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BOA

Building Operators Association of Canada

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What's Inside?

Important Phone Numbers

Emergency	911
Alberta Boiler Association	403 291 7070
Alberta Labour (Emergency)	403 297 2222
Buried Utility Locations	1 800 242 3447
City Of Calgary (All Departments)	311
Dangerous Goods Incidents	1 800 272 9600
Environmental Emergency	1 800 222 6514
Poison Centre	403 670 1414
Weather Information (24hr)	403 299 7878

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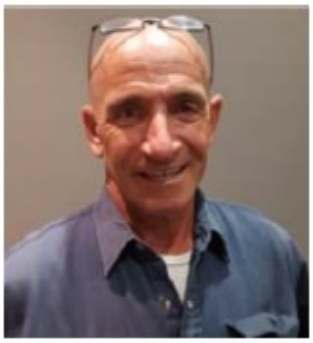
Front Cover: Saiya Bhandari

President's Message

I hope this message finds you & yours well and in good health



Welcome Back to a New Season!

I see that SOPEEC, and the federal government is at it again. Trying to unitize and box up the Building Operators into power engineers with the latest intrusion to our lives with "CSA B56, Power Engineering – Facility Rating and Staffing (New Standard)."

I have previewed the document CSA B56 (you can too) and I noticed they propose there will no longer be a classification 5th Class Power Engineer. It will be done away with, by either exempting the smaller facilities or classifying it under a 4th class Power Engineer or higher certificate, all based on KW size. So even though there are 7 jurisdictions of the 13 currently using a fifth-class certificate. This would mean that the Building Operators currently holding a 5th class certificate will be going back to attain a 4th Class if the building boiler size warrants it. The current 4th class certificate syllabus by SOPEEC has even less information on building operations than the current 5th syllabus and curriculum. I don't know what the agenda here is, but it seems we are losing ground on specific training and certifying competent Building Operators.

I agree that a change is needed, but not rolling Building Operations into another Steam Engineer Certificate. There are more Building Operators working in this country than there are Steam engineers working in industry, from 4th through to the 1st Class We deserve more individual recognition our own licences and certificates. Building Operators deal with public safety in a larger arena than Steam Engineers working in industry ever will. If CSA wants to meld safety and competency for Building Operators, CSA should have designated, certification for Building Operators separately. Where it can have its own syllabus and curriculum teaching what is important in the safe operation of facilities, including but not limited to offices, schools, churches and institutions.

The current Power Engineering structure classes from 4th through to 1st is geared to industrial standards, both in syllabus and the curriculum. Rating certificates to KW size buildings are commercial institutions and deal with public safety and effective and efficient operations, not focused on boilers and refrigeration, CSA should be approaching industry to help with this reorganization. Institutions such as BOMA who have been around longer than CSA and focused on managing all aspects of facilities.

The only commonality we have with power engineers is we are heating our buildings with boilers. Not usually, steam, not high pressure not high temperature but hydronic low pressure low temperature units. That those "not really boilers, more hot water heaters" accounting for less than 10% of our job description. That we have other duties in our facility that account for many more hours. The safe heating of our facilities is key to happy customers, but so is air quality, proper lighting, safe parking, correct plumbing, etc.

Our involvement with SOPEEC, if at all, should be distilled down to boilers and associated equipment, refrigeration and associated equipment. If they don't regulate it, they should not be testing it. I'm not saying it should not be taught and tested but let industry manage it. I have been watching these groups in action for 15 years. They are slow to respond to any change as they meet once per year with another group IPECC and can't agree on much. What they seem to agree on is the self interest of Power Engineers, not Building Operators.

It seems the intent is to do away with the 5th Class Power engineer, by making the smaller heating plants exempt, what good does that serve in the public interest? Building Operations should have their own Certificates of Competency, their own Syllabus and Curriculum. A variety of classifications of Building Operators, based on the facilities they are responsible for, and the role they play in that facility. Our industry is very fluid. Change is rapid, way too rapid for this group. We should have groups like BOMA or IFMA teach, test and certify Building Operators.

My thoughts only,

Les Anderson

BOA Building Operators Association of Canada

TEST YOUR OPERATOR IQ!

Are you equally adept at troubleshooting problems in the boardroom and the boiler room? As the resident facility guru, there's a lot riding on whether or not you know the difference between sounds control and a sound investment.

Try our monthly Operator IQ challenge...*answers on page 26*

1. Boiler structural strength must:

a. be at least ten times the normal working pressure rating

b. be at least equal to the various code requirements

c. take into account only pressure values and not consider temperatures

d. be increased if thinner metal is to be used

e. be verified by the purchaser

2. Manholes are openings through which a person can:

a. enter the boiler furnace

b. inspect the boiler uptake

c. enter the boiler shell or drum

d. enter and inspect the steam header

e. enter the ash hopper

3. On older boilers the brickwork which tended to surround the furnace was termed the:

a. boiler firebox

b. refractory

c. setting of the boiler

d. boiler casing

e. wind box

4. In the case of firetube boilers, the main part of the boiler is referred to as the _____ , and the tubes are contained within this part:

a. header

b. furnace tube

c. water space

d. steam space

e. shell

5. Packaged fire tube boilers:

a. are shipped in a packing case with the components disassembled

b. are skid mounted

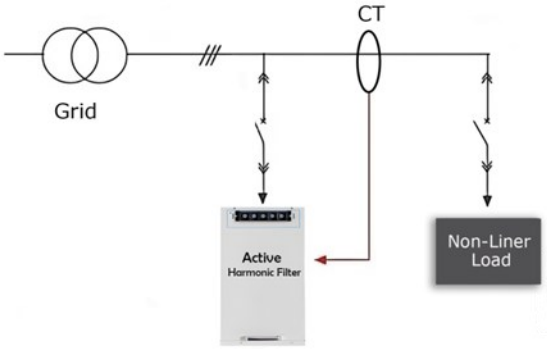
c. must not be used over 103 kPa working pressure

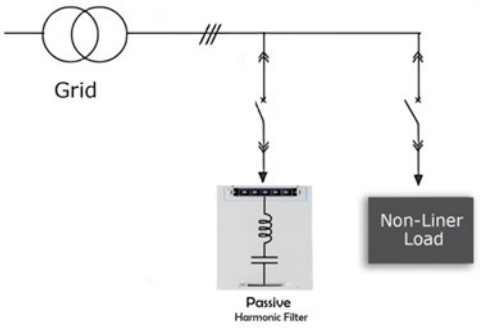
d. have risers and down-comers

e. do not require a water glass

Active Harmonic Filter VS Passive Harmonic Filter

Mohsen Abedi P.Eng, PSM.Eng





Both active harmonic filters (AHFs) and passive harmonic filters have their advantages and are suitable for different applications. The choice between the two depends on the specific requirements and characteristics of the electrical facility. Here are some reasons to use an active harmonic filter instead of a passive filter:

1- **Dynamic Compensation:** Active harmonic filters are capable of dynamic compensation, meaning they continuously monitor the harmonic currents and voltages in real-time. They can adapt to changing load conditions and harmonic profiles, providing more precise and effective harmonic mitigation over a wide range of operating conditions. On the other hand, passive filters are fixed and tuned to a specific set of harmonic frequencies, making them less flexible when dealing with varying loads.

2- **Higher Harmonic Attenuation:** Active harmonic filters can mitigate a broader range of harmonic frequencies compared to passive filters. Passive filters are typically effective in addressing specific harmonic orders but may not provide sufficient attenuation for higher-order harmonics. AHFs, on the other hand, can handle multiple harmonic orders simultaneously, making them more effective in complex harmonic environments.

3- **Power Factor Improvement**: Active harmonic filters can provide power factor correction in addition to harmonic mitigation. By controlling the injected currents, AHFs can improve the power factor and bring it closer to unity, helping to reduce reactive power charges and improve overall energy efficiency. Passive filters, however, do not offer power factor correction capabilities.

4- **Compact Size and Weight**:
Active harmonic filters are generally more compact and lighter than passive filters, making them easier to install, especially in retrofit applications. Passive filters may require large and heavy components, taking up more space and potentially requiring additional structural support.

5- **No Resonance Issues**: Passive filters can sometimes introduce resonance issues in the electrical system due to their reactive nature. These resonances can cause voltage amplification and lead to unexpected equipment failures. Active harmonic filters do not introduce resonance problems since they can be designed to have minimal reactive power flow.

6- **Fast Response Time:** Active harmonic filters respond rapidly to changes in harmonic conditions and load variations, providing immediate compensation. Passive filters may have slower response times, and their effectiveness can be limited in dynamic environments.

7- **Enhanced Reliability**: Active harmonic filters are less susceptible to environmental conditions (e.g., temperature variations) and aging effects that can impact the performance of passive filter components. This enhanced reliability can lead to longer service life and reduced maintenance requirements.

It's essential to consider the specific requirements and characteristics of the electrical facility, including the harmonic profile, load variations, available space, and budget when choosing between active and passive harmonic filters. In some cases, a combination of both types may be employed to achieve optimal harmonic mitigation and power quality improvement

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Elevator Safety, Codes and Regulations

by Stephen Murray

There is number of safety related issues of importance to the building operator and manager. We will be looking at the following issues:

1. Recent Code changes
2. Safety issues with hydraulic cylinders
3. Entrapments

Highlights of the changes are:

- Maintenance is required on all elevator at a minimum of once per quarter. (Previously no min. requirements)
- All escalators are required to have inspection switches installed in each machinery space where access space is provided.
- A logbook either manual or electronic must be provided on site or with the maintenance contractor. The log shall at minimum record the last 5 years activities.
- Current up-to-date wiring diagrams detailing circuits and primary directional circuits are to be provided in the machine room at all times.

This code change also requires that all modernization work on elevators must be performed within the guidelines of the B44-94 code requirements.

SAFETY ISSUES WITH HYDRAULIC CYLINDERS

Uncontrolled descent of Hydraulic elevators due to a catastrophic collapse of the cylinder has occurred resulting in environmental contamination and even injuries and death. This has resulted in litigation which has spurred Elevator manufacturers to outline the safety precautions that can be taken. Owners and managers of facilities should be aware of the potential ramifications.

Background

Up until 1977 cylinders on hydraulic elevators were single bottom in design. They are prone to collapse due to corrosion attaching the welded seam at the bottom of the

cylinder. **These units are most susceptible to collapse.**

Code requirements after 1977 call for the double bottom or Safety Bulkhead bottom. This was to prevent to collapse of the cylinder, but corrosion could still occur resulting in potential oil loss.

Mandatory on all new installations to have the Safety Bulkhead and also a protective PVC lining around the cylinder with a

enclosed monitoring system to detect oil loss from the cylinder and to isolate the oil loss.

Solutions

On installations an oil loss monitoring program should be put into place. Any detection of oil loss for any reason other than obvious seal or associated loss sites indicates a potential problem. A full load safety test should be conducted. Again, any noticeable movement of the elevator would necessitate the unit be turned off and remedial measures be put into place.

Remedial measures

- Replace the cylinder - This should be budgeted for in pre-1977 installations. Where a major loss of oil is involved, the cylinder should be replaced with a cylinder that meets the latest code requirements.
- Install a Safety Device - There are devices in the marketplace that will act to stop the elevator from falling should a sudden breech of the cylinder occur.
- Insurance - Some Elevator companies will insure the cylinder covering only replacement costs.

ENTRAPMENTS

Getting stuck in an elevator is not a pleasant experience. Elevators are designed with the utmost safety standards and are one of the safest means of transportation on the planet. However, entrapments happen and how they are dealt with is more of the issue.

As a building operator or manager, you should

- articles in building publications.
- Train your security and on-site staff as to how to deal with an entrapments.
- Have a procedures policy in place.

In all events of entrapment, it is recommended that you call your maintenance service company and have them come and deal with the entrapment. You would do this as your mechanic is aware of the safety procedures involved with releasing passengers and at the same time, he will be able to trouble shoot the problem to ensure it does not happen again.

In the case of an entrapment you can do the following:
Don't Panic - Remain calm, call your Elevator Maintenance Company.
Assure the passenger by means of the in-car communication system or by way of the door itself that there is someone on the way. There is plenty of oxygen in the cab and the elevator will not fall. Get the passengers to sit down, in most cases they may have something with them they can read to pass the time. Lighting shouldn't be a problem as most elevators are fitted with emergency lighting.

DO NOT try to pry the door open or release the passengers.

In some buildings, particularly residences or hotels people may try to get out themselves. There are products on the market to prevent the doors opening outside the door landing zone such as electromechanical door locking devices and door latches. Extended toe guards are also a good safety precaution. You should consider the installation of these.

Summary

In summary, safety is of the utmost importance when dealing with elevators. In terms of the issues raised in this article the facts are people are injured and die as the result of unsafe procedures or situations.

Review your facility and determine if you need to implement any of the actions mentioned above. Be aware of the Codes. Check your elevators for telephones and emergency lighting. If a building does not have 24 hour manned attendants you require a communications device in the elevator. Implement an oil monitoring program on your hydraulic elevators. Establish a policy on passenger entrapments. Above all think safety when it comes to elevators.

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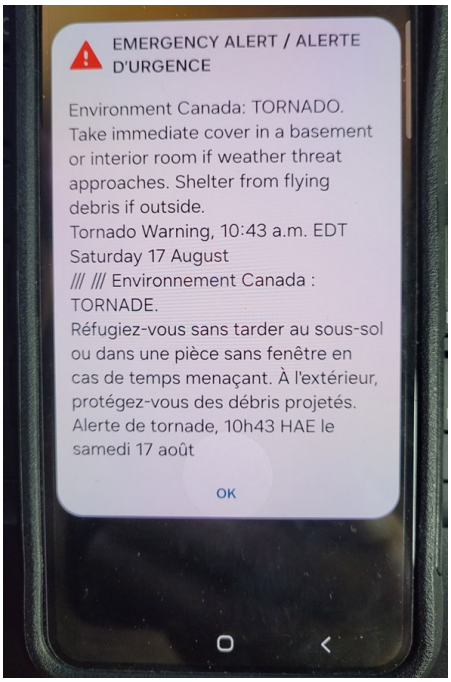
Emergency Power Plans: Why Every Facility Needs One—And What Yours Should Include

I was driving home with my youngest daughter from the market last Saturday morning when our conversation was interrupted by the piercing screech of another EMERGENCY ALERT on our cell phones.

Tornado Warning! I may be giving away my age but when I was a kid, tornados were something that only happened in Kansas. It was a rare affair for a tornado or hurricane like Hazel in 1955 to arrive this far north.



Unfortunately, as you think back over the past few years you realize, this is the new normal. **Forest fires, atmospheric rivers**, **storm surges** from hurricanes., heavy snow, hail, canyon rock slides damming up rivers flooding out communities downstream or two meter water mains bursting and flooding out a large section of downtown Montreal. The list of possible climate calamities seem endless.

If you have been thinking that planning for a climate emergency was something you could keep putting off into the future….THE FUTURE IS NOW!

To ensure readiness across all locations in the event of a local or regional emergency it is crucial to develop a comprehensive emergency power supply plan. The following are key points to consider:

Assess Power Requirements

Determine Critical Loads: Identify essential equipment and systems that require power during an emergency (e.g., lighting, refrigeration, communication systems). Ensure that critical operations can continue smoothly during an emergency.

Power Consumption Analysis: Calculate the power requirements for each location to ensure that generators and backup systems can support these loads.

Backup or Standby Power Systems

Standby Generators: Often facility managers with a generator believe they have their power generation needs covered in an emergency. However, depending on the age and type of facility, the generator could simply be a Life Safety generator that only powers the basics like hallway

lighting to get people out of the building safely.

A standby or backup generator power all loads considered critical to the normal operation of a building should utility power fail for an extended period. In many scenarios with region wide emergencies this can mean days or even weeks. If you are to be prepared for an emergency without utility power, you need to know and understand the difference between a Life Safety and Standby generator and the electrical equipment that each generator panel powers.

For those facilities without sufficient standby power generation, short term portable generators need to be sourced that can be deployed quickly while capital procurement works on the viability of a longer-term solution.

Fuel Supply Management: Most generators are fueled by diesel, natural gas and in some remote areas, propane. Contingency plans must be considered and incorporated in your emergency plan if you are to keep your generator fueled. If it is a region wide emergency, the fuel supplier may not be able to reach you, or fuel may not be available for many days. How many days fuel supply should you keep in storage on site to run your operation? If your standby generator runs on natural gas, what is the plan if the gas supply is cut off?

The 2011 Goderich tornado, an F3 tornado, caused significant damage, including the disruption of the natural gas supply to the town due to safety concerns. In severe weather events like this, it is sometimes necessary to shut off natural gas supplies to prevent

potential explosions or fires caused by damaged gas lines. Many buildings and businesses were without natural gas for weeks while lines were being repaired and inspected. A comprehensive emergency power program needs to consider an alternate supply of portable power.

Automatic Transfer Switches (ATS): In cases where you don't have sufficient standby power or you need to pivot due to your regular fuel supply being interrupted, each location should have an ATS with quick connects to enable rapid and seamless emergency hookups of portable generators.

Electrical Hookups: Each region, province and state have their own regulations for temporary electrical hookups, who is allowed to make them and who has authority to inspect them prior to applying load. The emergency plan should have a list of local electricians that can be relied upon to make this happen properly and safely in compliance with local regulations.

Portable generators can usually be in place in a couple of hours with the proper emergency planning.

Renewable Energy Solutions

While renewable energy projects such as wind and solar energy harvested by a battery storage solution will have its day in the future, in my opinion we are not quite there yet. Battery storage solutions are relatively short term and expensive when compared to legacy standby generators, when compared to kW's delivered per dollar spent.

Infrastructure and Facility Upgrades

Flood-Proofing: Elevate critical electrical equipment above potential flood levels and seal building envelopes against water ingress. Build earthen berms around the building or tunnels for water to flow with grates over them or permeable asphalt parking lots. There are many solutions, if you plan for them.

Fireproofing: Use fire-resistant materials for critical infrastructure and create defensible spaces around locations to protect against wildfires.

Communication Systems

Emergency Communication Plans: Develop and maintain communication plans to coordinate with local authorities and employees during emergencies. Do you have a plan in place to make sure that everyone who was in the building got out? Plan ahead.

Redundant Communication Systems: Use satellite phones and other redundant systems to ensure continuous communication.

Training and Drills

Staff Training: Train staff on emergency procedures, generator operation, and safety protocols. Staff training

provides a level of comfort to enhance confidence and reduce panic in a stressful situation.

Regular Drills: Conduct regular emergency drills to ensure readiness and address any weaknesses in the plan. Frequent drills help staff anticipate the unexpected. Police, fire and paramedics, the military, all practice and drill endlessly so that when the time comes, the basic skills are so automatic and second nature that you are prepared for the unexpected.

Collaboration and Coordination

Local Authorities: Collaborate with local emergency services and government agencies for coordinated response efforts. Know where to find out when roads are closed by local police due to heavy snow or roads

washed out in a storm.

Mutual Aid Agreements: Establish mutual aid agreements with other businesses for resource sharing during emergencies. Excess fuel, water pumps, generators, even labour. As they say, what goes around, comes around. It may be your turn tomorrow.

Monitoring and Maintenance

Regular Inspections: Conduct regular inspections and maintenance of backup power systems and emergency equipment. Planned maintenance and regular operation ensure the gen-set will operate as expected, when expected.

Monitoring Systems: Implement remote monitoring systems to track the status of power systems and quickly address issues. Oil, fuel and coolant level sensors are cheaper than ever, often costing less than $100. Certainly, much cheaper than having to scramble to get a technician on site in an emergency.

Now more than ever, standby power generation adds value to real property.

Document Plans: Maintain detailed documentation of the emergency power supply plan and update it regularly with current vendor contacts; fuel delivery, electricians, fire & security alarm systems, and so on.

Post-Emergency Reviews: After each emergency, review the response and update plans based on lessons learned. What worked and what did not. Failures or weaknesses in the plan this time around can be resolved by discussing alternatives for next time.

In an era where the unexpected has become the norm, the importance of proactive preparation cannot be overstated. Climate emergencies—whether they come in the form of tornadoes, floods, or wildfires—demand a robust response plan that safeguards not just the physical infrastructure but also the lives and operations within. The time to act is now. By assessing critical power needs, securing reliable backup systems, and ensuring seamless communication and coordination, we can face these challenges head-on. Remember, it's not just about surviving the storm but thriving in its aftermath. Plan today, protect tomorrow.

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KenKen Puzzle

How to solve the Kenken puzzle:

(Answers on page 26)

- Fill in the numbers from 1 –6
- Do not repeat the number in any row or column
- The numbers in each heavily outlined set of squares, called cages, must combine (in any order) to produce the target number in the top corner using the mathematical operation indicated
- Cages with just one square should be filled in with the target number in the top corner
- A number can be repeated within a cage as long as it in the same or column

5					8		2	9
	1			3	2		4	6
	6	2		1				
								2
	8	3	6	4		7		
6		9	1	2		8	5	
7		6		9			3	
4	9				3	6		5
3			8	5			7	4

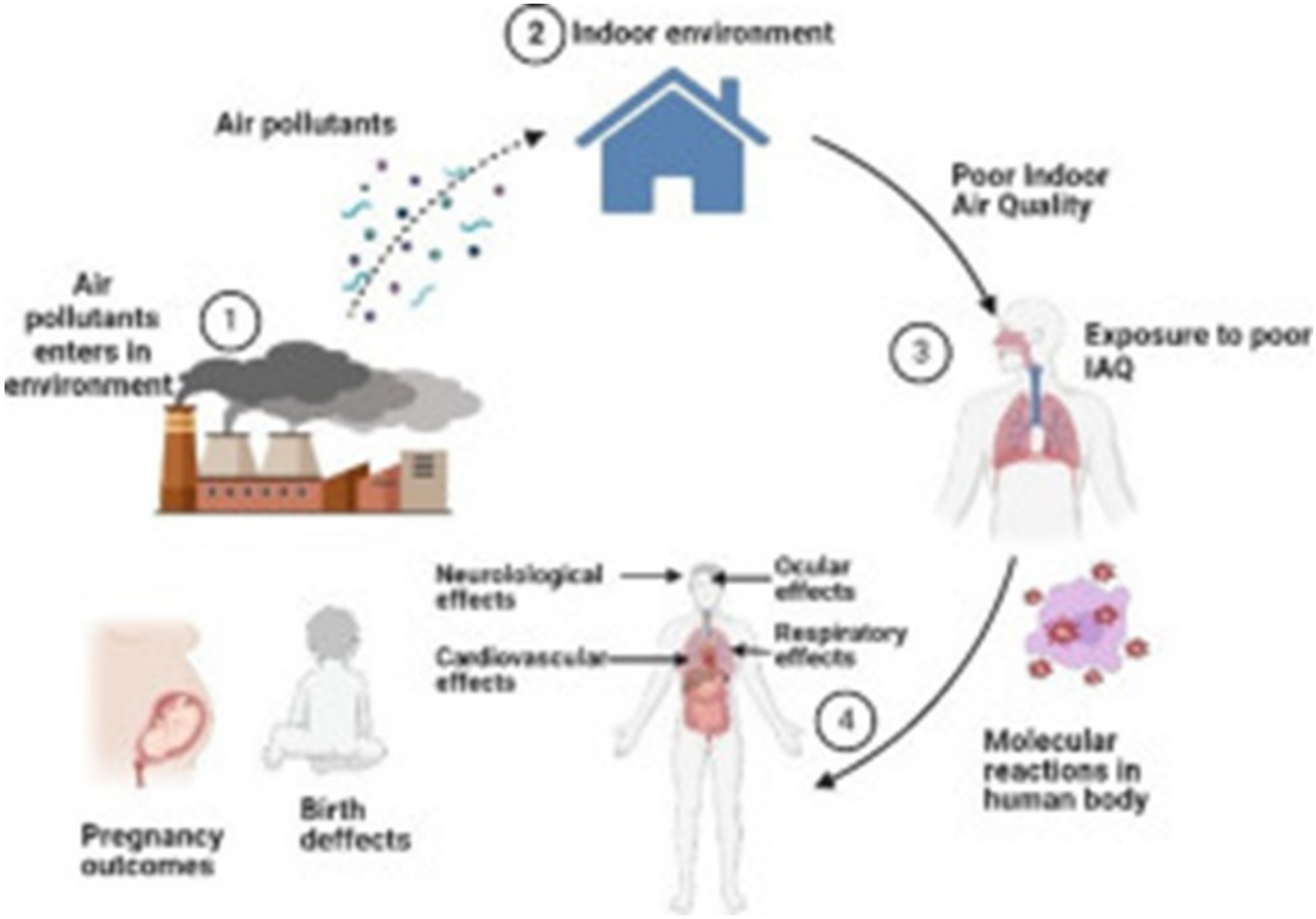
Gas Detection in Commercial Buildings

by Kae Shummoogum P.Eng.

The increased awareness of Indoor Air Quality issues has resulted in a greater demand for gas detection in commercial buildings. Carbon monoxide, Carbon dioxide, Ammonia, Freon's, Natural gas, Nitrogen dioxide and VOC's are typical gases being monitored. As a result, there is a greater need on the part of the building managers to know about the regulations governing the allowable exposure to the gases.

- The "Building code" contains information about Carbon monoxide and Nitrogen dioxide for closed vehicle storage areas.
- The "Chemical Hazards Regulation" section of the "Occupational Health and Safety Act" contains useful information regarding the legal limits for allowable exposure to building occupants.
- The "ASHRAE" standards have a list of suggested gas level for good air quality in an indoor environment.

Gas detectors are being installed in commercial building mainly because of the requirements of the building code or



safety consideration and there is little emphasis on the energy efficiency of such systems in operating the ventilation systems. As the need to save energy becomes more important especially with possible legal obligations from the Global warming conference in Kyoto, Japan to cut worldwide emissions, the energy savings aspect of the gas detection device becomes more important. Gasonic Instruments has conducted field test on different carbon monoxide sensors to help buildings save on the energy costs associated in running those devices.

Our test involved two Calgary parkades of the same size but with two different carbon monoxide sensors. One of the parkades installed 68 electrochemical sensors six years ago and the other is 1 year old and has 48 solid state sensors. One test looked at the drift of the sensors from their Zero baseline and lab tests on the two types of calibration gas after one year operation. The graphs on page 3 shows the considerable difference between stability of the two sensors. We also found that 4 solid state sensors failed after one year of operation and none of the electrochemical sensors had failed in 6 years.

When we analyzed the cost of operating the two systems, we concluded than the electrochemical maintenance costs one third less than the maintenance for the solid-state sensors. This does not include the energy savings from reducing the ventilation system run times.

More information regarding gas detection and test results are available from Gasonic Instruments. Kae can be reached at 403-276 -2201 (phone) or 403-276-2668 (fax).

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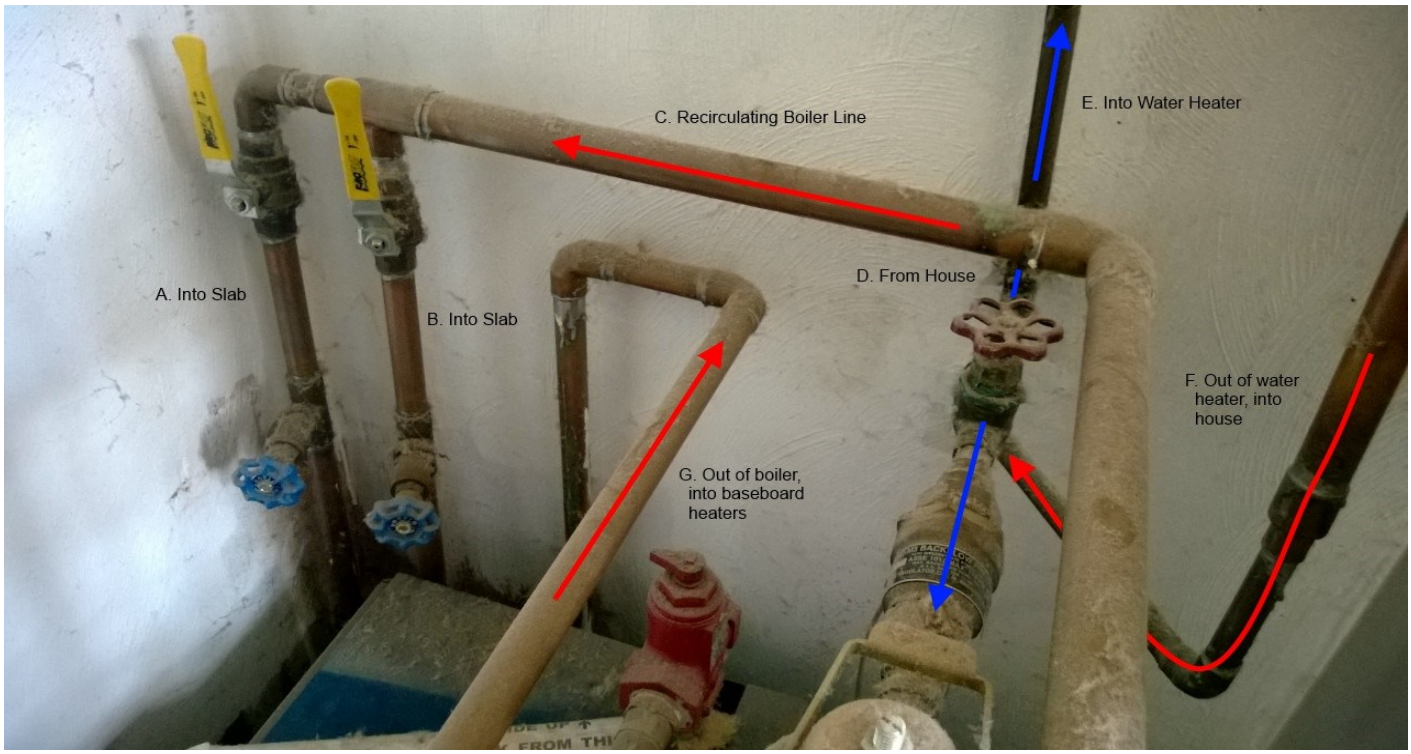
Strategies that aim to keep plumbing systems flowing

Maintenance and repair of a facility's numerous plumbing system components is especially important because according to health and safety codes, buildings must not be occupied without Functional plumbing.



Plumbing systems are constantly in operation, maintaining pressure, temperature and water seals between the occupied spaces and the septic or sewage disposal system.

Starting a plumbing maintenance program

The first step in beginning a maintenance program is a complete audit of the various systems and a count of all fixtures and plumbing apparatus, such as pumps, water heaters, pressure regulators and filters.

A set of the building's plumbing plans and specifications is helpful to have, as are operating and maintenance manuals, valve tag charts, parts lists and manufacturers' cuts. All of these materials are usually readily available from the architect or the plumbing contractor for a recently constructed building.

Part of initiating the maintenance program

is to make decisions pertaining to service, such as how much will be performed in-house and how much will be contracted out to a plumbing contractor or professional service organization. It is imperative that these decisions be made before an emergency arises.

Emergencies such as broken water pipes, backed up drains, gas leaks, and lack of hot water have to be addressed immediately. As with HVAC equipment, when plumbing emergencies occur during non-work hours, telephone numbers should be available so custodians or security personnel can contact building maintenance people.

Maintenance managers then will have decide how best to respond. The goal of any response will be to have all systems functioning as soon as possible without disrupting facility operations.

Preparing a maintenance log

A log should be kept of all plumbing fixtures, appliances and ancillary equipment. The log should indicate the age and condition of each item, as well as its history of operation and repair. It also should list any spare parts, along with their location.

In larger facilities, rather than log each individual plumbing fixture, a log page can suffice for each toilet room, as it can in the case of a motel/hotel or nursing home, individual or patient rooms.

If the plumbing systems contain pumps or shell and heat tube exchangers, keep records showing inlet and outlet pressure and temperature readings. Changes in these readings might indicate air accumulation in the lines or the need to punch tubes in the exchanger coil. Also record the electrical current drawn by the pump motor.

The log can be used as a checklist, as well as a repair record for the various items, noting those requiring excessive repair. From this, a proper maintenance schedule can be determined.

Equipment inspections

The simplest form of inspection of plumbing systems is observing the daily use of the equipment and its reliability. Questions to be answered during inspection include the following:

- ✦ Are adequate water pressure and temperature being maintained?
- ✦ Is the design or set water temperature being maintained?
- ✦ Do all faucets or flush valves close completely, or do they continue to drip or dribble after closure?
- ✦ Do any fixtures show discoloration? This may rust or other water borne minerals, as well as the need for a water treatment or filtration program.
- ✦ Are any of the fixtures' drains noisy or slower to empty that what is desirable? This might indicate that fixture traps need to be emptied or cleared out, or perhaps a more aggressive action is necessary. A chemical drain cleaner can break up clumps of hair or

other forms of build-up inside traps or on the interior walls of the drainage piping system. Using any chemical cleaner can be hazardous, so follow manufacturer's directions strictly.

✦ Are odors present? Check for dry trap seals in floor drains or fixtures.

✦ Does exposed pipe coverings or insulation appear moist, indicating a possible leak or condensation?

In addition to the daily "inspection by use" of these systems and fixtures, janitorial crews should be alerted to notify maintenance personnel of any perceived malfunctions.

During a heavy rainstorm, observe area drains for slow operation, indicated by a backup of standing water or water cascading from the roof down the exterior walls, roof hatches or into ducts serving exhaust fans or other rooftop HVAC equipment.

Check screens or strainers on roof and areas drains periodically for blockage.

Continual occurrences of any of the above should alert the maintenance department to the possibility of a defect in the system design or a malfunction of a mechanical device within the system.

Common repair items

The most frequently needed plumbing repairs typically involve flushometers on water closets and urinals and seals on faucets or other water outlets.

The need for repairs is identified by routine inspections or in the course of daily use of plumbing fixtures by the building's occupants. If the cleaning crew is part of the facility's in-house maintenance department, they are a good source of information on any problems and needed repairs.

Some modifications required by the Americans with Disabilities Act also may be included in the repair upgrade category. Major remodeling of rest rooms, hallways, for example, may be categorized as capital improvements, but smaller adaptations of such as pipe covering insulation may be considered maintenance and repair items.

Unlike HVAC and fire protection, plumbing maintenance generally does not involve regularly scheduled maintenance procedures. Instead, it relies chiefly on regular inspections to reveal problems or potential problems. The observations of building users and the cleaning crew are also a primary source of information as to fixture condition.

An effective reporting and response system prevents minor maintenance issues from developing into long-term nuisances or costly major repairs, thereby protecting the maintenance department and its reputation.

Specialized Systems

Certain specialized plumbing systems in

some facilities may require additional attention in terms of maintenance and inspection. These include:

✦ Hospitals, which have medical gas systems carrying oxygen, vacuum, nitrogen, nitrous oxygen and compressed air. Hospitals and laboratories also have acid waste systems, bed pan washers, autopsy tables and therapeutic baths.

✦ Schools, gymnasiums, athletic facilities, and hotels/motels, which have specialized swimming pool and filtration systems.

✦ Restaurants and other food preparation facilities, which use various plumbing systems to serve dish, utensil and tray washers; pot washers; coffee urns; ice makers; and refrigerators.

✦ Dental offices, which require cup sinks and vacuum and compressed air.

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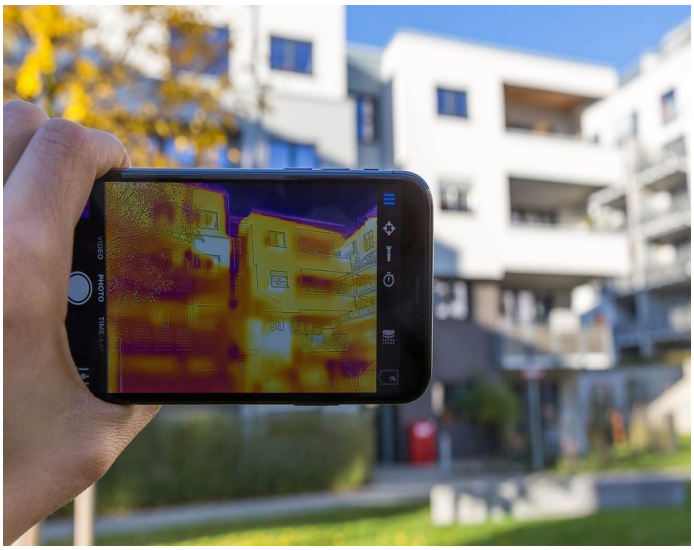
Possibilities of Infrared Scanning

by Grant J. Eliuk and Mike Peryy

INFRARED DETECTORS / IMAGERS

Infrared detectors/imagers can be used for a variety of applications in the construction and maintenance industries. Since infrared radiation does not rely on visible light, it offers the possibility of seeing in the dark or through obscured conditions, by detecting the infrared energy emitted by objects. The detected energy is translated into imagery showing the energy differences between objects, allowing these objects to be seen. There are a great number of areas where infrared thermography can be of benefit in almost any facility. These can be broken down into several major sectors.



Condition Monitoring

- Electrical - production, transmission, distribution, switchgear, panels.
- Mechanical - motors, pumps, various rotating equipment.
- Buildings & Structures- insulation, air infiltration, roof leaks.

Process Monitoring and Control

- Refractory
- Steam Systems
- Petrochemical Processes
- Automotive Industry Process

Metal and Plastic Processing

Quality Control and Quality Assurance

- Electronics design, verification, mass screening, diagnostics
- Mechanical Assemblies -malfunction and failure analysis

Non-destructive Materials Testing

- Cavities and Inclusions in Solids
- Composite Delamination
- Subsurface Corrosion Detection
- Moisture Detection
- Concrete Bridge Deck Delamination

Thermal Night Vision

- Security
- Surveillance
- Search & Rescue

Research and Development

- Heat Plow Studies
- Biological Studies
- Air Movement Studies
- New Product Evaluation

ADVANTAGES OF A CONDITION MONITORING SYSTEM

- Lower maintenance and production costs
- Reduced unscheduled production downtime
- Extends maintenance repair intervals
- Lower probability of catastrophic failure
- Increased personnel safety
- Reduced insurance rates
- Reduced spare parts inventory
- Unnecessary repairs minimized
- Maximize plant availability
- Maintenance or repairs can be planned for non-peak production periods
- Improved coordination of maintenance efforts
- Optimizes staff size
- Improved production quality
- Speeds up production output
- Improved communication and decision making
- Improved equipment design
- Competitive advantage

Undoubtedly there are major benefits to be derived from implementing a condition monitoring program in any facility.

With electrical equipment, machinery and labor costs rising, managers, engineers and technicians alike must turn to condition monitoring technology for assistance to maintain their competitive advantage. In a survey of 557 manufacturing and process facilities that have introduced a condition monitoring program, the following average improvements were made:

- 28% increase in maintenance productivity
- 19% decrease in material cost
- 18% reduction in spare parts inventory

In addition to quantifiable cost savings, 76% of the respondents cited improved relationships between management, maintenance organizations and operations departments. These are the reasons why more and more companies are taking advantage of technology such as Infrared Thermography. Condition monitoring utilizing Infrared Thermography is a WIN-WIN situation for everyone involved.

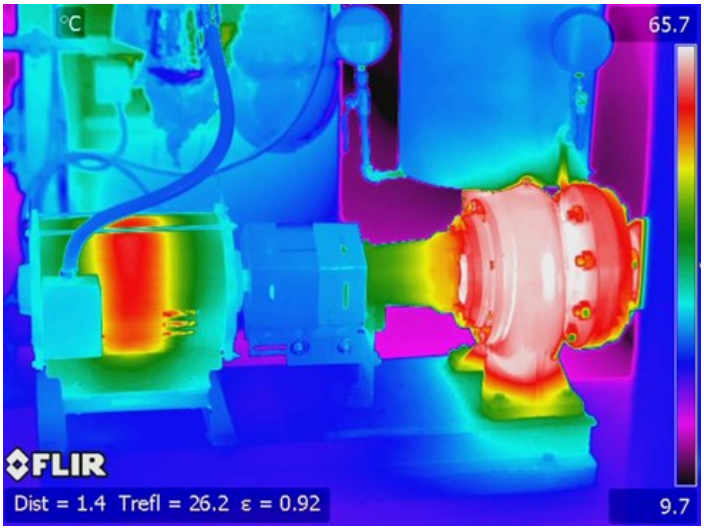
IR/T is currently experiencing rapid growth as more and more electric utilities and industrial sectors are embracing the technology. The reason for this growth is that company personnel are understanding the benefit of this non-contact, non-destructive method. The primary benefit is to find deteriorating components prior to catastrophic failure. Thermography provides a "different set of eyes" allowing a whole new level of diagnostic aid and problem solving.

INFRARED CONDITION MONITORING

Temperature and thermal behavior of power generation and distribution equipment as well as industrial machinery and processes are the most critical factors in the maintenance of operations. Temperature is one of the first observable parameters that will indicate the operating condition of a component and is by far the most measured quantity in an industrial environment. For this reason, monitoring the thermal operating condition of electrical and mechanical equipment is considered to be the key to any successful predictive maintenance program.

Infrared Thermography (IR/T) is a condition monitoring technique used to remotely gather thermal information for monitoring the condition of the entire electrical system from generation, distribution to end user.

Since all equipment (when operating) has a normal operating thermal signature, IR/T allows this signature to be recorded as a baseline measurement. Once this is established, IR/T over time will reveal the thermal differences deviating from the norm. This abnormally localized radiation (anomaly) can either be an over heated condition or lack of heat. This information is then reviewed, and the decision is made to plot the temperature change with time and/or the repair can be initiated at the most efficient time. The information gathered can be stored and Illy analyzed, providing complete predictive maintenance capabilities.



CONDITION MONITORING PROGRAM

A condition monitoring program, properly implemented, is an important tool for modem facilities. The total maintenance cost in most plants will range from 15 to 40 percent of the total cost of goods produced. It is the single largest contributor to controllable cost in most manufacturing and process plants. It also has the largest potential for improved availability and profit in industry today.

Independent surveys indicate that North American industry spends more than $200 billion dollars each year on maintenance and that more than one third, or $60 billion, is wasted as a result of unnecessary or improper maintenance These surveys also confirm that reactive (after the machine failure) maintenance will cost an average of three times more than the same repair performed using the advance notice provided by condition monitoring techniques. The forewarning of incipient machine or system problems provided by a condition based predictive maintenance program is invaluable in saving money.

IR/T Electrical Inspections - A Brief History

The main application for thermography has always been electrical system inspections. In 1965, the Swedish Power Board began IR/T inspections. In 1976, the UK Electrical Generation Board began utilizing IR/T for predictive maintenance on their transmission lines. Canadian companies such as Ontario Hydro and B.C. Hydro also became involved with IR/T during this period.

Over the years, IR/T has proved itself as valuable tool for electrical inspections. Electrical problems manifest themselves by emitting increased heat energy. The new generation of IR scanners can easily detect and image this information. IR/T has now been implemented in virtually every major industrial setting to provide valuable information for condition monitoring and preventive maintenance.

Return on Investment

The costs involved in implementing an 11~ITT condition monitoring program are dependant on several factors. These include:

- Facility size.
- Facility type.
- Complexity of monitoring program desired. IR equipment and training either contracted out or acquired internally.

Industry in general has begun to recognize IR/T inspections as an invaluable tool. The financial savings generated by IR/T programs through increased safety, productivity and efficiency are well documented. The cost of hiring an IR inspection company is fractional compared to these savings.

Conclusion

The benefits of a properly implemented IR/T inspection program are hard to ignore. Companies hoping to maintain a competitive edge must stay current with technology. While certainly not new, IR/T is just beginning to reveal how useful it can be to all areas of industry. By reducing maintenance costs, down-time and catastrophic failure, IR/T customers will continue to enjoy a strong bottom line.

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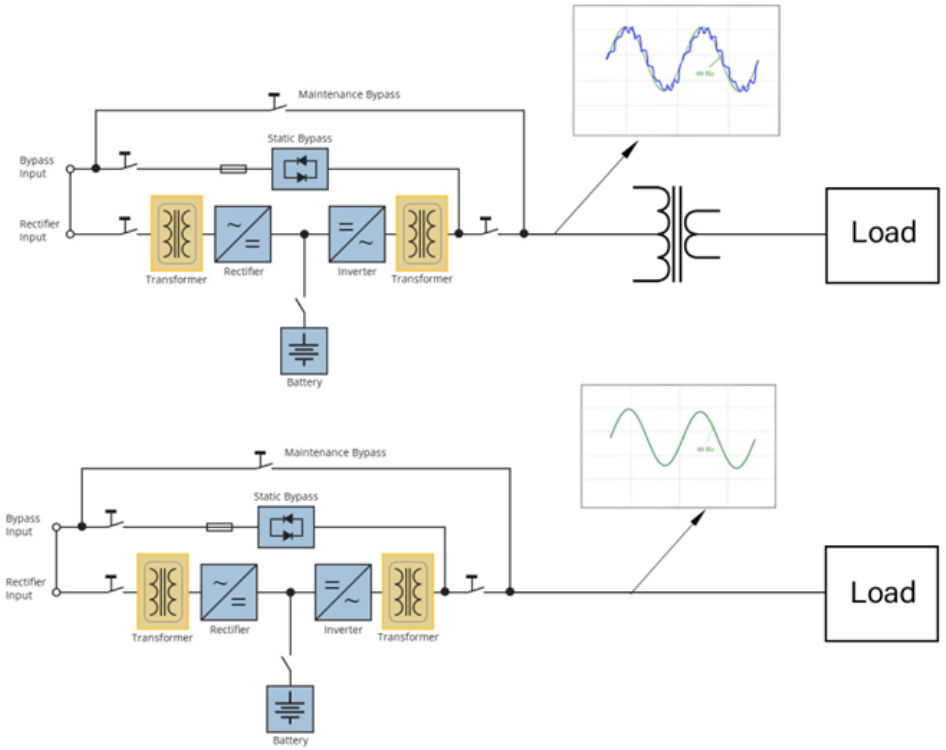
The impacts of an external stepdown transformer on the power quality of UPS systems.

Mohsen Abedi P.Eng, PSM.Eng



It is preferred to select a UPS system that matches the load voltage to avoid the need for a step-down transformer, as the transformer can cause output voltage distortion for several reasons:

1. **Non-Linear Load Effects**: Transformers can introduce non-linear characteristics to the load. When the UPS output feeds into a step-down transformer, the transformer's magnetizing current can create harmonics, leading to voltage distortion.
2. **Inrush Current**: When a transformer is energized, it draws a significant inrush current. If the UPS is not designed to handle this inrush current, it can lead to voltage dips or distortion.
3. **Impedance Mismatch**: The impedance of the step-down transformer can differ from what the UPS is designed to modulating PWM signal by internal output LC filter. This mismatch can cause reflections and distortions in the voltage waveform.
4. **Resonance**: Transformers and the UPS might interact in a way that causes resonance at certain frequencies. This resonance can amplify certain harmonics, leading to voltage distortion.
5. **Load Changes**: Sudden changes in the load on the transformer can affect the voltage regulation capabilities of the UPS. If the transformer steps down the voltage for a variable load, this can cause fluctuations in the UPS output voltage.
6. **Quality of the Transformer**: Poor-quality transformers can introduce more losses and distortions. The core material, winding design, and overall construction quality play a significant role in how much distortion is added.

To mitigate these issues, it is important to:

- Ensure the UPS can handle the inrush current of the transformer.
- Use high-quality transformers with recommended K factor and low harmonic distortion.
- Select a UPS system that matches the load voltage to avoid the need for a step-down transformer
- Properly match the transformer impedance with the UPS.
- Implement filtering solutions to reduce harmonics and resonance effects.
-

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Kickstart your career as a Building Operator

BOMA Calgary's Building Operator Training Course is designed for those wanting to gain more knowledge on commercial building operations and taught by industry veterans.

If you are looking to begin your career in building operations or are currently employed in the industry but want to further your own professional development, this course is for you.

It teaches to the 5th Class Power Engineering standard, allowing you to take the ABSA exam when the course is complete.

Click Here to Register

The 5th Class power Engineering Course will begin on Thursday February 23, 2023 and will take place every Tuesday and Thursday evenings from 5-8pm
The course will be held online only using Zoom.
The fee for enrollment will cover the cost of the 150 hour course, textbooks, and BOMA certificate upon completion
please note this does not include the ABSA exam
The total cost including GST is $2,199.75
Questions? Email Lloyd Suchet at lloyd.suchet@boma.ca for more details.

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Kenken Puzzle Answer

5	3	4	7	6	8	1	2	9
8	1	7	9	3	2	5	4	6
9	6	2	5	1	4	3	8	7
1	7	5	3	8	9	4	6	2
2	8	3	6	4	5	7	9	1
6	4	9	1	2	7	8	5	3
7	5	6	4	9	1	2	3	8
4	9	8	2	7	3	6	1	5
3	2	1	8	5	6	9	7	4

TEST YOUR OPERATOR IQ ANSWERS

Answers: 1) b 2) c 3) c 4) e 5) b

Every child matters.

Orange Shirt Day
National Day for Truth and Reconciliation
September 30

JOIN US:
TUESDAY SEPTEMBER 10, 2024 AT 5PM FOR OUR

Title: **Solutions for HVAC and Machinery Noise Control**

Andy and Taylor will be discussing their expertise in the realm of buildings that offer diverse solutions for HVAC and machinery noise isolation, as well as architectural acoustic barriers and noise isolation techniques. They will begin with a concise overview presentation, followed by a question-and-answer session. This will give our members an opportunity to gain insights on effectively addressing specific challenges and identifying pathways to achieve optimal solutions.

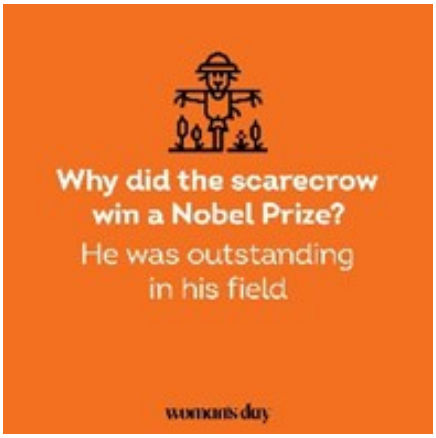
Presenter: **Andy Strasser, P.Eng Vice-President, Engineering & Taylor Smyth, Vice-President, Operations, Merlin Noise Control**

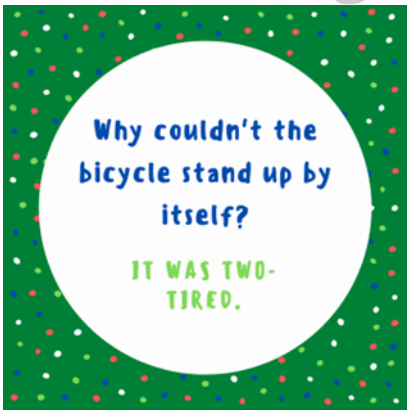
Location: **Danish Canadian Club, 727 11 Ave SW, Calgary, AB T2R 0E3**

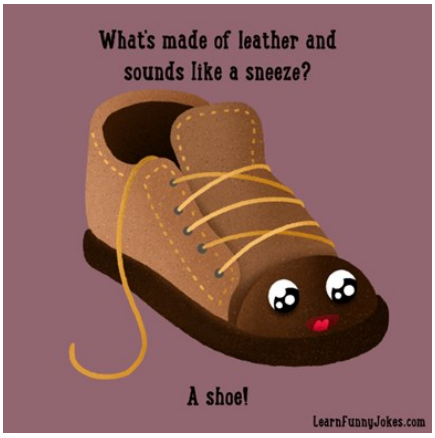
Bio: Andy is a noise control specialist with 20 years of experience in mitigating noise and vibration concerns. He started his career in Europe working for a turnkey provider of industrial and environmental noise and vibration control solutions. Learning the trade, Andy was extensively involved with quieting down environmental stack noise emissions from power plants and enclosing in plant noise sources to meet occupational noise exposure limits for operators.

Taylor has dedicated his career to being at the forefront of delivering innovative solutions throughout the Noise Management and Construction sectors. Working alongside many of Canada's leading organizations, he has become a partner of choice and trusted advisor, continuously delivering above and beyond. Taylor's client-centric approach combined with his in-depth understanding and focus on providing tangible results has made him a valued leader of the MERLIN team.

Just for laughs!







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1/2 page	$775	1/2 page outside cover	$900
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Check to see when your power engineer certificate is due for renewal!

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We look forward to seeing you in-person for our meeting at the Danish Canadian Club (727 11 Ave SW) on Tuesday September 10, 2024 @ 5pm

Please visit the Building Operators Association of Canada YouTube Channel to watch the Speakers.

BOA Building Operators Association of Canada