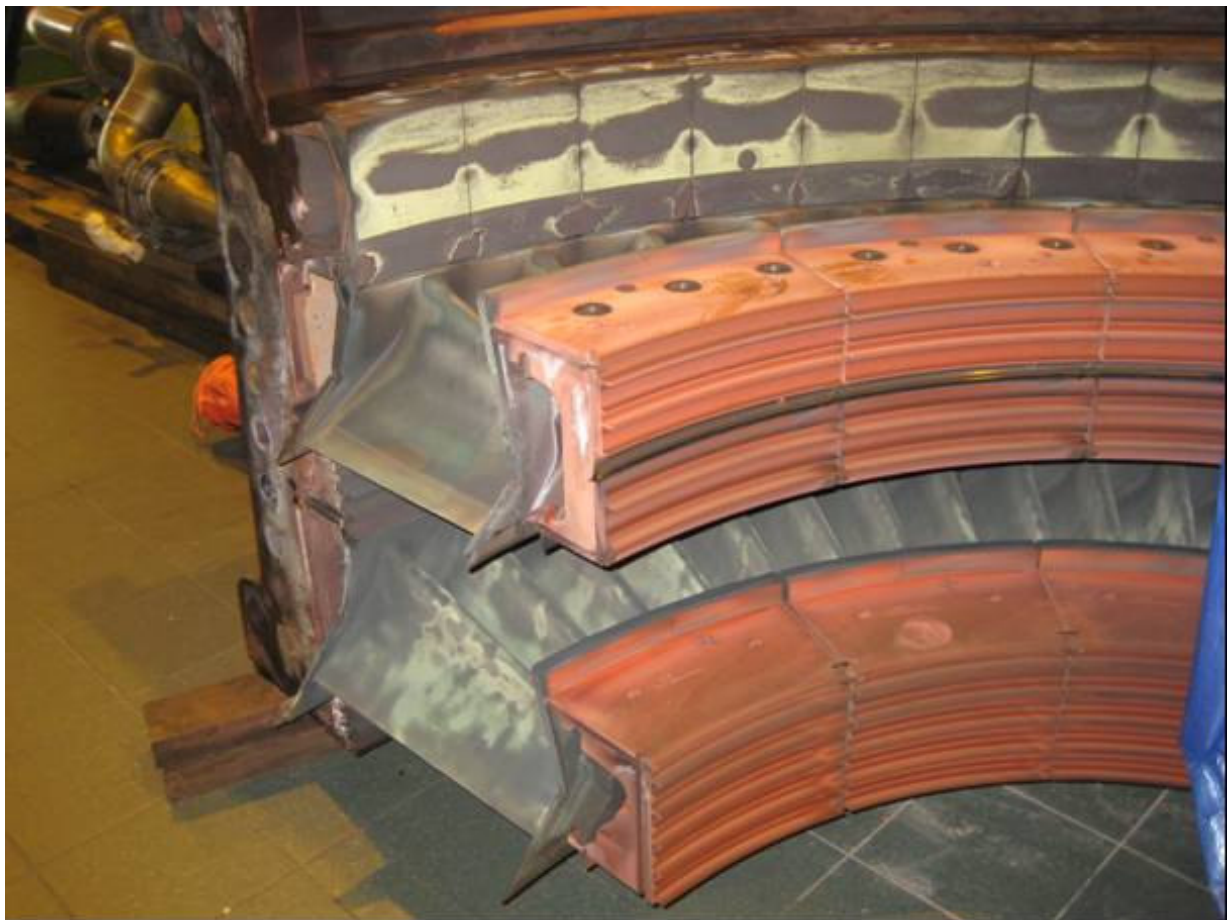
STAGE 1 NOZZLE IMPINGEMENT PLATE MISSING MATERIAL HEAVY CRACKS



STAGE 1 SHROUD BLOCK ABRADABLE COATING GONE PLUS EVIDENCE OF AFT FACE OVERHEATING



SATGE 2 SHROUD GENERAL CONDITION WITH EVIDENCE OF HOT SPOT AND OVERALL OVERHEATING



TURBINE CASING UPPER HALF AS FOUND ONCE TAKEN OFF THE UNIT



NEW HARDWARE INSTALLATION WITH PRESSURIZED W SEAL IN PLACE



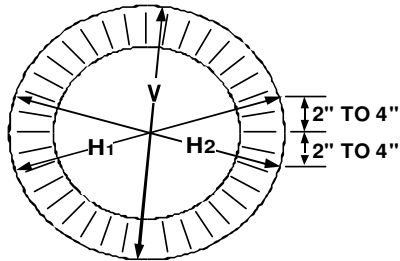
PRESSURIZED W SEAL IN PLACE



THIRD STAGE SHROUD GENERAL GOOD CONDITION



MS 7001, 9001

Nozzle, Ellipticity & Radial Concentricity Checks, 1st StageDate _____
FSR # _____Turbine S/N _____
Sketches Enclosed? _____
OPENINGPrepared by Z.TASYUREK _____
Photos Enclosed? YES _____**ELLIPTICITY CHECK:**

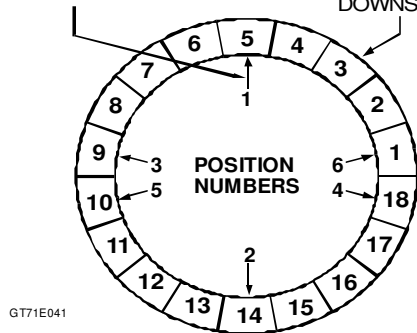
Vertical dimension V = 95.669
 Horiz. dimension H = 95.511
 (Average of H1 & H2)
 Ellipticity (H - V) = -0.158

NOTE: Take diameter readings at the I.D. of the downstream end of the outer sidewall and at the center of the nozzle segment.

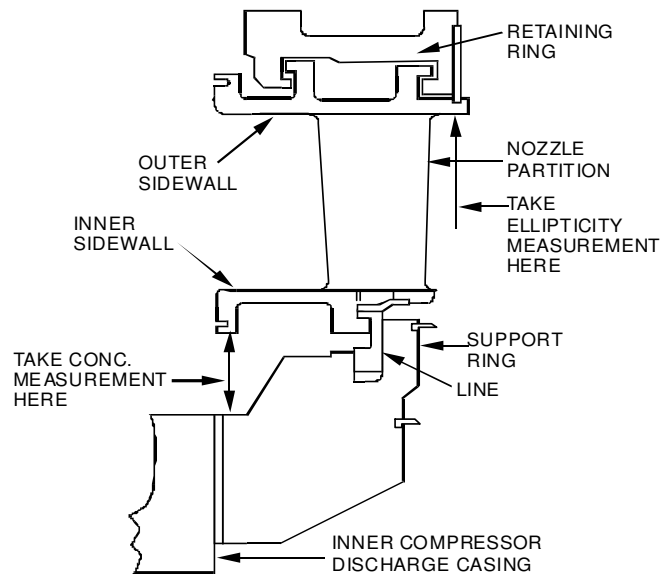
RADIAL CONCENTRICITY CHECK:

NOTE:
TAKE MEASUREMENT
TO CENTER OF
NOZZLE SEGMENT

NOZZLE SEGMENT
NOS. LOOKING
DOWNSTREAM



GT71E041



CONDITION	NOZZLE TO SUPPORT RING DIMENSION						MAXIMUM
	POS. #1	POS. #2	POS. #3	POS. #4	POS. #5	POS. #6	ECC.
DISASSEMBLY	4.759	4.745	4.814	4.706	4.818	4.762	0.041
REASSEMBLY							

MAX ECC. = 1/2 DIFFERENCE BETWEEN #1 AND #2
 OR MAX ECC. = 1/2 DIFFERENCE BETWEEN (#3+#5)/2 AND (#4+#6)/2
 WHICHEVER IS LARGER.

Comments:
First stage Nozzle old part Ellipticity was measured and found to be 158 mills, larger than GE spec which is 80 mills. However radial concentricity prior to its removal was found 41 mills which is right within the spec which requires 50 mills maxi. Anyway this part will be replaced with new as GE maintenance plan procedure.



INSPECTION REPORT
Gas Turbine Maintenance

Turbine

MS 7001, 9001

Nozzle, Ellipticity & Radial Concentricity Checks, 1st Stage

Date 5/4/2008

Turbine S/N 87HU0016

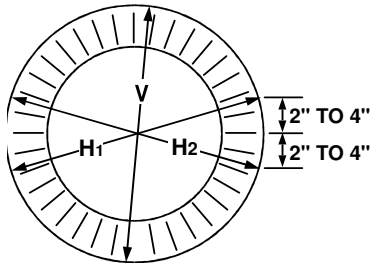
Prepared by Z.TASYUREK

FSR # 87HU0016

Sketches Enclosed?
closing INCHES

Photos Enclosed? YES

ELLIPTICITY CHECK:



Vertical dimension V = 103.031

Horiz. dimension H = 103.070

(Average of H1 & H2)

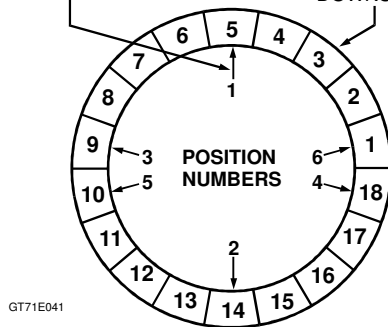
Ellipticity (H - V) = 0.039

NOTE: Take diameter readings at the I.D. of the downstream end of the outer sidewall and at the center of the nozzle segment.

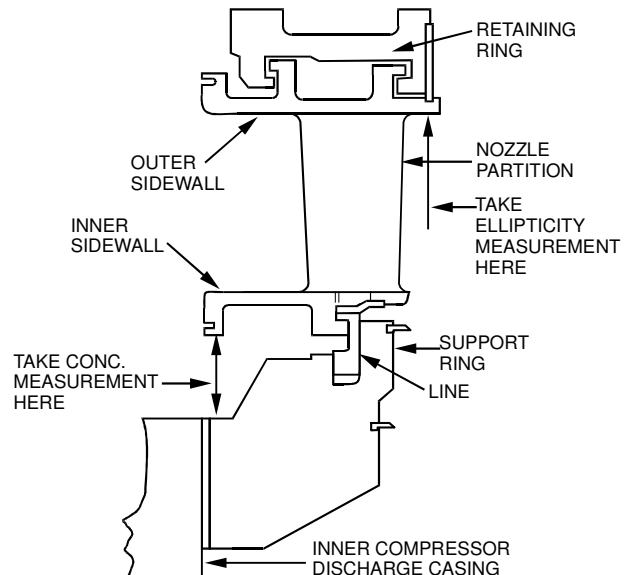
RADIAL CONCENTRICITY CHECK:

NOTE:
TAKE MEASUREMENT
TO CENTER OF
NOZZLE SEGMENT

NOZZLE SEGMENT
NOS. LOOKING
DOWNSTREAM



GT71E041



CONDITION	NOZZLE TO SUPPORT RING DIMENSION						MAXIMUM
	POS. #1	POS. #2	POS. #3	POS. #4	POS. #5	POS. #6	ECC.
DISASSEMBLY							
REASSEMBLY	4.680	4.684	4.730	4.728	4.748	4.714	0.009

MAX ECC. = 1/2 DIFFERENCE BETWEEN #1 AND #2
OR MAX ECC. = 1/2 DIFFERENCE BETWEEN (#3+#5)/2 AND (#4+#6)/2
WHICHEVER IS LARGER.

Comments:

First stage Nozzle new part Ellipticity was measured and found to be 39 mills within right in the middle of GE spec which is 80 mills maxi.
As well as radial concentricity once S1N was installed and measured was found 9 mills which is very good since specification requires 50 mills maxi.



Turbine

Turbine Rotor Clearances

Date _____ Turbine S/N _____ Prepared by Z.TASYUREK
 FSR # _____ Sketches Enclosed? _____ Photos Enclosed? YES
 Data Type _____ INCHES

All axial clearances are measured with rotor against the loaded thrust face. Refer to EM5260 to confirm rotor position.

Record all measurements in Mils

1ST STAGE S/N _____									
	OPENING		CLOSING			OPENING		CLOSING	
	Left	Right	Left	Right		Left	Right	Left	Right
1N1	0.048	0.052	0.044	0.049	1A1	0.888	0.890	0.892	0.873
1N2	0.315	0.337	0.321	0.332	1A2	1.458	1.463	0.290	0.304
E	0.022	0.020	0.019	0.022	1A3	0.768	0.767	0.752	0.751
1F1					1A4	0.825	0.827	0.847	0.848
1F2	0.205	0.212	0.209	0.230	"A"	0.512	0.528	0.519	0.523
1F3	0.525	0.572	0.515	0.536	1PH	0.253	0.249	0.245	0.250
1F4	0.189	0.198	0.185	0.191	1PL	0.239	0.245	0.240	0.260
1F5	0.580	0.568	0.572	0.561	AC	0.467	0.469	0.445	0.483
"C"					1R	0.206	0.220	0.199	0.204
"D"									

2ND STAGE S/N _____					3RD STAGE S/N _____				
	OPENING		CLOSING			OPENING		CLOSING	
	Left	Right	Left	Right		Left	Right	Left	Right
2F1	0.462	0.455	0.431	0.411	3F1	0.514	0.528	0.508	0.515
2F2	0.271	0.265	0.295	0.312	3F2	0.296	0.310	0.340	0.336
2F3	0.488	0.493	0.472	0.482	3F3	0.575	0.566	0.586	0.566
2F4					3F4				
2A1	0.904	0.920	0.890	0.878	3A1				
2A2	0.316	0.310	0.324	0.327	3A2				
2A3	0.905	0.923	0.912	0.931	3A3				
"B"	0.577	0.598	0.563	0.604	3A4				
2PH	0.244	0.252	0.254	0.260	3A5				
2PL	0.248	0.239	0.251	0.258	3SA	0.330	0.320	0.345	0.358
BC	0.528	0.521	0.586	0.543	3B	0.888	0.888	0.251	0.248
2B	0.702	0.695	0.238	0.256	3S	0.310	0.314	0.320	0.315
2S	0.336	0.325	0.322	0.333					
2SA	0.446	0.450	0.320	0.401					

Comments:	

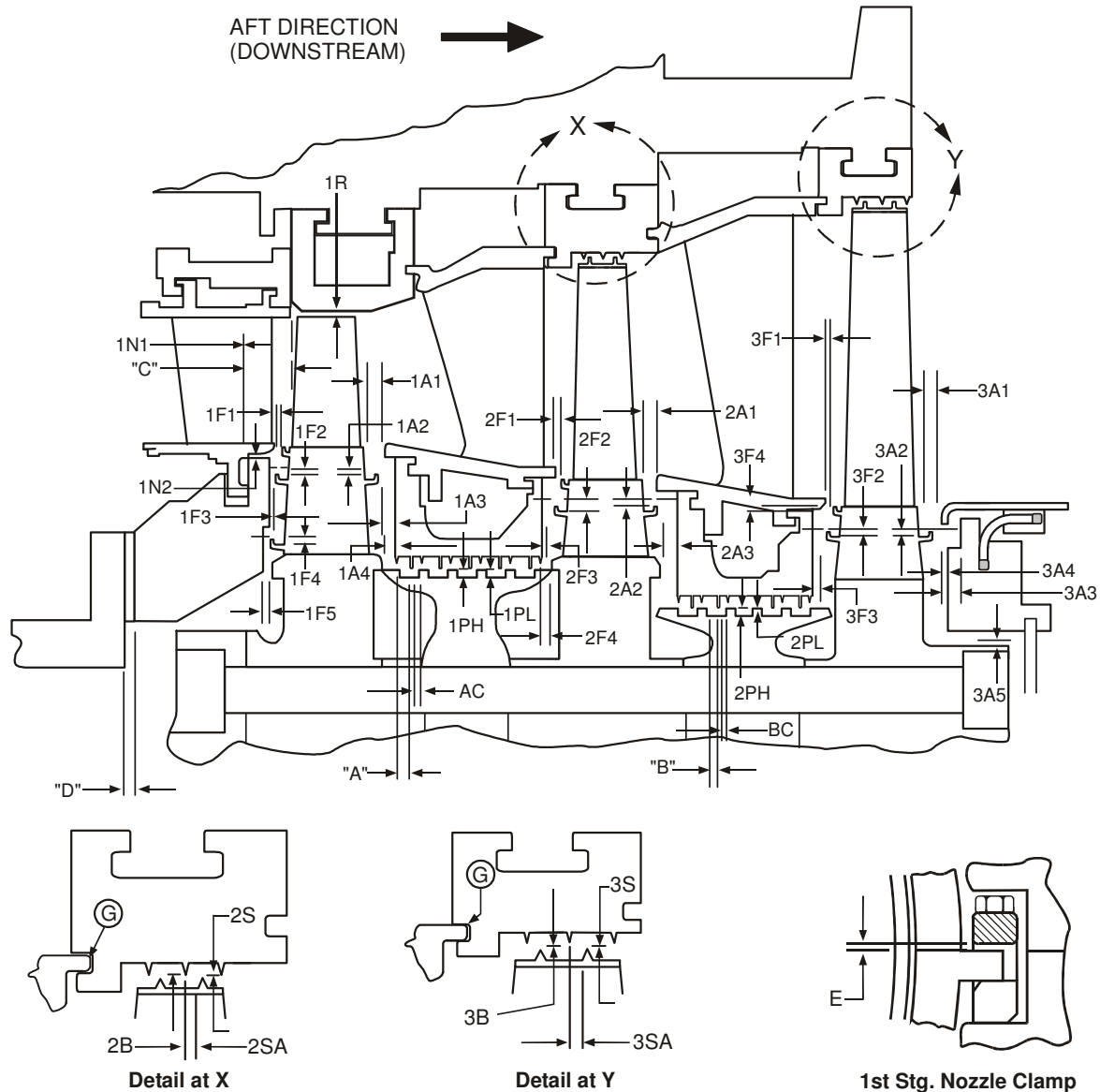


Turbine

Turbine Rotor Clearances

Date _____ Turbine S/N _____ Prepared by Z.TASYUREK
FSR # _____ Sketches Enclosed? _____ Photos Enclosed? YES
Data Type INCHES

All axial clearances are measured with rotor against the loaded thrust face. Refer to EM5260 to confirm rotor position.

**NOTE:**

Ⓒ Loc before taking axial clearances, these gaps must be no greater than 0.0015 inches [0.04 mm] and must be free of all foreign material.

GT91E001

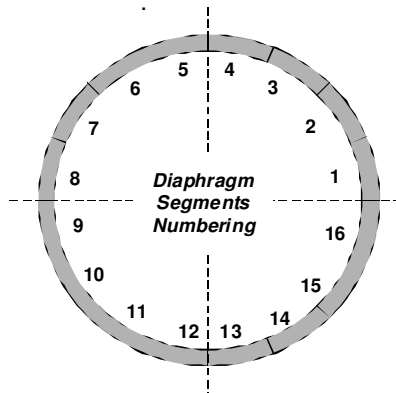


INSPECTION REPORT
Gas Turbine Maintenance
MS 6001, 9001

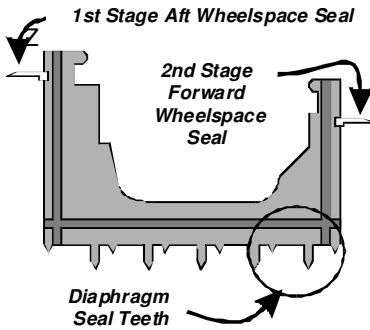
Turbine
Diaphragm Seals, 2nd Stage

Date _____ Turbine S/N _____
 FSR # _____ Sketches Enclosed? _____
 Data Type _____

Prepared by ZEKERYA TASYUREK
 Photos Enclosed? YES



LOOKING DOWNSTREAM



DEFECT CODES

WR - Worn/Rubbed
CO - Corroded
BT - Bent
ER - Eroded
MP - Missing Pieces

DISPOSITION CODES

N - No repair or replacement necessary.
RN - Replaced with new component.
RR - Replacement Recommended
RG - Repaired by GE
RC - Repaired by Customer
RO - Repaired by Other

Diaphragm Segment	Diaphragm Seal		Wheelspace Seal				Comments
	Radial Teeth		1st Stage Aft		2nd Stage Fwd		
	Condition	Disposition	Condition	Disposition	Condition	Disposition	
1	OK	RN	OK	RN	OK	RN	DIAPHRAGME REPLACEMENT IS NECESSARY
2	OK	RN	OK	RN	OK	RN	
3	OK	RN	OK	RN	OK	RN	
4	OK	RN	OK	RN	OK	RN	
5	OK	RN	OK	RN	OK	RN	
6	OK	RN	OK	RN	OK	RN	
7	OK	RN	OK	RN	OK	RN	
8	OK	RN	OK	RN	OK	RN	
9	OK	RN	OK	RN	BT,WR,CO	RN	
10	OK	RN	OK	RN	OK	RN	
11	OK	RN	OK	RN	OK	RN	
12	OK	RN	OK	RN	OK	RN	
13	OK	RN	OK	RN	BT,WR,CO	RN	
14	OK	RN	OK	RN	OK	RN	
15	OK	RN	OK	RN	OK	RN	
16	OK	RN	OK	RN	OK	RN	

Comments:

Second stage nozzle diaphragme #13,9 were found heavily damaged on their forward wheelspace seal as shown on the following pictures. All radial teeth and diaphragm body were found in a pretty condition with normal corosion and discoloration.

As customer preventive maintenance plan we all replaced nozzles with refurbished set.

GT9165 STG2 NOZZLE DIAPHRAGM CONDITION(a)



INSPECTION REPORT
Gas Turbine Maintenance

MS 6001, 9001

Turbine
Nozzle Partitions, 3rd Stage

Date _____
FSR # _____

Turbine S/N _____
Sketches Enclosed? _____
Data Type _____

Prepared by ZEKERYA TASYUREK
Photos Enclosed? YES

Form Key

DISPOSITION CODES

N - No repair or replacement necessary.
RG - Repaired by GE
RC - Repaired by Customer
RO - Repaired by Other
RN - Replaced with new component.
RR - Replacement Recommended

CONDITION CODES

N - Normal
BT - Bent/Bowed
BR - Broken
ER - Eroded
CR - Cracked
M - Missing Metal
CO - Corroded
BR - Broken

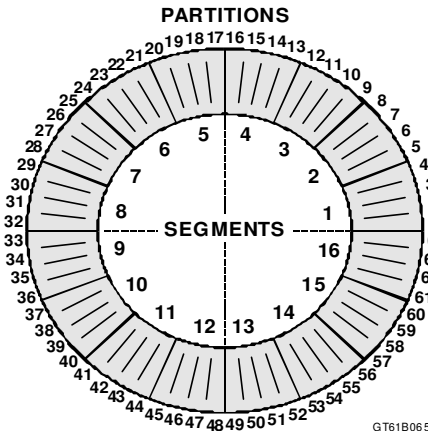
Solid lines are cracks on gas path side of side walls or pressure side of partitions.

Dashed Lines are cracks on external side of side walls or suction side of partitions.

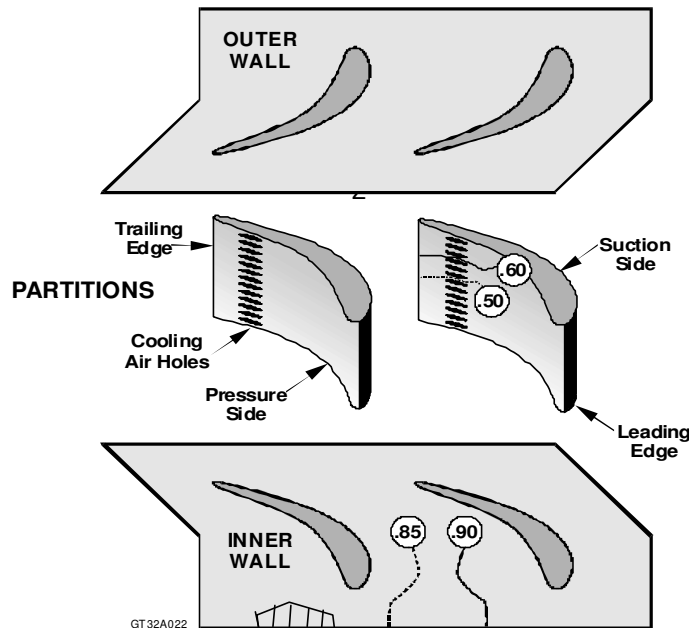
.85 Length of crack

 Piece broken or burned off

PARTITIONS AND SEGMENT NUMBERING SYSTEM



Looking Downstream



Comments:

No cracks or any kind of failure third stage nozzle segments were found in a very good condition but still need to be change as part of FMI brush seal system with new aero bucket and nozzle third stage change out.

GT9320 S3N OLD GEN COND(a)



INSPECTION REPORT

MS 6001, 9001

Turbine Nozzle Partitions, 3rd Stage

Date _____
FSR # _____

Turbine S/N _____
Sketches Enclosed? _____
Data Type visual

Prepared by ZEKERYA TASYUREK
Photos Enclosed? YES

Serial Number:

Removed	SEE RECORD SHEET
Installed	SEE RECORD SHEET

Segment Number

ALL

Partition Number

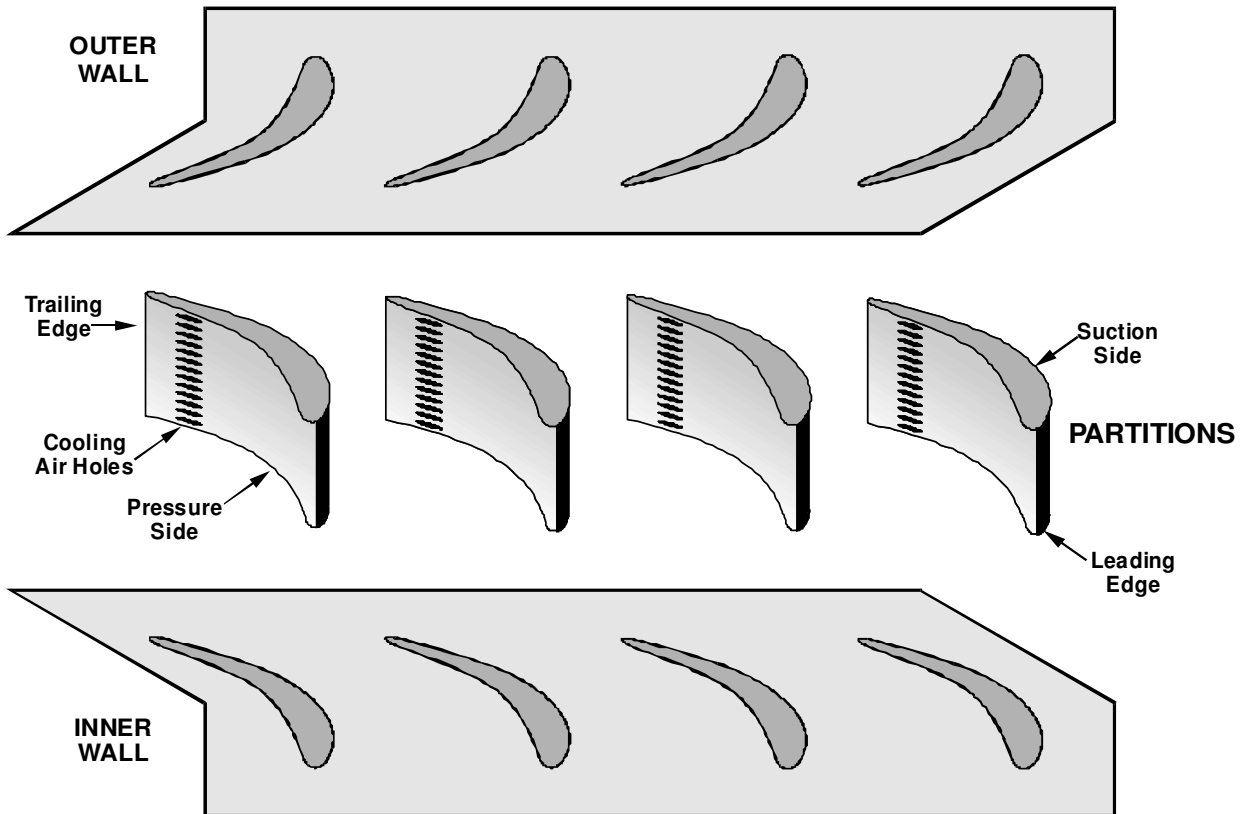
ALL

ALL

ALL

Part Number:

Removed	103E5505P003
Installed	119E9556P001



GT500035

Nozzle Condition & Disposition

Partition Number	Partitions				Walls	
	9	10	11	12	Outer	Inner
Disposition Code	RN	RN	RN	RN	RN	RN
Condition Code	N	N	N	N	N	N
# of Plugged cooling Holes	0	0	0	0		
Partition Trailing Edge Bowing:						
N-None U-Upstream D-Downstream	N	N	N	N		
Amount of Bowing:	N	N	N	N		

GT9320 S3N OLD GEN COND(b)



INSPECTION REPORT
Gas Turbine Maintenance

MS 9001

Turbine
Bucket Shroud - General Condition, 1st Stage

Date _____
FSR # _____

Turbine S/N _____
Sketches Enclosed? No
Data Type Inches

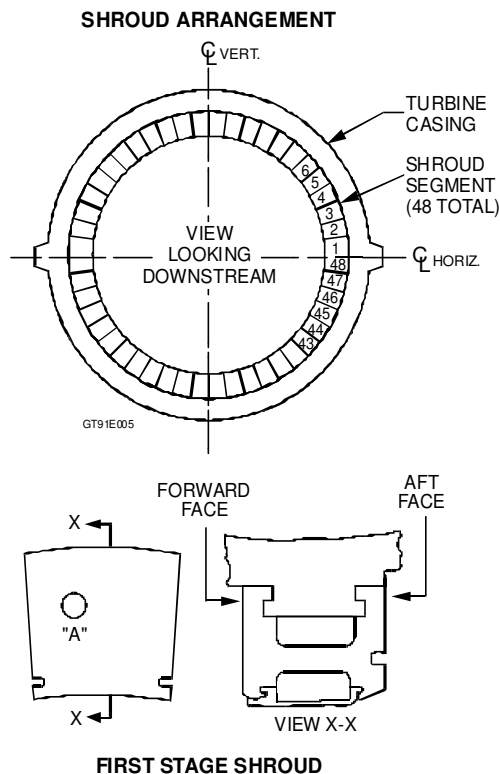
Prepared by ZEKERYA TASYUREK
Photos Enclosed? Yes

GENERAL SURFACE EFFECTS - Put "X" where applicable.

	NONE	LIGHT	MEDIUM	HEAVY	COMMENTS
Deposits		X			
Corrosion		X			
Erosion		X			
Cracks		X		Z	
Nicks & Dents		X			
Rubs/Wear			X		TBC BURN AND GONE ON 1,2,48,47,23,24,26,27

Disposition

No repair or replacement necessary
Repaired
X Replaced with new component
Recommended replace/repair at next outage



Comments
ALL SHROUD SEGMENTS ARE REPLACED WITH THE NEW SET AS PART OF OUTAGE PREVENTIVE MAINTENANCE

Percent "A" Plugged	Shroud Segment Nos.
0	X
0-25	
25-50	
50-100	

Comments
TCB IS MISSING ON SHROUDS LOCATED ON THE SPLIT JOINT BOTH LOWER AND UPPER HALVES

gt9105 SHROUDN 1 GEN CONDITION(a)

Date _____
FSR # _____

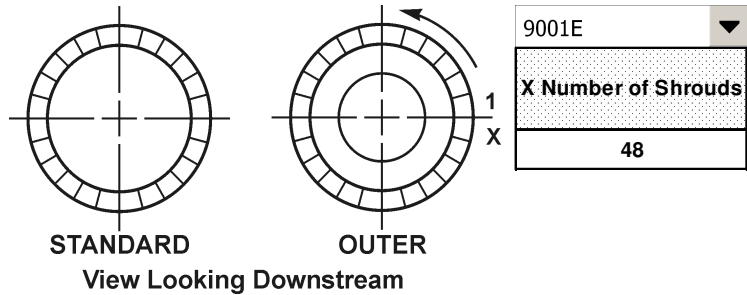
Turbine S/N _____

Prepared by TASYUREK ZEKERYA

Note:This sheet is required for **all** configurations.

Select one:

- ☒ Standard Shroud (non FA)
☐ Outer Shroud (FA)



Shroud Segment	Dwg. No. Out	Dwg. No. In	Serial No. Out	Serial No. In.
1	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
2	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
3	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
4	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
5	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
6	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
7	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
8	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
9	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
10	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
11	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
12	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
13	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
14	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
15	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
16	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
17	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
18	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
19	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
20	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM

first stage shroud SN(a)

**Standard & Outer Shroud Configuration
(First Stage)**Date 4/28/2008
FSR # 87HU0016Turbine S/N 296973Prepared by TASYUREK ZEKERYA

Shroud Segment	Dwg. No. Out	Dwg. No. In	Serial No. Out	Serial No. In.
21	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
22	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
23	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
24	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
25	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
26	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
27	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
28	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
29	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
30	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
31	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
32	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
33	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
34	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
35	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
36	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
37	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
38	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
39	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
40	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
41	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
42	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
43	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
44	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
45	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
46	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
47	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM
48	116E1068 P1	116E1068 P1	NO SERIAL NUM	NO SERIAL NUM

first stage shroud SN(b)



Definitions

Assembly Dwg. No. - The higher level drawing above the individual part drawing

Part Dwg. No. Out - The design identification number of each part removed from the gas turbine during an outage or inspection.

Part Dwg. No. In - The design identification number of each part installed on the gas turbine during an outage or inspection.

Serial No. Out - A unique number assigned to each individual part removed from the gas turbine.

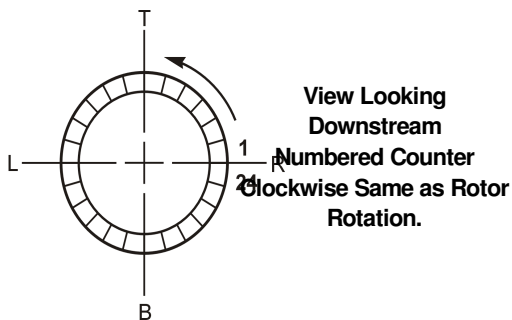
Serial No. In - A unique number assigned to each individual part installed on the gas turbine.

Nomenclature

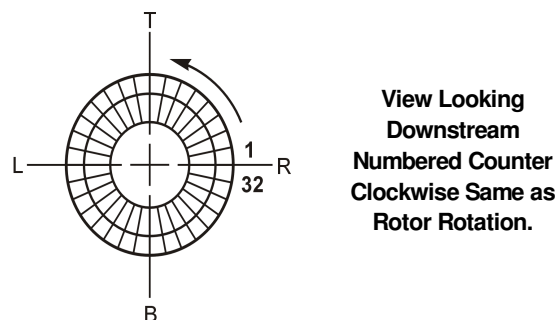
Inner Shroud - The shrouds located nearest radially to the turbine rotor.

Outer Shroud - The shrouds located farthest radially from the turbine rotor.

Nozzle Segment Position



Shroud Segment Position - Inner and Outer



	SHROUD SEGMENTS - (INNER/OUTER), 1st, 2nd, 3rd STAGE					
	Standard or Outer			INNER		
	1st Stage	2nd Stage	3rd Stage	1st Stage	2nd Stage	3rd Stage
6001B	36	36	30	None	None	None
6001FA	24	24	20	72	None	None
7001EA	48	48	32	None	None	None
7001EC	48	48	32	None	None	None
7001FA	32	48	36	96	None	None
7001FA+	32	48	36	96	None	None
7001FA+e	32	48	36	96	None	None
9001E	48	48	32	48	None	None
9001EC	40	48	44	120	None	None
9001FA	40	48	44	120	None	None
9001FA+	40	48	44	120	None	None
9001FA+e	40	48	44	120	None	None

first stage shroud SNDefinitions

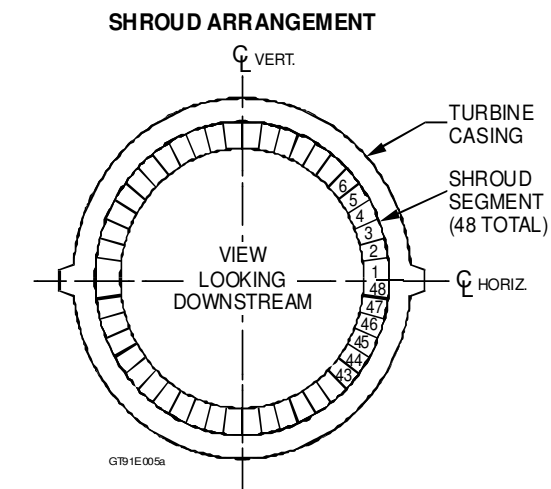
	NONE	LIGHT	MEDIUM	HEAVY	COMMENTS
Deposits			X		
Corrosion			X		
Erosion			X		
Cracks	X				

Disposition

	No repair or replacement necessary
	Repaired
X	Replaced with new component
	Recommended replace/repair at next outage

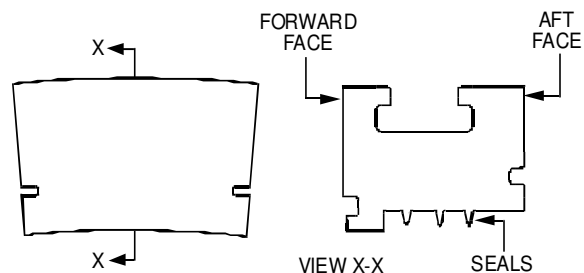
Comments

SECOND STAGE SHROUDS ARE ERRODED CORRODED BURNISHED MEDIUM , THEY HAVE ALL BEEN REPLACED AS PER PLANED OUTAGE MAINTENANCE SCOPE



Seal Condition

	Cracks
X	Distortion
X	Wear/Rubs
	Missing Pieces



SECOND STAGE SHROUD

Comments

gt9125 SHROUD 2 GEN COND(a)

Date _____
FSR # _____

Turbine S/N _____

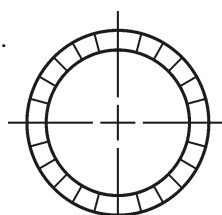
Prepared by ZEKERYA TASYUREK

Note:

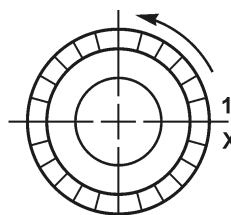
This sheet is required for **all** configurations.

Select one:

- ☒ Standard Shroud (non FA)
☐ Outer Shroud (FA)



STANDARD



OUTER

View Looking Downstream

Select Frame Size

9001E

X Number of Shrouds

48

Shroud Segment	Dwg. No. Out	Dwg. No. In	Serial No. Out	Serial No. In.
1	329A3247G006	329A3247G002	no serial number	no serial number
2	329A3247G006	329A3247G002	no serial number	no serial number
3	329A3247G006	329A3247G002	no serial number	no serial number
4	329A3247G006	329A3247G002	no serial number	no serial number
5	329A3247G006	329A3247G002	no serial number	no serial number
6	329A3247G006	329A3247G002	no serial number	no serial number
7	329A3247G006	329A3247G002	no serial number	no serial number
8	329A3247G006	329A3247G002	no serial number	no serial number
9	329A3247G006	329A3247G002	no serial number	no serial number
10	329A3247G006	329A3247G002	no serial number	no serial number
11	329A3247G006	329A3247G002	no serial number	no serial number
12	329A3247G006	329A3247G002	no serial number	no serial number
13	329A3247G006	329A3247G002	no serial number	no serial number
14	329A3247G006	329A3247G002	no serial number	no serial number
15	329A3247G006	329A3247G002	no serial number	no serial number
16	329A3247G006	329A3247G002	no serial number	no serial number
17	329A3247G006	329A3247G002	no serial number	no serial number
18	329A3247G006	329A3247G002	no serial number	no serial number
19	329A3247G006	329A3247G002	no serial number	no serial number
20	329A3247G006	329A3247G002	no serial number	no serial number

GT7116 shroud 2 sn(a)

Date _____
FSR # _____

Turbine S/N _____

Prepared by ZEKERYA TASYUREK

Shroud Segment	Dwg. No. Out	Dwg. No. In	Serial No. Out	Serial No. In.
21	329A3247G006	329A3247G002	no serial number	no serial number
22	329A3247G006	329A3247G002	no serial number	no serial number
23	329A3247G006	329A3247G002	no serial number	no serial number
24	329A3247G006	329A3247G002	no serial number	no serial number
25	329A3247G006	329A3247G002	no serial number	no serial number
26	329A3247G006	329A3247G002	no serial number	no serial number
27	329A3247G006	329A3247G002	no serial number	no serial number
28	329A3247G006	329A3247G002	no serial number	no serial number
29	329A3247G006	329A3247G002	no serial number	no serial number
30	329A3247G006	329A3247G002	no serial number	no serial number
31	329A3247G006	329A3247G002	no serial number	no serial number
32	329A3247G006	329A3247G002	no serial number	no serial number
33	329A3247G006	329A3247G002	no serial number	no serial number
34	329A3247G006	329A3247G002	no serial number	no serial number
35	329A3247G006	329A3247G002	no serial number	no serial number
36	329A3247G006	329A3247G002	no serial number	no serial number
37	329A3247G006	329A3247G002	no serial number	no serial number
38	329A3247G006	329A3247G002	no serial number	no serial number
39	329A3247G006	329A3247G002	no serial number	no serial number
40	329A3247G006	329A3247G002	no serial number	no serial number
41	329A3247G006	329A3247G002	no serial number	no serial number
42	329A3247G006	329A3247G002	no serial number	no serial number
43	329A3247G006	329A3247G002	no serial number	no serial number
44	329A3247G006	329A3247G002	no serial number	no serial number
45	329A3247G006	329A3247G002	no serial number	no serial number
46	329A3247G006	329A3247G002	no serial number	no serial number
47	329A3247G006	329A3247G002	no serial number	no serial number
48	329A3247G006	329A3247G002	no serial number	no serial number

GT7116 shroud 2 sn(b)



Definitions

Assembly Dwg. No. - The higher level drawing above the individual part drawing

Part Dwg. No. Out - The design identification number of each part removed from the gas turbine during an outage or inspection.

Part Dwg. No. In - The design identification number of each part installed on the gas turbine during an outage or inspection.

Serial No. Out - A unique number assigned to each individual part removed from the gas turbine.

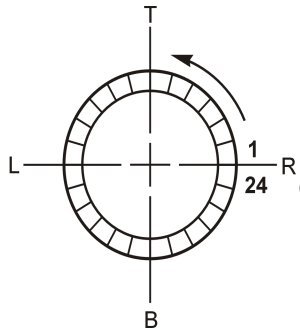
Serial No. In - A unique number assigned to each individual part installed on the gas turbine.

Nomenclature

Inner Shroud - The shrouds located nearest radially to the turbine rotor.

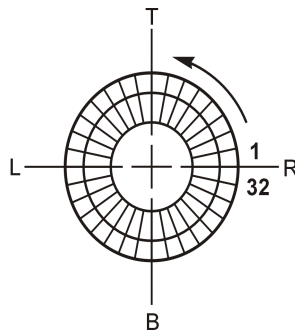
Outer Shroud - The shrouds located farthest radially from the turbine rotor.

Nozzle Segment Position



View Looking
Downstream
Numbered Counter
Clockwise Same as Rotor
Rotation.

Shroud Segment Position - Inner and Outer



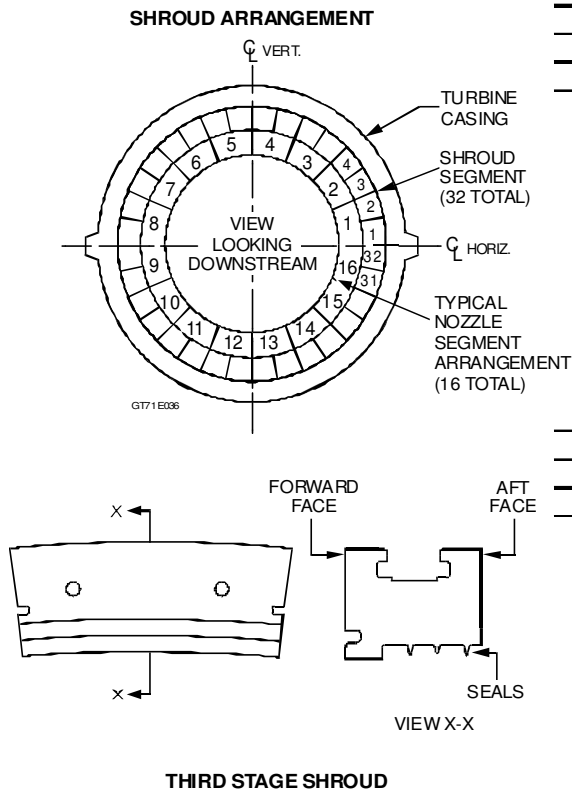
View Looking
Downstream
Numbered Counter
Clockwise Same as
Rotor Rotation.

SHROUD SEGMENTS - (INNER/OUTER), 1st, 2nd, 3rd STAGE						
	Standard or Outer			INNER		
	1st Stage	2nd Stage	3rd Stage	1st Stage	2nd Stage	3rd Stage
6001B	36	36	30	None	None	None
6001FA	24	24	20	72	None	None
7001EA	48	48	32	None	None	None
7001EC	48	48	32	None	None	None
7001FA	32	48	36	96	None	None
7001FA+	32	48	36	96	None	None
7001FA+e	32	48	36	96	None	None
9001E	48	48	32	48	None	None
9001EC	40	48	44	120	None	None
9001FA	40	48	44	120	None	None
9001FA+	40	48	44	120	None	None
9001FA+e	40	48	44	120	None	None

GT7116 shroud 2 snDefinitions

GENERAL SURFACE EFFECTS - Put "X" where applicable.

	NONE	LIGHT	MEDIUM	HEAVY	COMMENTS
Deposits		X			
Corrosion	X				
Erosion	X				
Cracks	X				



Disposition

	No repair or replacement necessary
	Repaired
X	Replaced with new component
	Recommended replace/repair at next outage

Comments

As customer preventive maintenance plan all shrouds will be left as is

Seal Condition

good	Cracks
no	Distortion
light	Wear/Rubs
no	Missing Pieces

Comments

Shroud Seal teeth were found in very good condition. Forward face was just a little worn. Shroud aft face was found slightly burnish with hot spot. Honeycomb were normally grooved without any serious damage. Generally speaking these shrouds are in a very pretty condition.

shroud gen cond(a)

GT9135 3rd stg



INSPECTION REPORT

Turbine

MS 9001

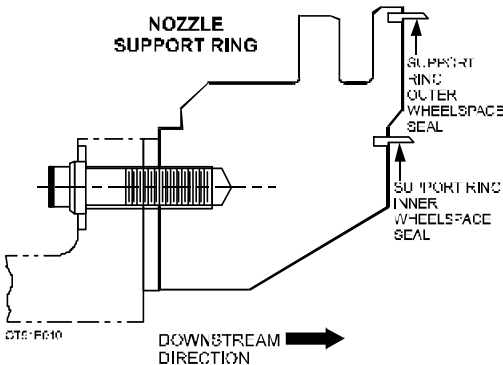
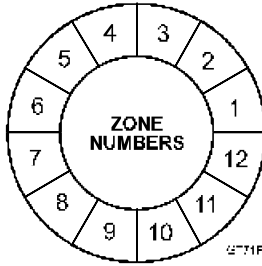
Nozzle & Support Ring - General Conditions, 1st Stage

Date _____
FSR # _____

Turbine S/N _____
Sketches Enclosed? _____

Prepared by ZEKERYA TASYUREK
Photos Enclosed? No

SUPPORT RING SEAL CONDITION [Check (X) if Condition Exists]

	Outer Seal		Zones	ZONES: Note location of condition by Zone (1-12) as indicated on sketch.  VIEW LOOKING DOWNSTREAM
	☐ Corrosion ☐ Erosion ☐ Missing Pieces ☐ Wear ☒ Distortion		4,11	
	Inner Seal		Zones	
	☐ Corrosion ☐ Erosion ☐ Missing Pieces ☐ Wear ☒ Distortion		4,11	

Comments:

No defects noted. Support Ring cleaned & returned to service

SUPPORT RING GENERAL CONDITION



INLET SYSTEM

Inlet Plenum

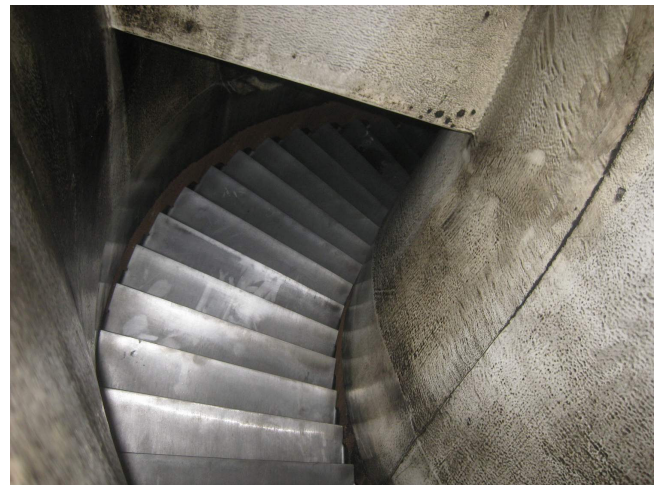
Assembly:

Inlet plenum was cleaned with vacuum cleaner .No problems were found all surrounding inlet plenum wall and inlet bell mouth were cleaned as well with rags , ready for operation

Check inlet plenum cleanliness during the next planed outage and clean if necessary.



INLET PLENUM ONCE CLEANED WITH VACCUM CLEANER





EXHAUST SYSTEM

Exhaust Plenum

EXHAUST DIFFUSOR; EXHAUST DIFFUSOR

Exhaust diffuser was found cracked on various location and was requiring weld repair performed by customer subcontractor.

Check diffuser condition for potential crack and weld repair with proper electrodes or filler, diffuser is made of B7A62A commonly stainless steel 0304 L by the way filler should be 0308 L.

Exhaust Plenum

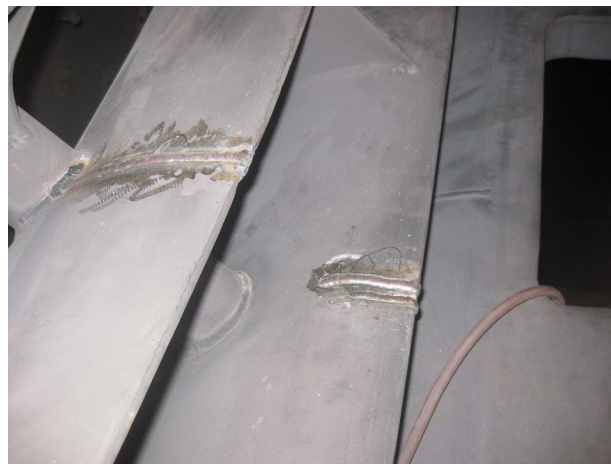
FLEX SEALS FORWARD; EXHAUST PLENUM...

Exhaust casing forward metal expansion segment flex seals integrated in the exhaust hood were repaired by customer due their bad condition. Seals were heavy worn and disordered in several point. Therefore customer decided to cut the pipe bracket in the exhaust hood forward flange then remove the damaged flex seal afterward weld back and secure the cut piece. The following pictures shows this repair which is not guaranteed by GE since the standard procedure has not been respected.

Also during exhaust clean condition check prior to close hatch door we noticed big mismatch of inner and outer exhaust casing thermal shield which probably happened during the last major inspection, seems like they failed in installing upper half exhaust hood which is out of its centering pins.

Check flex seal forward and aft condition and change them if necessary during the next planed HGPI also if possible correct this big mismatch of inner thermal shield at the first opportunity.

EXHAUST DIFFUSOR CRACK WELD REPAIR





EXHAUST SYSTEM



EXHAUST INNER THERMAL SHIELD MISMATCH





EXHAUST SYSTEM



EXHAUST FLEX INTERNAL FLEX SEAL REPAIR BY EON





GAS FUEL SYSTEM

Piping/Components (GF)

Hose - Flexible:

All piping flex hose were disassembled ,cleaned and inspected with borescope . No problem areas were found on these components. All parts were returned to service. Also we check the TIL 1585 related to the proper use and care of flexible metal hoses.

Check TIL 1585 at the next planed combustion inspection in order to avoid any damage on flex hoses during removal and installation.

Control Valve SRV, GCV AND SPLITTER

A calibration check was performed, and the device was satisfactory with little or no adjustment necessary.



LUBE OIL SYSTEM

Filters (LO)

Cartridge - Filter; FILTER LUBE OIL

New Lube Oil Filter Cartridge Elements installed during Outage re-assembly
[Part # 354 A 1418 P001]

Check differential pressure from filter in and out then change the if they re close to the electrical switch limit.

Main Pump

Assembly; MAIN PUMP

Check main lube oil discharge pressure and temperature to monitor its condition versus time. From now find out replacement like pump gears and bearing that is to say whole assembly.

Emergency Pump

DC LUBE OIL PUMP MARK5 SET UP; MARK5

DC emergency pump set up is being changed from speedtronic control panel to protect the turbine bearings following a plant AC power loss by maintaining the continued operation of the DC lube oil pump.



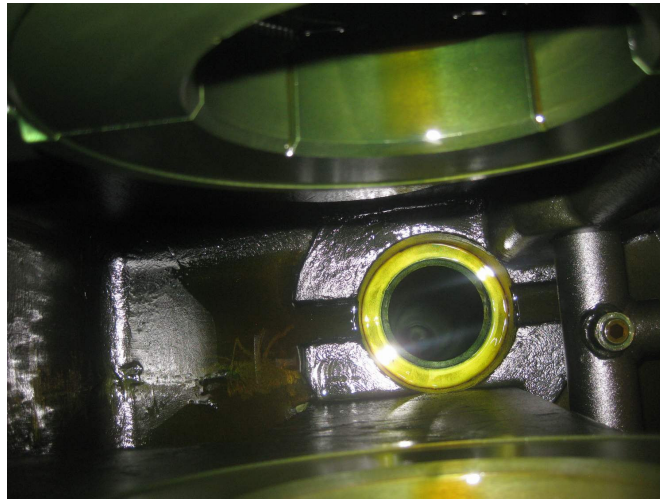
ACCESSORY BASE

Accessory Gear

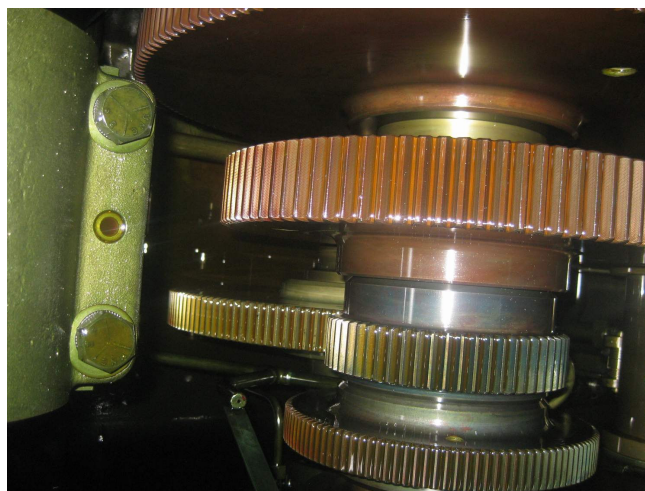
Bearing:

Accessory gear box inspection cover was removed in order to check whether we have Babbitt particles at the bottom of gear box .See the following pictures which don t show any evidence of Babbitt particles neither hard material loss.

Remove gear box upper half inspection cover and check any trace or debris of Babbitt loss.



NO EVIDENCE OF BABITT DEBRIS



GEAR GENERAL CONDITION WITH NO INDICATION



GENERATOR ALIGNMENT & CLEARANCES

Alignment - Coupling

ACCESSORY GEAR; ACCESSORY GEAR

Accessory gear box alignment wasn't in our scope, indeed customer hasn't experienced any kind of high vibration there.

Check alignment during the next planned HGPI.



STARTUP COMMENTS

See control TA reports for start up comments