

## Correction of Frequent Maintenance Construction Assembly Error

See anything immediately wrong in the picture below? It is a 5 plus inch Shaft and Pillow-block on a Criticality 1 - Boiler I.D. Fan. If it doesn't run, the plant doesn't run! And 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 180-200F and the maintenance guys always pumped in more grease #\$\$%!

**Hint 1:** 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, even thousand-pound loads like fan rotors.

**ROOT CAUSE?:** Just to cut to the chase: The Bearing Housing is flexing under load and "pinching" the outer ring because it is incorrectly shimmed. Just a few thousandths of an inch, pushing down on the outer ring of the bearing which is, as every bearing engineer will tell you, EXTREMELY FLEXIBLE and immediately takes the shape of the housing under load. In this case the Ring responds in the only direction it can, pushing down on the "few" thousandths of clearance inside the bearing and reduces that clearance, causing accelerated wear, heat, you get the idea. Very Bad! Very Bad! Why is that Occurring?



**HINT 2.** The Real Root Cause is the Common Habits of most Construction and Maintenance Mechanics, AND their Supervision, Engineers and Managers who allow it, if not Encourage it and often "assume" their mechanics know what to do. See the 2 metal shims under the housing? These are homemade from what looks like flat bar steel, a common practice throughout industry. but the "real professionals" they make the same mistake with more common and expensive 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!

Most Bearing Manufacturers Installation & Maintenance Manuals, certainly for this popular one pictured above, **Clearly Caution about NOT Creating This Problem** yet it exists in literally hundreds of thousands of Incorrect Installs. **The Manual Says, more or less, DO NOT Shim the Housing Without Using a FULL FACE SHIM TO SUPPORT THE HOUSING! Doing such will likely cause- Premature Bearing Failure. DUH !** 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 7 years!

Our experience is 99.9% 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 are smart enough 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<sup>1</sup>. They don't teach it in Engineering Design and for most companies it Does Not Exist in their Engr / Install Specifications.

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 10 times over the average 50 yr. life of most large plants instead of say Twice.

We are NOT Smarter than everyone else, We just try to 1) Not repeat the same mistake twice and 2) Once a better way is known, we didn't rest until we set the expectation with the workforce, contractors, and o.e.m.'s that We ARE going to ***Do it Once, Do It Right!*** Just as important, We Followed-Up and "Globally" Applied that correction all across the plant once it was identified. 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.