



Allen Pump
Chas G Allen Inc
25 Williamsville Road
Barre, MA 01005
Tel 978-355-2911
Fax 978-355-2917
March 2, 2018

Large Power Plant
123 Power Road
New England

Attn.: Mr. Maintenance Manager

Re: Unit 1-B Main Boiler Feed Pump Rotor Inspection
Ingersoll-Rand M/N 5CHTA

Dear Mr. Maintenance

We have completed our inspection of Unit No.1-B Main Boiler Feed Pump Rotor, our findings and recommendations as follows. It was also note that this unit incorporates the old style threaded setup for balance drum retainer nut in which the threads were damaged. Shaft has 0.003" TIR and other damage areas and will be scrapped and upgraded to a split ring retainer. The impellers are still in good condition with normal wear of the casing rings.



Old style threaded shaft design for retaining and adjusting the rotor centralization. Threads are damage and signs of water cutting under the drum

Newer design utilizes a split ring and retainer collar with an interference fit to the shaft as shown on the next page

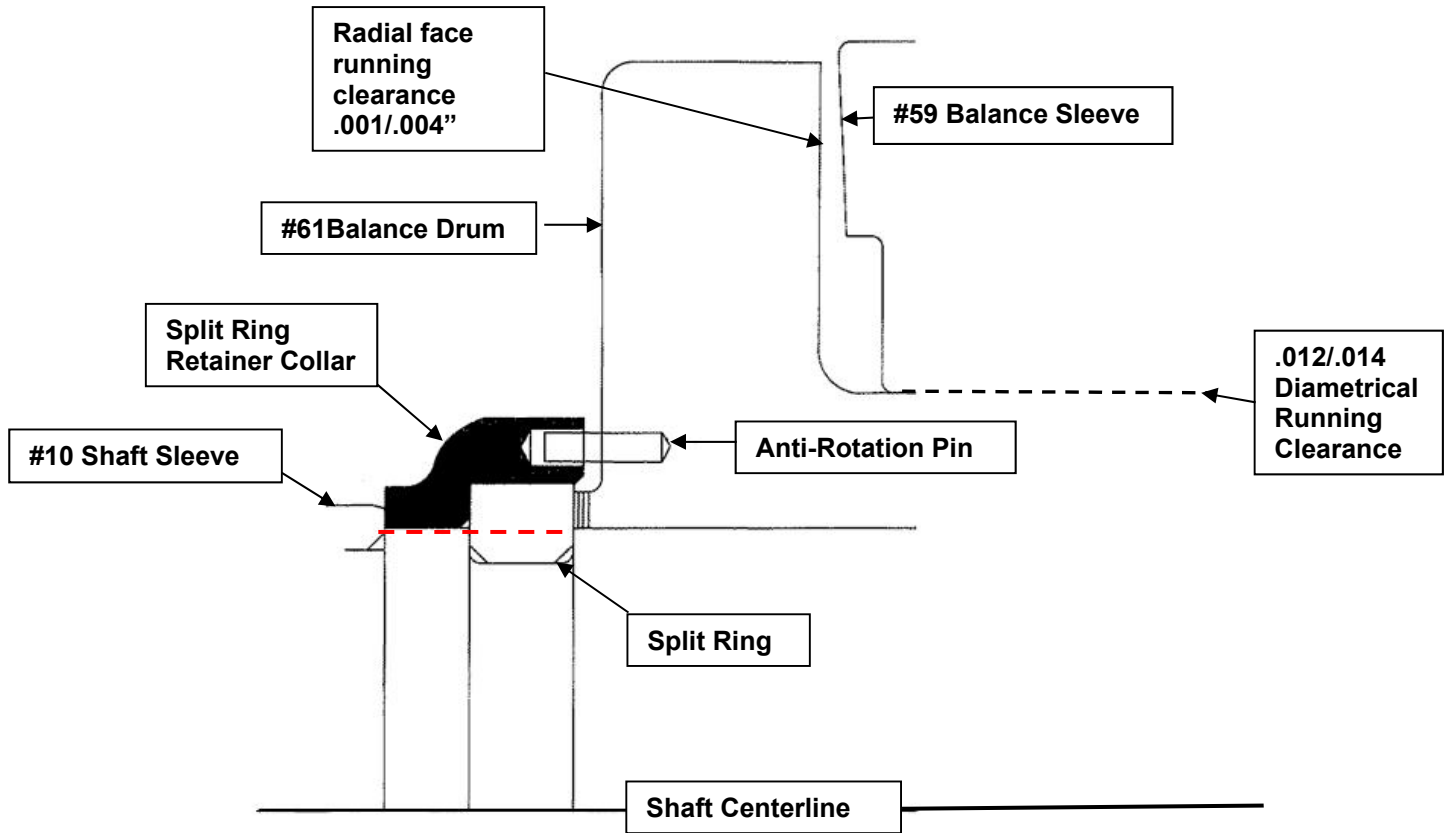
Engineered Pump Division
Service, Parts and Repairs

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Gary A. Boudreau
Tel 508-272-6578

A. INSPECTION

Provide a new shaft with the following upgrade eliminating the shaft threads



1st Stage Impeller in good condition



A. INSPECTION, CONT.

Overall general condition of the eleven impellers good only the running clearances are now out of design which can be corrected with new wear ring rings



A. INSPECTION, CONT.

Typical of channel rings having minor diffuser tongue indentations on faces



**A. INSPECTION, CONT.****RUNNING CLEARANCES AND FITS**

- Impeller Front Hub to Wearing Standard 0.014"/0.016"
- Impeller Back Hub to Channel Ring Bushing Standard 0.014"/0.016"
- Impeller Bores to Shaft 0.000"/+0.002"
- Total Axial Float 0.465"-Design Min 0.312"

Stage	1	2	3	4	5	6	7	8	9	10	11
Wear Ring Bore	7.547"	7.541"	7.540"	7.549"	7.549"	7.551"	7.542"	7.548"	7.554"	7.548"	7.547"
Imp Front Hub OD	7.528"	7.523"	7.522"	7.530"	7.528"	7.529"	7.525"	7.531"	7.536"	7.529"	7.530"
Clearance	0.017"	0.018"	0.018"	0.019"	0.021"	0.022"	0.017"	0.017"	0.018"	0.019"	0.017"
Channel Ring Bushing Bore	4.851"	4.851"	4.851"	4.850"	4.853"	4.851"	4.854"	4.851"	4.850"	4.850"	NA
Impeller Back Hub	4.832"	4.834"	4.833"	4.833"	4.832"	4.833"	4.833"	4.834"	4.833"	4.833"	4.865"
Clearance	0.019"	0.017"	0.018"	0.017"	0.021"	0.018"	0.021"	0.017"	0.017"	0.017"	NA
Shaft Diameter at Impeller	3.875"	3.875"	3.875"	3.875"	3.875"	3.875"	3.875"	3.875"	3.875"	3.875"	3.875"
Impeller Bore	3.874"	3.874"	3.874"	3.874"	3.874"	3.874"	3.874"	3.874"	3.874"	3.874"	3.874"
Interference	0.001"	0.001"	0.001"	0.001"	0.001"	0.001"	0.001"	0.001"	0.001"	0.001"	0.001"

Stage	1	2	3	4	5	6	7	8	9	10	11
Lift	NA	0.600	0.590	0.490	0.480	0.480	0.465	0.465	0.465	0.465	0.465

SHAFT RUNOUTS**C.E. Inboard End: 0.001"****Center: 0.003"****Outboard End: 0.000"**

**B. CORRECTIVE ACTION PLANNED****Shaft**

- Provide an upgraded shaft with the split ring retainer feature for the balance drum
- Furnish a new shaft in 410SS
- Rough machine to within 0.06"
- Stress relieve by heat treating
- Machine to within 0.030" of final dimensions
- Prepare and chrome plate both bearing journals and balance drum fit area
- Hard chrome areas to be ground to plan dimensions
- Cut all keyways
- Finish machine all diameters and threads to final sizes
- Inspect complete and furnish all new keys

Impellers quantity eleven (11)

- Remove all front and back wear rings
- Furnish and install eleven (11) front rings and ten (10) back hub rings
- Rings will be manufacture in 416SS with a 28-32Rc hardness
- The rings will be secured with three tack welds equally spaced
- Skim cut the front and back hubs to plan dimensions
- 11-Front Rings OD's 7.485" +0.000/-0.001"
- 10-Back Rings OD's 4.865" +0.000/-0.001"
- Mount all eleven (11) impellers on the shaft and dynamically balance
- Acceptance criteria 4W/N

Casing Rings/Channel Ring Bushings

- Remove the old casing and channel rings
- Furnish and install eleven (11) new casing rings and ten (10) new channel ring bushings with standard bores the proper running clearance
- Rings will be manufacture in 416SS with a 38-42Rc hardness
- 11-Casing Rings ID's 7.499" +0.001/-0.000"
- 10-Channel Rings ID's 4.879" +0.001/-0.000"
- Casing Ring diametrical clearance 0.014"/.016"
- Channel Ring diametrical clearance 0.014"/.016"

Balance Drum and Sleeve

- Furnish a new #59 balance sleeve in 416SS tempered material
- Furnish a new #61 balance drum in 416SS tempered material, designed for the split ring retainer
- Furnish a split ring retainer
- Furnish a new retainer collar

Reassembly

- Polish all channel ring assemblies at the pressure faces and wearing ring surfaces.
- Reassemble the pump and furnish eleven (11) new flexitalic 1937D363CX1 gaskets for the channel ring assemblies
- Record rotor floats and radial lifts, and submit report with final readings.
- Package for shipment and long term storage in the original wooden crate
- Deliver to the customers site

**B. CORRECTIVE ACTION PLANNED****PARTS TO BE SUPPLIED BY CGA**

Item	Qty	Part Number	Description	Material	Unit Cost
1	1	AP-5-11CHTA10X25	Shaft with upgrade for Balance Drum-Chrome Plated Journals and Balance drum fit	410SS Stress Relived and Chrome Plated	\$
2	11	AP-700D4AX2	Impeller Rings-Front Std 1 st -11 th	416SS 28-32 Rc	\$
3	10	AP-450D5AX2	Impeller Rings-Back Std 1 st -10 th	416SS 28-32 Rc	\$
4	11	AP-737D6HX1	Casing Rings Std	416SS 38-42 Rc	\$
5	10	AP-475D357BX1	Channel Ring Bushings Std	416SS 38-42 Rc	\$
6	11	AP-1937D363CX1	Gasket Channel Rings Pc #363C	316SS Flexitalic	\$
7	1	AP-5CHTA61AJX1	Balance Drum Pc #61	416SS 28-32 Rc	\$
8	1	AP-450D109HX2	Ring Retainer	416SS	\$
9	1	AP-331D252AX2	Split Ring	416SS	\$
10	1	AP-5CHTA59EX4	Balance Sleeve	416SS 38-42 Rc	\$
11	1	AP-350B28DX1A	Thrust Collar	1045 CS	\$
12	2	AP-300S8BFX2	Shaft Sleeves I/B -O/B	416SS 38-42 Rc	\$

A. Inspection Cost - \$

B. Corrective Action Plan - \$

Total \$

Lead time 8-12 weeks ARO

This offer and any work performed as a result are exclusively governed by our Terms and Conditions, form 2-2017 FSTC, which is attached. Any additional or conflicting terms contained in any document or purchase order issued authorizing work are expressly objected to in advance and shall not apply, except with written consent of Chas. G. Allen Inc

We will not proceed any further with the project until advised by Large Power Plant, please do not hesitate to contact Pat Higgins at 508-638-8449 or myself at 508-272-6578.

Very truly yours,

Gary A. Boudreau
Service Manager