

The following is the email sequence that I exchanged with Speedseal-

Sent: Friday, October 21, 2016 8:36 PM

To: safety@speedseal.com

Subject: Speedseal Life - Strange wear problem

I purchased a Speedseal Life from you for my Westerbeke 5.0 BCD generator on 17/11/15 on receipt # 1056. I installed this on my pump and used it for 100 hours this summer season.

At layup, I pulled out the impeller to inspect it and the impeller appeared to be in excellent condition.

However, I noticed some unusual wear on the cover itself and on the metal disk. See the pictures below. I have placed some annotations on the pictures to explain the wear that I observed.





Your instructions indicate that you recommend replacement of the PTFE disk and the metal disk every two years, but you never describe what the normal wear looks like.

The characteristic that bothers me is the wear on the cover itself. I would not expect that the cover would wear in addition to the metal disk.

It appears that when the cover is slid onto the two thumbscrews at the slots, the **cover is not co-axial with the impeller** and as the impeller rotates, it causes a lateral movement of the metal disk and results in the wear shown above on both the disk and the cover plate.

Your installation instructions don't say to do any kind of alignment of the outside of the plate with the pump flange, but close examination of the pump with your cover does indicate that the depth of the slots allow the cover to rest too far onto the fixed locating screws.

What do we do now?

Hi Richard

We have been reviewing all the information and illustrations you have sent, and have reaffirmed that the key fact which determines the mechanical precision and functionality of the cover plate design is the central position of the cover plate and its pivot point as dictated by the fixing screw holes and not the cover slots. The practical evidence and outcomes over many years is very clear and positive.

The independent movement of the impeller and its irregular impact on the pump cylinder together with any movement of the impeller drive shaft, before and after fitting a Speedseal, are more difficult to assess, but are the crucial wear factors for the pump housing.

The information you get from your examination on Sunday will be very helpful, and I look forward to hearing from you.

Regards
Alex

Sent: Wednesday, October 26, 2016 4:55 PM
To: 'Alex Parker'
Subject: RE: Speedseal Life - Strange wear problem

Alex,

It was good to speak with you this week.

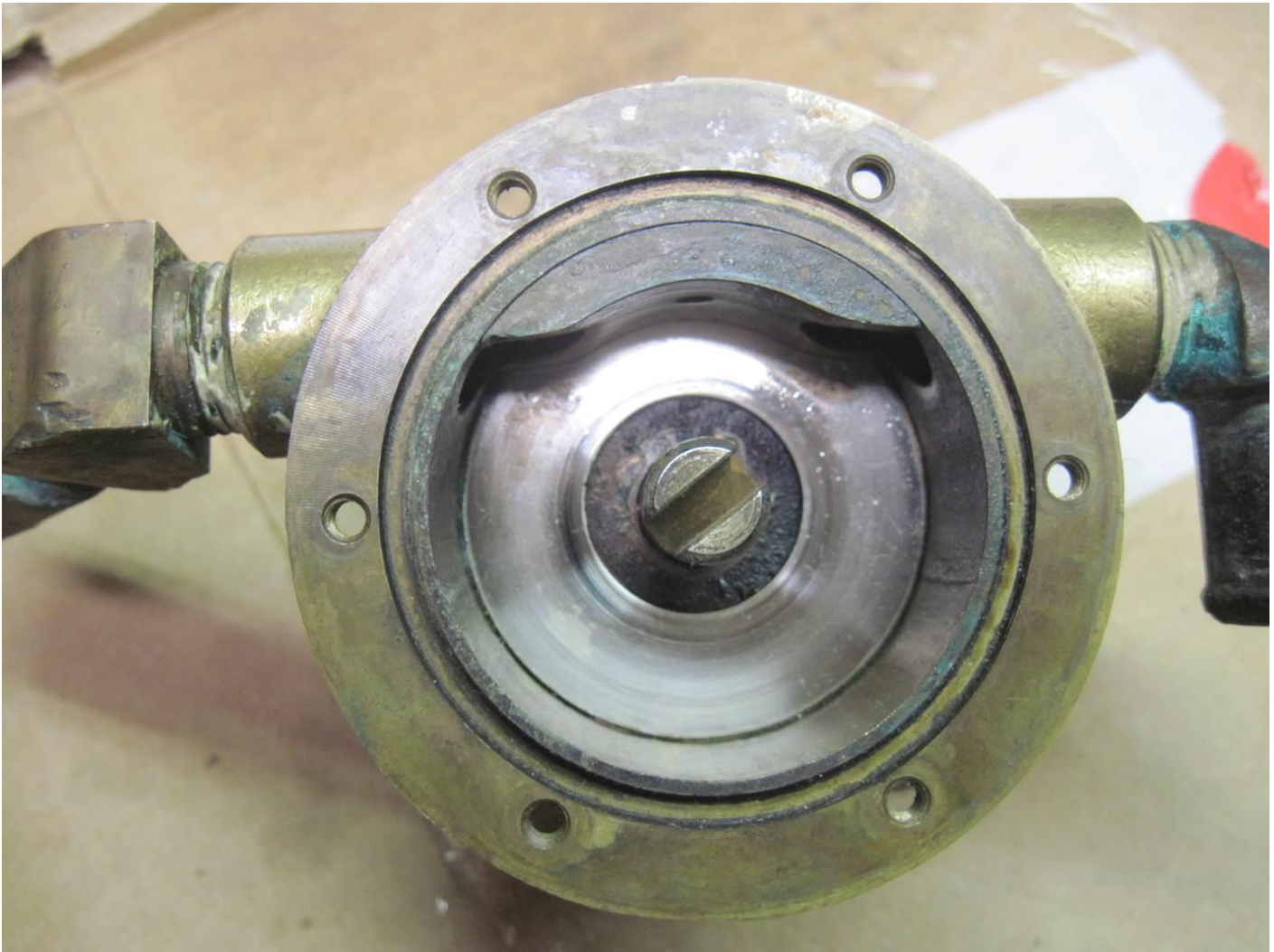
We spoke about the possibility of the pump cavity being worn egg-shaped and being that being the cause of the wear on the cover plate and metal washer. I will chuck up the pump body in a lathe and measure the run-out of the cavity. That should prove if the cavity is worn from the impeller flexing as you suggest.

Although I have a lathe, I later remembered that I had previously borrowed a dial indicator from a friend. I won't be able to get that tool until Sunday, so my measurement results will be delayed until then.

However I did take a few more pictures for you to view. If you remember I stated that when the cover is inserted onto the two screws at the slots, the cover is not perfectly centered on the pump body. This is nearly impossible to observe when the pump is on the engine in an inaccessible spot. But now on the bench, the mis-alignment is evident.

I will annotate each of the pictures below-

This first picture shows a straight-on view of the pump cavity.



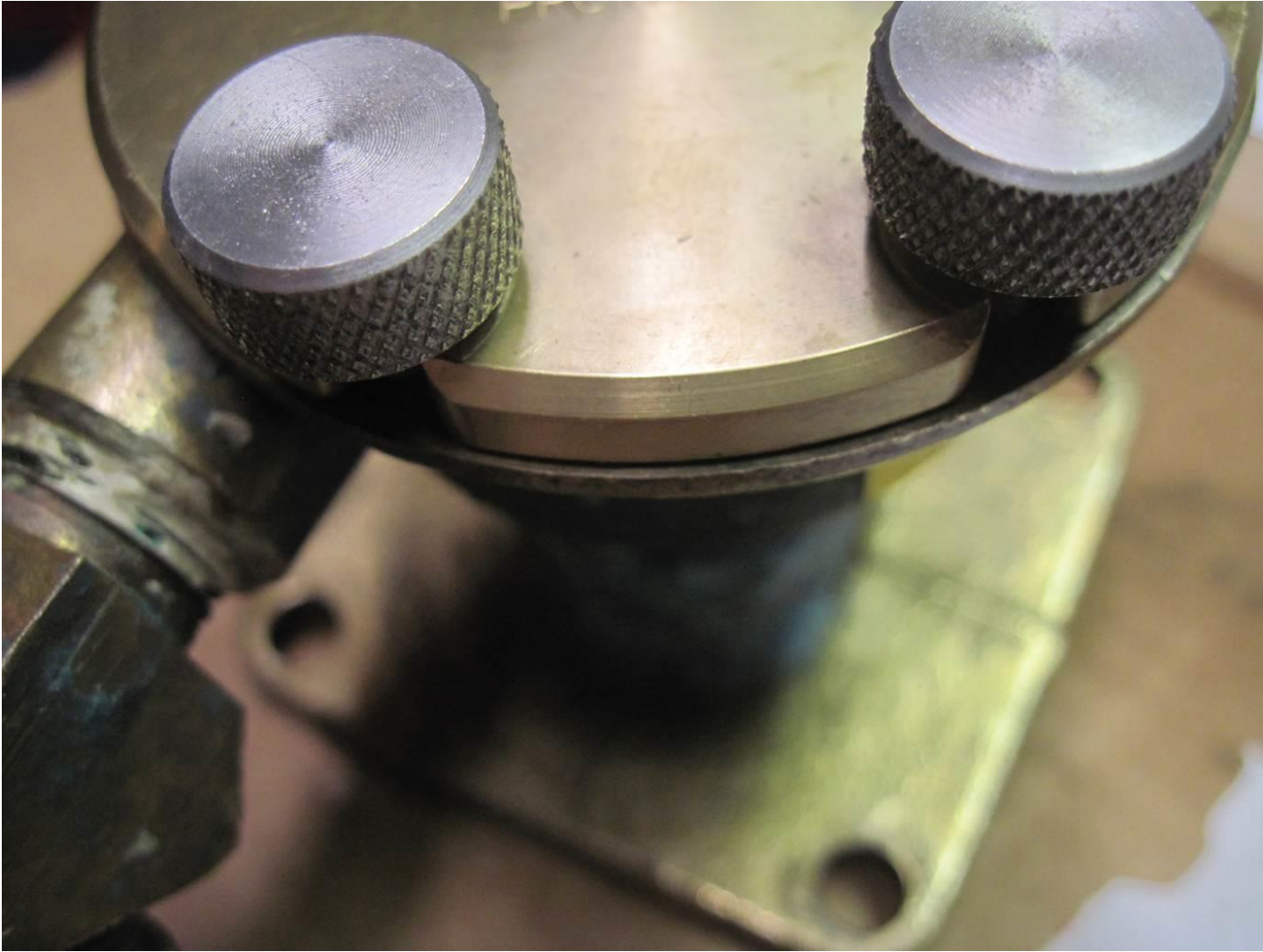
This picture shows the two thumb screws installed with the cover plate dropped in place and resting on the edges of the screw threads.



This picture shows the spacing of the cover edge to the pump body edge at the hole side of the plate.



This picture shows the spacing of the cover edge to the pump body edge at the slotted side of the plate. Note that it is less than at the hole side.



I now removed the screws at the slots, and centered the cover plate on the pump body with my fingers. The clearance of the plate to the pump body is now equal around the entire diameter. This photograph shows the distance that the plate would move to come up against the edge of the threads of the thumbscrews. This equated to the uneven spacing of the outside edge of the plate with respect to the pump body as seen in the above photos.



Here is a shot of the other slot, again showing that the plate would move closer to the screws when simply dropped in place.



I think that this is compelling evidence that the plate is off-center or not co-axial with the impeller when it uses the screws at the slot to locate itself. I believe that this mis-alignment is the cause of the wear to the side of the cover and the outer and inner edges of the metal washer as the impeller pushes the washer to one side as it rotates.

However I will still measure the run-out of the pump cavity and tell you the results as soon as I can.

The good news is that if you accept that the plate is not being aligned properly, I have an engineering solution for that problem and it would be an easy fix to implement.

Let's see what the run-out measurements are.

Rich

Thank you for all that information. I will give you a call

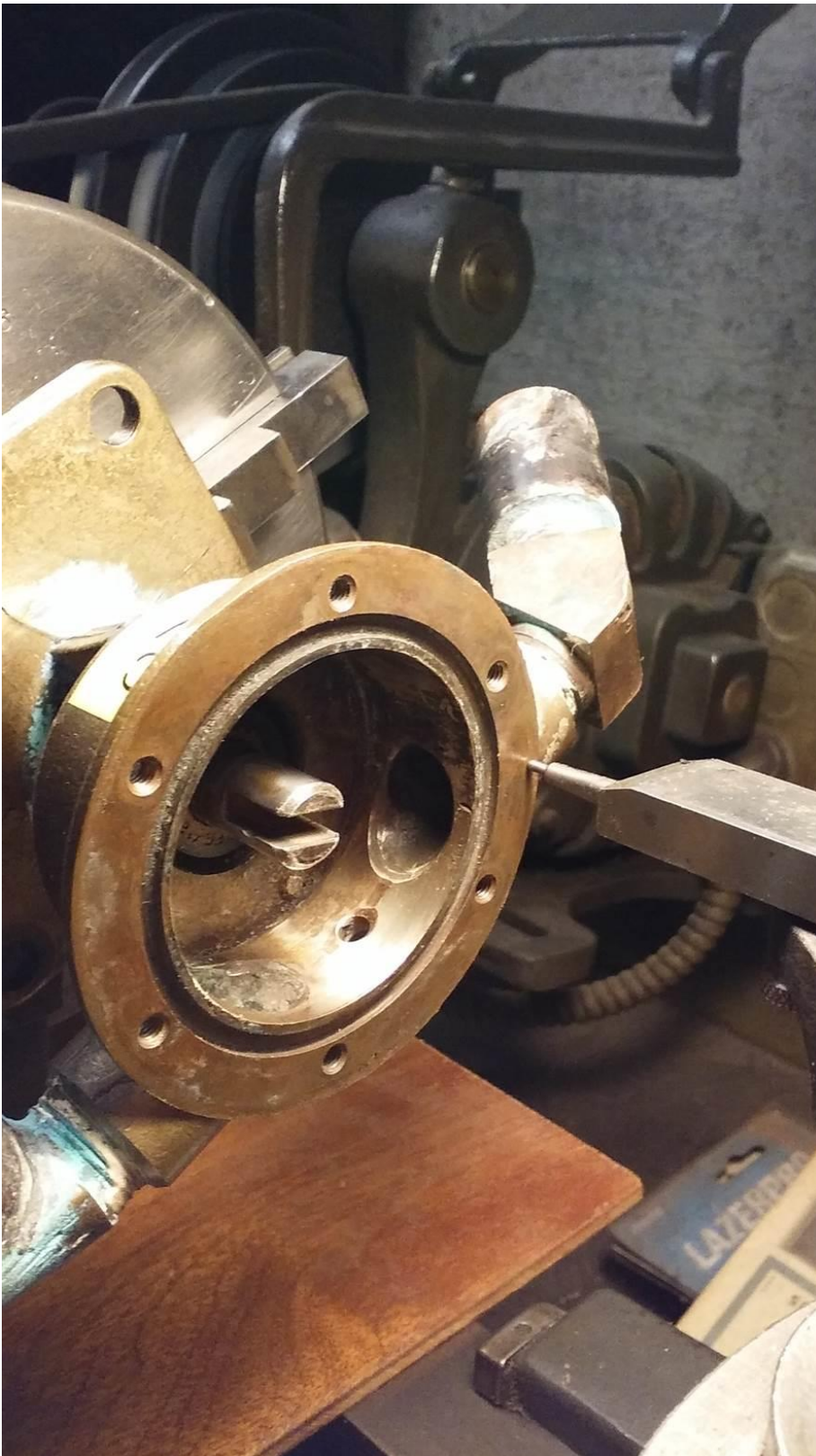
Best
Alex

Sent: Wednesday, November 2, 2016 2:50 AM
To: 'Alex Parker'
Subject: RE: Speedseal Life - Strange wear problem

Alex,

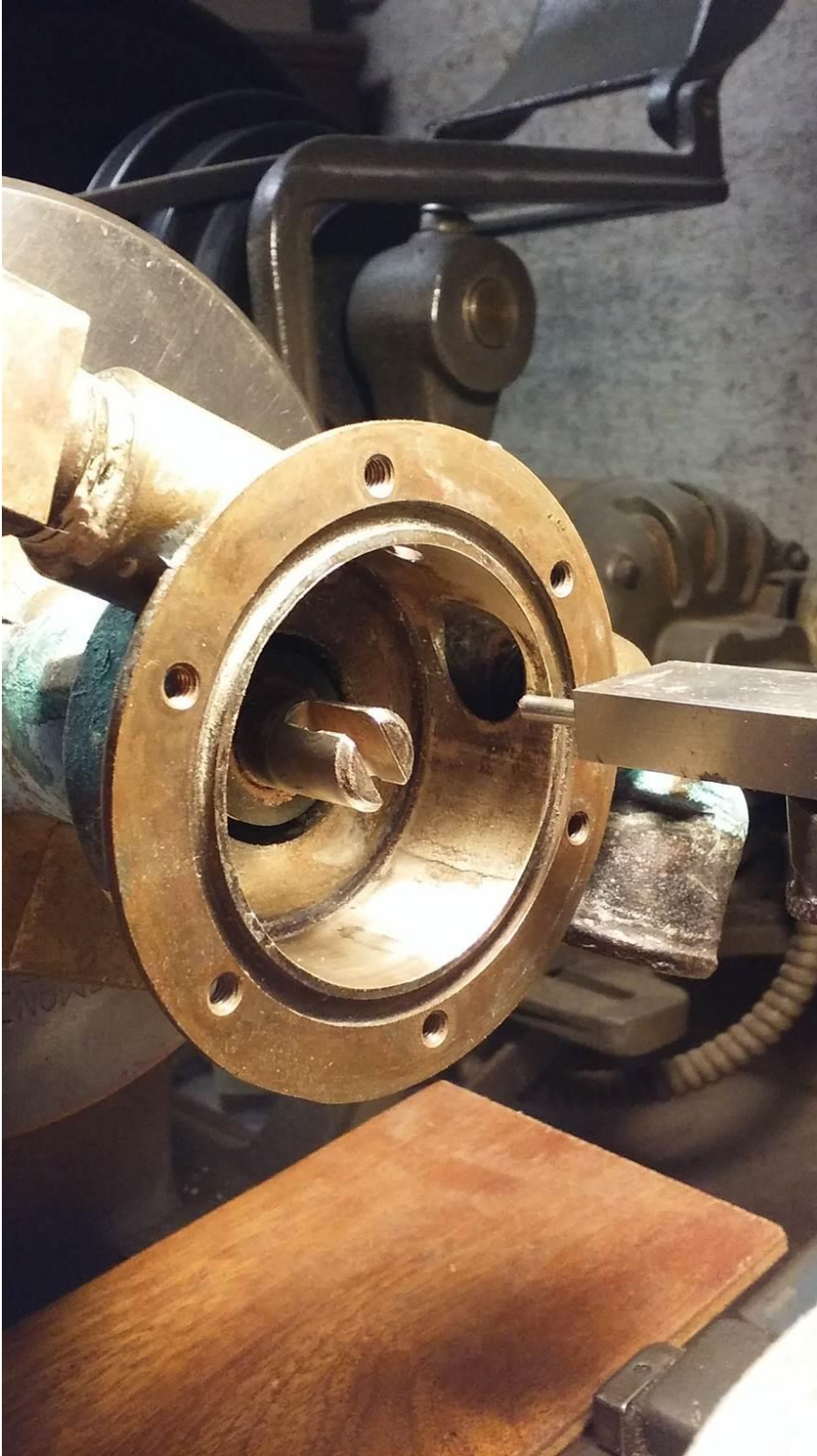
I got together this evening with my friend with the dial indicator. We chucked the pump onto his lathe and performed the following:

First we measured to be sure that the pump was perfectly centered. We did this by checking the flat surface of the flange where the cover plate attaches. Using an indicator we rotated the pump and checked that the flange was in a perfect vertical plane- that is that measurements at 3, 6, 9 and 12 o'clock were all the same. The pump body was tapped into alignment so that the measurements were all within 0.002" of each other.



The next step was to measure the roundness of the pump cavity. We moved the indicator to measure the inside surface of the pump cavity and rotated the pump as we watched the indicator. We positioned the indicator about $\frac{1}{4}$ " into the cavity. From the arbitrary "zero" position on the indicator, we observed readings from -0.001 to +0.002. These measurements prove that the cavity of the pump is round to within ± 0.0015 .

These more precise measurements agree with the quick measurements that I made last week with my vernier caliper. So in the case of this pump, the cavity is not worn by the impeller as you suggested could be the case.



So where do we go from here? I am convinced on the basis of the location of the wear pattern that the cover plate was not centered on the shaft by about 0.019. The amount of wear that I measured on the inside edge of the cover recess is that same amount of 0.019, and that corresponds to the clearance between the thumbscrews and the cover holes of 0.019. I explained these measurements and conclusions in my last email.

I think you should be willing to replace this cover plate and I will be happy to return this plate to you if you wish. Given a new plate and bearing set, the question now becomes how to stop this from recurring.

Your thoughts?

Tomorrow, Wednesday, November 2nd I will be out of town so I won't be available for a phone call should you wish to talk. However, the following day I expect to be around except between 11:30am-2:00pm my local time. I think we figured that you are 6 hours ahead of me.

Rich