

## **Correction of Frequent Maintenance Construction Assembly Error**

**See anything immediately wrong in the picture below?** This is a 5 plus inch Shaft and Pillow-block bearing on a Criticality 1 - Boiler I.D. Fan. If it doesn't run, the plant doesn't run! It Failed Frequently Until We Suggested a Simple Correction!



This bearing had an average life of 6 months to a year between random failures for many years. The plant had just "learned to live with it" Sometimes Vibe guys would catch it and schedule replacement, sometimes just sudden failure and downtime occasionally requiring expensive shaft replacement and 2 days downtime. The Bearing always ran hotter than expected 210-230F and the maintenance guys always pumped in More Grease #\$\$%!

**HINT ?** - I must admit, although I have preached and preached, I have failed miserably to get mechanics, engineers, and M&E mgrs. to understand, CAST IRON Housings Are Flexible, especially when submitted to multi-hundred, multi thousand-pound loads like fan rotors. See anything flexing?

**ROOT CAUSE?:** Most Bearing Manufacturers Installation & Maintenance Manuals, certainly this bearings mfr, SKF, Clearly Cautions, "Use a FULL FACE SHIM TO



SUPPORT THE HOUSING” The Bearing Pillow-block Housing is flexible enough under load it is "Pinching" the outer ring of the internal spherical roller bearing because the housing is

incorrectly shimmed on the bottom between the housing and the base. Look at those shims only supporting the 2 ends of the blue pillow-block housing.

What is happening in the center where there is no full face shim? As the Housing flexes, only 2 or 3 or 4 thousandths of an inch perhaps, pushing down on the outer ring of the roller bearing, it immediately takes the shape of the housing around it under the load. In this case the Ring responds in the only direction it can, pushing down on the "few" thousandths of original clearance, causing reduced bearing internal roller to rings clearance and thus accelerated friction, heat, lubricant breakdown and accelerated wear. You get the idea. VERY BAD! VERY BAD! Why is that occurring...

**Digging deeper, the Real Root Cause is the Common Habits** of most Construction and Maintenance Mechanics, All readily accepted by their Supervision, Engineers and Managers who allow it, if not Encourage it. They don't teach millwright skills in engineering school unfortunately and often management and supervision, pressed to make it run, "assume" their mechanics, also feeling the pressure to "make it run" know the correct thing to do. Those 2 – 1/8" metal shims under the housing? These are homemade from what looks like flat bar steel, a common practice throughout industry. but the same flexing takes place if they use more common and pre-cut stainless shims when trying their best to install the fan rotor and BOTH bearings Level to the Fan base. It's Ironic that while doing something admirable and craftsmen like, they create another yet worse problem. Bet you have heard that before huh!

**All we did to correct this issue was install a full face stainless custom shim that took all of 2 man-hours to find material and fabricate in their shop. Last time I checked, the bearing had NOT been changed in over 10 years!**

Our experience is 99 % of Engineers and Installer / Maintainers have never read the o.e.m. Bearing Manufacturer Maintenance Install Manual !! Never Attended a Proper Hands-On Bearing Install Class and worse yet, most Brg O.E.M classes don't even mention it, perhaps because they ASSUME Engineers and Installers know to read the Instructions. WRONG! Also, we know in most plants, Joe basically learned to do it like Fred before him and Fred learned by watching Robert and you get the drift. Not only do they not teach it in Engineering Design and for most companies it Does Not Exist in their Engr / Install Specifications for Design and Install Bids.

Perhaps even worse for encouraging / perpetuating this practice are the hundreds of Pillow-Blocks similarly installed but, they DONT Fail Right Away, that is to say, they don't have quite as much load perhaps and they last say, 5 to 7 yrs. when they should



have lasted 20, 30 or longer if shimmed / installed and lubricated correctly. For the Plant Maintenance Cost, that means at 5 yrs., we will incur an unnecessary cost/repair 10 times over the average 50 yr. life of most large plants instead of say Twice if it had been installed correctly.

**Caution! First**, Correct and Communicate Specifications for Design, Purchase / Install AND insure all New Installs are done correctly. **Second**, identify any similar installs that bearings are not lasting and correct asap. "IF" you have good repair history, identify the ones that although incorrectly installed Have Never Failed (probably because they are more lightly loaded, bearing sizing, etc) For those DO NOTHING until a bearing has to be replaced. For those that have failed previously correct the shimming ASAP! **Third**, and most difficult, Set the Expectation with ALL mechanics, supervision and staff, we Will NOT create any more of these and every time we have to work on one previously incorrectly installed we will PLAN ahead and make the shim we need. We WILL NOT use smaller pre-cut stainless shims.

We are NOT Smarter than everyone else, We just try to **Do it Once, Do It Right!** Just as important, Once a known problem and solution is identified We Followed-Up to "Globally" correct all across the plant! It is the Role and Responsibility of a Competent M & E Manager to Make That Process Happen and Expect Nothing Less.

## MEET THE AUTHOR



### **Phil Hendrix**

#### **Co-Founder, Hendrix Precision Maintenance**

Phil Hendrix earned a BS in Engineering at night school, while working as a Maintenance Superintendent in a large pulp and paper mill. In his career, Phil has worked every mechanical position in a maintenance department after starting in welding fabrication and construction. His first managerial role included taking over a failing maintenance department of a 50-year-old facility. Although successful in leading dramatic improvements in safety, cost and reliability in 3 different huge mills, the most important acceleration to record reliability and cost control was the understanding and adoption of a precision approach to maintenance.

In 2001, Mr. Hendrix founded Hendrix Precision Maintenance, focusing on providing high quality precision maintenance training and reliability consulting. Since starting Hendrix Precision Maintenance, he and his instructors, engineers, and predictive



maintenance analysts have provided services to over 400 facilities/companies, enhancing their employee's skills sets required to maintain rotating equipment at a highly reliable level. Developing and utilizing unique training tools combined with effective hands-on learning techniques, his customers in many cases have experienced double and even triple the expected life of their rotating equipment within their facilities.



Phil's passion of precision maintenance and attention to detail is shared with the many maintenance teams who come through our classes.