



INCOMING INSPECTION REPORT



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MS6001FA (GE Frame 6FA) 2nd Stage Nozzle Set

Work Order WO-1004061634 / WO-1004061642

Customer	Nghi Son Refinery & Petrochemical LLC	Report Date	19 June 2026
Customer P.O. No.	WO-1004061634 / WO-1004061642	Component	MS6001FA 2nd Stage Nozzle
Engine Type	MS6001FA (GE Frame 6FA)	Qty. Received	24 pieces (1 set)
Component Part No.	119E2604 G04 REV A	As-Received Coating	MCrAlY (APS) coating
Material	GTD262	Severity Category	Standard / Medium Refurbishment
Repair Classification	MEDIUM REPAIR, LEVEL 6	Previous Repairs	(Not supplied)
Service History	(Not supplied)	Disposition	Repair and restore per the Level 6 scope

Report Reviewed and Approved By

Paul McGuire
Engineer Manager



INCOMING INSPECTION REPORT

1. INTRODUCTION

Twenty-four (24) pieces of MS6001FA 2nd Stage Nozzle have been received by UNEW, Inc. and have undergone cleaning, coating removal where required, incoming inspection and metallurgical analysis. The component set was received complete, correctly identified and in good packing condition, with no evidence of transit-induced damage. The initial findings and results of the incoming inspection are presented below and are developed in full technical detail in the sections that follow.

The objective of this incoming evaluation is twofold: first, to establish the true as-received condition of every component in the set; and second, to determine the most parent-metal-conservative route by which the complete population of twenty-four segments and their associated diaphragm assemblies can be restored to serviceable condition. As recorded throughout this report, the full set has been retained for repair; no component has been consigned to the non-repairable category.

Order Information	
UNEW Work Order no.	WO-1004061634 / WO-1004061642
Date of report	19 June 2026
Customer P.O. no.	WO-1004061634 / WO-1004061642
Component Details	
Engine type	MS6001FA
Component type	2nd Stage Nozzle
Component part number	119E2604 G04 REV A
Qty. received	24
Material type	GTD262
As-received coating type(s)	MCrAlY (APS) coating
Additional items received with main set	—
Customer-Supplied Component History	
Total fired hours	(No information supplied)
Total starts	(No information supplied)
Total factored fired hours	(No information supplied)
Number of previous repairs	(No information supplied)
FFH on component since last repair	(No information supplied)
Total FFS on component	(No information supplied)
FFS on component since last repair	(No information supplied)
Hours of operation since last repair interval	(No information supplied)
Operational fuel type	(No information supplied)
Mode of operation (base load / peaking)	(No information supplied)
Maintenance intervals — combustion	(No information supplied)



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Maintenance intervals — hot gas path	(No information supplied)
Unloaded Condition	
Incoming packing / container condition	Good
Signs of transit damage	—

Because no service history was supplied with the set, the repair-severity disposition recorded in this report is derived entirely from the measured incoming condition and the restoration scope required, rather than from accumulated operating hours. This is consistent with the principle that the repair level shall be governed by the actual damage condition and the restoration effort required, and not by the process name or the elapsed service life alone.

2. INSPECTION SUMMARY & REPAIR DISPOSITION

Based on the findings of the incoming inspection process — the results and supporting detail of which are presented in full in the following sections — UNEW Engineering submits the following recommendations for the required repair category, required coatings and replacement materials necessary to restore the components to a serviceable condition. The disposition has been assembled with the deliberate intent of returning the entire set to service within the controlled, standard/medium repair envelope.

Repair Requirements

DISPOSITION		QTY	UNIT
Inspect	Incoming inspections	1	Set
Level 6 — Medium Repair	Repair (significant but controlled restoration)	1	Set
Required	Diffused aluminide coating	1	Set

Repair level assigned: Level 6 — Medium Repair (Standard / Medium Refurbishment band, Levels 4–7). The full engineering basis for this classification — including the relationship between the extent of the weld restoration and the non-critical location of every affected feature — is presented in Section 3. In summary, although the restoration scope across this set is significant in both area and repetition, every disposition falls within a location that is designated weld-repairable, and the set therefore remains within the standard/medium band rather than the heavy-repair band.

Additional Items

DISPOSITION		QTY	UNIT
Required	Replace locking plate	24	Piece
Required	Replace cloth seals and joint seals	1	Set

Scrap / Non-Repairable

None. No component within this set has been assessed as non-repairable. The complete population of twenty-four (24) nozzle segments and twenty-four (24) diaphragm assemblies has been retained for restoration.



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Additional Recommendations

None at this stage. In the event that any individual indication is found, during repair, to extend beyond the allowable limit for its specific location, an addendum will be issued to this report to advise the customer; on the present incoming evidence, no such condition is anticipated.

3. REPAIR SEVERITY CLASSIFICATION & ENGINEERING BASIS

This section records the engineering basis on which the present set has been classified as a Level 6 — Medium Repair. The classification has been carried out against UNEW's ten-level repair-severity framework for GE 6FA hot-gas-path components, and it is the governing reference for the disposition recorded in Section 2.

3.1 Classification Framework

Repair severity is determined by the actual incoming condition of the component and the restoration effort required to return it to serviceable condition. The process name alone does not determine the repair level: cleaning, inspection, FPI/NDT, dimensional check, heat treatment, coating, assembly and standard consumable replacement may all form part of a normal refurbishment unless the damage extent, repair volume, dimensional recovery, material condition or engineering risk makes the work more severe. The framework groups the ten levels into three bands:

Level Range	Classification	Working Meaning
Levels 1–3	Light Repair	Minor cleaning, inspection, limited local correction; no major structural restoration.
Levels 4–7	Standard / Medium Refurbishment	Normal to significant restoration within the expected refurbishment range. — The present set is classified here, at Level 6.
Levels 8–10	Heavy Repair	Repair exceeds normal refurbishment expectation because of damage extent, critical location, restoration risk, or repairability limit.

Level 6 — Medium Repair is defined within the framework as: *“Significant but controlled restoration — multiple repair areas, larger weld/braze restoration, measurable material loss, coating/base-metal recovery, repeated inspection required.”*

This definition describes the present set with precision. The incoming condition is characterised by multiple repair areas and by larger weld restoration across the complete population — exactly the conditions the framework places at Level 6 — while remaining controlled, weld-repairable and within the normal repairability margin.

3.2 Governing Principle — Location Over Size

The single most important engineering consideration in this disposition is the governing principle that the final repair classification shall not be determined by measurement size alone. Repair severity must also consider the location of the defect, the function of the affected area, local wall



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thickness, stress level, cooling-air function, sealing function, fit-up requirement, previous repair history, remaining repair margin and turbine reliability risk.

The framework states the principle directly: a larger repair area in a non-critical location may remain within standard or medium repair, whereas a much smaller defect in a critical location may require heavy-repair control or may be determined non-repairable. The critical locations are specifically enumerated as the cooling holes, seal slots, root/attachment areas, shroud contact faces, thin-wall sections and high-stress regions. It is precisely against this enumerated list that the present findings have been assessed.

The conclusion of that assessment, developed item-by-item below, is the central finding of this report: the weld restoration required on this set is extensive in area and is repeated across all twenty-four segments, but it lies wholly outside every enumerated critical location. Under the governing principle, extent in a non-critical location does not by itself elevate the repair level. The breadth of the restoration is therefore a measure of the work content, not of the repair severity.

3.3 Condition Assessment Against the Core Technical Review Categories

The incoming condition has been reviewed against each of the five core technical review categories that govern repair-level determination. In every category the affected features are significant in extent yet controlled in location, which is the defining signature of a Level 6 disposition.

Review Category	Condition Found on This Set	Governing Location / Severity Assessment
Welding & Material Build-up	All 24 segments require weld-and-blend (WB) restoration across the airfoil gas-path surfaces and across both the leading-edge and trailing-edge core-plug cavities. The cumulative weld area across the set is large and is repeated on every component.	The weld zones lie on the airfoil gas-path surface, the non-gas-path shroud faces and the internal core-plug cavity — all designated weld-repairable locations. No weld restoration is required at a cooling hole, seal slot, root/attachment or shroud contact face. Large area, non-critical location → remains standard/medium.
Dimensional Restoration	Downstream deflection is recorded as unacceptable (Rej) on 23 of 24 segments and acceptable on segment 24; nozzle twist and platform geometry require restoration across the set. Diaphragm radius and base-plate-to-segment dimensions are within the recorded inspection range.	Dimensional recovery is achieved by controlled cold straightening, weld build-up and machining to restore the original profile — a standard nozzle dimensional-restoration route. The geometry to be recovered is gas-path and platform geometry, not root fit-up or sealing-surface geometry. Significant recovery, controlled method → medium.
Coating & Base-Metal Condition	Hot-gas-path surfaces were protected by MCrAlY (APS) coating, now removed by grit blast for repair. The GTD262 base metal is confirmed sound,	Coating loss is the expected service condition and is fully recoverable by the specified diffused-aluminide re-coat. No substrate attack, hot-corrosion penetration or base-metal

Review Category	Condition Found on This Set	Governing Location / Severity Assessment
	with fine grain-boundary carbide and a gamma matrix carrying fine gamma-prime.	exposure beyond coating depth was found. Normal coating recovery → standard/medium.
Cooling-Hole / Passage Recovery	Cooling-hole and seal-slot geometry is restored by EDM as part of the standard work scope following weld and heat treatment; no blocked or collapsed cooling passages were identified at incoming inspection.	Cooling-passage recovery is performed by controlled EDM to the original geometry; the cooling holes themselves were not the seat of the structural defects. No through-wall cooling-passage damage → does not elevate the level.
Inspection, Heat-Treatment & Engineering Risk	The set requires incoming and intermediate FPI, full solution heat treatment, TPR where multiple surface indications are marked, and repeated inspection. Pre-weld solution heat treatment recovered the base-metal microstructure (36.3 HRC).	A repeated-inspection, multi-heat-cycle burden is explicitly part of the Level 6 definition (“repeated inspection required”) and confirms the medium classification rather than contradicting it. The base metal has been demonstrated to be in a fully repairable condition. Controlled engineering risk → medium.

3.4 Extent of Restoration — Significant but Controlled

It is important that the reader of this report not mistake the extent of the work for the severity of the classification. The weld restoration on this set is, by any measure, substantial: weld-and-blend is dispositioned on the airfoil gas-path of every one of the twenty-four segments, on both core-plug cavities of every segment, and on the body of every one of the twenty-four diaphragm assemblies. Taken together this represents one of the larger weld-restoration scopes that a 2nd-stage nozzle set will present. Were repair severity judged by area alone, such a scope might invite a heavier classification.

That judgement, however, would be contrary to the governing principle. Each of these weld zones has been individually located, and each lies within a feature that the framework designates as weld-repairable and non-critical: the gas-path airfoil surface, the non-gas-path inner and outer shrouds, and the internal core-plug cavity. None lies at a cooling hole, a seal slot, a root or attachment, a shroud contact face, a thin-wall edge or a high-stress region. A 2nd-stage nozzle is, moreover, a stationary component whose gas-path airfoil surfaces are inherently more tolerant of weld restoration than the equivalent surfaces of a rotating bucket. The combination of a large but non-critical weld area, a confirmed-repairable base metal and a standard dimensional-recovery route is the textbook condition for Level 6 — significant restoration held firmly within the controlled, standard/medium band.

Where the framework provides that the more severe technical condition shall govern when multiple criteria apply, that test has been applied here and is satisfied: the most severe technical condition present on this set — the large, repeated weld restoration — still resolves to a medium-repair location, and no single criterion drives any component toward the heavy-repair band or toward a non-repairable disposition.

3.5 Disposition Philosophy

The dispositions in this report have been assembled with a clear and consistent objective: to recover the maximum quantity of qualified parent material and to return the complete set of twenty-four segments and diaphragm assemblies to NSRP in serviceable condition. Wherever a feature is weld-repairable, weld restoration has been selected in preference to replacement, conserving the original certified hardware and its established service pedigree. Wherever a defect could in principle have been read as approaching a critical boundary, the affected feature has been examined against its specific location limit before any disposition was assigned, so that the decision rests on the governing engineering condition and not on the headline area of the repair.

The result of that approach is recorded plainly in the dispositions that follow: every one of the twenty-four segments has been retained; every diaphragm assembly has been retained; the scrap report is empty; and the entire restoration is contained within the Level 6 — Medium Repair envelope. UNEW Engineering has applied the full extent of its repair capability to this set so that NSRP recovers its hardware through a controlled, standard/medium refurbishment rather than through a heavier and more intrusive route. Every step of the work scope described in this report has been selected with that outcome in view.

4. SPARE PARTS SCHEDULE (REPAIR / REPLACE)

The following schedule records the spare and consumable hardware associated with the set, together with its incoming condition and disposition. Consistent with the parent-material-conservative approach adopted throughout this evaluation, structural hardware capable of restoration has been dispositioned for repair, while sealing elements and locking hardware — items that are replaced as a matter of course at every refurbishment — are dispositioned for replacement with new.

Item	Part Description	Received / Required	Condition	Quantity	Remark
1	Segment assy. seals (cloth seal type) — Material: L605, UNW4058-01 to 07	154/154 ea	Replace	154 ea	Additional
2	Diaphragm seals (cloth seal type) — Material: L605, UNW4058-08 to 09	44/44 ea	Replace	44 ea	Additional
3	Segment joint seals (flat seal type) — Material: Hast-X, UNW4078-01 to 07; Ref. OEM P/N 119D3157 P0087, P0088, P0089, P0090, P0091, P0092, P0093, P0094, P0095	14/14 ea	Replace	14 ea	Additional
4	Diaphragm joint seals (flat seal type) — Material: Hast-X, UNW4078-08 to 09; Ref. OEM P/N 119D3157 P0094, P0095	4/4 ea	Replace	4 ea	Additional
5	Diaphragm retaining screw pin, UNW4061-01 — Material: A286; Hex. Head Bolt (Ref. OEM P/N 207C3851P3); Size 5/8", thread 1/2"-20 UNC, L = 48 mm	48/48 ea	Repair	48 ea	—

Item	Part Description	Received / Required	Condition	Quantity	Remark
6	Outer cover plate (SS304)	24/24 ea	Repair	24 ea	—
7	L/E core plug (SS304)	48/48 ea	Repair	48 ea	—
8	T/E core plug (SS304)	48/48 ea	Repair	48 ea	—
9	Locking plate, UNW4060 — Material: SS316	24/24 ea	Replace	24 ea	Additional
10	Bush / sleeve — Material: A286; Dia. OD 20 mm / ID 12.7 mm, L = 23 mm	24/24 ea	Repair / Replace	23 ea / 1 ea	Standard
11	Thermocouple guide for segment no. 14, 23 — UNW4082	2/2 ea	Replace	2 ea	Standard
12	Honeycombs — Material: Haynes 214, UNW4051	24/24 ea	Replace	24 ea	Standard

With the single exception of one bush/sleeve that is dispositioned for replacement on dimensional grounds, every structural item in the schedule is retained and repaired. The replacement items — cloth and joint seals, locking plates, honeycombs and the thermocouple guides — are standard refurbishment consumables and their replacement does not, in itself, influence the repair-severity classification of the set.

5. SCRAP REPORT

No scrap is reported. No component within this set has been assessed as non-repairable at incoming inspection, and the complete population of twenty-four (24) nozzle segments and twenty-four (24) diaphragm assemblies has been retained for restoration. This empty scrap report is itself a direct outcome of the disposition philosophy described in Section 3: each feature was evaluated against its specific location limit so that, wherever restoration was technically permissible, restoration was selected in preference to rejection.

6. ENGINEERING RECOMMENDATION

All components falling within the repair limits established by UNEW Engineering will be rejuvenated and repaired in accordance with the UNEW work scope of repair set out in Section 9. The method of repair for each component and each defect is recorded in the defect-disposition register of Section 12, which describes whether each indication is to be blend-repaired, weld-and-blend repaired, high-temperature braze or TPR repaired, dimensionally restored, or any combination of these.

Where any component is found to carry an indication in an area in which weld repair is not permitted because of the high-stress nature of the location, that indication will be addressed using the maximum allowable blend limit for the location before any other route is considered, so that parent material is conserved to the greatest extent the engineering limits allow. On the present incoming evidence no such condition has been identified; should any indication be found during repair to extend beyond the allowable limit for its location, an addendum will be issued to this report to advise the customer of the affected component.



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All component base materials will be fully heat treated during the repair process, the exact programme being selected on the basis of the base-material composition, the condition of the material and the results of the incoming metallurgical evaluation reported in Section 10. The pre-weld solution heat treatment has already been demonstrated, on the nozzle material itself, to recover the base-metal microstructure to a fully weld-ready condition, which underpins the confidence with which the full set has been retained for weld restoration.

7. PACKING LIST FROM CUSTOMER

(No information supplied.) The set was received in good packing condition with no evidence of transit damage; a formal customer packing list was not provided with the consignment.

8. COMPONENT CORRELATION

The following correlation sheets record the part number, serial number and material of each nozzle segment and of each diaphragm/honeycomb assembly as received. The set is internally consistent: all segments are GTD262 castings to drawing 119E2604, and all diaphragm honeycombs are Haynes 214 on SS304 carriers to drawing 109E9128. The minor revision differences noted within the set (G05/G06 segment castings; G09 diaphragm carriers at positions 14 and 23) are recorded faithfully and are within the expected mix for a set of this vintage.

Correlation Sheet — Segment

Item	Part Number	Serial Number	Material
1	119E2604 G04 REV A	P2FE 04505	GTD262
2	119E2604 G04 REV A	P2FE 04575	GTD262
3	119E2604 G04 REV A	P2FE 04573	GTD262
4	119E2604 G04 REV A	P2FE 04705	GTD262
5	119E2604 G04 REV A	P2FE 04566	GTD262
6	119E2604 G06 REV A	P2FE 04721	GTD262
7	119E2604 G04 REV A	P2FE 04725	GTD262
8	119E2604 G04 REV A	P2FE 04574	GTD262
9	119E2604 G04 REV A	P2FE 04564	GTD262
10	119E2604 G04 REV A	P2FE 04723	GTD262
11	119E2604 G04 REV A	P2FE 04713	GTD262
12	119E2604 G06 REV A	P2FE 04577	GTD262
13	119E2604 G04 REV A	P2FE 04568	GTD262
14	119E2604 G05 REV A	P2FE 04556	GTD262
15	119E2604 G04 REV A	P2FE 04549	GTD262
16	119E2604 G04 REV A	P2FE 04547	GTD262
17	119E2604 G04 REV A	P2FE 04569	GTD262
18	119E2604 G04 REV A	P2FE 04563	GTD262
19	119E2604 G04 REV A	P2FE 04578	GTD262



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Item	Part Number	Serial Number	Material
20	119E2604 G04 REV A	P2FE 04551	GTD262
21	119E2604 G04 REV A	P2FE 04570	GTD262
22	119E2604 G04 REV A	P2FE 04562	GTD262
23	119E2604 G04 REV A	P2FE 04565	GTD262
24	119E2604 G04 REV A	P2FE 04546	GTD262

Correlation Sheet — Diaphragm / Honeycomb

Item	Part Number	Serial No.	Carrier Mat'l	Honeycomb Mat'l
1	109E9128 G03 REV B2	1	SS304	Haynes 214
2	109E9128 G03 REV B2	2	SS304	Haynes 214
3	109E9128 G03 REV B2	3	SS304	Haynes 214
4	109E9128 G03 REV B2	4	SS304	Haynes 214
5	109E9128 G03 REV B2	5	SS304	Haynes 214
6	109E9128 G03 REV B2	6	SS304	Haynes 214
7	109E9128 G03 REV B2	7	SS304	Haynes 214
8	109E9128 G03 REV B2	8	SS304	Haynes 214
9	109E9128 G03 REV B2	9	SS304	Haynes 214
10	109E9128 G03 REV B2	10	SS304	Haynes 214
11	109E9128 G03 REV B2	11	SS304	Haynes 214
12	109E9128 G03 REV B2	12	SS304	Haynes 214
13	109E9128 G03 REV B2	13	SS304	Haynes 214
14	109E9128 G09 REV B2	14	SS304	Haynes 214
15	109E9128 G03 REV B2	15	SS304	Haynes 214
16	109E9128 G03 REV B2	16	SS304	Haynes 214
17	109E9128 G03 REV B2	17	SS304	Haynes 214
18	109E9128 G03 REV B2	18	SS304	Haynes 214
19	109E9128 G03 REV B2	19	SS304	Haynes 214
20	109E9128 G03 REV B2	20	SS304	Haynes 214
21	109E9128 G03 REV B2	21	SS304	Haynes 214
22	109E9128 G03 REV B2	22	SS304	Haynes 214
23	109E9128 G09 REV B2	23	SS304	Haynes 214
24	109E9128 G03 REV B2	24	SS304	Haynes 214

9. SCOPE OF WORK

The repair work scope for this set is recorded below. The disposition column is headed Medium Repair, reflecting the Level 6 classification established in Section 3; the work-scope content itself is the controlled restoration sequence appropriate to that classification. Inspection operations are



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marked in the Inspect column and the restoration, coating and final-assembly operations in the Medium Repair column.

Work Scope	Inspect	Medium Repair
Inspect		
Perform receipt inspection and record serial numbers	X	
Take digital photographs of components in as-received condition	X	
Assemble in fixture; perform downstream deflection and nozzle twist inspection	X	
Perform metallurgical evaluation of base material and coating type, and report on condition	X	
Disassemble diaphragms from nozzle segments; identify diaphragm with matching segment; bag and tag hardware	X	
Remove cover plates and core plugs; bag and tag hardware with segment serial number	X	
Abrasive blast	X	
Perform cooling-hole inspection	X	
Perform incoming solution heat treat of nozzle segments in full vacuum environment	X	
Perform fluorescent penetrant inspection	X	
Perform visual inspection	X	
Compile incoming inspection report and forward to customer	X	
Repair		
Blend to remove oxidation product on external areas		X
Cold straighten any distorted / bulged areas		X
Scallop to remove defective material in nozzle segments in preparation for welding		X
Perform weld repairs as determined by incoming inspection results of all major structural cracking		X
Blend all repaired areas to restore component profile		X
Rectify downstream deflection and nozzle twist on segments		X
Machine to rectify downstream deflection and nozzle twist on segments		X
Perform fluorescent penetrant inspection and mark all defects for TPR		X
Perform solution heat treat of nozzle segments in full vacuum environment		X
Perform fluorescent penetrant inspection and mark all defects for TPR		X
Apply Transient Phase Restoration (TPR) repair to nozzle segments at all multiple surface cracking		X
Blend to restore component profile		X



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Work Scope	Inspect	Medium Repair
Electro-Discharge-Machine (EDM) to restore cooling holes and seal slots		X
Abrasive blast full component and blow out with dry compressed air to remove all blasting media		X
Perform fluorescent penetrant inspection (FPI) of component		X
Perform water and/or air flow check of cooling holes to ensure no blockages		X
Perform visual inspection to ensure component conformity		X
Set in fixture and perform dimensional inspection		X
Perform weld / blend repairs to diaphragms		X
Prepare and fit replacement honeycombs to diaphragm faces		X
Perform braze heat treatment		X
Perform visual inspection		X
Blend excess honeycomb section		X
Perform dimensional inspection		X
Coating & Final Assembly		
Apply diffused aluminide coating to external surfaces		X
Perform diffusion heat treat of nozzle segments in partial vacuum environment		X
Perform visual inspection to ensure component conformity		X
Perform final heat treatment in air or partial vacuum environment		X
Fit core plugs and assemble segments to diaphragms		X
Perform final dimensional inspection		X
Perform post-repair assembly build; ensure correct seal alignment		X
Perform final visual inspection		X
Compile final report; pack and ship components with all required documentation as listed in the Purchase Order		X

Required: replace all cloth seals and joint seals (1 set); replace all locking plates (Qty 24 ea.).

10. MATERIAL & METALLURGICAL EVALUATION

Metallurgical evaluation of the as-received nozzle material was performed to establish the base-material identity and condition of the set and, critically, to confirm that the material is capable of accepting the weld restoration described in this report. Two conditions were assessed: the as-received condition and the pre-weld solution-heat-treated condition. The findings demonstrate a sound, weld-ready GTD262 base material and directly underpin the decision to retain the complete set for weld restoration within the Level 6 envelope.

10.1 As-Received Condition

Report No.	UNEW-MET-1634-01	Job order no.	WO-1004061634
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Serial no. (or ID)	Item# 14	Cutting location	Leading Edge
Received status	As-Received	Hardness test	—

Chemical composition (main elements, % by mass):

Element	Co	Cr	Ni	Ti	W	Ta	Mo	Fe	Al
Nominal	19.0	22.5	Bal	2.2	2.0	0.0–1.1	—	—	1.7
Result	19.8	19.9	52.4	2.2	2.2	0.2	—	—	1.7
Coating type	MCrAlY (APS) coating			Nearest alloy			GTD262		
Microstructure / grain size	Fine grain-boundary carbide; gamma matrix			Hardness			—		



Fig. 1 — Hot-gas-path coating and substrate condition (etched).

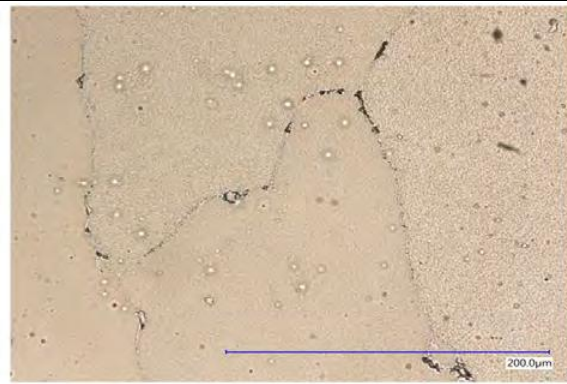


Fig. 2 — Typical microstructure at higher magnification (etched).

Recommendation. The as-received nozzle material was examined under report UNEW-MET-1634-01 to assess whether it is acceptable for repair. The hot-gas-path surface was found to be protected by the MCrAlY (APS) coating (Fig. 1). The base material was confirmed as GTD262 alloy, comprising fine grain-boundary carbide and a gamma matrix carrying fine gamma-prime, primary carbide and dispersed secondary carbide (Fig. 2). On the basis of these findings the base material is considered suitable for repair following coating removal by grit blast.

The measured composition is consistent with GTD262, with a nickel balance of 52.4 % and the expected titanium and tungsten contents. The modest reduction in measured chromium relative to the nominal value reflects near-surface chromium participation in the service-formed oxide and coating interaction and is fully consistent with a sound, repairable substrate; it does not indicate base-metal degradation. This confirmation of a sound parent material at incoming inspection is the first technical prerequisite for retaining the entire set for weld restoration.

10.2 Pre-Weld Solution-Heat-Treated Condition

Report No.	UNEW-MET-1634-02	Job order no.	WO-1004061634
Serial no. (or ID)	Item# 18	Cutting location	Leading Edge
Received status	Pre-Weld HT	Hardness test	36.3 HRC



Fig. 1 — Heat-treated material condition (etched).

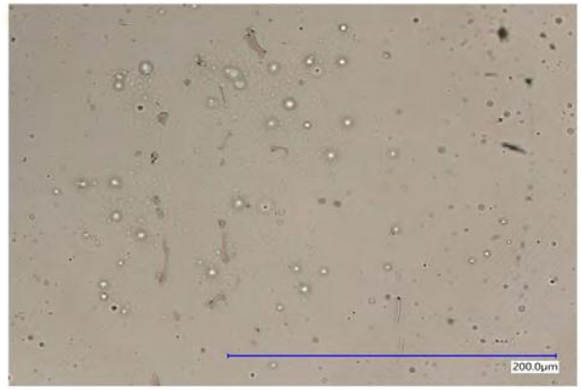


Fig. 2 — Typical microstructure at higher magnification (etched).

Recommendation. The nozzle material in the pre-weld solution-heat-treated condition was examined under report UNEW-MET-1634-02 to assess its microstructure. Examination revealed that the base material has been significantly improved: the grain-boundary carbide and detrimental phase were satisfactorily refined relative to the as-received microstructure (report UNEW-MET-1634-01), as shown in Figs. 1 and 2. The base material was satisfactorily recovered by the solution-heat-treatment programme applied.

The recorded hardness of 36.3 HRC, together with the refinement of grain-boundary carbide and the dissolution of detrimental phases, demonstrates that the solution heat treatment has restored the base metal to a fully weld-ready metallurgical condition. This is the second and decisive technical prerequisite for the disposition adopted in this report: because every segment enters the weld process in a known, solution-treated and ductility-restored condition rather than in a degraded service condition, the large and repeated weld restoration across the set can be carried out as a controlled, repeatable operation. The metallurgical evidence therefore supports, at the level of the base material itself, the classification of this work as a significant but controlled Level 6 restoration.

11. COMPONENT CONDITION — PHOTOGRAPHIC FINDINGS

The photographs below record the as-received condition of the segment and diaphragm hardware. They illustrate the consistent pattern on which the disposition rests: the structural hardware is sound and retainable, while the wear, sealing and locking elements display the fretting and corrosion that are the normal consequence of service and are replaced as standard consumables.

10. PHOTOGRAPHS:



Fig.1 As-received condition.



Fig.2 As-received condition.



Fig.3 As-received condition.



Fig.4 As-received condition.



Fig.5 As-received condition.

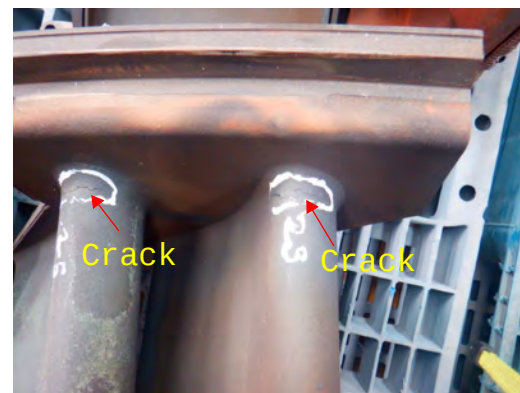


Fig.6 As received condition.

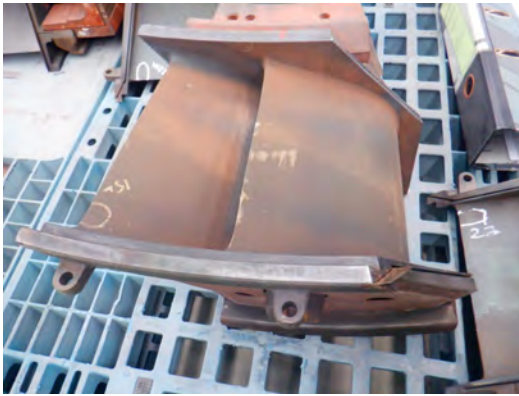


Fig.7 As received condition.



Fig.8 As received condition.



Fig.9 As received condition.



Fig.10 As received condition.



Fig.11 As received 3-pcs assembly inspection.



Fig.12 As received 3-pcs assembly inspection.

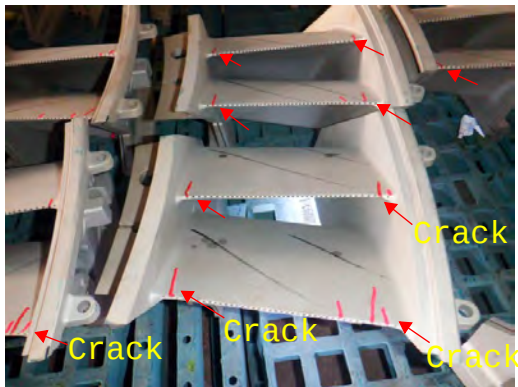


Fig.13 Crack on trailing edge.

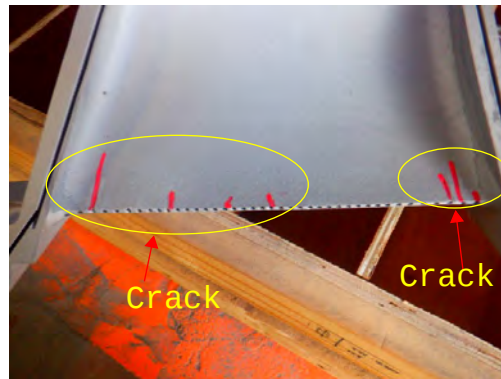


Fig.14 Crack on trailing edge.

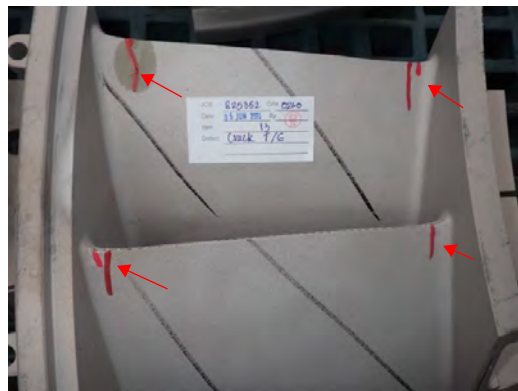


Fig.15 Crack on trailing edge.

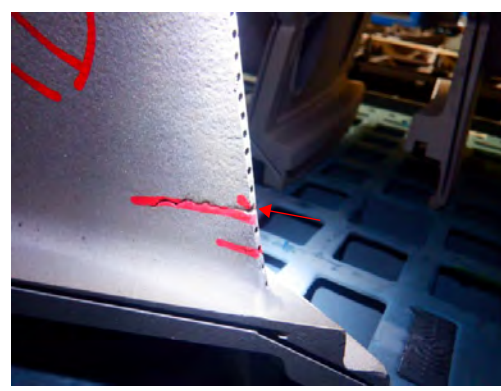


Fig.16 Crack on trailing edge.

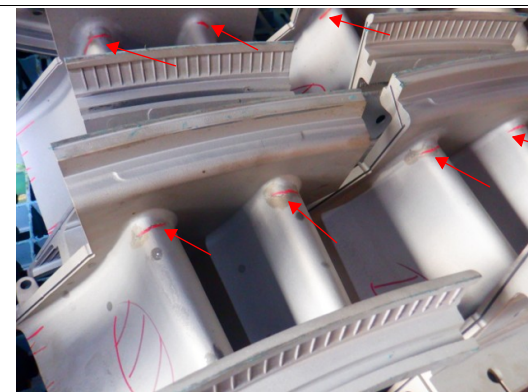
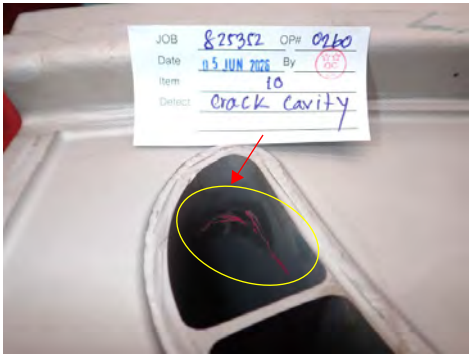
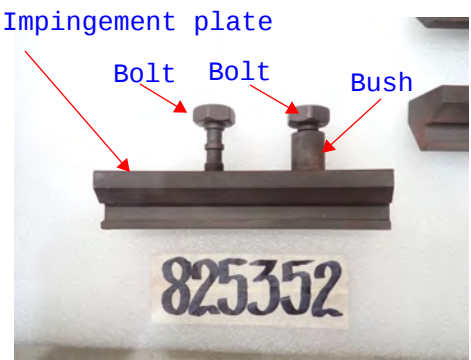
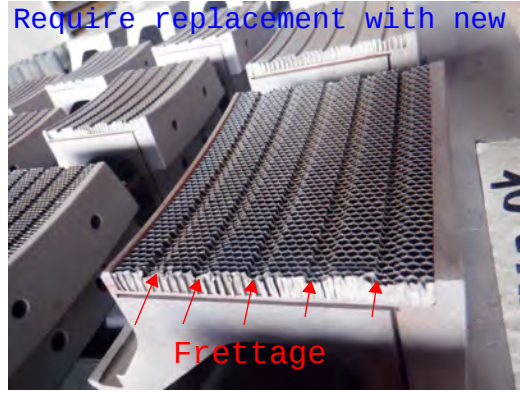


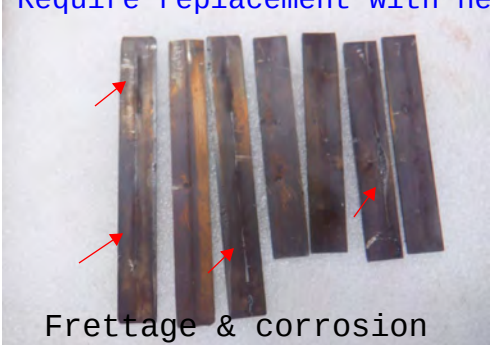
Fig.17 Crack on leading edge.



Fig.18 Crack on leading edge.

	
Fig.19 Through crack on LE. (Inside cavity view)	Fig.20 Through crack on LE. (Inside cavity view)
	
Fig.21 As received condition of cover plate (repairable).	Fig.22 As received condition of cover plate (repairable).
	
Fig.23 As received condition of core plugs (repairable).	Fig.24 As received condition of core plugs (repairable).

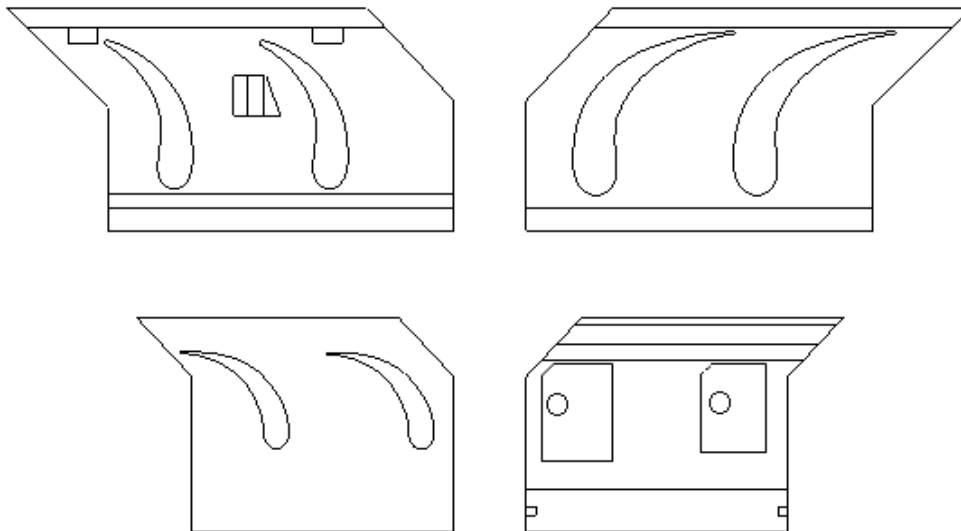
	 Impingement plate Bolt Bolt Bush
Fig.25 Impingement plate, Bush, Diaphragm RET. screw pin- Hex. Head Bolt (repairable).	Fig.26 Impingement plate, Bush, Diaphragm RET. screw pin- Hex. Head Bolt (repairable).
 Require replacement with new	 Require replacement with new Fretage
Fig.27, 28 Fretage on Honeycomb seals which require replacement with new.	Fig.27, 28 Fretage on Honeycomb seals which require replacement with new.
 Require replacement with new	 Require replacement with new
Fig.29 Deformation of locking plates which require replacement with new.	Fig.30 Deformation of locking plates which require replacement with new.

Require replacement with new  Fretting & corrosion	Require replacement with new  Fretting & corrosion
Fig.31 Fretting and corrosion on seals which require replacement with new.	Fig.32 Fretting and corrosion on seals which require replacement with new.

11. DEFECT LEGEND TABLE:

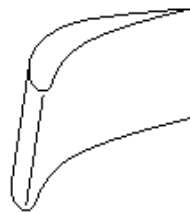
FOR SEGMENTS

O/D Wall



I/D Wall

I/D Wall



O/D Wall



AF#1

AF#2 I/D Wall



INCOMING INSPECTION REPORT

Information		NOZZLE SEGMENT INSPECTION FINDINGS																																				DIMENSIONAL DATA																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
Segment No.	S/N	Airfoil												Gas path Inner & Outer shrouds												Non- Gas path Inner & Outer shrouds												Core plug Cavity				Downstream deflection																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
		Corr / Erosion		Cracks		FOD		Deform.		Missing material		Bowing Airfoil		Corr / Erosion		Cracks		FOD		Deform.		Missing material		Frettage		Corr / Erosion		Cracks		FOD		Deform.		Missing material		Frettage		Cracks		Typical flake																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
		C.C - A/F	C.V - A/F	C.C - A/F	C.V - A/F	C.C - A/F	C.V - A/F	C.C - A/F	C.V - A/F	C.C - A/F	C.V - A/F	C.C - A/F	C.V - A/F	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	A/F #1	A/F #2	A/F #1	A/F #2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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B = Blend repair to be performed in accordance with the location blend limits.

JK = jacking and contouring to be performed based on the deformation and distortion detected.

WB = Weld and Blend to be performed based on the area limits and defects detected.

WM = Weld and Machining to be performed to build material dimensions and restore original dimensions and contours.

WE = Welding and Electric discharge machining (EDM) to be performed to build material dimensions and restore original dimensions.

TPR = Transient Phase Restoration to be performed based on the defects detected.

R = Replace with new.

ACC = Acceptable as is.

Rej = Dimension unacceptable and will require repair or cause of scrap.

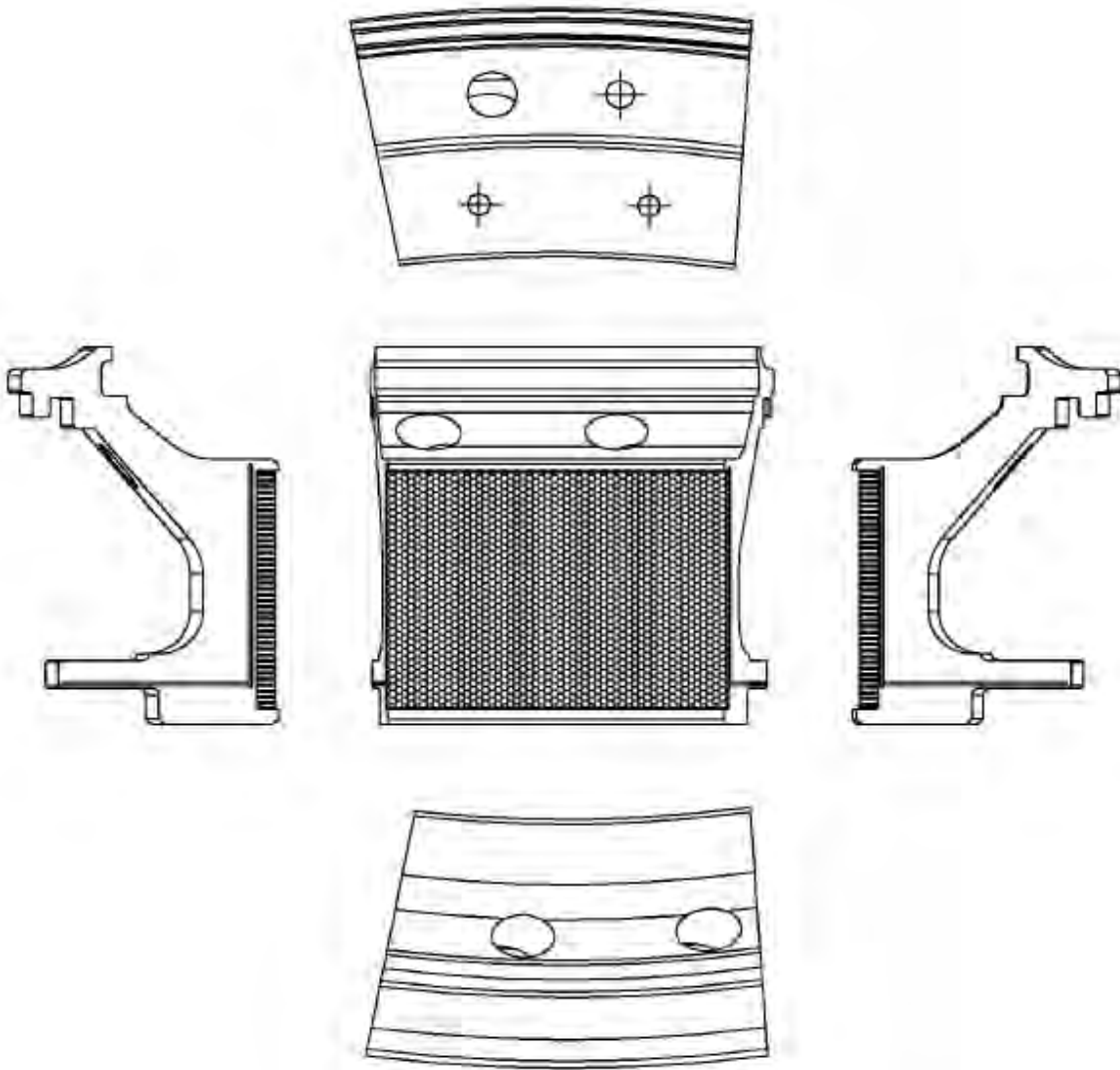
S = Non-repairable / Scrap

L = Light repair category

M = Medium repair category

H = Heavy repair category

FOR DIAPHRAGMS





INCOMING INSPECTION REPORT

Information		INSPECTION FINDINGS											
Segment No.	S/N	Honeycombs						Body					
		Corr. / Erosion	Cracks	FOD	Deform.	Missing material	Frettage	Corr.	Cracks	FOD	Deform.	Missing material	Frettage
1	-						R						WB
2	-						R						WB
3	-						R						WB
4	-						R						WB
5	-						R						WB
6	-						R						WB
7	-						R						WB
8	-						R						WB
9	-						R						WB
10	-						R						WB
11	-						R						WB
12	-						R						WB
13	-						R						WB
14	-						R						WB
15	-						R						WB
16	-						R						WB
17	-						R						WB
18	-						R						WB
19	-						R						WB
20	-						R						WB
21	-						R						WB
22	-						R						WB
23	-						R						WB
24	-						R						WB

B = Blend repair to be performed in accordance with the location blend limits.

JK = jacking and contouring to be performed based on the deformation and distortion detected.

WB = Weld and Blend to be performed based on the area limits and defects detected.

WM = Weld and Machining to be performed to build material dimensions and restore original dimensions and contours.

WE = Welding and Electric discharge machining (EDM) to be performed to build material dimensions and restore original dimensions.

TPR = Transient Phase Restoration to be performed based on the defects detected.

R = Replace with new.

ACC = Acceptable as is.

Rej = Dimension unacceptable and will require repair or cause of scrap.

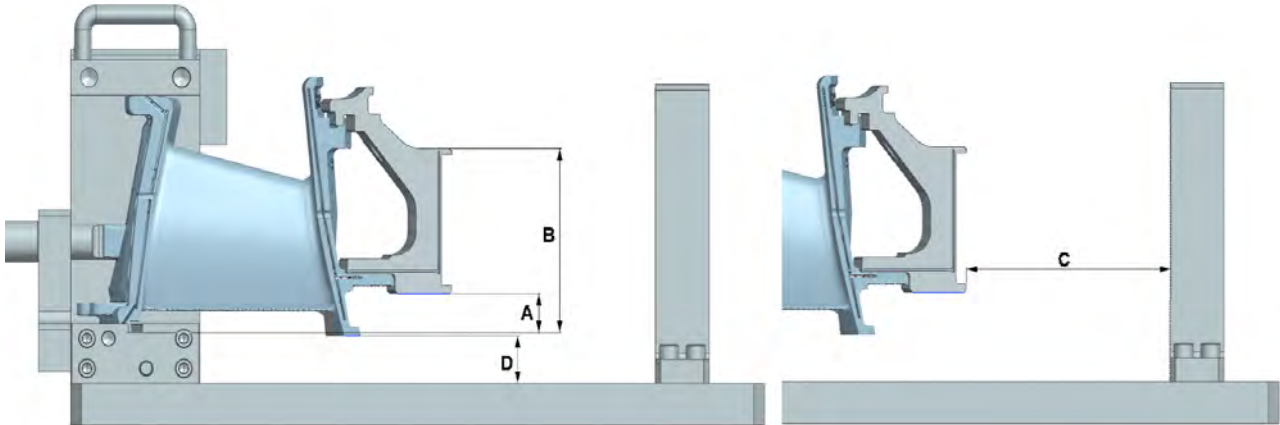
S = Non-repairable / Scrap

L = Light repair category

M = Medium repair category

H = Heavy repair category

12. DIMENSION INSPECTION:



Location	A		B		C Diaphragm radius	D Base plate to segment
1	32.99	33.07	154.54	154.92	201.04	40.30
2	33.34	33.41	154.87	155.24	201.35	40.59
3	32.71	32.84	154.36	154.79	200.96	40.32
4	33.19	33.25	154.70	155.06	201.16	40.42
5	32.84	32.89	154.33	154.68	200.77	39.97
6	33.12	33.56	154.71	154.41	200.79	40.23
7	32.77	33.22	154.38	154.09	200.48	39.94
8	33.40	33.79	154.89	154.54	200.87	40.21
9	32.92	33.38	154.55	154.27	200.67	40.11
10	33.04	33.41	154.69	154.38	200.85	40.30
11	32.69	33.07	154.36	154.06	200.54	40.01
12	32.76	33.18	154.51	154.25	200.77	40.32
13	33.24	33.59	154.85	154.52	200.97	40.42
14	32.89	33.23	154.48	154.14	200.58	39.97
15	32.97	33.66	154.84	154.46	200.88	40.51
16	32.69	33.43	154.66	154.33	200.80	40.53
17	33.17	33.84	155.00	154.60	201.00	40.63
18	33.12	33.84	155.05	154.70	201.15	40.84
19	32.96	33.12	154.42	154.41	200.78	40.42
20	32.76	32.94	154.26	154.27	200.66	40.30
21	33.11	33.30	154.63	154.65	201.05	40.75
22	33.00	32.71	154.07	154.22	200.71	39.95
23	33.35	33.05	154.40	154.54	201.02	40.24
24	32.28	32.84	154.16	153.72	200.65	40.01

Unit:mm

360 DEGREE DIMENSION INSPECTION RESULT

1. Segment position

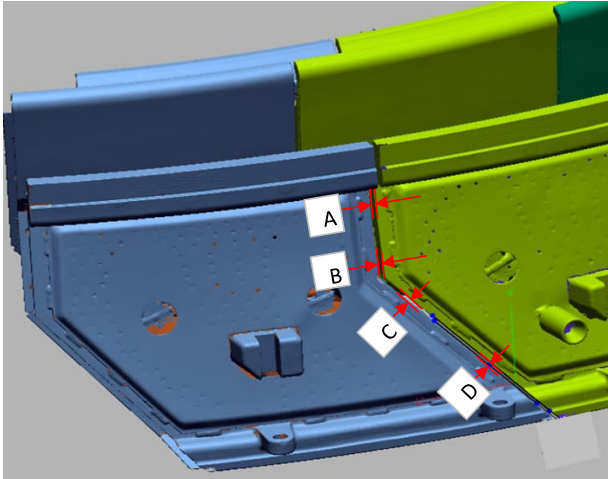


Segments No.	1	2	3	4	5	6	7	8
Position (Acc / Rej)	Acc	Acc	Acc	Acc	Acc	Acc	Acc	Acc
Segments No.	9	10	11	12	13	14	15	16
Position (Acc / Rej)	Acc	Acc	Acc	Acc	Acc	Acc	Acc	Acc
Segments No.	17	18	19	20	21	22	23	24
Position (Acc / Rej)	Acc	Acc	Acc	Acc	Acc	Acc	Acc	Acc

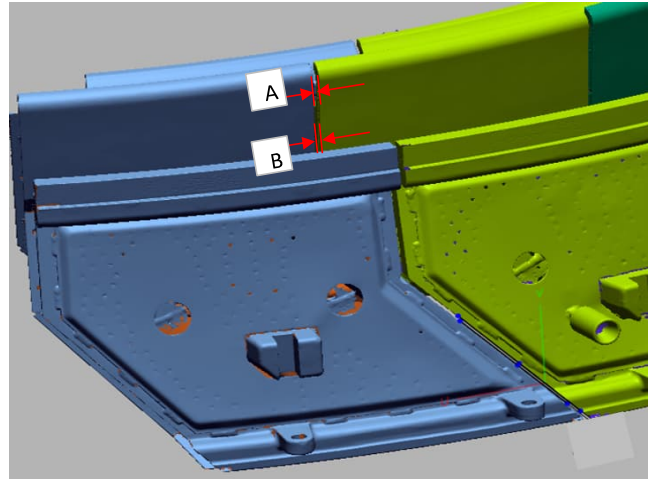
360 DEGREE DIMENSION INSPECTION RESULT

2. Outer wall/ Inner wall abutment face gaps

Outer platform of Nozzle



Inner platform of Nozzle

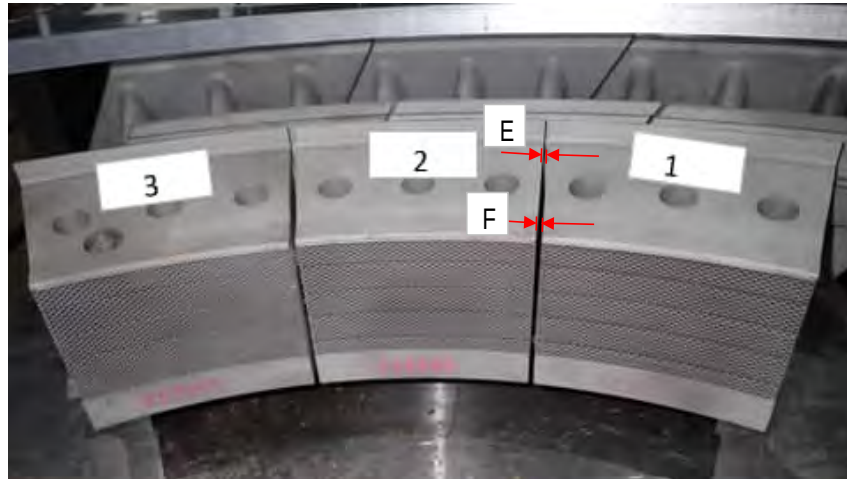


Segment	A (Outer)	A (Inner)	B (Outer)	B (Inner)	C (Outer)	C (Inner)	D (Outer)	D (Inner)
1-2	2.91	2.78	3.27	3.10	2.77	2.71	2.71	2.64
2-3	3.45	3.01	3.40	3.14	2.70	2.17	2.64	2.22
3-4	3.49	3.21	3.45	3.34	3.06	2.59	3.11	2.61
4-5	3.38	3.35	2.69	2.74	2.96	2.35	2.94	2.95
5-6	2.35	3.84	3.15	3.30	2.65	3.28	2.23	2.53
6-7	2.23	3.23	4.43	3.59	2.08	2.13	2.12	2.25
7-8	3.24	3.18	3.64	3.41	2.05	2.16	2.35	3.05
8-9	3.24	2.68	3.89	2.88	3.59	2.35	2.68	3.15
9-10	3.09	3.26	3.91	3.34	3.54	2.61	2.69	3.10
10-11	3.61	3.40	3.95	3.22	3.06	2.67	2.86	3.10
11-12	3.39	3.63	3.44	3.15	3.41	2.84	3.18	4.89
12-13	3.36	2.95	3.72	3.34	3.22	2.61	3.15	3.45
13-14	3.30	2.34	3.35	3.69	3.52	3.58	2.93	3.15
14-15	2.95	3.33	3.35	2.92	3.48	2.12	2.76	3.10
15-16	3.70	3.09	3.93	3.71	3.33	3.14	2.17	2.94
16-17	2.88	2.23	3.15	2.54	2.94	1.87	2.00	2.15
17-18	3.38	3.40	3.75	3.35	3.86	2.82	2.97	2.64
18-19	3.50	3.27	3.08	3.41	2.98	2.76	2.50	2.15
19-20	3.35	3.02	3.53	3.33	3.33	2.83	3.00	2.64
20-21	3.37	3.21	3.68	3.33	3.41	2.36	2.64	2.87
21-22	3.06	3.17	3.43	3.27	3.01	2.51	2.63	3.13
22-23	3.09	3.15	3.20	3.19	3.08	2.45	2.50	3.02
23-24	3.30	3.75	3.43	3.64	3.14	2.96	3.06	3.73
24-1	3.28	2.70	3.45	3.79	3.60	2.99	3.89	3.67

Unit : mm.

360 DEGREE DIMENSION INSPECTION RESULT

3. Diaphragm top face abutment face gaps

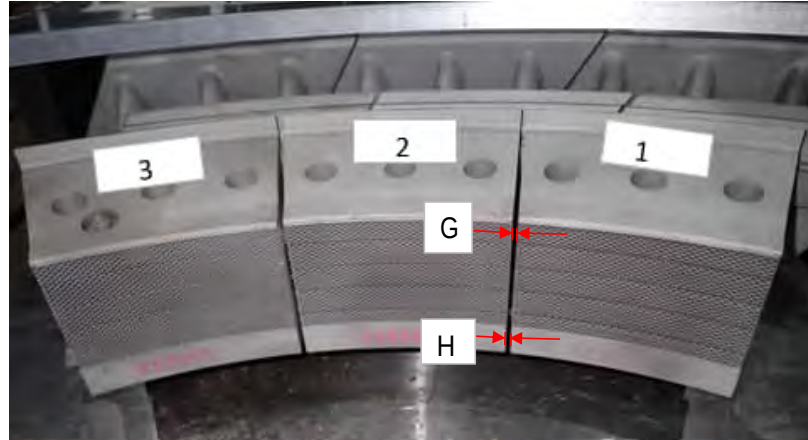


Segment	E	F
1-2	3.31	3.38
2-3	3.25	3.31
3-4	3.38	3.30
4-5	3.31	3.42
5-6	3.07	2.82
6-7	3.97	3.92
7-8	3.45	2.93
8-9	2.94	3.00
9-10	3.83	3.71
10-11	3.47	3.55
11-12	3.24	3.20
12-13	2.89	2.76
13-14	4.08	3.58
14-15	3.48	3.50
15-16	3.58	3.50
16-17	2.47	2.46
17-18	3.22	2.85
18-19	3.64	3.20
19-20	3.63	3.41
20-21	3.60	3.57
21-22	2.82	2.85
22-23	3.05	2.92
23-24	3.02	3.13
24-1	4.23	3.53

Unit : mm.

360 DEGREE DIMENSION INSPECTION RESULT

4. Diaphragm front face abutment face gaps

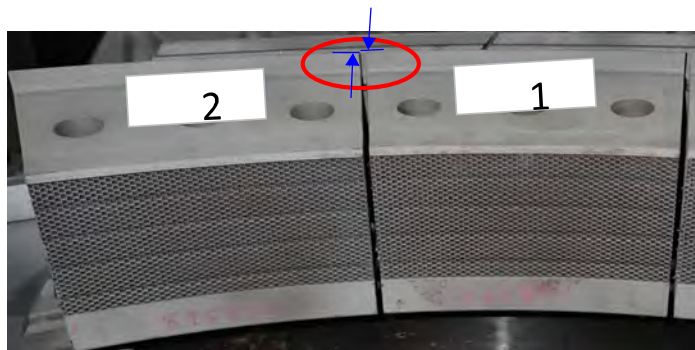


Segment	G	H
1-2	3.41	3.52
2-3	3.22	3.24
3-4	3.45	3.56
4-5	3.24	3.39
5-6	4.98	3.79
6-7	4.39	4.19
7-8	3.17	2.76
8-9	3.00	3.15
9-10	4.03	4.24
10-11	4.04	3.14
11-12	3.10	3.62
12-13	2.60	2.92
13-14	3.99	2.93
14-15	3.50	3.33
15-16	3.71	3.70
16-17	2.67	2.99
17-18	3.30	3.32
18-19	3.47	3.58
19-20	3.65	3.43
20-21	3.80	3.82
21-22	3.48	2.92
22-23	3.01	2.86
23-24	3.04	2.92
24-1	4.33	4.43

Unit : mm.

360 DEGREE DIMENSION INSPECTION RESULT

5. Diaphragm discourager seal alignment



Segment	Seal alignment
1-2	0.25
2-3	0.30
3-4	0.29
4-5	0.08
5-6	0.16
6-7	0.27
7-8	0.09
8-9	0.28
9-10	0.16
10-11	0.13
11-12	0.17
12-13	0.24
13-14	0.20
14-15	0.25
15-16	0.19
16-17	0.24
17-18	0.19
18-19	0.22
19-20	0.18
20-21	0.25
21-22	0.20
22-23	0.18
23-24	0.21
24-1	0.24

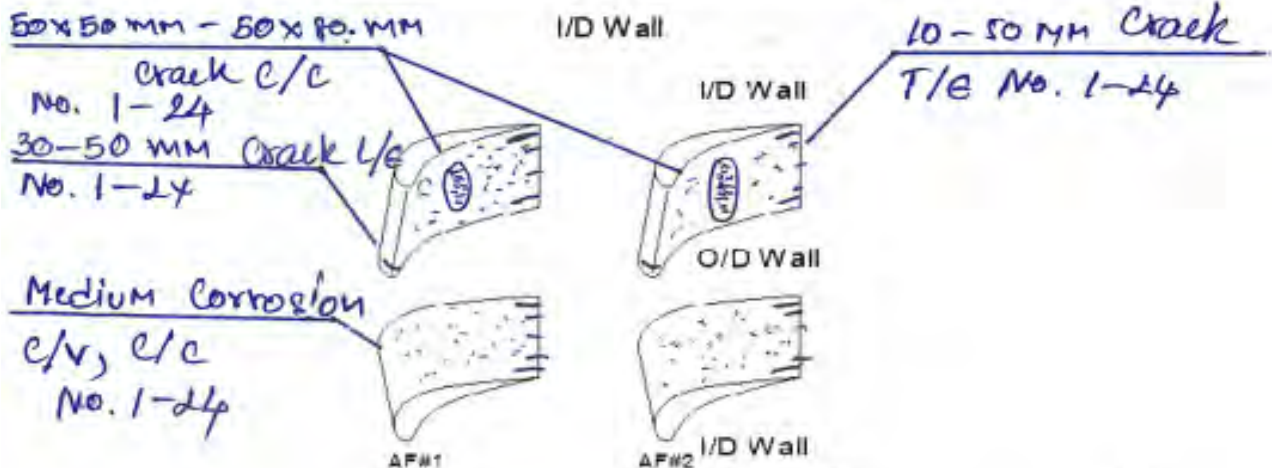
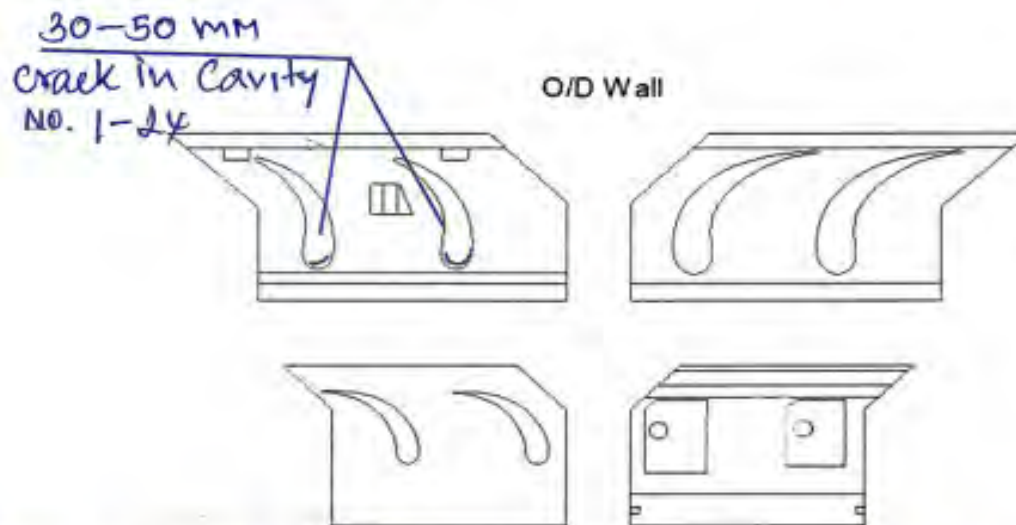
Unit : mm.

13. DEFECT MAP:

INSPECTION AND PROCESS RECORD SHEET	MS6001FA 2nd STAGE NOZZLE		IPRS NO.	3063-70
	PART NUMBER : GENZ02M6FA		REV.	00
CUSTOMER :	Nghi Son Refinery &	CUSTOMER PO :	WO-1004061634-100406	
JOB NUMBER :	825352	OP.	0260	
INSPECTED BY :	Pangthep	DATE :	05-06-26	

☐ Crack (mm)
 ☐ Foreign Object Damage (L/AMH)
 ☐ Pitting (L/AMH)
 ☐ Distortion (mm/inch)
 ☐ Corrosion (L/AMH)
 ☐ Missing Material (mm²)

*Showing Airfoil indicator in Light (L), Medium (M), Heavy (H)



INSPECTION AND PROCESS RECORD SHEET	MS6001FA 2nd STAGE NOZZLE	IPRS NO.	3063-70
	PART NUMBER : GENZ02M6FA	REV.	00
CUSTOMER :	Nghi Son Refinery &	CUSTOMER PO :	WO-1004061634-100406
JOB NUMBER :	825352	OP.	0210
INSPECTED BY :	Mr. Jipachon Kariyong	DATE :	03-06-26

☐ Crack (mm)
 ☐ Foreign Object Damage (L/M/H)
 ☐ Pitting (L/M/H)
 ☐ Deformation (mm)
 ☐ Corrosion (L/M/H)
 ☐ Missing Material (mm)

