October 2018 Newsletter

Welcome to the October issue of the AFE Chapter 140 newsletter is. It not only includes greetings from our President Steve Bellemore, but member meeting details and schedule, chapter board meeting schedule, information on our certification programs, who our sponsors are and a technical paper. Region 8 is hosting another CPMM review class in November and is taking applicants now for a CPS class in February. Included in the certifications section of this newsletter is new information on certification costs and incentives. If you have a certain topic you would like to see covered, let us know. Please forward comments to either Steve Bellemore at steven.r.bellemore@baesystems.com or Ed Gagnon at edgagnon78@gmail.com.

AFE Mission Statement

The Association for Facilities Engineering (AFE) is a professional membership organization serving all professionals working in the built environment. We bring together professionals who ensure the optimal operation of high-rise commercial real estate, industrial plants, campuses of higher education, medical centers and (classified / non-classified) government facilities around the world. Established in 1915, AFE remains the leading technical education and credentialing resource for facilities management professionals. Each day we work to advance our mission to provide tools and resources to enhance the expertise and broaden the connections of facility management professionals worldwide.

Just as in social science, for AFE the term built environment refers to the surroundings people construct to provide settings for human activity and interaction, ranging in scale from buildings to parks and can often include their supporting infrastructure such as water supply and energy networks.

President's Message

First, I personally would like to invite all members and guest members to join us for our exciting 2018 tours! I am excited to see what great tour this year will bring. It's always a great time socializing and networking with a wonderful group of professionals the ones in AFE chapter 140! We had several outstanding tours and we are very much looking forward to another successful year in 2018. Association for Facilities Engineering is all about networking and learning as a group of

professionals. I have always said "You get out what you put in" and I encourage all of you to attend as many of our monthly meetings as possible and to give your Board of Directors feedback about what you want to see in future tours and meetings.

I ask you to please encourage the younger workforce and get them involved in the Chapter events! Even if it's just forwarding on our monthly newsletter so that they see what fun we are having. We need more youth to help take on some roles and responsibilities going forward. Facilities professionals are retiring every day, with not enough qualified people to back fill the spots.

Thank you to everyone who supported and contributed to AFE Chapter 140 in 2017! Please see our website for a list of supporting companies. We are always looking for volunteers to become involved in the board and help plan events and tours. If you are interested, please let one of the Board Members know at the next meeting.

I look forward to seeing all of you at our next meeting!

Steve Bellemore, CPMM
AFE Chapter 140 President
603-494-1687
steven.r.bellemore@baesystems.com

Upcoming Meeting

October 24, 2018

Southern NH Hospital

Nashua, NH.

AFE Chapter 140 will tour the Southern NH Hospital and their new chiller plant at 8 Prospect Street, Nashua, NH. Don't miss this informative tour of what it takes to keep a hospital running. The tour starts at 5:30 PM and dinner will follow at Martha's Exchange at 185 Main Street, Nashua, NH.

Details and registration

Past Tour of BAE Systems

The AFE 140 tour of the BAE Systems facility at 65 Spit Brook Road in Nashua on September 24 was well attended, with nearly 30 members participating. We had a very informative event led by the Spit Brook Road Facility Manager, Norm Coutu (also a Chapter 140 member) who, along with Kim Cadorette, Director of Operations, gave us a tour and overview of part of their manufacturing spaces and central stock room operations. Norm then led us on a tour of their boiler room and new chiller plant. We then went to Lui Lui's for dinner and networking. Thank you BAE Systems for a great tour.

Upcoming Chapter 140 Events

Board meeting schedule

All chapter 140 members are welcome to attend any board meeting.

Meetings will be held at the new Electronics for Imaging facility at 12 Innovation Way in Londonderry, just off Pettengill Rd near the airport. Meetings start at 5:30. Board meeting dates as follows:

10-3-18 11-7-18 12-5-18

Member Meetings Schedule

Member meetings are typically held on the 4th Wednesday of every month.

October 24 – Tour of Southern NH Hospital in Nashua

November/December – Meeting format, date and location to be announced in early October.

January 23, 2019 – Tour of Pat's Peak ski mountain operations in Henniker

If you have places of interest, or wish to host a tour of your facility, please contact any of the board members for chapter 140. For their contact info, see our Board of Directors page.

Other Events

Solar Social Hour & Tour – Keene, NH

October 13, 0218 Noon - 2 PM

Chalice Residence

25 Beech Street

Keene, NH

Learn how to put the power of the sun to work for you! Join us as we lead a tour of the Chalices solar-powered home, and learn how to transition your home or business from fossil fuels to clean, solar energy.

Stop by at Noon on Saturday, October 13 to experience the solar-powered, clean energy lifestyle! Solar technology costs have dropped by more than 75% over the past 10 years, making solar energy an affordable investment opportunity. One of ReVision Energy's solar design professionals will also be available to discuss current trends, how solar energy works, and how you can make the exciting transition to 100% clean power.

Solar Ribbon Cutting – Nottingham, NH

October 17, 2018 9 - 10 AM

Nottingham Community Center

139 Stage Road

Nottingham, NH

A public ribbon cutting and tour are scheduled on October 17 to showcase two solar arrays that were recently installed at the community center and fire station in Nottingham. The arrays will offset roughly 90% of the municipality's electric load. Harnessing the sun to generate electricity will save taxpayers approximately $600,000 over the life of the systems, reducing both the town's carbon footprint and its energy costs.

After Nottingham voters approved two warrant articles last year, ReVision Energy installed two grid-tied rooftop arrays earlier this year, a 50.4-kilowatt system at the town's fire station and a 60-kilowatt system at its community center. The fire station array includes 168 solar panels, and the community center array includes 200 panels. The arrays are backed by a 25-year warranty and have an expected lifespan of 40 years. If all of the solar panels were laid lengthwise, end-to-end, the panels would span the length of five and a half football fields.

Granite State Chapter of ASHRAE - Meeting Notice

October 11, 2018 at the Roundabout Diner in Portsmouth

We will be having a joint NH-Maine event this month on Thursday October 11th at the Roundabout Diner in Portsmouth. This month we will be hearing from an ASHRAE Distinguished Lecturer Gordon Sharp discuss the issues of energy and airflow measurement and control in the Laboratory environments. As you are aware, laboratories have stringent airflow refresh requirements and therefore consume a great deal of energy. Gordon is the founder of Aircuity Inc., which is focused

on using sophisticated control systems to modulate the airflow and therefore air quality in the lab environment, while minimizing energy consumption.

Since this month's event is a joint event with the Maine Chapter of ASHRAE, it is important for you let us know early if you plan to attend. So please either use the link and register, or send a note to Rick Knowlton (rknowlton@buckleyonline.com) to let him know you will be attending.

I hope you will plan to join us for this interesting and informative discussion.

Event Schedule

5:00-6:00 PM	Social Hour
6:00-7:00 PM	Dinner
7:00-8:00 PM	Presentation
8:00 PM	Questions and discussion
9:00 PM	Close

Presentation Summary:
New Approaches to Slash Lab and Commercial Building Energy Use and Improve IEQ

In the face of significant energy costs and concerns over global warming, buildings are receiving increasing scrutiny to reduce their carbon footprint and cut their energy expenses. For many buildings outside air is the largest single driver of both energy efficiency and indoor environmental quality. Demand control ventilation has attempted to reduce energy expenses by controlling outside air but the actual results over time have been mixed at best. This talk will discuss and provide case studies of both commercial and laboratory buildings for a more energy efficient and healthier variation on demand control ventilation that uses a new, cost effective, and more accurate sensing approach known as multiplexed sensing.

Region 8 Events

AFE Region 8 New England will offer CPMM and CPS Review Classes in the months ahead.

Region 8 Certified Professional Maintenance Manager (CPMM) Review Class

November 7th - 9th, 2018 in Waltham, MA

Instructor: Ed Gagnon CPE, CPMM, CPS

We will conduct the AFE Certified Professional Maintenance Manager course in two 8-hour review classes covering the entire CPMM Review Pack. On the third day, there will be a 1-hour tutorial-exam preparation followed by a 4-hour open book exam based entirely on the CPMM Review Pack. The exam is a 200-question test, with 100 multiple choice and 100 true or false. A 70% score is needed in order to pass the examination.

The course covers the following:

1. Preventive Maintenance and Reliability Centered Maintenance, (RCM)
2. Predictive Maintenance, (infrared, Ultrasonic, Vibration & Chemical Analysis)
3. Work Flow-Planning and Scheduling, Safety and Inventory Control Strategies
4. Computerized Maintenance Management Systems, (CMMS)
5. Return on Investment, (ROI) & Life Cycle Cost, (LCC)
6. Indoor Air Quality, (IAQ) Documentation & Total Productive Maintenance, (TPM)

You will have all the necessary materials and opportunities to ask questions. Upon successful completion you will join the ranks of AFE's fastest-growing certification program as a CPMM.

Review Class will be held Wednesday, November 7 through Thursday, November 8 at 8:00 AM –5 PM. The exam is on Friday, November 9 from 9:00 AM-1:00 PM with a tutorial from 8:00 AM - 9:00AM

When: Wednesday, November 7, 2018, 8:00 AM until Friday, November 9, 2018, 1:00 PM

Where: Reservoir Place – Padanaram Room, 1601 Trapelo Road, Waltham, MA 02451

Contact: Ed Gagnon at edgagnon78@gmail.com for class information.

Registration is required. Contact Gaby for registration and payment.

Gabriella (Gaby) Rodriguez
Manager, Operations
571-395-8772
grodriguez@afe.org

Cost: Payment in Advance Only
AFE-Member - $995.00
AFE-Non-Member - $1,395.00

Region 8 CPS Review Course January 2019

Certified Professional Supervisor (CPS) Review Class

January 16, 17 & 18, 2019

Instructor: Ed Gagnon CPE, CPMM, CPS

We will conduct the AFE Certified Professional Supervisor course in two 8-hour review classes covering the entire CPS Review Pack. On the third day, there will be a 1-hour tutorial-exam

preparation followed by a 2-hour open book exam based entirely on the CPS Review Pack. The exam is a 100-question test, with 50 multiple choice and 50 true or false. A 70% score is needed in order to pass the examination.

The course covers the following:

1. Role of Supervisor
2. Industrial Workplace and Safety
3. Communication Skills
4. Business and Industrial Law
5. Interpersonal Skills
6. Interviewing and Hiring
7. Introduction to Finance and Budgeting
8. Conflict Resolution
9. Leadership and Motivation
10. Time Management and Planning
11. Problem Solving and Team Building

You will have all the necessary materials and opportunities to ask questions. Upon successful completion you will join the ranks of AFE's fastest-growing certification program as a CPS.

The Review Class is tentatively scheduled for Wednesday, January 16 through Thursday, January 17 at 8:00 AM – 5 PM. The exam is on Friday, January 18 from 9:00 - 11:00 AM with a tutorial from 8:00 - 9:00AM

When: Wednesday, January 16, 2019 at 8:00 AM until Friday, January 18, 2019 at 11:00 AM.

Where: Reservoir Place – Padanaram Room, 1601 Trapelo Road, Waltham, MA 02451 TBD

Contact: Ed Gagnon @ edgagnon78@gmail.com for class information.

Registration is required. Contact Gaby for registration and payment.

Gabriella (Gaby) Rodriguez
Manager, Operations
571-395-8772
grodriguez@afe.org

Cost: Payment in Advance Only
AFE-Member - $1295.00
AFE-Non-Member - $1,595.00*

*Includes one-year membership in AFE

Region 8 Bard Meeting

To be scheduled.

Other Region 8 News

Region 8 is now sponsoring CPMM and CPS classes, as noted earlier in this newsletter.

Classes may also be held at your place of work based on a minimum of four class attendees.

New pricing is being put into place after the presently scheduled CPMM class in November. Classes for each certification program will be $1295 for members and $1595 for non-members. The $1595 price for non-members includes a one-year membership in AFE. Contact Ed Gagnon at 603.724.7530 for more information.

Our Sponsors

Companies wishing to place an ad in our newsletters good for 1 year for a price of $200, or by sponsoring a chapter meeting. Contact any board member for details on where to send a check and your company logo in jpg format.

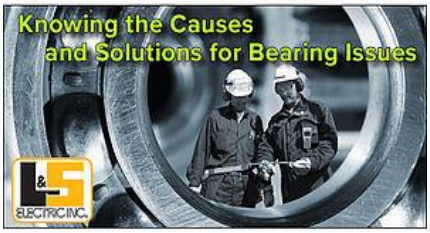
Technical Paper

Reprinted with permission from *Plant Engineering Magazine,* October 2018

Knowing the Causes and Solutions for Bearing Issues

Improving the performance and longevity of bearings begins with understanding the most common causes of bearing failure and malfunction.

David Manney, L&S Electric, 10/24/2017



With the right application, proper installation, and good maintenance practices, ball bearings have a longer lifespan. On the other hand, premature bearing failure arises from poor handling practices and unfavorable operating conditions. This can include contaminated areas and areas where moisture persists.

If the bearing malfunctions and fails, it is best to identify the cause of the problem. By doing so, you conduct proper techniques and utilize necessary adjustments to address the issue. In fact, it is easier to determine the underlying problem when you examine the failure mode. However, it is quite complicated to go through this procedure since a single failure mode tends to lead to another.

In the case of corrosion in the ball race, an abrasive material such as rust is left, which results in wear. This, then, leads to greater radial clearance or preload loss. If a bearing is grease-lubricated, the wear debris may hamper lubrication. Over time, successive overheating issues and lubrication failure arise.

There are several ways to identify the main reasons why bearing failure occurs. However, there are instances when imperfections may not be noticeable. In some cases, the problem is quite evident, even to the naked eye. Also, we present specific techniques and remedies for each issue with ball bearings.

Overheating

The signs of overheating include discoloration of the cages, balls, and rings, which turn from gold to bluish.

Exposure to temperatures that exceed 400ºF anneals the ball and ring materials. This process leads to a loss in hardness and a reduction in the bearing capacity. If left unresolved, early failure may occur.

Deformation of the rings and balls also arises in extreme cases. It is possible for the rise in temperature to destroy or degrade the lubricant.

Common overheating causes

- Insufficient heat paths
- Inadequate lubrication and cooling
- Heavy electrical heat loads.

A lack of proper lubrication where there is excessive speeds and loads is detrimental to the life and performance of the bearing.

Corrective procedures

Be sure to provide adequate heat paths, supplemental cooling and overload, and thermal controls to prevent this problem.

Excessive loads

One of the most common reasons why premature fatigue happens is an excessive load. However, other factors affect early fatigue failure in bearings such as improper preloading, brinelling, and tight fits. Although premature failure has the same symptoms as normal fatigue, the clear signs of a shortened bearing life span include:

- A more advanced case of spalling
- Evidence of overheating
- Severe ball wear paths.

Corrective procedures

To prevent this issue, minimize the load. It also helps to redesign and use a bearing with greater capacity.

True brinelling

When the loads go beyond the ring material's elastic limit, brinelling occurs. True brinelling appears as indentations that form in the raceways, which results in further bearing vibration.

Brinelling often results from severe impact or static overload. This overload is why it is best to avoid practices leading to brinelling. These practices include:

- Striking or dropping the assembled equipment
- Applying excessive force to the outer ring whenever you press a bearing onto the shaft
- Installing or removing bearings with the use of a hammer.

Early fatigue failure usually happens when there are severe and extensive brinell marks.

Corrective procedures

To extend bearing life, avoid pushing the outer ring as you place the inner ring onto the shaft. Applying the right amount of force to the ring that is being press-fitted when you install bearings is also advisable.

False brinelling

False brinelling refers to the elliptical wear marks set in an axial direction located at each ball position. The marks also have sharp demarcations and a bright finish. There can be seen a ring of brown-colored debris surrounding them. In most cases, too much external vibration causes false brinelling.

External vibration also occurs with non-rotating types of ball bearings. Once the bearing fails to turn, this prevents an oil film to form, thus exposing it further to raceway wear. The debris that collects in this area contributes to the acceleration of the wear process.

Corrective procedures

Make it a point to apply lubricants that contain molybdenum disulfide or other anti-wear additives. These additives isolate the bearing from external vibration. Use these greases for bearings in actuator motors that tend to reverse or oscillate rapidly.

Reverse loading

Angular contact bearings are capable of accepting an axial load in only one direction. However, loading in the opposite direction causes truncation on the elliptical contact area, found on the outer ring by the lower shoulder located on that part of the outer ring.

Besides the rise in temperature and excessive stress, look for early failure and increased vibration. The failure mode resembles tight fits, and the balls appear to have a grooved wear ring due to the riding of the ball over the raceway's outer edge.

Corrective procedures

The best way to correct this issue is proper bearing installation:

Install the angular contact bearings with the resultant thrust (marked "thrust") on the wide face of the outer ring, as well as the inner ring's opposite face.

Normal fatigue failure

Spalling or fatigue failure refers to the fracture or damages to the running surface, as well as the removal of discrete and small particles of the material.

The balls, outer ring, and inner ring are susceptible to spalling. Once this type of failure arises, it progresses into something more severe. A significant increase in vibration occurs due to spalling, a sign of an abnormality.

Corrective procedures

If you observe this issue with the bearing, you need to replace it immediately. Another solution is redesigning that allows you to use a bearing with a maximum calculated fatigue lifespan.

Tight fits

It is easy to detect a tight fit when you notice a severe ball wear path located at the bottom of the raceway. The wear path is around the outer and inner ring's entire circumference. Excessive loading of the ball occurs when the interference fits end up exceeding the radial clearance at the operating temperature. Thus, an increase in temperature occurs, along with high torque. Rapid wear and premature fatigue arise with continued operation.

Corrective procedures

Reduce the total interference by matching the bearings according to the housings and shaft, which addresses the issue.

Consider the differences both in the operating temperature and the materials when you cut the total interference.

Loose fits

Relative motion between the mating components is often due to loose fits. Fretting occurs as a result of a continuous relative motion between these parts. Fine metal particles that oxidize generate over time (fretting). This material tends to worsen the looseness because of its abrasive quality.

Once the looseness becomes severe, this leads to an increase in the movement of either the outer or inner ring. Then, the mounting surfaces in due course heat up and wear out, leading to run out and noise.

Contamination

A bearing failure could also arise from contamination. Some of the signs of contamination include high vibration and wear issues with balls and dents on the bearing raceways. Once abrasive substances, including dirt or airborne dust, get into the bearing, contamination failures occur. Contamination is a common problem with:

- Contaminated work areas
- Foreign matter in cleaning solutions
- Lubricants and dirty hands or tools.

Corrective procedures

Minimizing the occurrence of contamination failures is possible by

- Making sure the fixtures, tools, hands, and work areas are clean
- Ensuring all grinding operations are far from the bearing assembly areas
- Storing the bearing in the original packaging, removing them only when ready to use or install
- Keeping in mind that seal damage no longer prevents the bearings from contamination.

Corrosion

Signs of corrosion include red or brown areas on ball bearings' bands, as well as the raceways, balls, and cages. Bearings exposed to a corrosive atmosphere or corrosive fluids are prone to this issue. Over time, an increase in vibration rises, followed by fatigue, wear, preload loss, and greater radial clearance. Early fatigue failures result from extreme cases of corrosion.

Corrective procedures

- Utilizing stainless steel bearings and external and integral seals
- Using these techniques particularly in a hostile operating environment
- Keeping corrosive fluids far from the bearing areas.

Lubricant failure

Lubricant failure appears as brownish or bluish colors on balls and ball tracks. When this issue persists, excessive wear of the cages, ring, and balls occur. Lubrication failure leads to overheating and catastrophic failure.

Corrective procedures

Since ball bearings rely on proper lubrication of critical areas such as between the bearing rings, balls, cage, and races, it is imperative to lubricate these parts well. Excessive temperatures and restriction to lubricant flow, however, impacts the lubricant's properties.

Misalignment

Spotting a ball wear path on the nonrotating ring raceway is a symptom of misalignment. This wear path is not parallel to the edges of the raceway.

An abnormal temperature increase occurs once the misalignment goes beyond 0.001 inch/inch. This slight misalignment impacts the bearing, as well as the housing. Common contributing factors of the misalignment include

- Dirt or burrs on the housing shoulders and shaft
- Shaft threads not square with the soft seats
- Bent shafts.

Depending on the applications, the maximum acceptable misalignment varies.

Corrective Procedures

Some of the corrective techniques include:

- An inspection of the housings and shafts to check for run out of bearing seats and shoulders
- The use of precision-grade locknuts
- Utilizing single point-turned on non-hardened shafts
- Ground threads for hardened shafts.

These are the most common causes and solutions to bearing failure. Paying attention to what your bearings are telling you is vital to ensuring your facility runs efficiently. 51% of all electric motor failures are a direct result of bearing failure.

Take advantage of a predictive maintenance program. Utilizing an excellent program is the best thing you can do for your bottom line.

David Manney *is marketing administrator at L&S Electric. This article originally appeared on Watts New, L&S Electric's blog. L&S Electric is a CFE Media content partner.*

Links:

AFE National website: www.afe.org

AFE Region 8 website: https://afe8.wordpress.com

AFE Chapter 140: http://www.afechapter140.org