T-067 Inspection Limits and Repair

2nd Stage Turbine Nozzle Floating Diaphragm Assembly

Engine Application(s):	250-C20B, C20F, C20J, C20C, C20R, C20R/1, C20R/2, C20R/4
Subject:	Installation, Inspection and Rework Procedures for the E23072654 & E23072654-UC 2nd Stage Turbine Nozzle Floating Diaphragm Assembly.
Compliance:	INSTALLATION: The E23072654-UC nozzles are manufactured with machining stock remaining on the 1st and 2nd turbine wheel blade path diameters. This allows the overhaul facility to custom machine the nozzle for specific turbine wheels to optimize performance. Before installation of the nozzle assembly, machine the blade paths to allow the desired radial blade tip clearance. Re-identify the part as 'E23072654' by removing the '-UC' from the part number marking. If the '-UC' is ink stamped, remove with MEK. If '-UC' is permanently marked, remove by vibro-peening an "X" over the '-UC'. INSPECTION and REPAIR: Any time the nozzle assembly is removed for engine overhaul or turbine wheel replacement, it should be inspected to Extex criteria. The inspection will determine if the component is serviceable in its current condition, if the component is repairable per this instruction or if the component should be replaced. The following sections of T-009 can be used for non-diaphragm repairs: *Section 3.0-Weld Repair of Airfoils, 4.0-Weld Repair of Inner/Outer Bands and Tangs, 5.0-Blade Tip Paths, 6.0-Furnace Braze Repair of Vane Ring, 7.0-Heat Treatment, 8.0-Center bore stationary lab seal surface, 11.0-Part Marking, 12.0-Metallizing for Dimensional Restoration.*
Revisions:	N/C Dated: 11/26/02 Initial Release A Dated: 05/24/07 In Compliance Section, indicated sections of T-009 that may be used for non-diaphragm repairs. EFA "5.025-5.065" was "5.02-5.06 in Table 1 and Note 4. B Dated: 08/26/09 Updated EXTEX to TIMKEN. C Dated: 2/16/15 Updated Timken to EXTEX Engineered Products.

REASON:

Provide inspection and repair procedure for floating diaphragm 2nd stage nozzle.

DESCRIPTION:

A procedure to inspect and repair an Extex supplied RR 250 engine parts.

APPROVAL:

Technical aspects are FAA Approved.

WEIGHT AND BALANCE:

N/A

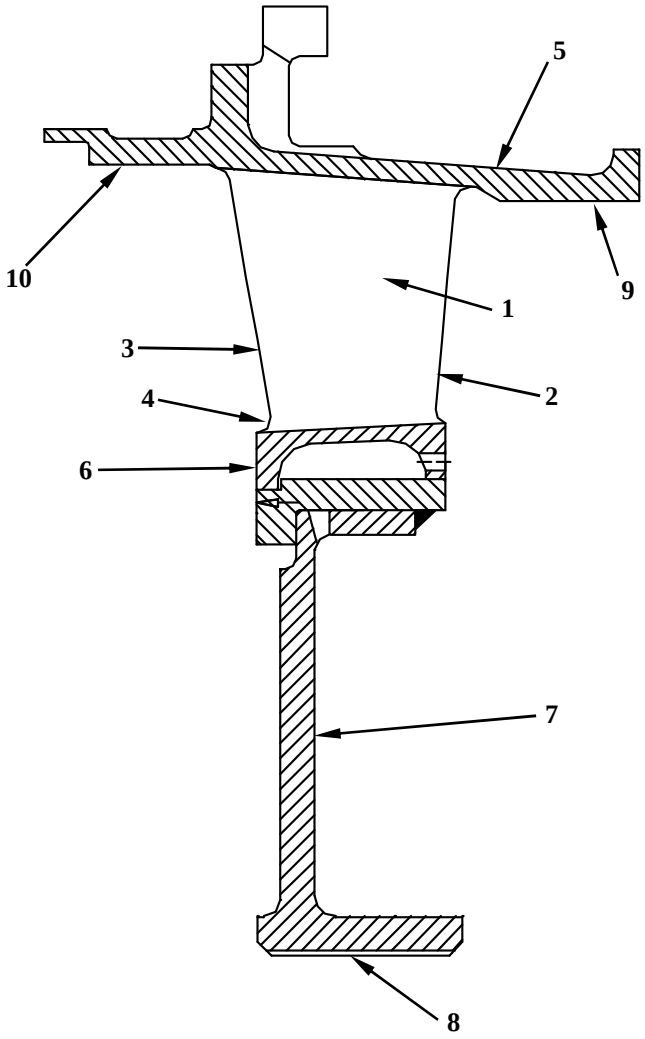
PREREQUISITES:

T-067 Inspection Limits and Repair

N/A

ACCOMPLISHMENT INSTRUCTIONS:

E23072654
Second Stage Turbine Nozzle Repair



Key	Location	Description of Condition
1	Vane Airfoil	Cracks
2	Vane Leading Edge	Nicked, Dented
3	Vane Trailing Edge	Nicked, Dented, Warped, Burned
4	Vane Fillet	Cracks
5	Outer Band	Cracks
6	Inner Band	Cracks
7	Diaphragm	Cracks
8	Seal Surface	Wear
9	#1 Blade Tip Path	Wear
10	#2 Blade Tip Path	Wear or Warped

FIGURE 1

E23072654
Second Stage Turbine Nozzle Assembly
Inspection and Rework Limits

Condition	Service and/or Repair	Corrective Action
Airfoil Crack Indications, Visual and FPI*	Leading Edge: 0.25 inch maximum is acceptable. Trailing Edge: 0.25 inch maximum is acceptable. Acceptance is contingent upon the following: 1) Two or more cracks cannot lie in the same plane. 2) Multiple cracks are separated by at least 0.25 inch. 3) Two or more cracks do not propagate toward one another.	1) Weld repair. Open void areas. 2) Replace when welding capability exceeded. 3) Furnace braze per approved procedure when crack condition permits. Welding not required when brazing condition exists. Airfoils may be repaired using FAA/DER approved procedure.
Damaged Airfoils**	Leading Edge: 0.156 inch maximum after blending is acceptable provided the EFA is 5.025 - 5.065. Trailing Edge: 0.156 inch maximum after blending is acceptable provided the EFA is 5.025 - 5.065.	Install new or serviceable Nozzle or weld repair Vane Ring per approved procedure if Service Limit cannot be met. Blend airfoil to remove damage. ***** See Note on Page 5** Airfoils may be repaired using FAA/DER approved procedure.
Airfoil Fillet Crack Indications, Visual and FPI*	At Inner Band: 0.25 inch maximum from Leading or Trailing edge. At Outer Band: 0.25 inch maximum from Leading or Trailing edge. **NOTE:** Length specified is for cracks along the airfoil measured parallel to the adjacent band. Two or more cracks are acceptable provided they do not propagate towards one another.	Install new or serviceable Nozzle if Service Limit cannot be met. ** Repair using approved braze procedure. ** Repair using approved weld procedure when braze capability is exceeded. EFA to be between 5.025 - 5.065 inch after repair.
Outer Band Crack Indications, Visual and FPI*	Axial: 0.50 inch maximum into band provided there are no cracks in line on the opposite edge. Circumferential: 0.62 inch maximum completely through wall, provided cracks are between vanes.	Install new or serviceable Nozzle if Service Limit cannot be met. ** Repair using approved braze procedure when crack condition permits. ** Weld repair open void areas per approved weld procedure. EFA to be between 5.025 - 5.065 inch after repair.
Inner Band Crack Indications, Visual and FPI*	Axial: 0.188 inch maximum into band provided there are not cracks in line on the opposite edge. Circumferential: Circumferential cracks are not acceptable.	** Repair using approved braze procedure. ** Repair using approved weld procedure when braze capability is exceeded. EFA to be between 5.025 - 5.065 inch after repair. Install new or serviceable Nozzle or replace Vane Ring per approved procedure if Service Limit cannot be met.

TABLE 1 (sheet 1 of 2)

E23072654
Second Stage Turbine Nozzle Assembly
Inspection and Rework Limits

Condition	Service and/or Repair Limits	Corrective Action
Diaphragm Cracking, Visual and FPI*	Radial cracks not extending into the inner bore are acceptable. Furnace braze repair is permitted on a maximum of 2 cracks, provided they are a minimum of 2 inches apart. Dimples are not permitted.	Install new or serviceable Nozzle or replace Diaphragm assembly per approved procedure if Service Limit cannot be met. ** Repairs using approved braze procedure when crack condition permits. ** Weld repair open void areas per approved weld procedure. EFA to be between 5.025 - 5.065 after repair.
Inner Seal Bore Wear/Grooving	Polish to remove burrs and sharp edges. I.D.: 1.833 - 1.835 inch diameter. Depth of Grooves: 0.012 inch maximum. Concentricity: 0.003 inch maximum TIR.	Re-plate or metallize per approved procedures - **See Figure 2**. Max. Dia 1.885 inch before brazing or metallizing.
#1 Blade Tip Path	Maximum Inner Diameter of blade tip path: 6.221 inch diameter. Concentricity: 0.005 inch max TIR.	Restore blade path by brazing or metallizing per approved procedures - **See Figure 2.** Metal removal limits: #1 blade path: 6.239 inch maximum diameter. 0 .047 inch minimum localized**** wall thickness. **** **Localized = Less than 16% (60º) of the Total Circumference of the blade path and no greater than 8% (30º) of the circumference of the blade path in any one area.**
Negative Imperfections (Pitting)	Smaller than 0.050 Dia and 0.010 deep. Must not be within 0.080 of L.E. or T.E. Limited to one per airfoil and five per part.	Blend to transition smoothly to parent material. Parting line evidence is not acceptable.
Positive Imperfections	Smaller than 0.050 Dia and 0.005 tall. Must not be within 0.080 of L.E. or T.E. Limited to one per airfoil and five per part.	Blend to transition smoothly to parent material. Parting line evidence is not acceptable.
#2 Blade Tip Path	Maximum Inner Diameter of blade tip path: 6.435 inch diameter. Concentricity: 0.005 inch max TIR.	Restore blade path by brazing or metallizing per approved procedures - see Figure 2. Metal removal limits: #2 blade path: 6. 459 inch maximum diameter. 0.047 inch minimum localized**** wall thickness. **** **Localized = Less than 16% (60º) of the Total Circumference of the blade path and no greater than 8% (30º) of the circumference of the blade path in any one area.**

TABLE 1 (sheet 2 of 2)

E23072654
Second Stage Turbine Nozzle Assembly
Inspection and Rework Limits

NOTES:

1. Extex considers airfoil restoration of this part a Major Repair, (as defined in FAR 1,) and should be performed under FAA authorization.
2. Airfoil repairs to be performed by an FAA Approved repair facility with Major Repair experience.
3. Blending to remove L.E. and/or T.E. damage may affect airflow.
4. Recommended airflow (EFA) to be 5.025-5.065 inch AFTER REPAIR (as determined with a Fleming Flow Rig.)
5. FPI indications less than 0.005 inch are acceptable.
6. Blend and polish acceptable vane edge damage in a radial direction using a fine file or 320 grit abrasive paper. Optimum blend should produce scallops with a 3:1 width to depth ratio. Maintain a smooth blend with the basic airfoil. Trailing edge radius after blend to be greater than 0.005 inch.

* FPI per approved water washable or post-emulsifiable technique. Indications less than 0.005 inch are not interpretable.

** Weld wire per AMS 5798 or AMS 5675. Braze material per AMS 4777. For better performance use BNi-10 or N99622(UNS) to procedure AMS 2675.

*** Blend and polish acceptable vane edge damage in a radial direction using a fine file and 320 grit abrasive paper. Maintain a smooth blend with the basic airfoil. Trailing edge radius after blend is to be greater than 0.005 inch.

**** Localized = Less than 16% (60º) of the Total C ircumference of the blade path and no greater than 8% (30º) of the circumference of the blade path in any one area.

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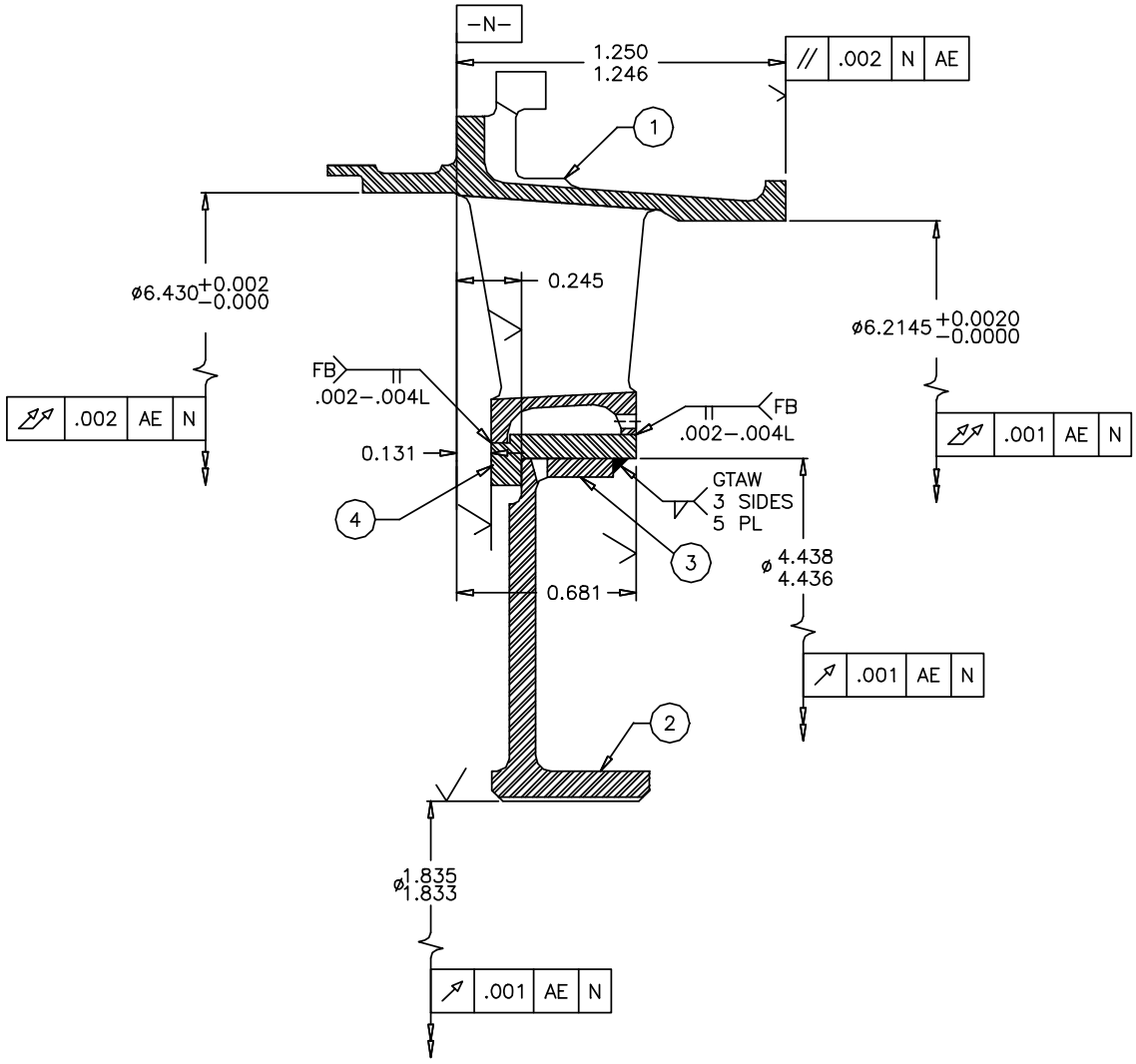
Second Stage Turbine Nozzle Repair



DATUM -AK- ESTABLISHED BY 8 EQ SP LOCATION TANGS
DIMENSIONS ARE IN INCHES.

FIGURE 2

T-067 Inspection Limits and Repair

NOTE

1. FOR DIMENSIONAL RESTORATION OF WHEEL SHROUDS USE AMDRY 960, METCO 443, OR METCO 450 PLASMA SPRAY REPAIR PROCEDURE. WHEEL SHROUD DIAMETERS MAYBE MACHINED TO DESIRED TIP CLEARANCE RATHER THAN THE ABOVE VALUES.

MATERIAL INFORMATION:

Not Applicable