TECHNICAL BULLETIN

PROGRESSING CAVITY PUMPS | LS-TB-008

LIFTING SOLUTIONS

BULLETIN	TOPIC	ISSUE DATE	ISSUED BY
LS-TB-008	PCP MANUFACTURING ROTOR INSPECTIONS	FEBRUARY 20, 2020	ENGINEERING

RAW BAR PREPARATION

1) The head is prepped as per the callout on the rotor travel document/work and the drawings which are pre-programmed on the CNC machine.
2) All threaded connections are verified using API go-no go gauges.
3) Bar Welding – occasionally for longer peeled rotor lengths over maximum available raw bar lengths

ROTOR PEELING

4) Target major and minor machining dimensions are specified on the travel document for each rotor.
5) Operators set the cutting head based on the target size and use the pre-programmed CNC operating sequence to peel the rotor with target machining tolerance of average measurement being within +/- 0.002" and all measured points to be within 0.004" of the specified machining major and minor diameters.
6) The rotor major and minor diameters are measured at a minimum of five locations along the length. Number of locations measured are more for longer lengths. The goal is to have the first points within 3ft (36") from each end and distance between two measurements locations are also kept within 3ft (36") [ISO requires 1m (~39")]. Attached is an example of an inspection form. (See Image 2c)
7) Visual inspection is performed on the rotor surface to ensure there are no damages on the rotor due to handling on the machine. The peeled surface is typically at 32-48 micro-inches Ra roughness.
8) Phase Welding pre-chroming – this is done for the lengths exceeding our machine/setup limits yet can be proceed by the chrome shop. Only a few configurations need this done.

ROTOR CHROME COATING

9) Cleaning/Polishing – the peeled surface is cleaned by lightly polishing with material removal of no more than 0.001" per side.
10) The inspection form from the rotor travel document is sent with the rotor where the chrome shop records their measured values prior to chroming.
11) Chrome shop uses their established processes to coat the rotor.
12) The rotors are polished after chrome with target surface roughness of below 16 micro-inches Ra.
13) Finished major and minor diameters are measured with the target of average measurement being within +/- 0.003" and all measured points to be within 0.003" of the specified finished major and minor diameters on the inspection form. Note that the peeling sizes are based on the coating ratios for a given model previously established by the chrome shop.
14) Visual inspection is performed internally by the chrome shop prior to shipment and they provide a COC for each rotor along with completed LSI inspection form showing their measurements pre and post chroming.
15) Phase welding post –chroming – this is very rare for extremely long lengths that chrome shops cannot process. We did not need to this ever since we started to use Moore's.

FINAL INSPECTION

16) Visual inspection is performed on full length with special attention on the following details:
17) Rotor head thread protection – to ensure there was no damage during transportation (See Image 4b)
18) Rotor straightness
19) Rotor top and bottom transitions from chrome coating to base metal since the head (including the flat surface on the shoulder) and the flat surface on the bottom and the head are not chrome coated. (See Image 4d)
20) Rotor stamping (See Image 4e)
21) Visual defects on the surface along full length – most common surface defect (in new condition) are pin holes. (See Image 4f)
22) Phase weld location – if any
23) Finished Dimensions – rotor major and minor diameters are measured on same locations as the peeled dimensions with minimum five locations and more depending on the length while keeping the measurement intervals within 36" and end point being within 36" from the ends. (See Image 4h)

Note: The welding process was initially qualified via inspection by a third party and since then we only do hardness check to validate the weld while making sure the established process was followed. The weld join is always in the bottom half of the rotor so does not see as high loads as the top section.

IMAGE REFERENCES

Image 4b)
Pin Threads

Image 4d)
Top and Bottom Transitions

Image 4e)
Rotor Stamping

Image 4f)
Visual Defects

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Image 2c)
Machined
Dimensions

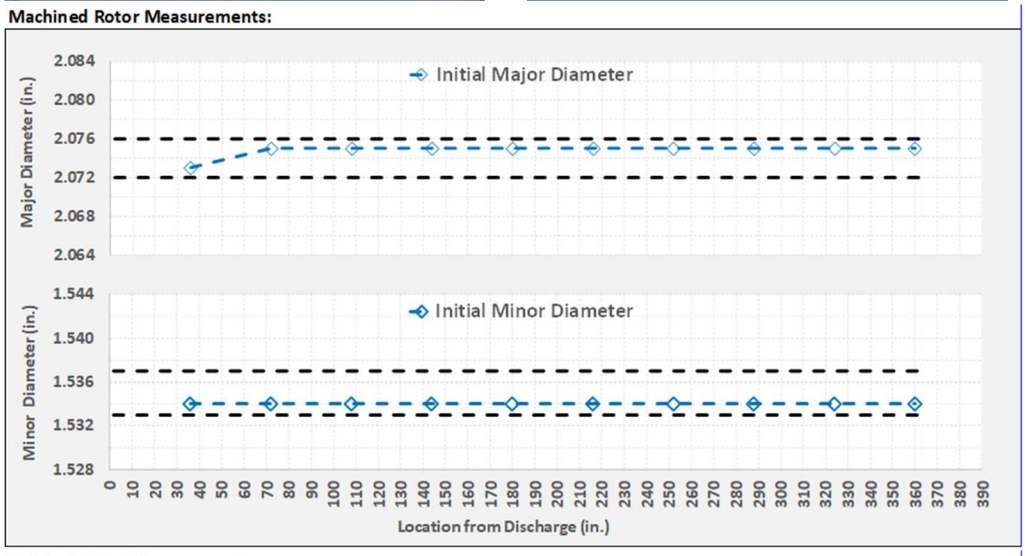
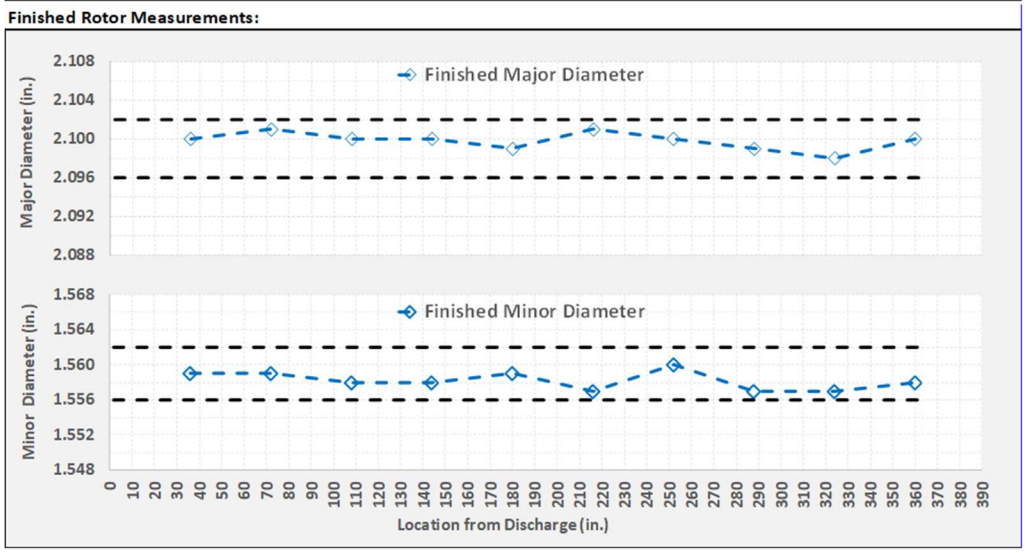


Image 4h)
Finished
Dimensions



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