

INCOMING INSPECTION REPORT

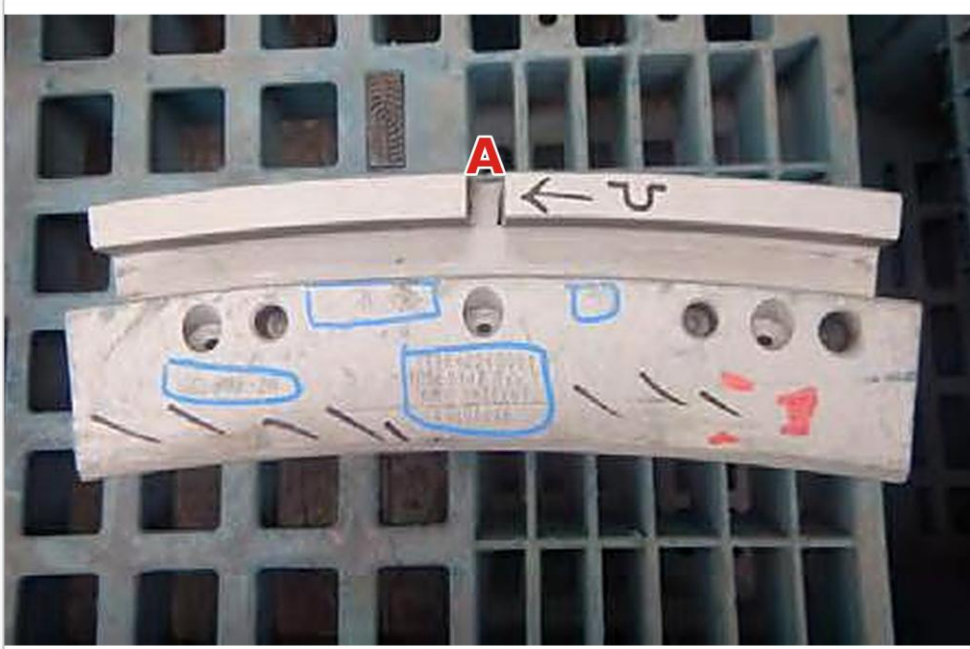
Customer	Nghi Son Refinery & Petrochemical, LLC.	Report Date	27 April 2026
Customer P.O. No.	WO1003986864	Component	MS6001FA 1st Stage Shroud Block
Engine Type	MS6001FA (GE Frame 6FA)	Qty. Received	24 Units (1 Complete Set)
Component Part No.	Body: 119E4234 G001 Inner plate (Tip shoe): 176D3829 P001	Material	Body: SS310 Inner plate (Tip shoe): Inconel 738
As-Received Coating	Body: No coating Inner plate (Tip shoe): TBC Abradable coating	Coating Requirement	TBC Abradable plus ceramic compound
Repair Classification	HEAVY REPAIR Severity Level 9 of 10 (Very Heavy, upper boundary)	Total Emergency Trips	125
Total Initiated Starts	476	Breaker Trips at Load	127

Reviewed and approved
UNEW Engineering



Paul McGuire
Engineering Manager

FIG. 7 - HEAVY WEAR AND SURFACE DEGRADATION - SHROUD BODY



ORIGINAL INSPECTION PHOTOGRAPH



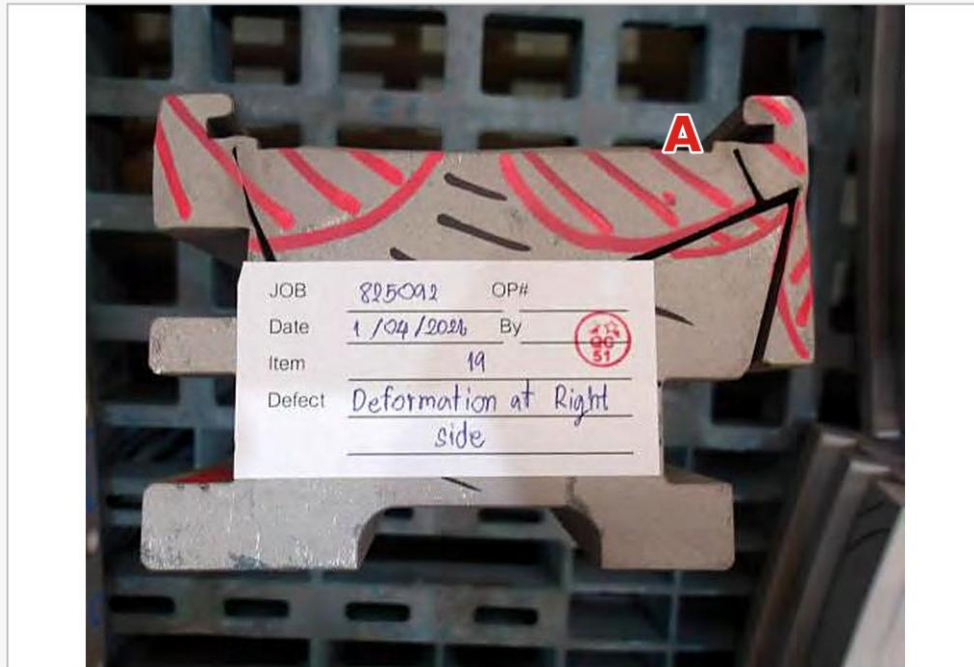
MAGNIFIED VIEW A

DOCUMENTED EXTENT: FWD/AFT BODY FRETAGE BEYOND BLEND LIMITS ON 24/24 UNITS

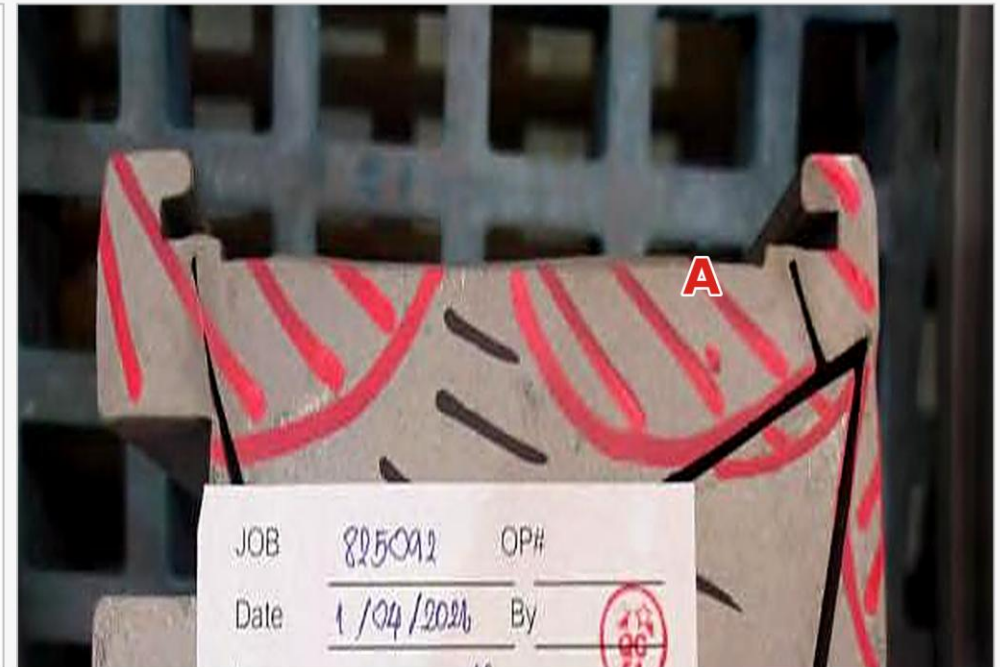
HEAVY REPAIR BASIS

The damaged rails are load-bearing contact interfaces; loss of their geometry affects fit-up and structural stability. A discrete depth is not assigned to this photograph, but the report confirms depth and area exceed blend limits on the full set. Restoration therefore requires material removal, GTAW weld build-up, blending, re-machining, and dimensional verification.

FIG. 15 - HEAVY DEFORMATION - RIGHT SIDE OF SHROUD BODY



ORIGINAL INSPECTION PHOTOGRAPH



MAGNIFIED VIEW A

FIXTURE BASIS: Z2 REJECT 24/24 | Z1 POSITION C REJECT 24/24 | ITEM 18 NOT FULLY SEATABLE

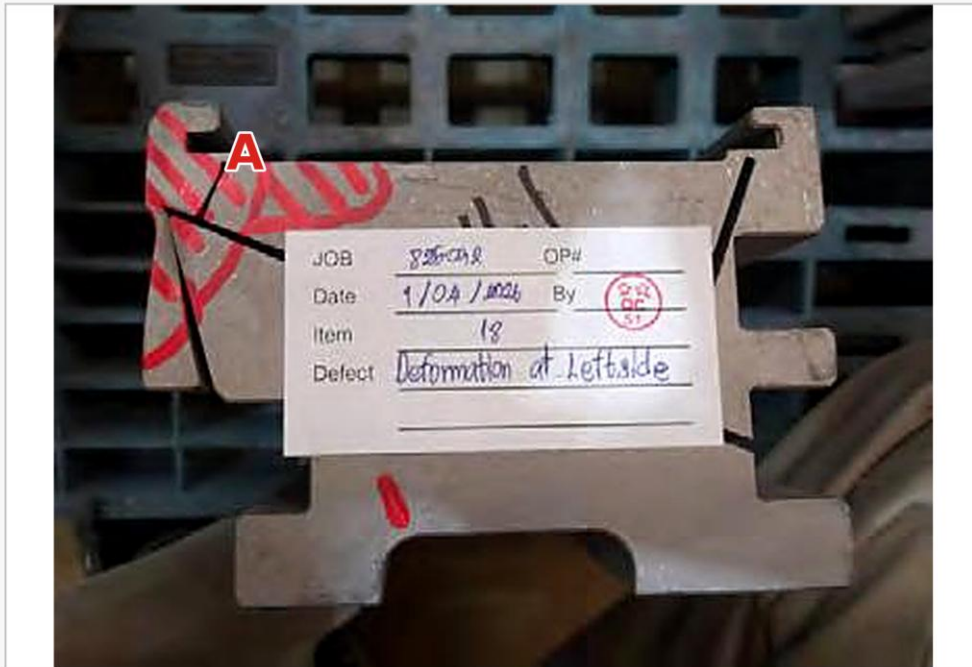
HEAVY REPAIR BASIS

Deformation is located at the body/inner-plate fit and sealing interface, where small geometric error is operationally critical.

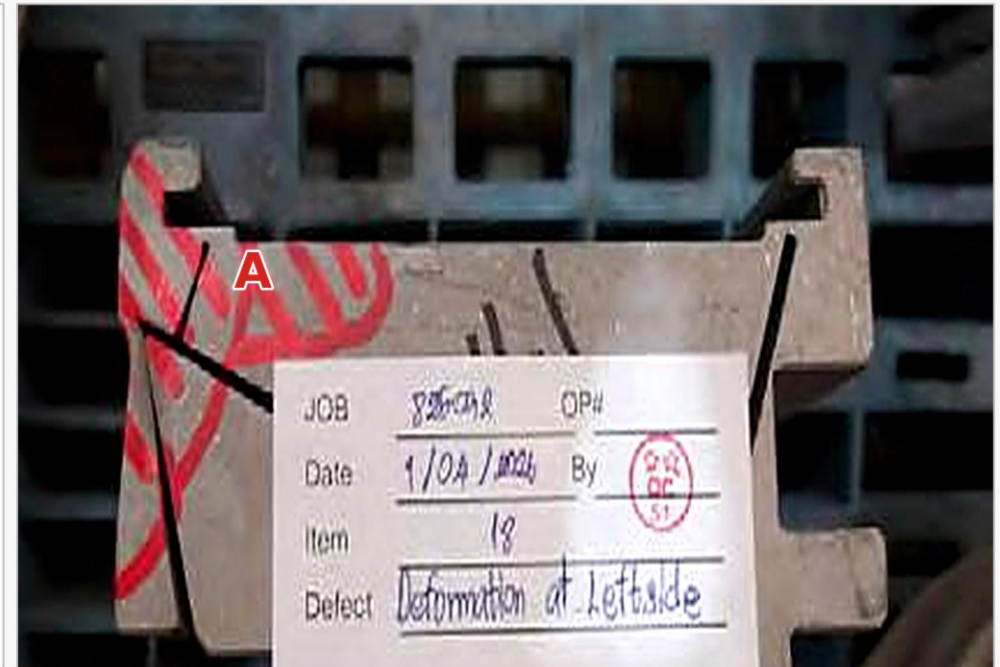
The report does not assign a separate millimeter value to this photograph; the objective go/no-go fixture verdict controls.

Items 14, 17, 18, and 19 require jacking, contouring, mechanical straightening, and complete fixture requalification.

FIG. 17 - HEAVY DEFORMATION - LEFT SIDE OF SHROUD BODY



ORIGINAL INSPECTION PHOTOGRAPH



MAGNIFIED VIEW A

FIXTURE BASIS: Z2 REJECT 24/24 | Z1 POSITION C REJECT 24/24 | ITEM 18 NOT FULLY SEATABLE

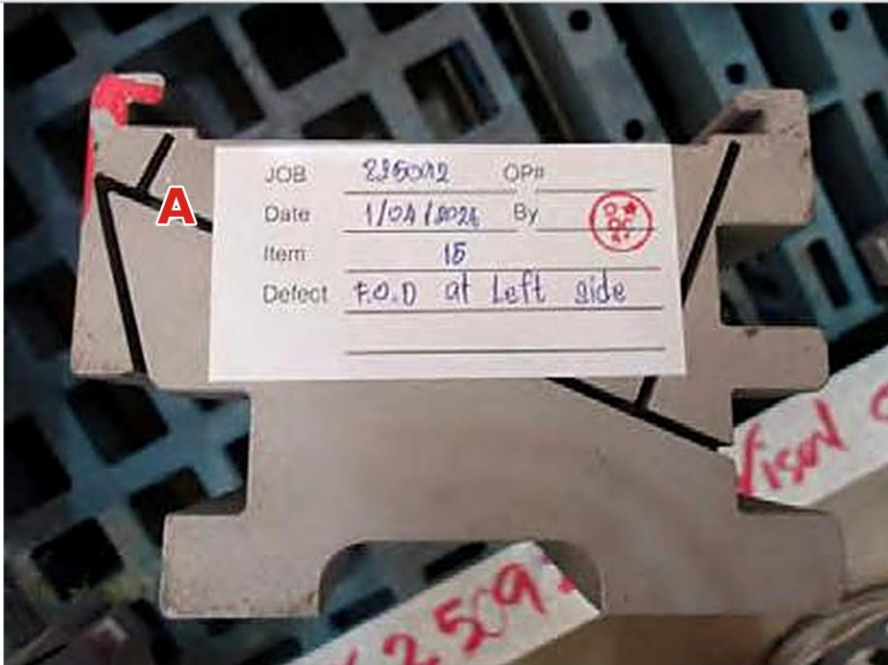
HEAVY REPAIR BASIS

The marked left-side distortion changes interface alignment and sealing geometry even when the visible displacement appears local.

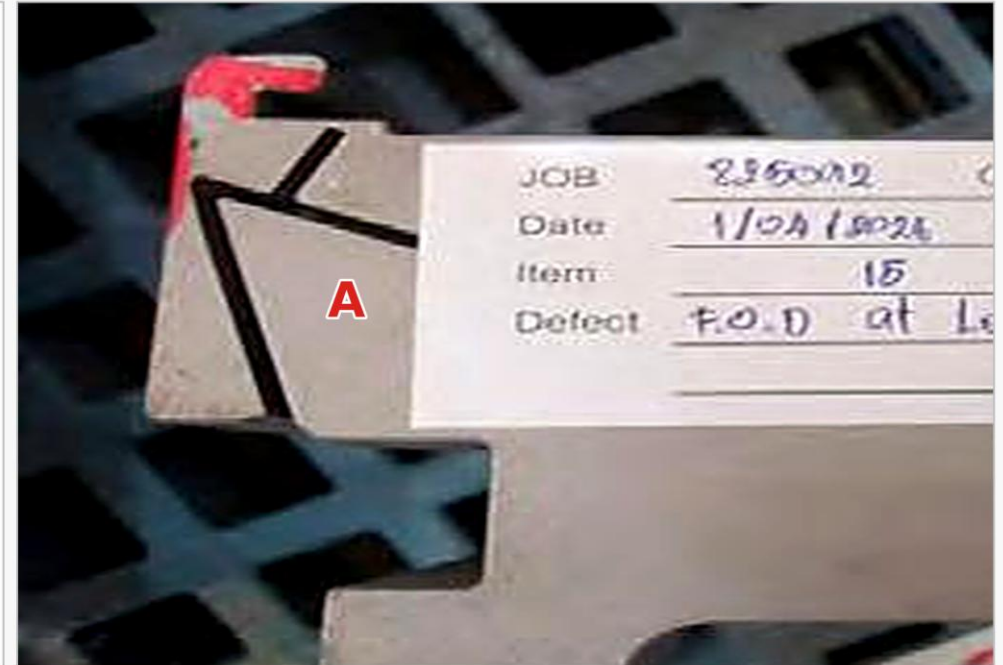
Heavy Repair is governed by failed assembled geometry and the required correction scope, not visible size alone.

Mechanical straightening must be followed by full dimensional restoration, re-machining, and fixture requalification.

FIG. 19 - FOREIGN OBJECT DAMAGE - LEFT SIDE OF SHROUD BODY



ORIGINAL INSPECTION PHOTOGRAPH



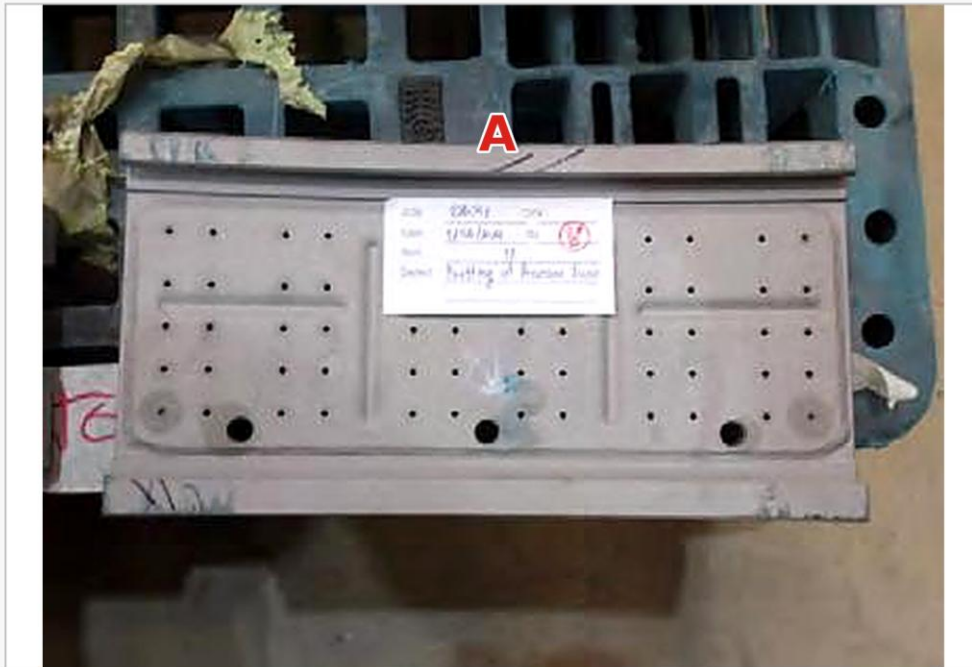
MAGNIFIED VIEW A

DOCUMENTED FOD SCOPE: ITEMS 3, 9, 13-19, AND 21-24

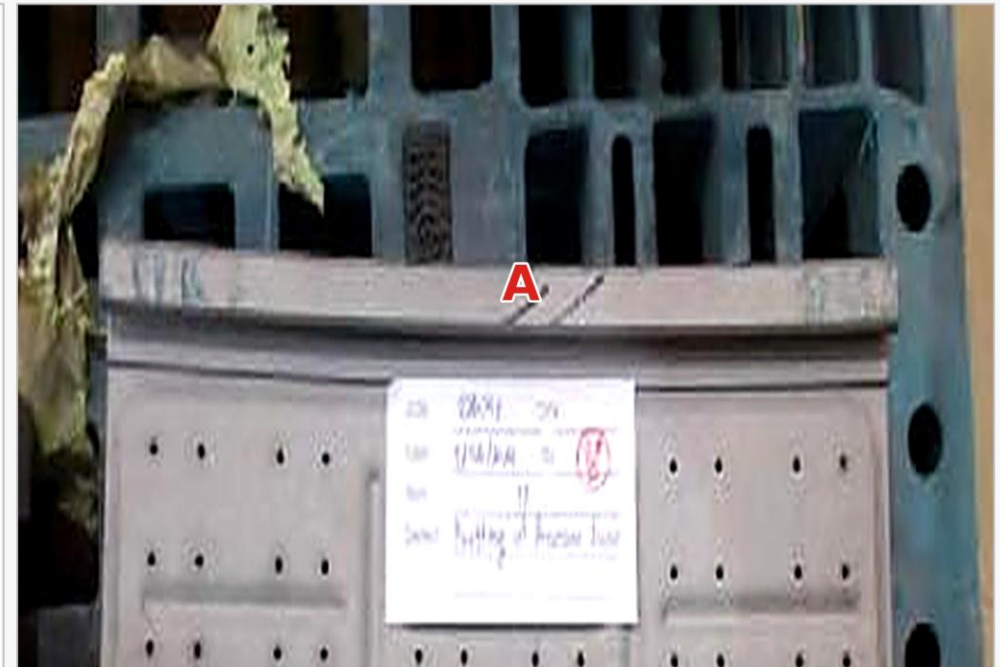
HEAVY REPAIR BASIS

FOD at the side contact region creates a local stress concentration on an already frettage-damaged structural interface. The report records no separate photo dimension; severity follows the critical location and combined material-loss condition. Complete removal, blending, and weld restoration are required before geometry and sealing can be requalified.

FIG. 20 - HEAVY FRETTAGE - PRESSURE FACE OF SHROUD BODY



ORIGINAL INSPECTION PHOTOGRAPH



MAGNIFIED VIEW A

PRESSURE-FACE MATERIAL LOSS: MULTIPLE UNITS | WELD BUILD-UP AND CONTOUR RESTORATION REQUIRED

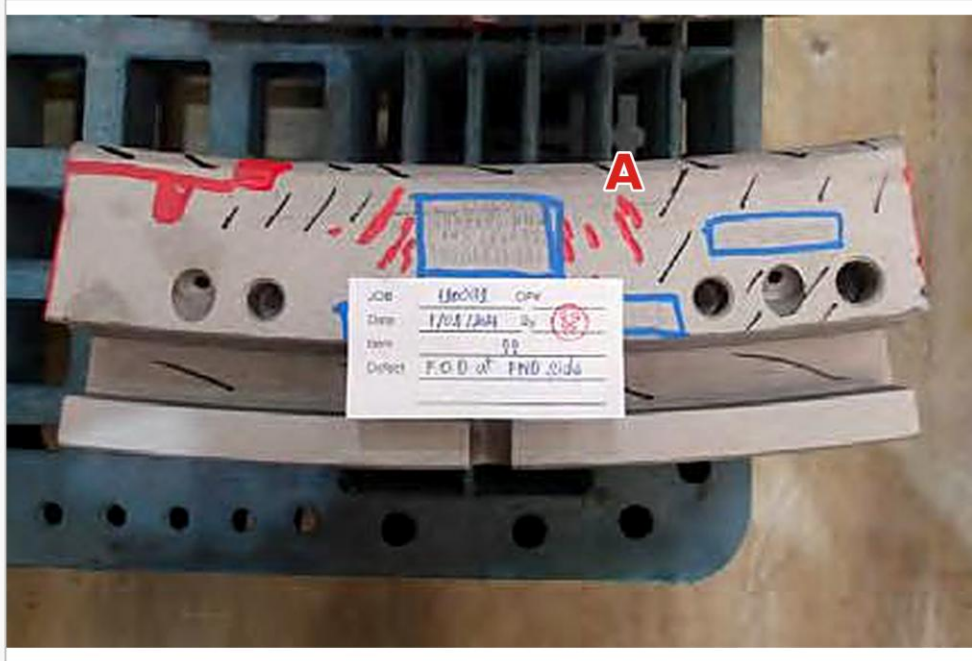
HEAVY REPAIR BASIS

The pressure face transfers load and maintains sealing contact; material loss here directly changes interface load distribution.

Because fretting exceeds local blend limits, further blending alone would remove more metal and worsen assembly fit.

Heavy Repair requires routing, GTAW build-up, contour recovery, post-weld heat treatment, and dimensional requalification.

FIG. 22 - FOREIGN OBJECT DAMAGE - FORWARD SIDE OF SHROUD BODY



ORIGINAL INSPECTION PHOTOGRAPH



MAGNIFIED VIEW A

DOCUMENTED FOD SCOPE: ITEMS 3, 9, 13-19, AND 21-24

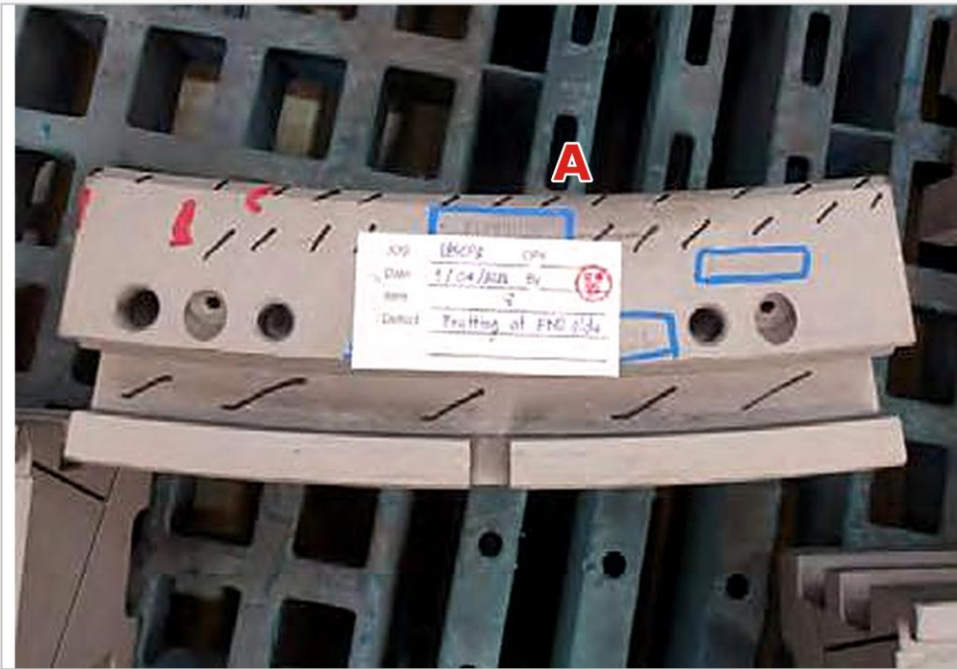
HEAVY REPAIR BASIS

The damaged forward rail is part of the load-bearing assembly contact network and is also affected by full-set fretting.

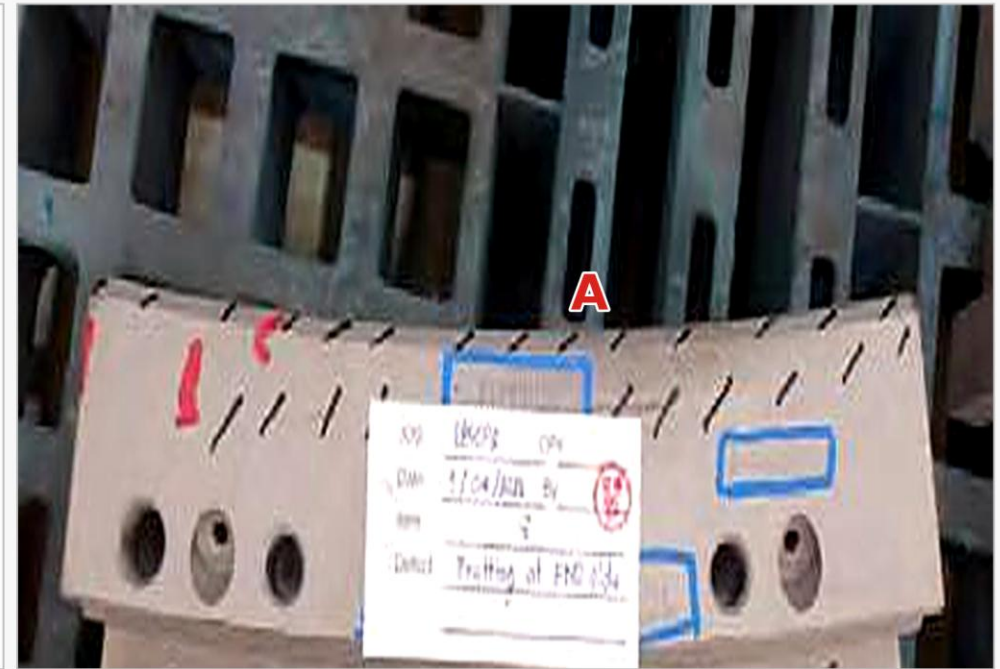
Even localized FOD requires Heavy Repair when removal exposes insufficient geometry for blend-only restoration.

The repair sequence requires blending, weld build-up as necessary, re-machining, FPI, and final fit verification.

FIG. 23 - HEAVY FRETTAGE - FORWARD SIDE OF SHROUD BODY



ORIGINAL INSPECTION PHOTOGRAPH



MAGNIFIED VIEW A

DOCUMENTED EXTENT: FORWARD-SIDE FRETTAGE ON 24/24 BODIES; DEPTH/AREA BEYOND BLEND LIMITS

HEAVY REPAIR BASIS

Widespread forward-rail wear removes material from the interface controlling assembly position and load transfer.

A millimeter depth is not assigned to Fig. 23; the report documents full-set exceedance of the location blend limits.

Weld reconstruction and re-machining are mandatory because blend-only treatment cannot replace the lost rail geometry.

FIG. 25 - HEAVY FRETTAGE - FORWARD SIDE OF INNER PLATE (TIP SHOE)



ORIGINAL INSPECTION PHOTOGRAPH



MAGNIFIED VIEW A

SET-WIDE RAIL DATA: 1.70 mm DATUM | WORST 0.90 mm (47.1% BELOW) | 13 READINGS BELOW

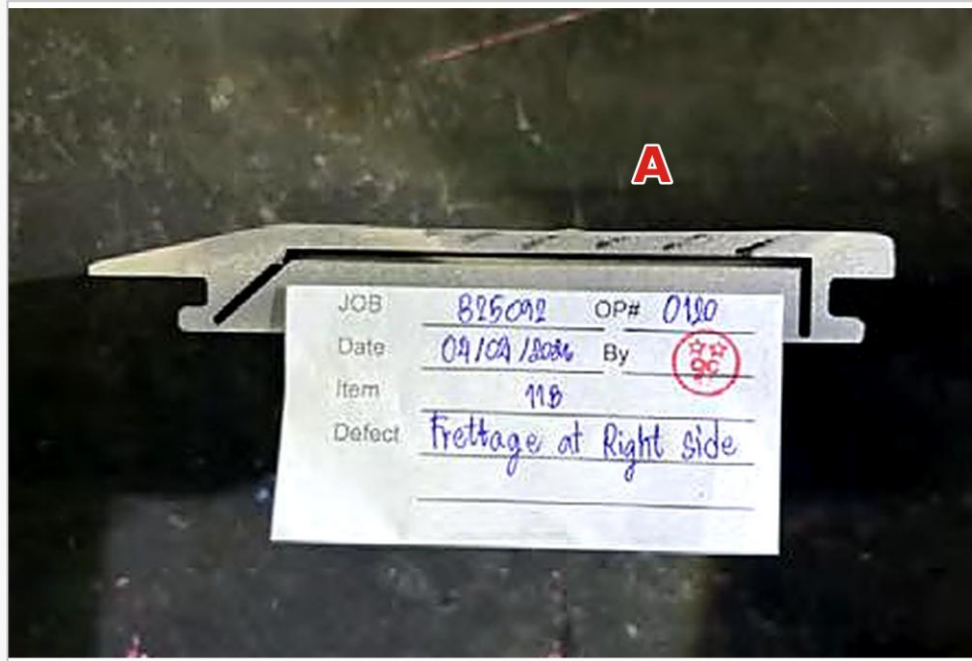
HEAVY REPAIR BASIS

The forward contact rail controls tip-shoe seating, tip clearance, sealing, and thermal performance at the gas-path interface.

The displayed measurements are set-wide report data, not an unsupported measurement taken from this photograph.

All 24 inner plates require weld build-up, re-machining, and fixture requalification; blending alone worsens fit-up.

FIG. 27 - HEAVY FRETTAGE - RIGHT SIDE OF INNER PLATE (TIP SHOE)



ORIGINAL INSPECTION PHOTOGRAPH



MAGNIFIED VIEW A

SET-WIDE RAIL DATA: 1.70 mm DATUM | WORST 0.90 mm (47.1% BELOW) | 13 READINGS BELOW

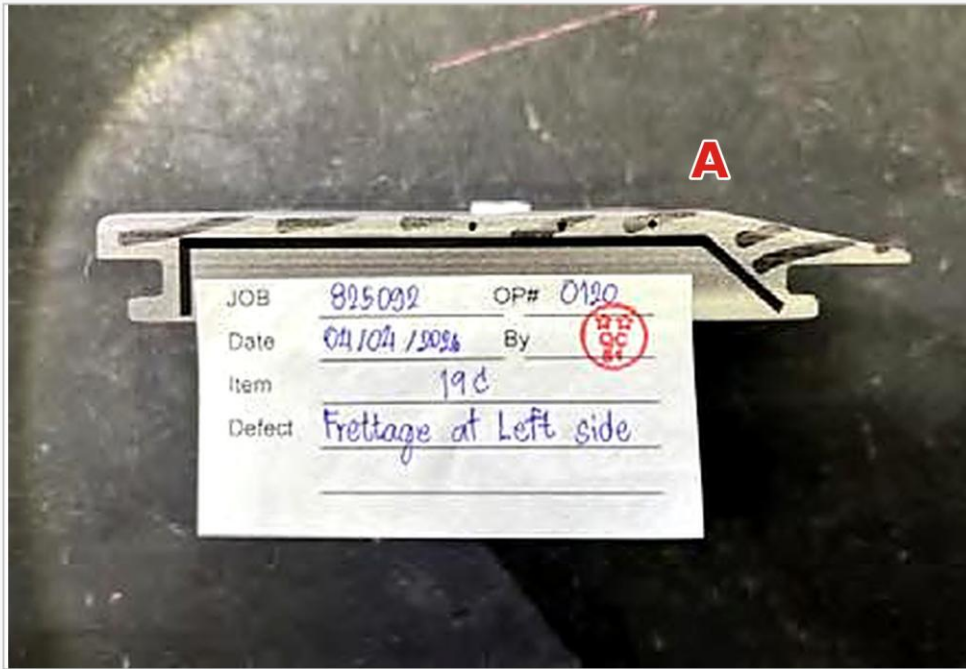
HEAVY REPAIR BASIS

Right-side rail material loss affects the assembled side contact and makes reliable fixture fit impossible without restoration.

Item 19 is non-conforming at 7 of 8 rail positions; its L-dimension is 3.45 mm, 10.2% below the lowest conforming value.

Heavy Repair requires structural build-up and precision re-machining across the contact geometry before coating and assembly.

FIG. 30 - HEAVY FRETTAGE - LEFT SIDE OF INNER PLATE (TIP SHOE)



ORIGINAL INSPECTION PHOTOGRAPH



MAGNIFIED VIEW A

SET-WIDE RAIL DATA: 1.70 mm DATUM | WORST 0.90 mm (47.1% BELOW) | 13 READINGS BELOW

HEAVY REPAIR BASIS

Left-side rail wear is at a critical fit and sealing interface, so repair level is not determined by visual size alone.

All 24 assemblies failed the Z2 fixture check and require full dimensional restoration of the inner-plate geometry.

The required weld build-up, re-machining, heat treatment, and fixture requalification place the work in Heavy Repair.

1. EXECUTIVE SUMMARY

Twenty-four (24) MS6001FA 1st stage shroud blocks were received from Nghi Son Refinery and Petrochemical LLC and subjected to full incoming inspection, including visual inspection, fluorescent penetrant inspection (FPI), dimensional measurement, fixture check, and metallurgical evaluation of both the shroud body and inner plate (tip shoe) components.

The inspection confirmed severe and widespread damage across the complete set. Multiple heavy damage mechanisms are acting at the same time: extensive fretting at all load-bearing contact interfaces with depth and area exceeding blend repair limits, foreign object damage (FOD) on exposed surfaces, structural deformation of the shroud body, dimensional non-conformance of the inner plates, abnormal metallurgical transformation of both base materials, and widespread coating deterioration requiring full strip and recoat.

Fixture inspection returned an objective, gauge-based result: all 24 inner plate assemblies were recorded as REJECT at the Z2 fixture check position (24 of 24), tip shoe position C was rejected at Z1 on all 24 assemblies, and Item 18 could not be fully seated in the fixture and is rejected on failure to achieve fixture seating, the most severe dimensional deviation in the set. Inner plate side rail measurements recorded 13 readings below the 1.70 mm minimum repair datum across 5 assemblies; the worst assembly (Item 19) is non-conforming at 7 of 8 side rail positions, and its L-dimension of 3.45 mm sits 0.39 mm (10.2%) below the lowest conforming value recorded in the set.

The combined presence of universal fixture rejection, contact interface material loss beyond blend limits, geometric distortion, and abnormal metallurgical transformation of the base material places this set beyond standard or medium repair. This condition cannot be corrected by routine blending, inspection, coating, or standard refurbishment alone; local or partial correction cannot recover the required geometry, interface condition, and dimensional compliance. The shroud block set is classified as **HEAVY REPAIR, Severity Level 9 of 10 (Very Heavy, upper boundary)** under the UNEW Repair Severity Classification. The classification basis is summarized in Section 1.1 and derived in full in Section 4.

Full structural rebuild, weld restoration of all fretting-damaged contact surfaces, mechanical straightening, full dimensional restoration and re-machining of all inner plate assemblies, post-weld vacuum heat treatment, fixture requalification, and reapplication of TBC Abradable coating with ceramic compound are required across the complete set. No components are recommended for scrap under this work order; the set remains repairable through the Heavy Repair work scope defined in this report.

1.1 HEAVY REPAIR TECHNICAL BASIS

The Heavy Repair classification of this set rests on the measured findings summarized below. Each driver is independently documented in the referenced sections of this report; together they define a full-set restoration scope.

Heavy Repair Driver	Evidence (This Set)	Repair Impact
100% fixture rejection	All 24 inner plate assemblies REJECT at Z2 fixture check (24 of 24); tip shoe position C rejected at Z1 on all 24 assemblies; Item 18 could not be fully seated in the fixture (Section 12).	Full dimensional restoration, re-machining, and fixture requalification
Inner plate dimensional non-conformance	13 side rail readings below the 1.70 mm minimum repair datum across 5 assemblies; Item 19 non-conforming at 7 of 8 positions; Item 19 L-dimension 3.45 mm, 10.2% below the lowest conforming value in the set (Section 12).	Re-machining and weld restoration of inner plates
Fretage beyond blend limits	Fretage confirmed at FWD, AFT, pressure face, and left and right contact rails on all 24 shroud bodies and at inner plate contact surfaces on all 24 assemblies; depth and area exceed blend repair limits (Sections 3 and 11).	Weld build-up and blend on all contact interfaces
Structural deformation	Deformation of the shroud body at left and right side regions; Items 14, 17, 18, and 19 require jacking and contouring (JK) (Sections 3.5 and 11).	Mechanical straightening and geometry correction
Metallurgical degradation, both alloys	Abnormal microstructural transformation confirmed in the SS310 shroud body; coating degradation and localized material loss confirmed on the Inconel 738 inner plates (Reports UNEW-ME-825092-01 and -02, Section 9).	Full removal of degraded material; mandatory post-weld vacuum heat treatment
Coating deterioration	Inner plate TBC Abradable coating severely deteriorated across the complete set with confirmed coating and substrate degradation (Section 9).	Full strip and recoat, TBC Abradable plus ceramic compound
Sealing hardware non-serviceable	All inner plate side seals (cloth type) received damaged with complete loss of sealing function; all 72 tile retention pins received deformed and cannot be reused (Section 3.8).	Replacement with new L605 seals, pins, and retaining rings

BASIS OF CLASSIFICATION

This set is not classified as Heavy Repair because standard processes such as cleaning, FPI, coating, heat treatment, or dimensional inspection appear in the work scope; those processes are common to all repair levels. It is classified as Heavy Repair because the incoming condition shows universal fixture rejection, full-set contact interface material loss beyond blend limits, structural deformation, abnormal metallurgical transformation of both

base materials, and a full-set restoration requirement. These findings require structural restoration beyond routine refurbishment.

The scope of work (Section 8) identifies the repair processes applied to this component. The repair classification is determined by the actual incoming damage condition and the extent of restoration required, as documented in Sections 3, 4, 9, 11, and 12 of this report.

APPLICABILITY OF LOWER REPAIR LEVELS

Lower Repair Level Argument	Why Not Applicable
Standard FPI, inspection, and coating processes appear in the SOW	The classification is based on the measured damage condition, not on the names of the processes applied (Section 8 note).
Local blending can restore the surfaces	Fretage depth and area exceed blend repair limits on all 24 units; weld build-up and re-machining are required (Sections 3 and 5).
Standard weld repair is sufficient	All 24 units require structural weld restoration combined with mechanical straightening, full dimensional re-machining, fixture requalification, and post-weld vacuum heat treatment (Section 5).
Coating renewal is routine refurbishment	Coating is one element only; the classification is driven by universal fixture rejection, contact interface material loss, deformation, and metallurgical degradation (Section 1.1 table).
Some dimensional results are within limits	Classification is governed by the more severe conditions: 24 of 24 fixture rejection at Z2 and inner plate non-conformance, verified by objective gauge-based fixture check (Sections 4 and 12).

1.2 MINIMUM TECHNICAL BASIS FOR HEAVY REPAIR

The Heavy Repair classification is supported even without considering coating renewal or replacement hardware. The minimum technical basis is: 24 of 24 inner plate assemblies rejected at the Z2 fixture check, tip shoe position C rejected at Z1 on 24 of 24 assemblies, full-set contact interface fretage requiring weld build-up and re-machining, structural deformation requiring mechanical correction, and full dimensional restoration required before fixture requalification. These conditions cannot be corrected by routine cleaning, inspection, coating, or local blending alone.

2. INTRODUCTION

Twenty-four (24) MS6001FA 1st stage shroud blocks were received and processed for inspection. The work includes cleaning, coating removal where applicable, disassembly of inner plates, and full incoming inspection supported by metallurgical evaluation. The inspection process consists of visual inspection, fluorescent penetrant inspection, dimensional measurement, fixture check, and material evaluation to determine the condition of the shroud body and inner plate components.

The shroud assembly operates under high temperature gas flow, mechanical loading, and continuous contact at mating interfaces. These conditions subject the components to wear, impact, and thermal exposure, which lead to degradation mechanisms such as fretting, surface damage, deformation, and dimensional instability over time. The purpose of this inspection is to identify all defects, including fretting, foreign object damage, deformation, and dimensional deviation, and to evaluate their impact on structural integrity and assembly condition.

ORDER INFORMATION

Date of report	27 April 2026
Customer P.O. no.	1003986864
UNEW Job Order no.	825092
Component Details	
Engine type	MS6001FA
Component type	1st Stage Shroud Block
Component part number, Body	119E4234 G001
Component part number, Inner plate (Tip shoe)	176D3829 P001
Qty. received	24
Material type, Body	SS310
Material type, Inner plate (Tip shoe)	Inconel 738
As-received coating, Body	No coating
As-received coating, Inner plate (Tip shoe)	TBC Abradable coating
Additional items received with main set (if any)	-
Customer supplied component history	
Total Initiated Starts	476
Manually Initiated Starts	468
Fired Starts	180
Total Emergency Trips	125
Breaker Tripped At Load Count	127

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Operational fuel type	(No information supplied)
Mode of operation (base load / peaking)	(No information supplied)
Maintenance Intervals Combustion	(No information supplied)
Maintenance Intervals Hot gas path	(No information supplied)
Unloaded condition	
Incoming packing / container condition	Good
Signs of transit damage (if damaged upon receipt photos to be included within report)	No

3. INSPECTION SUMMARY

The following operational history increases the damage risk profile and supports the Heavy Repair classification across all 24 units:

- Total Emergency Trips: 125. Together with 476 initiated starts and 180 fired starts, the unit counters record a severe cyclic thermal loading history with repeated thermal shock events that accelerate fretting progression at all contact interfaces and drive geometric distortion of the shroud body.
- Breaker Trips at Load: 127, consistent with heavy cyclic thermal loading causing accelerated material loss at mating surfaces and dimensional instability across the inner plate population.

The following damage categories were identified across the complete set of 24 shroud blocks and collectively confirm the Heavy Repair classification:

Damage Category	Finding (As Inspected)	Disposition
Fretting at FWD and AFT Contact Surfaces, Body	Widespread fretting confirmed on FWD and AFT sides across all 24 shroud bodies. Progressive material loss and deterioration of contact interface geometry at all load-bearing rails. Fretting depth and area exceed the limits of blend repair.	Weld Build-up + Blend
Fretting at Pressure Face, Body	Heavy fretting confirmed on the pressure face across multiple units. Material loss at this surface directly affects load distribution and sealing condition during high temperature operation.	Weld Build-up + Blend
Fretting at Left and Right Side Contact Rails, Body	Fretting wear confirmed on left and right side contact rails across all 24 shroud bodies. Wear at these locations directly affects interface fit-up and structural stability of the assembly.	Weld Build-up + Blend
Fretting at Inner Plate (Tip Shoe) Contact Surfaces	Heavy fretting confirmed on FWD side, left side, and right side contact surfaces of the inner plates across all 24 assemblies. Directly affects tip clearance, sealing, and thermal performance at the gas path interface.	Weld Build-up + Blend
Foreign Object Damage (FOD), Body	FOD confirmed on exposed surfaces of multiple shroud body units, creating localized surface damage and stress concentration points. Combined with fretting, FOD significantly increases the risk of crack initiation during operation.	Blend + Weld Repair
Structural Deformation, Shroud Body	Deformation confirmed on the left and right side regions of multiple shroud bodies. Deviation from original geometry directly affects assembly fit, inner plate interface alignment, and sealing effectiveness. Items 14, 17, 18, and 19 require jacking and contouring (JK), Section 11.	Straighten + Geometry Correction
Dimensional Non-Conformance, All 24 Inner Plates	All 24 inner plate assemblies recorded as REJECT at Z2 fixture check positions. Item 18 could not be fully seated in the fixture. Individual plate measurements at positions L, S1, S2, S5, and S7 are below the minimum repair datum across multiple items.	Full Dimensional Restoration + Re-machining

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	Deviations directly affect assembly alignment, gas path sealing, and operational stability.	
Inner Plate Side Seals Non-Serviceable	All 24 shroud blocks received with inner plate side seals (cloth type) in damaged and non-serviceable condition with complete loss of sealing function. Replacement with new L605 flat and bone type seals is mandatory and is outside the standard repair scope.	Replace with New
Tile Retention Pins Deformed	All tile retention pins received in deformed condition, confirmed visually across the complete set. Pins cannot be reused and require full replacement.	Replace with New
Abnormal Metallurgical Transformation, Body and Inner Plate	Metallurgical evaluation confirms abnormal microstructural transformation in the SS310 shroud body, indicating degradation of material stability under service conditions. The Inconel 738 inner plates show coating degradation and localized material loss at critical areas. All degraded material must be fully removed prior to weld restoration and post-weld heat treatment (Section 9).	Full Material Removal + Weld + Post-Weld HT
Coating Deterioration (TBC Abradable)	Inner plate TBC Abradable coating is severely deteriorated across the complete set, with confirmed coating and substrate degradation (Section 9). Full coating removal and reapplication of TBC Abradable with ceramic compound is required on all 24 assemblies.	Full Strip + Recoat

3.1 DIMENSIONAL INSPECTION SUMMARY

Key dimensional findings from the incoming inspection are summarized below:

Inspection Parameter	Result	Status
Shroud Body Dimensions (A to K, L, M)	All 24 shroud bodies recorded at positions A through K, L, and M as the incoming baseline for post-repair verification. Local deviations recorded at Item 13 and Item 20 (position C) and Item 19 (positions D and E).	RECORDED
Inner Plate Side Rail Thickness (S1 to S8)	13 readings below the 1.70 mm minimum repair datum across 5 assemblies (Items 13, 16, 19, 22, 23). Item 19 records the most severe deviation, non-conforming at 7 of 8 positions. Item 16 records critically low values at S5 and S7 (1.00 mm against the 1.70 mm minimum repair datum).	REJECT: MULTIPLE UNITS
Inner Plate L- Dimension	Item 19 records 3.45 mm, 0.39 mm (10.2%) below the lowest conforming value recorded in the set (3.84 mm). Multiple additional items are at or near the lower boundary of the recorded population.	REJECT: MULTIPLE UNITS
Fixture Check Z1 Position	Tip shoe position C recorded as REJECT at Z1 on all 24 assemblies (24 of 24). Positions A and B accepted at Z1 on 23 of 24 assemblies; Item 18 could not be fully seated; its position A measurement is not measurable.	REJECT: 24/24 AT POSITION C
Fixture Check Z2 Position	All 24 inner plate assemblies recorded as REJECT at Z2 (24 of 24). Item 18 could not be fully seated in the fixture and	REJECT: 24/24

	represents the most severe case of dimensional deviation in the set.	
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Note: The fixture check is an objective, gauge-based pass or fail assessment of assembled geometry; Z1 and Z2 results above are direct fixture verdicts. Shroud body linear dimensions are recorded against the incoming population as baseline; final acceptance of these dimensions is verified at post-repair dimensional requalification (Section 8).

3.2 FIXTURE CHECK STATISTICAL SUMMARY, ALL 24 ASSEMBLIES

Fixture check results (Section 12) constitute the objective dimensional basis of the classification. The measured data set confirms:

Fixture Check, Statistical Summary	Result
Inner plate assemblies checked (Z2 position)	24
Assemblies REJECT at Z2	24 of 24 (100%)
Assemblies REJECT at Z1, tip shoe position C	24 of 24 (100%)
Assemblies unable to achieve full fixture seating (Item 18)	1
Recorded side rail readings below the 1.70 mm minimum repair datum	13 readings across 5 assemblies
Worst single assembly (Item 19): non-conforming side rail positions	7 of 8 positions
Worst L-dimension (Item 19) against lowest conforming value (3.84 mm)	3.45 mm (10.2% below)
Inner plate assemblies REJECT overall	24 of 24

The 24 of 24 fixture rejection is a gauge verdict, not an interpretation: each assembly either conforms to the fixture or it does not. No assembly in this set conforms.

3.3 MEASURED CONTACT RAIL MATERIAL LOSS, WORST RECORDED VALUES

The inner plate side rail thickness record (Section 12.2) provides the numeric measure of contact rail material loss against the 1.70 mm minimum repair datum. The worst recorded values are:

Item / Position	Measured (mm)	Loss vs 1.70 mm Datum	Disposition
Item 19, S2	0.90	0.80 mm (47.1%)	Weld build-up + re-machine
Item 16, S5 and S7	1.00	0.70 mm (41.2%)	Weld build-up + re-machine
Item 19, S7	1.10	0.60 mm (35.3%)	Weld build-up + re-machine
Item 19, S4	1.20	0.50 mm (29.4%)	Weld build-up + re-machine
Items 22 (S1), 23 (S2, S7)	1.40	0.30 mm (17.6%)	Weld build-up + re-machine
Items 13 (S5), 19 (S1, S3, S5, S6)	1.50	0.20 mm (11.8%)	Weld build-up + re-machine
Item 19, L-dimension	3.45	10.2% below lowest conforming L (3.84)	Full dimensional restoration

Material loss of this magnitude at load-bearing contact geometry cannot be recovered by blending: blending removes additional material and worsens fit-up. Fretage exceedance of blend repair limits at

the remaining contact interfaces was assessed by visual and FPI inspection against UNEW location blend limits and is corroborated by the measured rail losses above and by the fixture check verdicts of Section 12.4.

4. REPAIR SEVERITY CLASSIFICATION

UNEW applies a 10 level Repair Severity Classification to all gas turbine capital parts refurbishment. Levels 1 to 3 represent Light Repair. Levels 4 to 7 represent Standard or Medium Repair. Levels 8 to 10 represent Heavy Repair. Repair severity is determined by the actual incoming condition of the components when compared to the condition of a part which would be serviceable. Based on the incoming inspection findings, this set of 24 first stage shroud blocks is classified as **HEAVY REPAIR, Severity Level 9 of 10 (Very Heavy, upper boundary)**. This designation is derived from the recorded inspection data summarized in this section.

The repair level is determined by the combination of damage location, measured non-conformance, defect extent, material loss, deformation, metallurgical condition, and the total restoration scope required. The classification is set by the recorded inspection data in Sections 3, 9, 11, and 12, anchored to the objective fixture check verdicts, and reflects the full restoration scope required across the complete set. The five core technical review categories of the UNEW classification basis are assessed below:

Review Category	Confirmed Condition (This Set)	Severity Contribution
Welding and Base Metal Buildup	Fretage material loss beyond blend repair limits at FWD, AFT, pressure face, and side contact rails on all 24 bodies and at inner plate contact surfaces on all 24 assemblies. FOD damage on exposed surfaces. Full weld build-up with compatible high temperature filler and reconstruction of slot and location rails is required.	Heavy (Level 9)
Dimensional Restoration	All 24 inner plate assemblies REJECT at Z2 fixture check; tip shoe position C REJECT at Z1 on 24 of 24; Item 18 unable to achieve full fixture seating. Item 19 non-conforming at 7 of 8 side rail positions with L-dimension 10.2% below the lowest conforming value. Full dimensional restoration, re-machining, and fixture requalification are required. These are objective gauge-based pass or fail results.	Heavy (Level 9)
Structural Deformation Correction	Shroud body deformation at left and right side regions across multiple units; Items 14, 17, 18, and 19 require jacking and contouring (JK). Mechanical straightening and geometry correction are required to recover assembly fit, inner plate interface alignment, and sealing effectiveness.	Heavy (Level 9)
Coating and Base Metal Condition	Abnormal metallurgical transformation confirmed in the SS310 body; coating degradation and localized material loss confirmed on the Inconel 738 inner plates (Reports UNEW-ME-825092-01 and -02). All degraded material must	Heavy (Level 9)

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	be fully removed prior to weld restoration. TBC Abradable coating deteriorated across the complete set; full strip and recoat with ceramic compound required.	
Inspection, Heat Treatment, and Engineering Risk	The repair route requires incoming solution heat treatment (shroud face), post-weld heat treatment in full vacuum, repeated FPI cycles, full dimensional inspection, and fixture requalification at final assembly. The operating history of 125 emergency trips and 127 breaker trips at load adds engineering risk to every acceptance decision.	Heavy (Level 9)

Level 9 (Very Heavy, the upper boundary of the Heavy Repair band) in the UNEW classification is defined as extensive full-set or critical-zone restoration: widespread damage across many parts, major geometry restoration, multiple heat cycles, repeated FPI and NDT, and high repair labor and acceptance risk. Every element of that definition is present in this set, and it is present on all 24 units at the same time. Several categories sit at the top of Level 9, most notably the universal fixture rejection and the inability of Item 18 to achieve full fixture seating. Where multiple criteria apply, the more severe technical condition governs the classification.

Level 10 is reserved for components at or near the technical repair limit, where non-repairable disposition is possible. All 24 units remain repairable, but the margin between their as-received condition and that retirement limit is small. The set is therefore designated Severity Level 9 of 10 (Very Heavy, upper boundary), the most severe classification available for a repairable set. The documented condition requires Heavy Repair classification under the criteria assessed above.

5. DEFECT FINDINGS AND RECOMMENDED REPAIR ACTIONS

Following receipt, cleaning, disassembly of inner plates, coating removal where applicable, incoming solution heat treatment, visual inspection, fluorescent penetrant inspection, dimensional measurement, and fixture check, all defects were recorded and dispositioned per the UNEW repair framework. The table below defines the required repair action for each defect category identified during incoming inspection. All repair methods shall be performed in accordance with UNEW approved repair procedures.

5.1 DEFECT AND REPAIR ACTION TABLE

N o.	Defect / Condition	Location / Affected Items	Repair Method	Action
1	Fretting beyond blend limits	FWD and AFT contact surfaces, body; all 24 units (Section 11)	Scallop or route, GTAW weld build-up + blend	REQUIRED
2	Fretting at pressure face	Pressure face, body; multiple units	Material removal, weld build-up, contour restoration	REQUIRED

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3	Fretage at side contact rails	Left and right side rails, body; all 24 units	Weld build-up + blend, re-machining of location rails	REQUIRED
4	Fretage at inner plate contact surfaces	FWD, left, and right contact surfaces; all 24 tip shoe assemblies	Weld build-up + blend	REQUIRED
5	Foreign object damage (FOD)	Exposed body surfaces; Items 3, 9, 13 to 19, 21 to 24 (Section 11)	Blend and weld repair	REQUIRED
6	Structural deformation	Left and right side regions, body; Items 14, 17, 18, 19 (JK)	Jacking and contouring, mechanical straightening	REQUIRED
7	Dimensional non-conformance, inner plates	All 24 assemblies REJECT at Z2; Item 18 unable to achieve full seating; Item 19 worst case	Full dimensional restoration, re-machining, fixture requalification	REQUIRED
8	Abnormal metallurgical transformation	SS310 body and Inconel 738 inner plates, complete set (Section 9)	Full removal of degraded material, weld restoration, post-weld vacuum HT	REQUIRED
9	Coating deterioration	Inner plate TBC Abradable coating, complete set	Full strip and recoat, TBC Abradable + ceramic compound	REQUIRED
10	Side seals non-serviceable	All 24 assemblies, cloth type seals with complete loss of sealing function	Replace with new L605 flat and bone type seals	ADDITIONAL ITEM
11	Tile retention pins deformed	Complete set, 72 pins	Replace with new	ADDITIONAL ITEM
12	Dowel hole degradation	Old dowel holes, body	Weld plug pins of old dowel holes	REQUIRED

NOTE: Replacement of side seals, tile retention pins, and internal retaining rings is mandatory for return to service and is outside the standard repair scope. These items are classified as Additional work items on this work order.

5.2 RECOMMENDED REPAIR SEQUENCE

All components shall be repaired in the following sequence to ensure structural integrity and coating adhesion:

Step	Process	Applies To
1	Receipt inspection, serial number recording, disassembly of inner plates from shroud bodies, record block numbers	All 24 units
2	Degrease; abrasive blast to remove coating and clean; incoming solution heat treatment in partial pressure vacuum (shroud face only)	All 24 units
3	Mask non-coated surfaces and chemical strip to remove coating; FPI and record all defects; dimensional and fixture inspection	All 24 units
4	Blend to remove oxidation product on pressure face surface	All 24 bodies

INCOMING INSPECTION REPORT



5	Scallop or route to remove defective material in pressure face and location rails, preparation for weld repair	All 24 bodies
6	Local penetrant inspection of prepared areas	As required
7	Weld repairs to the slot, pressure face, and location rails using compatible high temperature filler material	All 24 bodies
8	Weld build-up of fretting-damaged contact surfaces, body and inner plates; weld plug pins of old dowel holes	Complete set
9	Mechanical straightening, jacking and contouring of deformed shroud bodies (Items 14, 17, 18, 19)	JK items
10	Blend all repaired areas to restore component profile; reconstruction and machining of slot and location rails	All 24 bodies
11	Full dimensional restoration and re-machining of inner plate assemblies to recover tolerance and fit-up at positions L, S1 to S8, and Z2	All 24 plates
12	Post-weld heat treatment in full vacuum environment	Complete set
13	Fluorescent penetrant inspection (FPI), visual inspection, dimensional inspection	Complete set
14	Fixture alignment correction and assembly requalification; confirm all units meet dimensional acceptance criteria prior to coating	All 24 assemblies
15	Mask off non-coated areas; abrasive blast gas path surfaces; blow out with clean dry compressed air	All 24 plates
16	Apply TBC Abradable coating with ceramic compound to gas path areas; coating heat treatment in furnace	All 24 plates
17	Post-coating dimensional and final visual inspection (plates and blocks); install new seals, pins, and retaining rings; final assembly of shroud plates to blocks	Complete set
18	Compile Final Report, pack and ship components with all required documentation as listed in Purchase Order	Complete set

5.3 COATING RECOMMENDATION

The following coating restoration is required on the complete set:

Coating Process	Surface / Area
Chemical strip of existing TBC Abradable coating, heat tint verification, confirm full removal	All inner plate (tip shoe) coated surfaces
Abrasive blast, surface preparation	All gas path surfaces to receive coating
Apply TBC Abradable coating plus ceramic compound for high temperature protection	All 24 inner plate gas path surfaces
Coating heat treatment in furnace	All 24 inner plates
Post-coating dimensional and visual inspection	All coated surfaces

5.4 ENGINEERING RECOMMENDATION CONCLUSION

CLASSIFICATION: HEAVY REPAIR, SEVERITY LEVEL 9 OF 10 (VERY HEAVY, UPPER BOUNDARY), ALL 24 UNITS

UNEW Engineering confirms that the complete set of 24 MS6001FA 1st Stage Shroud Blocks (UNEW Job Order 825092) is classified as HEAVY REPAIR, Severity Level 9 of 10 (Very Heavy, upper boundary), based on the findings of the incoming inspection process. The damage categories identified, universal fixture rejection, fretting beyond blend limits at all load-bearing interfaces, foreign object damage, structural deformation, abnormal metallurgical transformation of both base materials, and widespread coating deterioration with confirmed coating and substrate degradation, are consistent with extended service operation under severe cyclic thermal loading conditions.

The severity, extent, and combination of damage found across the complete set confirms that this set requires HEAVY REPAIR at the most severe repairable level. No unit in the set is eligible for a lower repair classification: every assembly carries a REJECT fixture verdict and requires weld restoration, dimensional re-machining, and full coating replacement, with mandatory replacement of sealing hardware additionally required on the complete set.

All components are within the repairable limits established by UNEW Engineering and will be restored to a serviceable condition in accordance with the Heavy Repair work scope defined in this report. All repair methods, heat treatment programs, weld procedures, and coating processes will be performed in accordance with UNEW approved process specifications and quality procedures.

Based on the objective fixture rejection, full-set contact interface material loss, measured dimensional non-conformance, structural deformation, metallurgical condition, and the required weld build-up, re-machining, and fixture requalification scope, the complete set is classified as **HEAVY REPAIR, Severity Level 9 of 10 (Very Heavy, upper boundary)**. A lower classification would not reflect the measured incoming condition or the restoration work required to return the set to serviceable condition.

6. PACKING LIST FROM CUSTOMER

The line items of the customer packing list covering this delivery are reproduced below. The 1st stage shroud block set corresponds to the SHROUD ARR, STG 1 6FA+E line (P/N 119E4234G001, 24 units in boxes 7/8 and 8/8).

INCOMING INSPECTION REPORT



Description	MAXIMO	P/N	S/N	UOM	Box	DIM (CM)	Gross Weight	Net Weight
CAP AND LINER ASSY	2090129788	119E9620G001	11151561	PC	1/8	H135 X W116 X L151	310	188
			11160952					
			11151560					
			11160951					
			11151558					
			11151559					
6FA+E TRANSITION PC ASSY	2090129787	119E9574G002	213998-773	PC	2/8	H100 X W100 X L136	285	192
			213998-775		3/8	H100 X W100 X L136	285	192
			213998-774					
			213998-778					
			213998-777		4/8	H100 X W100 X L136	285	192
213998-776								
BUCKET KIT, STG 1, 6FA	2090119749	105T4989P0015XRV3	As attached file	SET	5/8	H83 X W98 X L111	355	230
		105T4989P0015XRV3						
NOZZLE KIT, TURB-STG1	2090157737	143E9711G02	SNEG842589	SET	6/8	H64 X L220 X W128	700	575
		129E9734 P002						
SHROUD ARR, STG 1 6FA+E	2090119751	119E4234G001	As attached file	SET	7/8	H35 X W92 X L115	255	200
					8/8	H35 X W92 X L115	155	100
							2,630.00	1,867.00

Total packages: 08 packages

Total gross weight: 2630.00 kg

I hereby certify that this is true and correct.

7. COMPONENT SERIAL NUMBER CORRELATION

CORRELATION SHEET, BODY

Item	Part Number	Serial Number	Material	Item	Part Number	Serial Number	Material
1	119E4234 G001	1	SS310	13	119E4234 G001	13	SS310
2	119E4234 G001	2	SS310	14	119E4234 G001	14	SS310
3	119E4234 G001	3	SS310	15	119E4234 G001	15	SS310
4	119E4234 G001	4	SS310	16	119E4234 G001	16	SS310
5	119E4234 G001	5	SS310	17	119E4234 G001	17	SS310
6	119E4234 G001	6	SS310	18	119E4234 G001	18	SS310
7	119E4234 G001	7	SS310	19	119E4234 G001	19	SS310
8	119E4234 G001	8	SS310	20	119E4234 G001	20	SS310
9	119E4234 G001	9	SS310	21	119E4234 G001	21	SS310
10	119E4234 G001	10	SS310	22	119E4234 G001	22	SS310
11	119E4234 G001	11	SS310	23	119E4234 G001	23	SS310
12	119E4234 G001	12	SS310	24	119E4234 G001	24	SS310

Body serial numbers 1 through 24 as received and recorded at incoming inspection.

CORRELATION SHEET, INNER PLATES (TIP SHOES)

Item	Part Number	Serial Number	Material	Item	Part Number	Serial Number	Material
1A	176D3829 P001	176DEW68D 216	Inconel 738	13A	176D3829 P001	176DEL37Y 174	Inconel 738
1B	176D3829 P001	176DEW68E 045	Inconel 738	13B	176D3829 P001	176DEW68C 009	Inconel 738
1C	176D3829 P001	176DEL37X 280	Inconel 738	13C	176D3829 P001	176DEW68C 026	Inconel 738
2A	176D3829 P001	176DEW68C 025	Inconel 738	14A	176D3829 P001	176DEW68D 205	Inconel 738
2B	176D3829 P001	176DEW68E 007	Inconel 738	14B	176D3829 P001	176DEW68C 028	Inconel 738
2C	176D3829 P001	176DEW68C 004	Inconel 738	14C	176D3829 P001	176DEW68E 010	Inconel 738
3A	176D3829 P001	176DEW68E 039	Inconel 738	15A	176D3829 P001	176DEL37X 290	Inconel 738
3B	176D3829 P001	176DEW68E 044	Inconel 738	15B	176D3829 P001	176DEW68C 013	Inconel 738
3C	176D3829 P001	176DEW68D 196	Inconel 738	15C	176D3829 P001	176DEW68C 021	Inconel 738

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4A	176D3829 P001	176DEW68C 014	Inconel 738	16A	176D3829 P001	176DEL37X 151	Inconel 738
4B	176D3829 P001	176DEW68E 021	Inconel 738	16B	176D3829 P001	176DEL37X 155	Inconel 738
4C	176D3829 P001	176DEW68C 010	Inconel 738	16C	176D3829 P001	176DEL37X 036	Inconel 738
5A	176D3829 P001	176DEL37Y 099	Inconel 738	17A	176D3829 P001	176DEL37X 229	Inconel 738
5B	176D3829 P001	176DEL37X 138	Inconel 738	17B	176D3829 P001	176DEL37X 147	Inconel 738
5C	176D3829 P001	176DEL37X 264	Inconel 738	17C	176D3829 P001	176DEL37Y 029	Inconel 738
6A	176D3829 P001	176DEW68D 203	Inconel 738	18A	176D3829 P001	176DEL37X 233	Inconel 738
6B	176D3829 P001	176DEW68C 015	Inconel 738	18B	176D3829 P001	176DEL37X 248	Inconel 738
6C	176D3829 P001	176DEW68C 001	Inconel 738	18C	176D3829 P001	176DEL37X 281	Inconel 738
7A	176D3829 P001	176DEW68E 003	Inconel 738	19A	176D3829 P001	176DEL37X 156	Inconel 738
7B	176D3829 P001	176DEW68E 032	Inconel 738	19B	176D3829 P001	176DEL37Y 132	Inconel 738
7C	176D3829 P001	176DEL37X 247	Inconel 738	19C	176D3829 P001	176DEL37X 293	Inconel 738
8A	176D3829 P001	176DEW68E 035	Inconel 738	20A	176D3829 P001	176DEW68E 011	Inconel 738
8B	176D3829 P001	176DEW68E 040	Inconel 738	20B	176D3829 P001	176DEW68D 195	Inconel 738
8C	176D3829 P001	176DEW68C 012	Inconel 738	20C	176D3829 P001	176DEW68C 020	Inconel 738
9A	176D3829 P001	176DEW68C 033	Inconel 738	21A	176D3829 P001	176DEW68C 019	Inconel 738
9B	176D3829 P001	176DEW68E 034	Inconel 738	21B	176D3829 P001	176DEW68E 008	Inconel 738
9C	176D3829 P001	176DEW68C 032	Inconel 738	21C	176D3829 P001	176DEW68C 076	Inconel 738
10A	176D3829 P001	176DEW68E 042	Inconel 738	22A	176D3829 P001	176DEW68C 006	Inconel 738
10B	176D3829 P001	176DEW68C 007	Inconel 738	22B	176D3829 P001	176DEW68B 021	Inconel 738
10C	176D3829 P001	176DEW68C 029	Inconel 738	22C	176D3829 P001	176DEL37V 013	Inconel 738
11A	176D3829 P001	176DEL37Z 274	Inconel 738	23A	176D3829 P001	176DEW68B 020	Inconel 738
11B	176D3829 P001	176DEW68C 077	Inconel 738	23B	176D3829 P001	176DEW68E 027	Inconel 738
11C	176D3829 P001	176DEW68D 211	Inconel 738	23C	176D3829 P001	176DEW68C 030	Inconel 738

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12A	176D3829 P001	176DEW68C 005	Inconel 738	24A	176D3829 P001	176DEW68E 025	Inconel 738
12B	176D3829 P001	176DEW68D 215	Inconel 738	24B	176D3829 P001	176DEW68D 204	Inconel 738
12C	176D3829 P001	176DEW68E 015	Inconel 738	24C	176D3829 P001	176DEL37X 135	Inconel 738

8. SCOPE OF WORK

MS6001FA STAGE 1 SHROUD BLOCK

Work Scope	Inspect	Heavy Repair Scope	Coating
Inspect			
Perform receipt inspection and record serial numbers	X		
Degrease components	X		
Perform metallurgical evaluation of base material and coating type, report on condition	X		
Disassemble inner plate from shroud body, record block number plates are removed from	X		
Abrasive blast to remove coating and to clean, blow out with dry compressed air to remove all media	X		
Perform visual inspection and segregate obvious scrap components	X		
Perform incoming solution heat treatment in partial pressure vacuum environment (shroud face only)	X		
Mask non coated surfaces and chemical strip to remove coating	X		
Perform fluorescent penetrant inspection and record all defects	X		
Perform dimensional inspection, report all non-conformities	X		
Compile incoming inspection report and forward to customer	X		
Repair			
Blend to remove oxidation product on pressure face surface		X	
Scallop or route to remove defective material in pressure face, location rails preparation for weld repair		X	
Perform local penetrant inspection		X	
Perform weld repairs to the slot, pressure face, location rails		X	
Weld build-up of fretting-damaged contact surfaces, body and inner plates; weld plug pins of old dowel holes		X	
Mechanical straightening, jacking and contouring of deformed shroud bodies		X	
Full dimensional restoration and re-machining of inner plate assemblies		X	

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Blend all repaired areas to restore component profile		X	
Perform fluorescent penetrant inspection		X	
Perform post weld heat treatment in full vacuum environment		X	
Perform fluorescent penetrant inspection (FPI)		X	
Perform visual inspection		X	
Perform dimensional inspection and fixture requalification		X	
Coating			
Mask off non coated areas in preparation for abrasive blast			X
Abrasive blast gas path surfaces to receive coating			X
Blow out with clean dry compressed air to ensure no media entrapment			X
Apply TBC Abradable coating to gas path areas with ceramic compound for high temperature protection			X
Perform coating heat treatment in furnace			X
Perform dimensional inspection			X
Perform final visual inspection (plates and blocks)			X
Final assembly of shroud plates to blocks			X
Compile Final Report, pack and ship components with all required documentation as listed in Purchase Order			X

Note: The processes listed above define the work scope applied to this component. The repair classification is determined by the incoming damage condition documented in this report, not by the process list (see Section 1.1).

Required:

- TBC Abradable plus ceramic compound coating (Heavy Repair work scope).
- New Tile Retention Pins, 72 ea (received deformed, non-reusable).
- New Internal Retaining Rings, 72 ea.
- New Inner Plate Side Seals, L605 flat and bone type, 1 set.

SPARE PART (REPAIR / REPLACE)

Item	Part Description	Received / Required	Condition	Remark
1	Tile retention pins	72/72 ea	Replace	Additional
2	Internal retaining rings	72/72 ea	Replace	Additional
3	Inner plate side seal, long (L605 dog bone type)	48/70 ea	Replace	In scope
4	Inner plate side seal, short upper (L605 dog bone type)	44/70 ea	Replace	In scope

INCOMING INSPECTION REPORT



5	Inner plate side seal, short lower (L605 dog bone type)	47/70 ea	Replace	In scope
6	Split line seal, inner plate, long (L605 flat type)	2/2 ea	Replace	In scope
7	Split line seal, inner plate, short upper (L605 flat type)	2/2 ea	Replace	In scope
8	Split line seal, inner plate, short lower (L605 flat type)	2/2 ea	Replace	In scope

Note: Replacement of consumable and removable hardware listed above is not the basis of the Heavy Repair classification. The classification is based on universal fixture rejection, contact interface material loss beyond blend limits, structural deformation, metallurgical degradation, and the full-set restoration requirement (Sections 1.1, 3, 4, and 12).

9. MATERIAL EVALUATION

Report No.	UNEW-ME-825092-01	Job Order No.	825092
Serial No. (or ID)	Item 1	Cutting Location	Body
Received Status	As-Received	Hardness Test	Not required at as-received stage; hardness verification performed at post-weld heat treatment stage
Grain Size	Refer to micrographs, Figs. 1 and 2	Coating Type	No coating
Nearest Alloy	SS310		

Element	Co	Cr	Ni	Ti	W	Ta	Mo	Fe	Al
Nominal (%)	-	24-26	19-22	-	-	-	-	Bal	-
Result (%)	-	23.7	20.5	-	-	-	-	53.2	-



Fig. 1: Hot gas path surface condition (Etched)

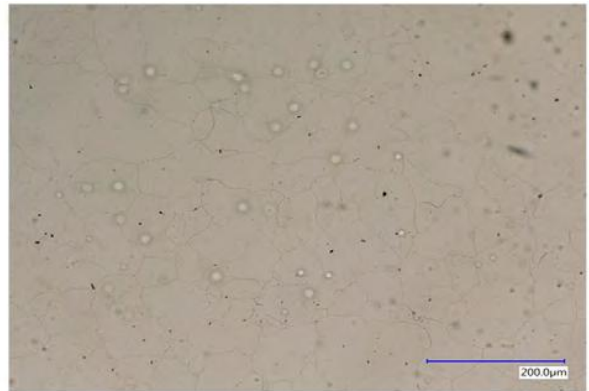


Fig. 2: Typical microstructure at higher magnification (Etched)

The component was evaluated to determine the condition of the base material for repair. The internal combustion surface is uncoated and exhibits surface degradation from service exposure, including localized oxidation, wear, and material loss in high temperature regions. The base material was confirmed as SS310 alloy, consisting of a gamma matrix with primary and secondary carbide distribution along grain boundaries. Abnormal metallurgical transformation is observed in the base material, characterized by coarsened grain boundary carbide networks, secondary phase precipitation, an oxidation-affected surface layer, and localized base metal loss in high temperature regions, indicating degradation of microstructural stability under service conditions (Figs. 1 and 2). The metallurgical findings support the requirement for removal of degraded material, controlled weld repair, and post-weld heat treatment; the material evaluation is not used alone as the repair classification basis and supports the dimensional and structural findings of Sections 3 and 12.

Recommendation: All degraded surface layers, including oxidation, worn material, and areas affected by metallurgical transformation, will be fully removed. Damaged and material-loss regions will be restored by weld build-up using compatible high temperature filler material. Repaired areas will be machined and contoured to recover original geometry and dimensional requirements. Deformed components will be corrected through mechanical straightening and geometry restoration. Post-weld heat treatment will be applied to relieve residual stress and stabilize material properties. All repaired areas will undergo repeated non-destructive testing to verify integrity as part of the Heavy Repair scope.

INCOMING INSPECTION REPORT

Report No.	UNEW-ME-825092-02	Job Order No.	825092
Serial No. (or ID)	Item 1C	Cutting Location	Inner Plate (Tip Shoe)
Received Status	As-Received	Hardness Test	Not required at as-received stage; hardness verification performed at post-weld heat treatment stage
Grain Size	Refer to micrographs, Figs. 1 and 2	Coating Type	TBC Abradable coating
Nearest Alloy	Inconel 738		

Element	Co	Cr	Ni	Ti	W	Ta	Mo	Fe	Al
Nominal (%)	8.5	16.0	61.5	3.4	2.6	-	1.8	-	3.4
Result (%)	8.7	14.6	62.1	3.5	2.7	-	1.8	-	3.4



Fig. 1: Hot gas path coating and substrate condition (Etched)



Fig. 2: Typical microstructure at higher magnification (Etched)

The component was evaluated to determine the condition and suitability of the base material for repair. The internal combustion surface is protected by TBC Abradable coating; inspection confirms coating degradation and localized damage associated with service exposure, including wear and material loss in critical areas. The base material was confirmed as Inconel 738 alloy, consisting of a gamma matrix with fine gamma prime, primary carbide, and dispersed secondary carbide along grain boundaries. Abnormal metallurgical transformation is observed, characterized by coating and substrate interface degradation, gamma prime coarsening consistent with extended high temperature exposure, and localized base metal loss at critical areas, indicating degradation of microstructural stability under high temperature service conditions (Figs. 1 and 2). The metallurgical findings support the requirement for removal of degraded material, controlled weld repair, and post-weld heat treatment; the material evaluation is not used alone as the repair classification basis and supports the dimensional and structural findings of Sections 3 and 12.

Recommendation: The TBC Abradable and ceramic coating shall be fully removed from all affected areas to expose and assess the base material condition. Any degraded coating, oxidized material, worn

surface, or material-loss region shall be completely removed before repair. Damaged areas on the Inconel 738 inner plates shall be restored by controlled weld build-up using compatible high temperature filler material; repaired surfaces shall be machined and contoured to restore original profile, clearance control, and assembly fit-up. Post-weld heat treatment shall be performed to relieve residual stress and stabilize the repaired material. After dimensional verification and FPI confirmation, the repaired surfaces shall be recoated with TBC Abradable coating to restore thermal protection and operating clearance performance. Based on the coating degradation, material loss, and abnormal metallurgical transformation observed, these components require Heavy Repair rather than standard repair.

10. PHOTOGRAPHS



Fig. 1: As-received condition



Fig. 2: As-received condition



Fig. 3: Heavy damage, as-received condition



Fig. 4: Heavy damage, as-received condition



Fig. 5: Tear and wear, shroud block body



Fig. 6: Tear and wear, shroud block body

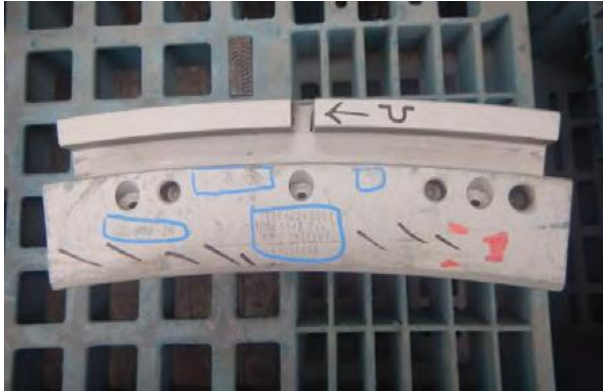


Fig. 7: Heavy wear and surface degradation



Fig. 8: Heavy wear and surface degradation



Fig. 9: Heavy tear and wear of shroud block body



Fig. 10: Heavy tear and wear of shroud block body



INCOMING INSPECTION REPORT



Fig. 11: Severe degradation on tip shoe (inner plate)

Fig. 12: Severe degradation on tip shoe (inner plate)



Fig. 13: Severe degradation on tip shoe (inner plate)



Fig. 14: Severe degradation on tip shoe (inner plate)



Fig. 15: Heavy deformation on right side, body



Fig. 16: Heavy deformation on right side, body

INCOMING INSPECTION REPORT

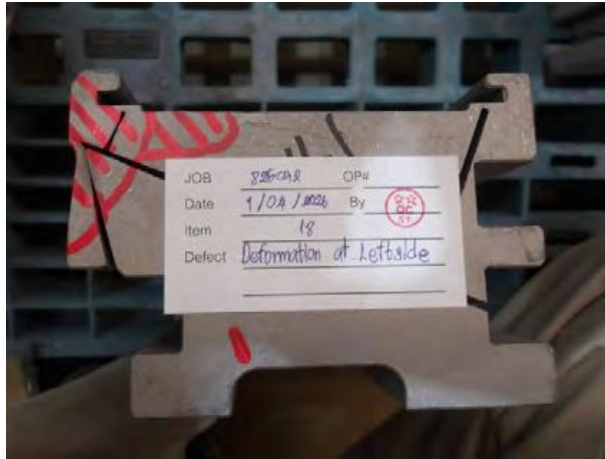


Fig. 17: Heavy deformation on left side, body

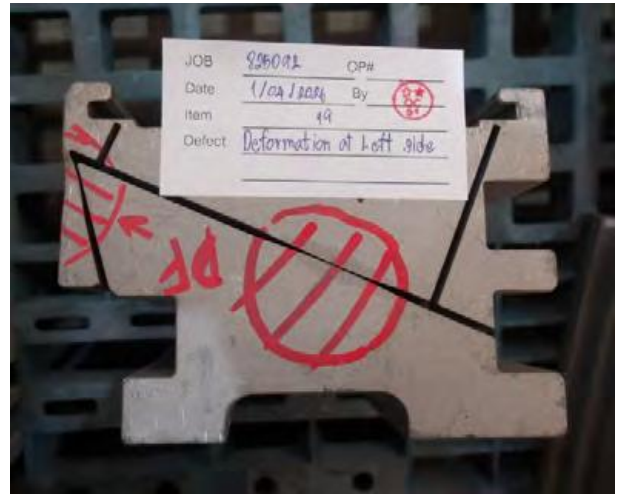


Fig. 18: Heavy deformation on left side, body



Fig. 19: Heavy FOD damage on left side, body



Fig. 20: Heavy frettage on pressure face, body



Fig. 21: Heavy frettage on back side, body



Fig. 22: Heavy FOD damage on FWD side, body

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Fig. 23: Heavy frettage on FWD side, body



Fig. 24: Heavy frettage on FWD side, body



Fig. 25: Heavy frettage on FWD side, tip shoe



Fig. 26: Heavy frettage on FWD side, tip shoe

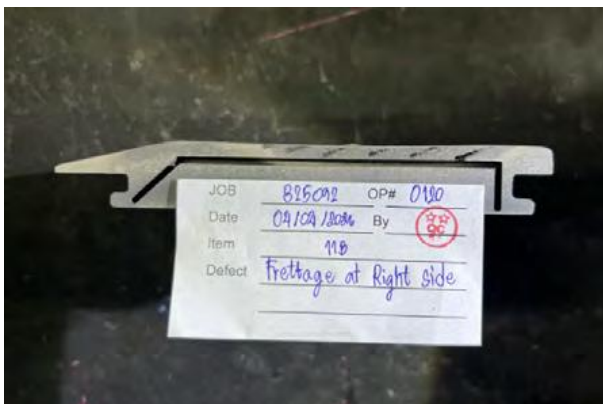


Fig. 27: Heavy frettage on right side, tip shoe



Fig. 28: Heavy frettage on left side, tip shoe



Fig. 29: Heavy fretting on right side, tip shoe



Fig. 30: Heavy fretting on left side, tip shoe



Fig. 31: Heavy fretting on right side, tip shoe



Fig. 32: Deformation on tile retention pins requiring replacement with new

SIDE SEAL AS-RECEIVED CONDITION

All shroud blocks were received with inner plate side seals (cloth seal type) in damaged and non-serviceable condition, with loss of sealing function. Replacement with new inner plate side seals (L605 flat and bone type) is required for Heavy Repair and is not included in the standard repair scope.



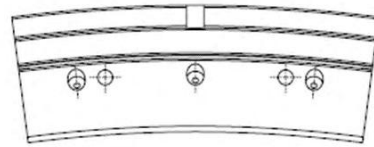
Fig. 33: As-received cloth-type side seals, damaged and non-serviceable



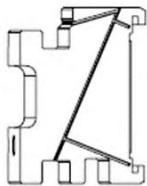
Fig. 34: Seal replacement with new L605 flat and bone type required

11. DEFECT LEGEND TABLE

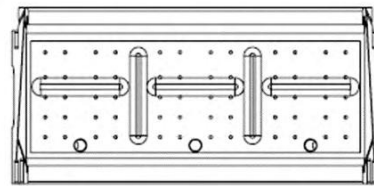
The reference drawing below shows the shroud block inspection zones (FWD side, AFT side, pressure face, left and right sides, back side) used for defect recording during incoming inspection.



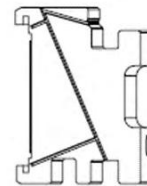
FWD SIDE



LEFT SIDE



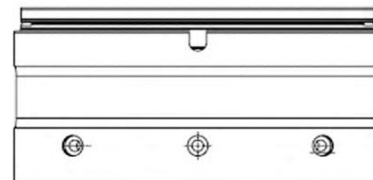
PRESSURE FACE



RIGHT SIDE



AFT SIDE



BACK SIDE

DEFECT LEGEND, BODY

Item	Top Face Fretage	L/R Side Deformation	L/R Side F.O.D.	FWD Fretage / F.O.D.	AFT / Back Fretage
1	-	-	-	B/WB / B/WB	B / -
2	-	-	-	B/WB / B/WB	B/WB / -
3	-	-	B	B/WB / B/WB	B/WB / -
4	-	-	-	B/WB / B/WB	B/WB / -
5	-	-	-	B/WB / B/WB	B/WB / -
6	-	-	-	B / B/WB	B/WB / -
7	-	-	-	B/WB / B/WB	B/WB / -
8	-	-	-	B/WB / B/WB	B/WB / -
9	-	-	B	B/WB / B/WB	B/WB / -
10	-	-	-	B/WB / B/WB	B / B
11	-	-	-	B/WB / B/WB	B / -
12	B	-	-	B / B/WB	B/WB / -
13	-	-	B	B/WB / B/WB	B/WB / -
14	-	JK	B	B/WB / B/WB	B / -
15	-	-	B	B/WB / B/WB	B/WB / -
16	-	-	B	B/WB / B/WB	B / B
17	-	JK	B	B / B/WB	B / -
18	-	JK	B	B/WB / B/WB	B/WB / B
19	-	JK	B	B / B/WB	B/WB / B
20	-	-	-	B / B/WB	B / -
21	-	-	B	B / B/WB	B/WB / B
22	-	-	B	B/WB / B/WB	B/WB / -
23	-	-	B	B/WB / B/WB	B/WB / -
24	-	-	B	B/WB / B/WB	B/WB / -

FWD Fretage / F.O.D. column lists FWD side fretage disposition and FWD side F.O.D. disposition. AFT / Back column lists AFT side fretage and back side fretage dispositions. Columns with no recorded findings are omitted.

DEFECT LEGEND, INNER PLATE (TIP SHOE)

Item	Pressure Face L/R Fretage	FWD Side Fretage	Inner Plate Fixture Verdict
1	B/WB	B/WB	Rej
2	B/WB	B/WB	Rej
3	B/WB	B/WB	Rej
4	B/WB	B/WB	Rej
5	B/WB	B/WB	Rej
6	B/WB	B/WB	Rej
7	B/WB	B/WB	Rej
8	B/WB	B/WB	Rej
9	B/WB	B/WB	Rej
10	B/WB	B/WB	Rej
11	B/WB	B/WB	Rej
12	B/WB	B/WB	Rej
13	B/WB	B/WB	Rej
14	B/WB	B/WB	Rej
15	B/WB	B/WB	Rej
16	B/WB	B/WB	Rej
17	B/WB	B/WB	Rej
18	B/WB	B/WB	Rej
19	B/WB	B/WB	Rej
20	B/WB	B/WB	Rej
21	B/WB	B/WB	Rej
22	B/WB	B/WB	Rej
23	B/WB	B/WB	Rej
24	B/WB	B/WB	Rej

LEGEND KEY

- B = Blend repair to be performed in accordance with the location blend limits.
- B/WB = Blend and weld build-up: blend performed as the first-stage material removal action; weld build-up and re-machining follow where post-blend inspection confirms material loss beyond the location blend limits, per Sections 5.1 and 5.2.
- WB = Weld and Blend to be performed based on the area limits and defects detected.
- JK = Jacking and contouring to be performed based on the deformation and distortion detected.
- R = Replace with new.

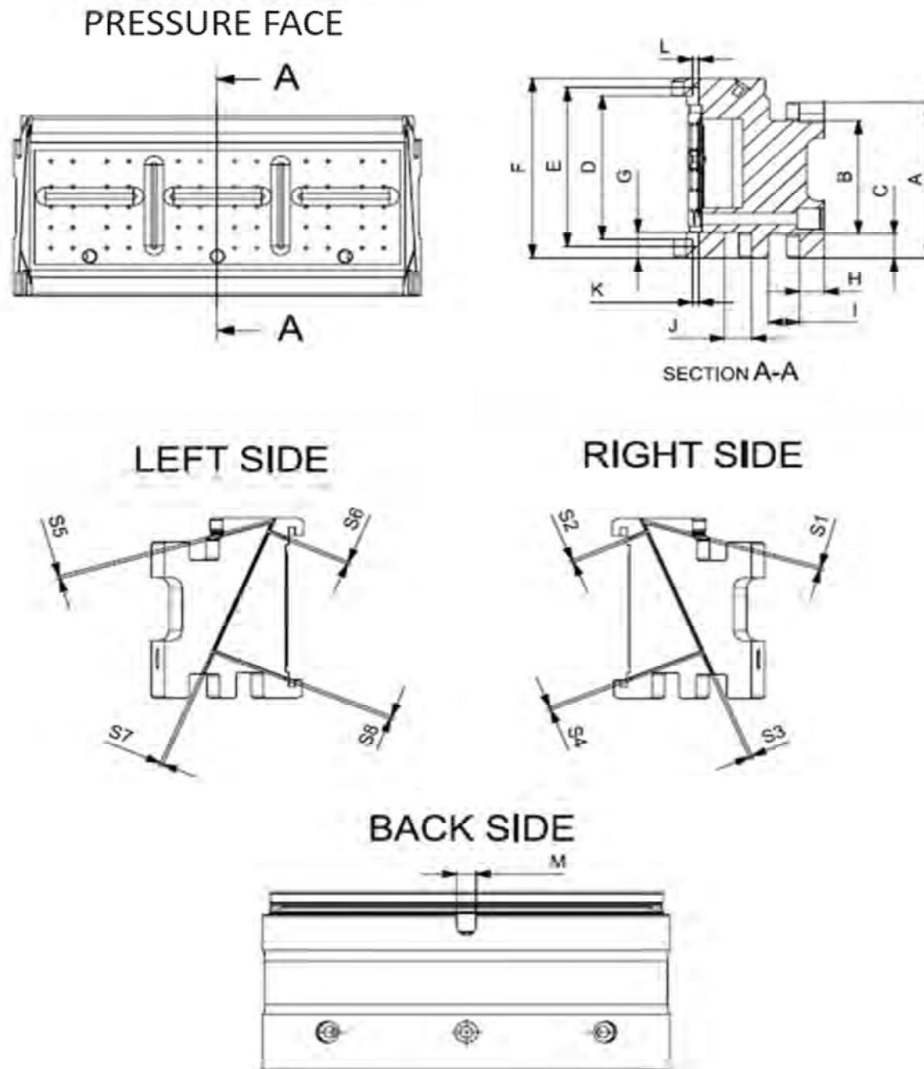
INCOMING INSPECTION REPORT



-
- ACC / Acc. = Acceptable as is. REJ / Rej. = Dimension unacceptable, repair required.
 - N/M = Not measurable; unit could not be fully seated in the check fixture.

12. DIMENSION INSPECTION

Shroud body measurement positions A through K, L, M and inner plate side rail positions S1 through S8 are shown in the reference drawings below. All values in mm.



12.1 SHROUD BODY DIMENSIONS, POSITIONS A TO K

Item	A	B	C	D	E	F	G	H	I	J	K
1	97.59	71.06	14.95	89.63	99.31	112.13	16.04	14.21	17.73	15.7	3.99
2	97.6	71.05	15.13	89.6	99.25	112.25	16.37	14.19	17.68	15.72	3.85
3	97.6	71.06	15.11	89.58	99.27	112.19	16.05	14.17	17.73	15.69	3.94
4	97.62	71.04	14.99	89.6	99.24	112.23	16.06	14.2	17.72	15.71	3.89
5	97.57	71.03	15.04	89.62	99.28	112.2	16.08	14.25	17.75	15.7	3.9
6	97.6	71.09	15.38	89.62	99.27	112.28	16.05	14.2	17.7	15.67	3.94
7	97.58	71.1	14.97	89.6	99.25	112.21	16.06	14.23	17.77	15.69	3.88
8	97.61	71.09	15.02	89.62	99.24	112.3	16.05	14.26	17.67	15.69	3.98
9	97.62	71.07	15.02	89.64	99.28	112.18	16.05	14.3	17.7	15.66	3.9
10	97.6	71.08	15.19	89.63	99.27	112.2	16.07	14.24	17.66	15.67	3.88
11	97.59	71.07	15.07	89.62	99.28	112.2	16.08	14.25	17.68	15.71	3.88
12	97.58	71.03	14.96	89.63	99.29	112.21	16.04	14.3	17.65	15.7	3.85
13	97.55	71.14	16.05	89.6	99.27	112.24	16.05	14.21	17.7	15.71	3.9
14	97.57	71.11	15.08	89.64	99.26	112.22	16.01	14.23	17.73	15.67	3.88
15	97.6	71.02	15.04	89.62	99.24	112.25	16.02	14.26	17.7	15.72	3.88
16	97.62	71.03	15.05	89.64	99.23	112.16	16.07	14.29	17.75	15.72	3.88
17	97.6	71.08	15.08	89.61	99.29	112.27	16.02	14.24	17.69	15.68	3.95
18	97.62	71.04	15.01	89.61	99.3	112.17	16.06	14.22	17.67	15.65	3.89
19	97.6	71.05	15.04	89.4	98.88	112.12	16.11	14.28	17.72	15.69	3.92
20	97.54	71.11	16.16	89.59	99.2	112.2	16.04	14.22	17.67	15.71	3.91
21	97.6	71.08	15.2	89.62	99.3	112.16	16.05	14.25	17.7	15.72	3.89
22	97.58	71.16	15.12	89.6	99.28	112.15	16.02	14.19	17.69	15.69	3.9
23	97.57	71.13	14.93	89.59	99.25	112.18	16.03	14.22	17.68	15.68	3.95
24	97.61	71.05	15.03	89.61	99.24	112.18	16.04	14.26	17.7	15.7	3.94

Note: Shroud body linear dimensions are recorded against the incoming population as baseline for post-repair verification. Local deviations recorded at Item 13 (C = 16.05), Item 20 (C = 16.16), and Item 19 (D = 89.40, E = 98.88). Final acceptance is verified at post-repair dimensional requalification.

12.2 INNER PLATE DIMENSIONS, POSITIONS L, M, S1 TO S8

Item	L	M	S1	S2	S3	S4	S5	S6	S7	S8
1	3.96	11.27	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
2	3.94	11.15	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
3	3.93	11.24	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
4	3.9	11.29	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
5	3.9	11.25	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
6	3.91	11.27	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
7	3.89	11.25	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
8	3.95	11.33	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
9	3.9	11.28	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
10	3.9	11.3	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
11	3.88	11.3	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
12	3.89	11.3	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
13	3.88	11.28	1.7	1.7	1.7	1.7	1.5	1.7	1.7	1.7
14	3.97	11.19	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
15	3.86	11.19	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
16	3.88	11.23	1.7	1.7	1.7	1.7	1	1.7	1	1.7
17	3.84	11.2	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
18	3.91	11.23	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
19	3.45	11.23	1.5	0.9	1.5	1.2	1.5	1.5	1.1	1.7
20	3.9	11.25	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
21	3.94	11.19	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
22	3.92	11.26	1.4	1.7	1.7	1.7	1.7	1.7	1.7	1.7
23	3.88	11.23	1.7	1.4	1.7	1.7	1.7	1.7	1.4	1.7
24	3.9	11.2	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7

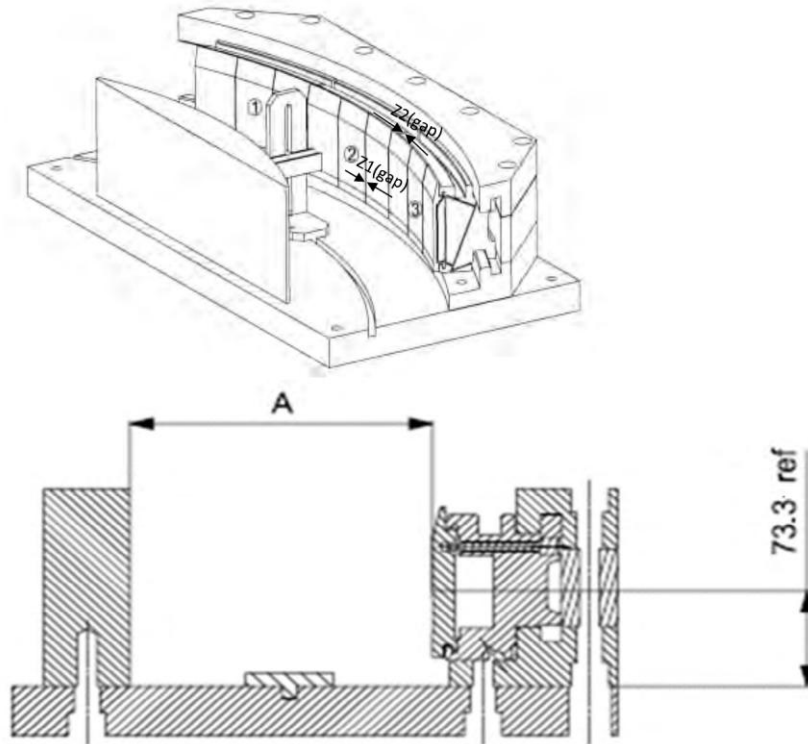
Note: Highlighted values are below the 1.70 mm minimum repair datum at positions S1 to S8. The 1.70 mm side rail value is used as the minimum repair datum for this inspection because it represents the required contact rail geometry for fixture fit-up and final assembly requalification. Item 19 records the most severe deviation: L = 3.45 mm, 0.39 mm (10.2%) below the lowest conforming L value in the set (3.84 mm), and 7 of 8 side rail positions non-conforming. Item 16 records critically low values at S5 and S7 (1.00 mm).

12.3 FIXTURE INSPECTION

Fixture check positions Z1 (gap positions per tip shoe A, B, C) and Z2 (assembled gap) with position A linear measurement are shown below. All values in mm.

Fixture Check Method and Acceptance Basis	
Check fixture	UNEW assembly check fixture, MS6001FA Stage 1 shroud block, fixture reference UNEW-FIX-825092-01, verified prior to use under the UNEW calibration program
Inspection method	Fixture seating and gap check (go / no-go) at Z1 per tip shoe position (A, B, C) and Z2 per assembled unit, with position A linear measurement recorded
Z1 acceptance criterion	Gap within fixture gauge tolerance at each tip shoe position with the unit seated in the fixture
Z2 acceptance criterion	Assembled unit achieves full fixture seating with the Z2 gap within fixture gauge tolerance
Result	24 of 24 assemblies REJECT at Z2; tip shoe position C REJECT at Z1 on 24 of 24; Item 18 rejected on failure to achieve full fixture seating

Fixture inspection:



12.4 FIXTURE CHECK RESULTS, ALL 24 ASSEMBLIES

Item	Plate	A	Z1	Z2	Item	Plate	A	Z1	Z2
1	A	209.15	Acc.	Rej.	13	A	208.96	Acc.	Rej.
	B	209.00	Acc.			B	209.05	Acc.	
	C	209.16	Rej.			C	209.07	Rej.	
2	A	209.00	Acc.	Rej.	14	A	208.83	Acc.	Rej.
	B	209.01	Acc.			B	208.93	Acc.	
	C	208.97	Rej.			C	208.97	Rej.	
3	A	209.06	Acc.	Rej.	15	A	209.06	Acc.	Rej.
	B	209.10	Acc.			B	209.10	Acc.	
	C	209.05	Rej.			C	209.10	Rej.	
4	A	208.92	Acc.	Rej.	16	A	208.93	Acc.	Rej.
	B	209.24	Acc.			B	209.05	Acc.	
	C	208.88	Rej.			C	208.95	Rej.	
5	A	209.07	Acc.	Rej.	17	A	208.99	Acc.	Rej.
	B	209.06	Acc.			B	209.03	Acc.	
	C	209.08	Rej.			C	209.03	Rej.	
6	A	208.85	Acc.	Rej.	18	A	Rej. (N/M)	Acc.	Rej.
	B	208.86	Acc.			B	Rej. (N/M)	Acc.	
	C	208.92	Rej.			C	Rej. (N/M)	Rej.	
7	A	209.08	Acc.	Rej.	19	A	208.82	Acc.	Rej.
	B	209.02	Acc.			B	208.81	Acc.	
	C	209.00	Rej.			C	208.85	Rej.	
8	A	208.94	Acc.	Rej.	20	A	208.92	Acc.	Rej.
	B	208.94	Acc.			B	208.94	Acc.	
	C	209.00	Rej.			C	208.95	Rej.	
9	A	209.08	Acc.	Rej.	21	A	208.93	Acc.	Rej.
	B	208.94	Acc.			B	209.03	Acc.	
	C	209.04	Rej.			C	209.07	Rej.	
10	A	208.98	Acc.	Rej.	22	A	209.02	Acc.	Rej.
	B	208.99	Acc.			B	208.90	Acc.	
	C	208.94	Rej.			C	209.05	Rej.	
11	A	209.02	Acc.	Rej.	23	A	209.03	Acc.	Rej.

INCOMING INSPECTION REPORT



	B	209.04	Acc.			B	209.24	Acc.	
	C	209.10	Rej.			C	209.32	Rej.	
12	A	209.21	Acc.	Rej.	24	A	208.87	Acc.	Rej.
	B	208.92	Acc.			B	208.90	Acc.	
	C	208.97	Rej.			C	208.87	Rej.	

Remark: Item 18 could not be fully seated in the fixture for position A measurement and complete Z2 assessment; partial Z1 contact checks at tip shoe positions A and B were recorded as accepted, and the assembly is recorded as REJECT on failure to achieve fixture seating (N/M = not measurable). Z1 result applies per tip shoe position; Z2 result applies per assembled unit. All 24 assemblies REJECT at Z2; tip shoe position C REJECT at Z1 on all 24 assemblies.

13. PER-UNIT DISPOSITION SUMMARY

Per-unit inspection dispositions are summarized below. B = Blend repair. WB = Weld and Blend. JK = Jacking and contouring. REJ = Dimension unacceptable, repair required.

Item	Body Fretage (FWD/AFT)	Deformation	F.O.D.	Inner Plate Fixture (Z2)	Disposition
1	B/WB	-	-	REJ	HEAVY REPAIR
2	B/WB	-	-	REJ	HEAVY REPAIR
3	B/WB	-	B	REJ	HEAVY REPAIR
4	B/WB	-	-	REJ	HEAVY REPAIR
5	B/WB	-	-	REJ	HEAVY REPAIR
6	B/WB	-	-	REJ	HEAVY REPAIR
7	B/WB	-	-	REJ	HEAVY REPAIR
8	B/WB	-	-	REJ	HEAVY REPAIR
9	B/WB	-	B	REJ	HEAVY REPAIR
10	B/WB	-	-	REJ	HEAVY REPAIR
11	B/WB	-	-	REJ	HEAVY REPAIR
12	B/WB	-	-	REJ	HEAVY REPAIR
13	B/WB	-	B	REJ	HEAVY REPAIR
14	B/WB	JK	B	REJ	HEAVY REPAIR
15	B/WB	-	B	REJ	HEAVY REPAIR
16	B/WB	-	B	REJ	HEAVY REPAIR
17	B/WB	JK	B	REJ	HEAVY REPAIR
18	B/WB	JK	B	REJ	HEAVY REPAIR
19	B/WB	JK	B	REJ	HEAVY REPAIR
20	B/WB	-	-	REJ	HEAVY REPAIR
21	B/WB	-	B	REJ	HEAVY REPAIR
22	B/WB	-	B	REJ	HEAVY REPAIR
23	B/WB	-	B	REJ	HEAVY REPAIR
24	B/WB	-	B	REJ	HEAVY REPAIR

Exceptions and non-typical findings: Item 18 could not be fully seated in the fixture and is rejected on failure to achieve fixture seating (most severe dimensional deviation in the set). Item 19, most severe inner plate dimensional non-conformance (7 of 8 side rail positions and L-dimension). Items 14, 17, 18, and 19 require jacking and contouring of the shroud body.

14. DEFECT MAP RECORD

Defect locations recorded during incoming inspection are summarized below against the component inspection zone reference of Section 11. This record consolidates the incoming defect mapping for the complete set of 24 shroud blocks and 72 inner plates.

Component	MS6001FA 1st Stage Shroud Block, 24 Units (1 Complete Set)
Part Numbers	Body: 119E4234 G001; Inner plate (Tip shoe): 176D3829 P001
Customer	Nghi Son Refinery & Petrochemical, LLC.
Customer P.O. No.	WO1003986864
UNEW Job Order No.	825092
Record Date	27 April 2026
Recorded By	UNEW Incoming Inspection; reviewed and approved by Paul McGuire, Engineering Manager

DEFECT LOCATION SUMMARY

Zone / Location	Defect / Condition	Repair Action	Items Affected
FWD side, body	Frettagage; F.O.D.	Weld build-up + blend	Items 1 to 24
AFT side, body	Frettagage	Weld build-up + blend	Items 1 to 24
Pressure face, body	Frettagage, oxidation product	Material removal, weld build-up + contour restoration	Multiple units
Left and right side rails, body	Frettagage; F.O.D.	Weld build-up + blend; re-machining of rails	Items 1 to 24; F.O.D. per Section 11
Left and right side regions, body	Structural deformation	Mechanical straightening (JK)	Items 14, 17, 18, 19
Back side, body	Frettagage	Blend	Items 10, 16, 18, 19, 21
Top face, body	Frettagage	Blend	Item 12
Inner plate contact surfaces (FWD, left, right)	Frettagage	Weld build-up + blend, re-machine	All 24 assemblies (72 tip shoes)
Inner plate assemblies	Dimensional non-conformance, fixture REJECT at Z2 (24/24)	Full dimensional restoration, re-machining, fixture requalification	Items 1 to 24; Item 18 not fully seatable
Inner plate gas path surfaces	TBC Abradable coating deterioration	Full strip + recoat	All 24 assemblies

INCOMING INSPECTION REPORT



Side seals and tile retention pins	Damaged seals, deformed pins (non-serviceable)	Replace with new	Complete set
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Metallurgical sectioning locations: coupons were removed at Item 1 (shroud body, report UNEW-ME-825092-01) and Item 1C (inner plate, report UNEW-ME-825092-02). Results are given in Section 9.

Defect dispositions above correspond to the legend tables of Section 11, the repair actions of Section 5.1, and the dimensional records of Section 12.

ANNEX A - QUANTIFIED HEAVY REPAIR WORK SCOPE

1ST STAGE SHROUD BLOCK

Annex to Incoming Inspection Report, WO1003986864

Customer	Nghi Son Refinery & Petrochemical LLC	Report Date	27 April 2026
Customer P.O. No.	WO1003986864	UNEW Work Order	825092
Engine Type	MS6001FA (GE Frame 6FA)	Component	1st Stage Shroud Block
Component Part No.	119E4234 G001 (body) / 176D3829 P001 (inner plate)	Qty. Received	24 units (1 complete set)
Repair Classification	HEAVY REPAIR	UNEW Repair Severity	Level 9 of 10 (Very Heavy, upper boundary)

A1. PURPOSE AND SCOPE

This Annex records the work quantity of the repair route required by the recorded incoming condition of this set: how many times each process is performed, at which feature, on how many units, and against which recorded finding.

The repair classification of this set is HEAVY REPAIR, UNEW Repair Severity Level 9 of 10 (Very Heavy, upper boundary), as recorded in the incoming inspection report. All quantities in this Annex are taken from the recorded findings, dimensional results, per item dispositions and part quantities of that report. One controlled operation is one process action applied at one feature location on one unit, or to the complete set where the process is a set level process.

A2. COMPONENT FEATURE COUNT

A process step is one line of the repair route, but it is not one job: it is performed at every affected feature on every unit. The feature counts below establish the multiplier applied throughout this Annex.

Feature	Per unit	Complete set	Source in the incoming inspection report
Shroud block assembly	1	24	Section 7, serial correlation, 24 assemblies received
Shroud body contact interface (FWD, AFT, pressure face, left rail, right rail)	5	120	Section 5.1, items 1 to 3, fretting beyond blend limits on all 24 bodies

ANNEX A - QUANTIFIED HEAVY REPAIR WORK SCOPE

Feature	Per unit	Complete set	Source in the incoming inspection report
Inner plate (tip shoe) contact surface (FWD, left, right)	3	72	Section 5.1, item 4, all 24 tip shoe assemblies
Inner plate machining position (L, S1 to S8, Z2)	10	240	Section 5.2, step 11, and Section 12.2
Location rail (left and right)	2	48	Section 5.1, item 3, re machining of location rails
Side seal (cloth type)	1	24	Section 5.1, item 10, complete loss of sealing function on all 24
Tile retention pin	3	72	Section 5.1, item 11, complete set, 72 pins deformed
Internal retaining ring	1	24	Section 5.2, step 17, install new retaining rings

A3. RECORDED FINDINGS AND REQUIRED RESTORATION

Finding	Recorded extent	Restoration required	Locations
Fretage beyond blend limits, FWD and AFT contact surfaces, body	Scallop or route, GTAW weld build up and blend	All 24 units	48
Fretage at pressure face, body	Material removal, weld build up, contour restoration	All 24 bodies	24
Fretage at left and right side contact rails, body	Weld build up, blend, re machining of location rails	All 24 units	48
Fretage at inner plate contact surfaces, FWD, left and right	Weld build up and blend	All 24 tip shoe assemblies	72
Structural welds at slot, pressure face and location rails	Weld repair with compatible high temperature filler	All 24 bodies	96
Weld plugging of degraded dowel holes	Weld plug pins of old dowel holes	All 24 bodies	24
Foreign object damage	Blend and weld repair	Items 3, 9, 13 to 19, 21 to 24	13

ANNEX A - QUANTIFIED HEAVY REPAIR WORK SCOPE

Finding	Recorded extent	Restoration required	Locations
TOTAL WELD REPAIR AND BUILD UP LOCATIONS			325

A4. DIMENSIONAL REJECTIONS AND GEOMETRY RESTORATION

The features below are recorded as REJECT or out of limit against fixed acceptance criteria. Each requires physical restoration, not measurement.

Feature	Recorded result	Restoration required	Ops.
Inner plate fixture position Z2	REJECT on 24 of 24 assemblies. Item 18 unable to achieve full seating.	Full dimensional restoration, re machining and fixture requalification	24
Inner plate machining positions L, S1 to S8, Z2	Dimensional non conformance requiring recovery of tolerance and fit up	Re machining at 10 positions on every inner plate	240
Slot and location rails, body	Contact rail material loss recorded to 47.1 percent below the minimum repair datum	Reconstruction and machining after weld build up	72
Structural deformation, left and right side regions	Items 14, 17, 18 and 19, disposition JK	Jacking, contouring and mechanical straightening	4
TOTAL GEOMETRY RESTORATION OPERATIONS			340

ANNEX A - QUANTIFIED HEAVY REPAIR WORK SCOPE

A5. REPAIR ROUTE WITH WORK QUANTITY

Step	Process, applies to all 24 units	Work quantity across the set	Ops.
1	Receipt inspection, serial number recording, disassembly of inner plates from shroud bodies, record block numbers	24 receipt inspections, 24 disassemblies, 24 block number records	72
2	Degrease; abrasive blast to remove coating and clean	24 degrease and 24 abrasive blasts	48
2a	Incoming solution heat treatment in partial pressure vacuum (shroud face only)	24 furnace exposures, cycle 1 of 2	24
3	Mask non coated surfaces and chemical strip to remove coating	24 masking operations and 24 chemical strips	48
3a	FPI and record all defects; dimensional and fixture inspection	24 FPI events, 24 dimensional inspections, 24 fixture inspections	72
4	Blend to remove oxidation product on pressure face surface	24 bodies	24
5	Scallop or route to remove defective material in pressure face and location rails, preparation for weld repair	24 pressure faces, 24 left rails, 24 right rails	72
6	Local penetrant inspection of prepared areas	72 prepared areas	72
7	Weld repairs to the slot, pressure face and location rails using compatible high temperature filler	24 slots, 24 pressure faces, 48 location rails	96
8	Weld build up of fretting damaged contact surfaces, body and inner plates; weld plug pins of old dowel holes	120 body contact interfaces, 72 inner plate contact surfaces, 24 dowel hole pluggings	216
8a	Blend and weld repair of foreign object damage on exposed body surfaces	13 units (Items 3, 9, 13 to 19, 21 to 24)	13
9	Mechanical straightening, jacking and contouring of deformed shroud bodies	4 bodies (Items 14, 17, 18, 19)	4
10	Blend all repaired areas to restore component profile; reconstruction and machining of slot and location rails	24 profile blends, 24 slot reconstructions, 48 location rail reconstructions	96
11	Full dimensional restoration and re machining of inner plate assemblies to	10 machining positions on each of 24 inner plates	240

ANNEX A - QUANTIFIED HEAVY REPAIR WORK SCOPE

Step	Process, applies to all 24 units	Work quantity across the set	Ops.
	recover tolerance and fit up at positions L, S1 to S8 and Z2		
12	Post weld heat treatment in full vacuum environment	24 furnace exposures, cycle 2 of 2	24
13	Fluorescent penetrant inspection, visual inspection, dimensional inspection	24 FPI events, 24 visual inspections, 24 dimensional inspections	72
14	Fixture alignment correction and assembly requalification; confirm all units meet dimensional acceptance criteria prior to coating	24 fixture alignment corrections, 24 assembly requalifications	48
15	Mask off non coated areas; abrasive blast gas path surfaces; blow out with clean dry compressed air	24 masking, 24 blasts, 24 blow out operations	72
16	Apply TBC Abradable coating with ceramic compound to gas path areas; coating heat treatment in furnace	24 coating applications and 24 coating furnace exposures	48
17	Post coating dimensional and final visual inspection	24 dimensional inspections and 24 final visual inspections	48
17a	Install new seals, pins and retaining rings; final assembly of shroud plates to blocks	24 side seals, 72 tile retention pins, 24 internal retaining rings, 24 final assemblies	144
18	Compile Final Report, pack and ship components with all required documentation	24 units, 1 set documentation package	25

ANNEX A - QUANTIFIED HEAVY REPAIR WORK SCOPE

A6. INSPECTION AND HOLD POINT SCHEDULE

Each event below is a hold point. The set does not advance to the next stage until the event is passed and recorded, and a failure at any gate returns the affected part to the repair loop.

Gate	Inspection event	Route step	Events
1	FPI and record all defects; dimensional and fixture inspection	3a	72
2	Local penetrant inspection of prepared areas	6	72
3	Fluorescent penetrant inspection, visual inspection, dimensional inspection	13	72
4	Fixture alignment correction and assembly requalification; confirm all units meet dimensional acceptance criteria prior to coating	14	48
5	Post coating dimensional and final visual inspection	17	48
TOTAL INSPECTION AND VERIFICATION EVENTS			312

A7. HARDWARE AND RESTORATION CENSUS

Disposition	Quantity	Detail
Replaced with new	24 side seals	L605 flat and bone type seals. All 24 received with complete loss of sealing function. Recorded as an Additional work item.
Replaced with new	72 tile retention pins	All 72 pins received deformed, confirmed across the complete set. Recorded as an Additional work item.
Replaced with new	24 internal retaining rings	Installed at final assembly, complete set
TOTAL WEAR EXPOSED PARTS FITTED NEW ACROSS THE SET	120	

ANNEX A - QUANTIFIED HEAVY REPAIR WORK SCOPE

A8. WORK VOLUME OF THE REQUIRED REPAIR SCOPE

Work category	Controlled operations
Cleaning, coating removal and material preparation	264
Structural weld repair, weld build up and profile restoration	325
Geometry restoration, machining and mechanical correction	340
Heat treatment, furnace cycles	48
Inspection, verification and hold point control	312
Coating application and acceptance	120
Receipt, assembly, documentation and release control	169
TOTAL CONTROLLED OPERATIONS	1,578

The Heavy Repair scope required by this set consists of 1,578 controlled operations across 24 assemblies. It includes 325 weld repair and weld build up locations at the load bearing contact interfaces, 240 inner plate re machining positions, 4 mechanical straightening operations on deformed bodies, 48 vacuum furnace exposures across two mandatory heat treatment cycles, 312 mandatory inspection events, and a fixture requalification gate that every assembly must pass before coating is authorised.

ANNEX A - QUANTIFIED HEAVY REPAIR WORK SCOPE

A9. HEAVY REPAIR - WORK PERFORMED, AND COMPARISON WITH A MEDIUM REPAIR

This set received a HEAVY REPAIR. We performed 1,578 controlled operations on 24 MS6001FA 1st stage shroud block assemblies. Every line below is work we carried out and recorded.

The HEAVY REPAIR work we performed

What we did	Controlled operations	Recorded detail
We stripped the coating and prepared the material	264	All 24 1st stage shroud block assemblies
We built up the load bearing contact interfaces by weld	325	325 weld build up locations across the set
We re machined the geometry and straightened the bodies	340	240 inner plate positions, 4 bodies contoured
We ran two heat treatment cycles	48	48 vacuum furnace exposures
We inspected and held the set at 5 gates	312	Includes the fixture requalification gate
We rebuilt the coating system	120	Only after every assembly passed the fixture gate
We received, assembled, documented and released	169	120 wear exposed parts fitted new
TOTAL CONTROLLED OPERATIONS	1,578	On 24 MS6001FA 1st stage shroud block assemblies

The measurements that required this work: all 24 side seals with complete loss of sealing function, all 72 tile retention pins deformed, 4 bodies outside fixture acceptance, and 325 load bearing locations below drawing.

Repair work hours for the complete set - the same hours shown on the UNEW invoice

Major task	Standard / Medium repair (hours)	HEAVY REPAIR (hours)	Difference
1. Disassembly, cleaning and coating strip	55	190	3.5 times (+245%)
2. Welding and material build up, body and inner plates	72	578	8.0 times (+703%)
3. Mechanical straightening (jacking and contouring)	0	34	Not performed at Medium
4. Dimensional restoration and re machining	77	468	6.1 times (+508%)
5. Heat treatment (solution and post weld vacuum)	0	155	Not performed at Medium
6. Hardware replacement and fit up	22	42	1.9 times (+91%)
7. Coating rebuild (TBC Abradable and ceramic compound)	58	220	3.8 times (+279%)
TOTAL FOR THE SET, 24 UNITS	284	1,687	5.9 times (+494%)

A Standard or Medium repair on this set of 24 MS6001FA 1st stage shroud block assemblies is 284 working hours. The HEAVY REPAIR we performed is 1,687 working hours. That is 5.9 times more work, 494 percent more. These are the same hours shown on invoice WO-1003946086 / WO-1003986864.

Reviewed and approved
UNEW Engineering



Paul McGuire
Engineering Manager