

Inspection & Repair Report

**Goulds 18 HMO Pump
Hot Well Supply Pump
APR Job 04172
November 30, 2004**

APR **ACCURATE
PUMP
REPAIR, INC.**

Suction bell



Suction bell liner



Suction bell



Bowl



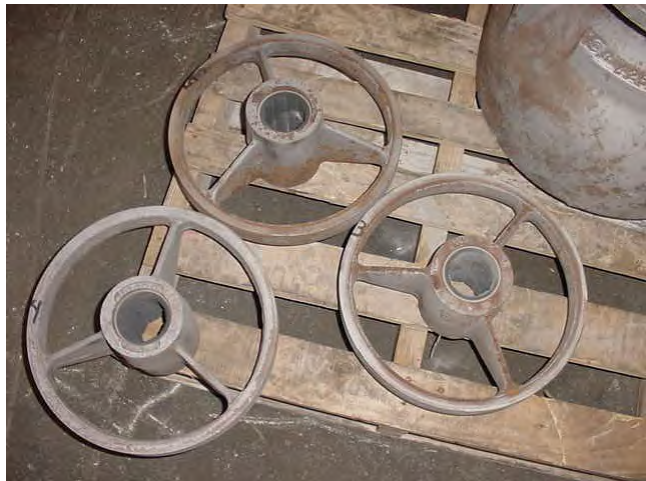
Bowl



Bowl register damage



Retainers



Column Pipe



Discharge head



Discharge head



Packing box



Packing box bearing



Impeller



Impeller



Impeller



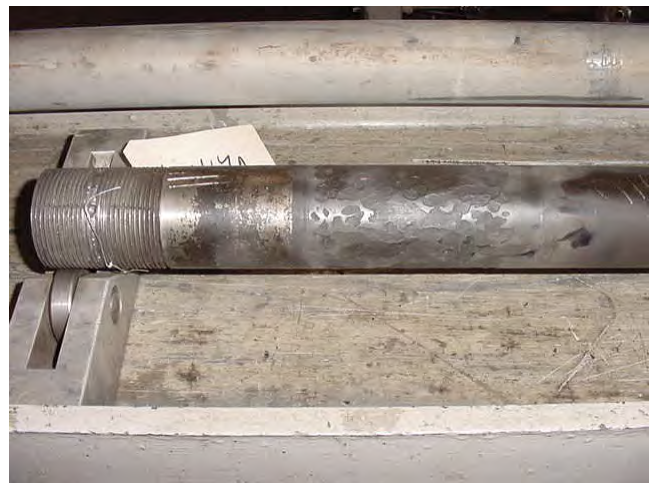
Pump shaft



Pump shaft journal



Pump shaft journal



Head shaft



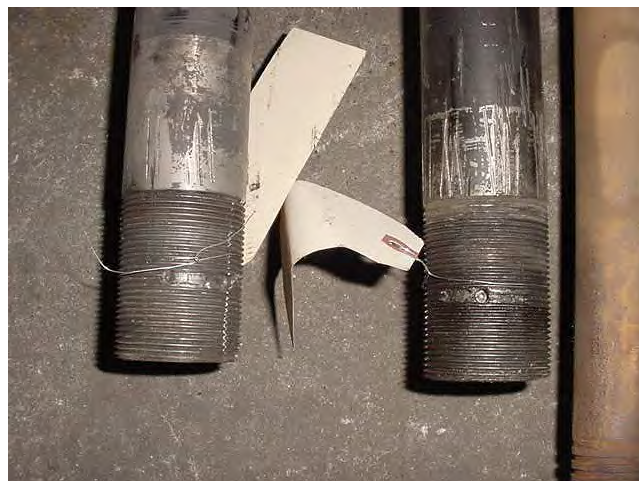
Head shaft journal



Head shaft journal



Damaged shaft threads



Line shaft



Line shaft journal



Clearances & Tolerances As Inspected

Shafts & Bearings				
	Shaft	Bearing Bore	Clearance	Design
	As Inspected	As Inspected		Clearance
Suction Bell - Bronze	2.670	2.705	0.035	0.012
1st Stage - Rubber	2.683	2.714	0.031	0.023
Column Bearing-Rubber	2.185	2.212	0.027	0.023
Column Bearing-Rubber	2.174	2.207	0.033	0.023
Column Bearing-Rubber	2.178	2.207	0.029	0.023
Packing Box - Bronze-PTI	2.168	2.210	0.042	0.011
Shaft Run Outs				
	Shaft			Design
	As Inspected			Run Out
Lower Head Shaft	0.005			0.002
Line Shaft	0.001			0.002
Pump Shaft	0.002			0.002
Registers				
	Male Register	Female Register	Clearance	Design
	As Inspected	As Inspected		Clearance
Suction Bell	15.151			
1st Stage	15.185	15.205	0.054	.004 To .006
Bottom Column (Bottom)		15.190	0.005	.004 To .008
Retainer	13.120			
Bottom Column (Top)		13.125	0.005	.004 To .006
Retainer	13.120			
Inter Column (Bottom)		13.124	0.004	.004 To .006
Retainer	13.123			
Inter Column (Top)		13.126	0.003	.004 To .006
Retainer	13.123			
Inter Column (Bottom)		13.126	0.003	.004 To .006
Retainer	13.121			
Inter Column (Top)		13.125	0.004	.004 To .006
Retainer	13.121			
Top Column (Bottom)		13.125	0.004	.004 To .006
Top Column (Top)	14.496			
Discharge Head Bottom		14.502	0.006	.004 To .006
Packing Box	5.499			
Discharge Head Box		5.505	0.006	.004 To .006
Discharge Head Top	13.496			
Impeller				
	Shaft	Impeller	Clearance	
	Diameter	Bore		
1st Stage	2.686	2.685	press fit	

Clearances & Tolerances As Assembled

Shafts & Bearings				
	Shaft	Bearing Bore	Clearance	Design
	As Assembled	As Assembled		Clearance
Suction Bell - Bronze	2.687	2.699	0.012	0.012
1st Stage - Rubber	2.687	2.707	0.020	0.023
Column Bearing-Rubber	2.187	2.206	0.019	0.023
Column Bearing-Rubber	2.187	2.207	0.020	0.023
Column Bearing-Rubber	2.187	2.207	0.020	0.023
Packing Box - Bronze-PTI	2.187	2.199	0.012	0.011
Shaft Run Outs				
	Shaft			Design
	As Assembled			Run Out
Lower Head Shaft	0.001			0.002
Line Shaft	0.001			0.002
Pump Shaft	0.001			0.002
Registers				
	Male Register	Female Register	Clearance	Design
	As Assembled	As Assembled		Clearance
Suction Bell	15.186			
1st Stage	15.185	15.187	0.001	.004 To .006
Bottom Column (Bottom)		15.190	0.005	.004 To .008
Retainer	13.120			
Bottom Column (Top)		13.125	0.005	.004 To .006
Retainer	13.120			
Inter Column (Bottom)		13.124	0.004	.004 To .006
Retainer	13.123			
Inter Column (Top)		13.126	0.003	.004 To .006
Retainer	13.123			
Inter Column (Bottom)		13.126	0.003	.004 To .006
Retainer	13.121			
Inter Column (Top)		13.125	0.004	.004 To .006
Retainer	13.121			
Top Column (Bottom)		13.125	0.004	.004 To .006
Top Column (Top)	14.496			
Discharge Head Bottom		14.502	0.006	.004 To .006
Packing Box	5.499			
Discharge Head Box		5.505	0.006	.004 To .006
Discharge Head Top	13.496			
Impeller				
	Shaft	Impeller	Clearance	
	Diameter	Bore		
1st Stage	2.687	2.6875	0.0005	

Inspection Report

Discharge Head Assembly

- The discharge head is in good condition.
- The discharge head registers are within design tolerance.
- The packing box is in good condition.
- The packing box register is within design tolerance.
- The packing box bearing is evenly worn.
- The ceramic head shaft journals are pitted and scored.
- The head shaft threads are damaged from set screws.
- Set screws in threaded couplings are not recommended.

Column Pipe Assembly

- The column pipes are in good condition.
 - The bearing retainers are in good condition.
 - The column and retainer registers are within design tolerances.
 - The ceramic line shaft journals are pitted and scored.
 - The line shaft threads are damaged from set screws.
 - The rubber line shaft bearings are lightly worn.
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Inspection Report

Bowl Assembly

The suction bell is severely damaged from cavitation.

The bottom bowl register is damaged from the cavitation in the suction bell.

The impeller is in good condition.

The impeller bore is within design tolerance.

The impeller vanes are not back filed.

The ceramic journals on the pump shaft are pitted and scored.

The basket strainer is missing.

Repair Report

Disassemble and inspect the pump.

Sandblast all parts.

Supply a new nitronic 60 packing box bearing.

Supply a set of Slade packing.

Supply a new head shaft.

Coat the head shaft journals with Tungsten / Chrome / Cobalt.

Supply a shaft slinger.

Supply a rubber base plate gasket.

Supply a discharge flange gasket.

Coat the ID and OD of the discharge head with a two-part epoxy.

Supply 3 new rubber retainer bearings.

Supply a new line shaft.

Coat the line shaft journals with Tungsten / Chrome / Cobalt.

Coat the ID and OD of the column assembly with a two-part epoxy.

Weld and machine the eroded area of the bowl register.

Supply a new suction bell.

Machine the bell for a replaceable liner.

Supply a new CD4MCU stainless liner.

Supply a new bronze suction bell bearing.

Back file the impeller vanes.

Dynamically balance the impeller.

Supply a new rubber bowl bearing.

Remove the old coating from the pump shaft journals.

Coat the journals with Tungsten / Chrome / Cobalt.

Supply a new basket strainer.

Coat the bowl assembly OD with a two-part epoxy.

Assemble the pump.

Balance Report



421 WRIGHTWOOD AVENUE
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630.758.0424 630.758.0425

October 26, 2004

David Eisenhauer
Accurate Pump Repair, Inc.
5252 W. 73rd Street
Bedford Park, IL 60638

Certificate of Balance

This is to certify that a quantity of 1 Impeller has been balanced in accordance with your purchase order number 04172 and API610 specifications.

	PLANE 1 INITIAL <u>UNBALANCE:</u>	PLANE 1 FINAL <u>UNBALANCE:</u>
#1	4.1 oz-in.	.02 oz-in.

Sincerely,
Rotating Equipment Specialists

Larry Williams
Shop Technician

LW: tf

www.rotatingequip.com

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Design Changes

The new suction bell was machined for a replaceable liner. A new CD4MCU liner was installed.

The bronze PTF coated packing box bearing was replaced with a nitronic 60 bearing.

The pump was packed with Slade packing.
