



The Equifactor® Minute

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Volume 1, Number 2

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A website dedicated to equipment troubleshooting

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From the Editor

We've had a great response from last quarter's newsletter. I'm planning on including more technical information as time goes on. If you are interested in having something included in the newsletter, please [email](#) me and I'll give it a try. I'm especially interested in lessons learned, success stories, and innovative ways you have used Equifactor® to help you solve those pesky equipment reliability issues.

TapRoot® Summit 2007

After completing our record-setting Summit 2006 in Gatlinburg, you'd think we'd take some time off from summit planning and bask in our success. No way! Mark has already set up next year's Summit in San Antonio, TX. I just taught a 5-Day course there at the same hotel ([Crowne Plaza Hotel](#)), and it was terrific. It's right on the world-famous Riverwalk, and the annual [Fiesta](#) is scheduled for the same week. What perfect timing!



The keynote speakers include Olympic Gold-Medalist Josh Davis, ABC aviation expert John Nance, and Judge Andrew Napolitano, Fox News legal consultant. In addition, the Equipment Reliability and Maintenance Best Practices Track will have sessions such as:

1. How Minor Failures Become Major Accidents
2. 7-Step Method for Electronic Troubleshooting
3. Equipment Failure Show and Tell
4. Secrets of the Nuclear Navy's Success
5. Equipment Reliability Best Practices
6. Lessons from the Crime Scene – Evidence Preservation for Accident Investigation
7. Proactive use of Equifactor® to Improve Equipment Reliability



There will also be industry-specific sessions, with mining industry speakers from Rio Tinto, Barrick, and MSHA. There will also be a healthcare focus.

It's already shaping up to be the best summit yet. And have I mentioned the golf tournament?

The Art of Maintaining Stand-by Pumps

I want to maintain the highest possible reliability of 2 parallel centrifugal pumps. One is the operating pump, and the other is a stand-by pump, required only as a back-up in case the running pump fails. What is the best run-time strategy to maximize the reliability of the pumps?



My first thought was, "50:50, of course!" That way the wear and tear on the pumps is spread out over both pumps, doubling the effective lifetime of the equipment. Seems reasonable to me.

Unfortunately, if you are using this strategy, there is a good chance you are significantly accelerating the wear on the pumps, resulting in increased downtime!!

One assumption that has to be made: The pumps are using mechanical seals. Pumps with packing glands normally are wetted by the working fluid. These pumps may require a more frequent cycle schedule for packing maintenance. This has been the strategy (weekly pump shifts) for packed pumps for years, and it hasn't necessarily changed for mechanically sealed pumps.

So why is a 50:50 run strategy bad?

First, the major wear and failure factor when considering a mechanical seal is the number of start-stop cycles, not overall run time. Starting and stopping the pumps solely for equal run time puts enormous stresses on the seals. Next, 50:50 introduces many more failure modes than are present in a standby pump.

Finally, with perfectly even wear, both pumps (theoretically) should fail at about the same time. Not the ideal situation for an emergency standby pump!

It seems then that the fewer start-stop cycles, the better. Ideally, as far as mechanical seal wear goes, the stand-by pump should never be started, maintaining it in pristine condition, ready to take over on the loss of the duty pump.

The problem with this, however, is that you no longer have confidence that the failure modes specific to the stand-by pump (fail to start, failure to reach full capacity) are not present.

A good compromise is a 90:10 ratio. For example, run the duty pump for 8 weeks, and then run the standby pump for a full 8-hour shift. Then **SHIFT BACK TO THE DUTY PUMP**. This has several advantages:

- You have confidence the pump will run when needed.
- It will prove it can reach full load capacity
- The shift can be scheduled around your normal PdM periodicities. For example, conduct thermal and vibration analysis of the standby pump at the scheduled 2-month PdM requirement, killing 2 birds with one stone.
- Most people shift pumps weekly, which is a total of 104 starts or stops for the 2 pumps over the course of a year. The 90:10 strategy at a bi-monthly interval lowers this to only 10 or 12 total.

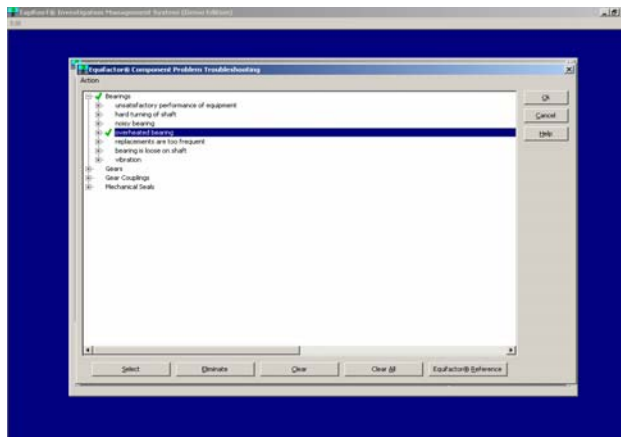
Some facilities have actually color coded their pumps. The duty pump is green, and the standby pump is red. When somebody sees the red pump running, they can now question why we are not in the "reliable" line-up. This

forces the operators to immediately report failures of the duty pump. This philosophy may not "feel right", but there is plenty of data to back it up. Again, this assumes that the prevalent failure mode is seal failure. It also assumes that there are not other extenuating circumstances requiring pump shifting. For example, maybe you have a history of false brinelling of the standby pump bearings if the pump is idle for xx weeks. Take a look at your strategy. You may find you are able to increase your equipment availability, reduce downtime, and limit repair costs, just by adjusting your pump switching schedule.

Equipactor® Software Improvements

We're really looking forward to the TapRoot® software upgrade coming out later this summer. The overall program functionality is immensely improved, with these enhancements automatically applied to the Equipactor® module. In addition, we've added several other updates to the tables:

1. At the requests of the users, we've included new tables on Valve Actuator troubleshooting. These tables include detailed guidance on pneumatic, hydraulic, solenoid, and motor-operated valve actuators.
2. We've broken up the motor troubleshooting tables into separate tables for AC and DC motors. Since the failure modes and symptoms can be quite different, we felt it was important to split these tables into 2 separate listings.
3. Additionally, we've added DC Commutator troubleshooting charts, allowing the user to troubleshoot motor and generator commutators.
4. The Version 5.0 of the software should also allow users to easily send, receive, and import individual tables. This may allow us to set up an on-line table "clearinghouse".



We will continue to make changes to the system as new user applications are found or requested.

And don't forget, Equipactor® is most useful when it is fully integrated into the rest of the TapRoot® system. I've included a link to a pdf presentation of how Equipactor® fits in to the overall TapRoot® Root Cause Analysis system. To

see the demonstration, click [here](#), then click on the logo on the right.

Upcoming Course Schedule

Looking at attending an Equifactor® 3-Day course? Click below to find out more about scheduled public courses.

	Location	Dates		
Upcoming Classes:	<u>Knoxville, TN</u>	Jul 17 - Jul 19	<u>Register</u>	<u>Brochure</u>
	<u>Singleton, Australia</u>	Aug 1 - Aug 3	<u>Register</u>	
	<u>Halifax, Nova Scotia</u>	Sep 6 - Sep 8	<u>Register</u>	
	<u>San Antonio, TX</u>	Oct 11 - Oct 13	<u>Register</u>	
	<u>Charleston, SC</u>	Dec 6 - Dec 8		

And don't forget: we can also come right to your site and teach a class of just your employees. Call me for more info.

Equifactor® Blog Entries

I've continued making weekly blog entries on the TapRoot® website every Wednesday. Here's a sampling of what you'll find there; click a link to see it for yourself!

May

- [Custom Equifactor® Tables](#) – What have *you* added to customize Equifactor® for your use?
- [Proactive Use of Equifactor®](#) – See what we've been doing while you weren't looking.
- [Return on Investment \(Lessons from MARCON 2006\)](#) - How to get management buy-in for reliability improvements.
- [Equipment Reliability Success Stories](#) – How have you successfully implemented Equifactor®?
- [When to conduct a RCFA for Equipment Failures](#) – Is a RCFA really necessary, or can I just implement an RCM program without it?
- [SnapCharTing® an Equipment Failure](#) – Sometimes, this is easier said than done. Take a look at some of the techniques involved in producing a SnapCharT® after the equipment post-mortem is complete.

June

- [Maintaining Stand-by Pumps](#) – This is the article posted above.
- [Reliability Issues](#) – How to mesh troubleshooting with root cause analysis.

Contact Me

Ken Reed
System Improvements, Inc.
238 S Peters Road, Suite 301
Knoxville, TN 37923 USA
Phone: 865-539-2139
Fax: 865-539-4335
Cell: 865-548-8992
ken@taproot.com
Web Sites:

www.taproot.com
www.equifactor.com