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# Canada

Official Publication of the Building Operators Association (Calgary)

November 2021



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## Important Phone Numbers

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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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# President's Message



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

The Building Operators Association is not having a live meeting for the remainder of the year. I am hoping to have better news for the 2022 season, the opportunity to meet again as we usually do will be announced in this magazine. I would not feel good if we became a cell source for one of the variants to spread. I feel as frustrated as everyone else in not returning to regular meetings. I believe there is special bonds made when we can talk freely looking eye to eye standing next to another person. We still will continue to have our meetings, but we remain in a virtual format. The Guest speakers are engaging and present timely talks on interesting topics. The meeting last month with tekmar Control Systems was very interesting. It can still be viewed on our website as well all our past meetings are posted there.

The next meeting will be on ventilation in the workplace, an important topic considering COVID-19 can as well be also an air borne virus. We post all our virtual meetings on our website at, boacalgary.com to be viewed at your convenience. There will be a link provided in the magazine to register to attend the monthly meetings.

The executives meet monthly, and the topic of "in person meetings" continues to be discussed. We are just not there yet. Please



Building Operators Association

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stay tuned to the website, we will announce any upcoming changes there.

BOMA Calgary has let me know that there will be another 5th class for Building Operators beginning the 3rd of February. It will again be a virtual event it will have a limited amount of students in so space will fill up early. BOMA had great success with the classes done with the students' in homes or remote settings. BOMA Calgary is also investigating the possibility of continuing on the way to further the education of Building Operators by assembling a Fourth-Class program. We have been successful in educating Building Operators at the 5th class level, it is only fitting that they continue this to the highest levels for facility operations. BOMA Calgary is now conducting a feasibility study with BOA Canada.

Carrissa has sent out membership invoices, please pay, as we continue to need your support.

The next virtual meeting is November 9th at 5PM, MST. **Please register to attend the meeting by clicking on this link.** Please extend an invitation those who you believe will as well benefit.

So, take care of yourselves and please, be kind to one another.

Smiles))

With kind regards,

Les Anderson PE, RPA





# Clean Air Matters

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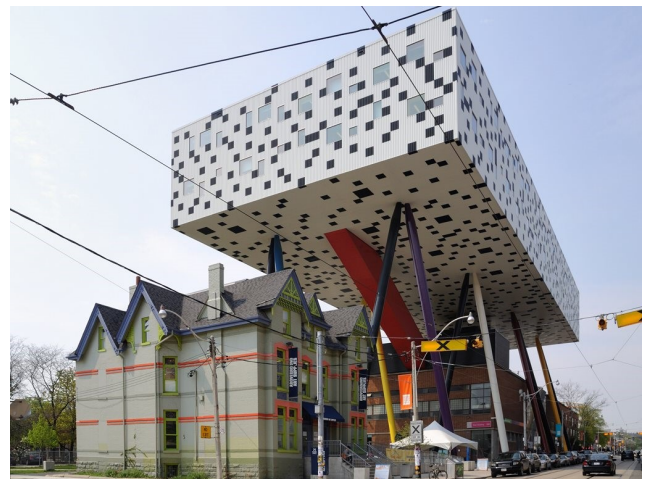
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# Did You Know?

This giant fish-shaped building is (quite fittingly) the regional office for the National Fisheries Development Board, located near Hyderabad, India. The building, which was constructed in 2012, was inspired by Frank Gehry's "Fish" in Barcelona.



The Sharp Centre for Design is part of the Ontario College of Art and Design (OCAD). It was designed by Alsop Architects in a partnership with Robbie/Young + Wright. The building consists of a rectangular structure that sits 26m above the ground, supported by 12 steel columns. The building hovers over the oldest building on the campus, and is connected to an existing building by a lift and stair core.



## 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 16

1. **The amount of heat lost by a building due to conduction, convection, and infiltration is directly affected by:**
  - a. outside air temperature
  - b. geographic location of the building
  - c. the velocity of the wind
  - d. the type of activity in the building
  - e. the type of heating system used in the building
2. **The resistance to heat flow through walls, floors, and windows is known as:**
  - a. infiltration
  - b. ventilation
  - c. reduced solar load
  - d. total thermal resistance
  - e. overall coefficient of heat transmission
3. **Which of the following methods can be used to estimate the ventilation load on a building?**
  - a. crack method
  - b. conversion method
  - c. conduction method
  - d. the "U" factor method
  - e. ventilation method
4. **Heat transfer through space from our sun occurs by:**
  - a. convection
  - b. Pascal's Law
  - c. conduction
  - d. radiation
  - e. none of the above answers
5. **One of the following is a value for atmospheric pressure at sea level:**
  - a. 1 atm
  - b. 101.3 kPa
  - c. 273 degrees C
  - d. 14.7 lb/in<sup>2</sup>
  - e. 760 mm Hg



# Driving Long Term Improvements with Submetering

by Alberto Quiroz

**Submetering** paves the way to equitable billing, energy and water conservation, and demand reduction on the building infrastructure. Through the use of individual submeters, building owners, property managers, and tenants gain insight into how they consume energy and water and the performance of the building in greater detail and real time.

Some of the immediate, short-term benefits to submetering are evident: changes in household behaviour that lead to a dramatic decrease in resource consumption, landlords distributing costs for tenants in a fair proportion, and an incredibly high return on investment quickly after installing the submeters.

That being said, there are also long-term improvements you can expect with submetering.

## Building Efficiency

Installing submeters has proven what many have already suspected: when responsible for their own utility costs, tenants are more likely to conserve resources. Studies have shown that the average conservation of resources post-submetering starts at 20%. Improvements begin in the first month after the submeter installation.

Long-term, this efficiency grows deeper. Submeters and sensors provide large amounts of data over time. This data offers invaluable insight to building managers and owners about resource consumption; in case the Energy Analysis software package does not have it, the data reports can be used to generate heat maps for the building, identifying outliers, whether tenants or areas of the building that consume more resources than others.

## Accountability

Landlords have different options once a submeter is installed in the building. They can either continue charging a flat rate but informing their tenants of their resource use, or they can introduce new charges,

improving their revenue stream.

A perhaps unpredictable long-term advantage of submetering is fewer landlord-tenant disputes. Submeters allow for more accurate determination of resource use, and thus there is no question of whether or not the distribution of costs is fair.

## Cost



The return on investment (ROI) is relatively high and happens quickly after installing submeters (from two to six months), in the long run, these savings accumulate.

Another major benefit of the data submeters provide, is identifying potential leaks, damages, and other operation and maintenance issues. This allows for easy repairs and timely preventative maintenance. Submeters can also verify whether certain efficiency technologies have been correctly installed and are delivering the expected performance. All of that contributes to lower operation costs and keeps the entire building system running smoothly for longer periods of time.

## Conclusion

The short-term and long-term benefits of submetering are undeniable.

*Continued on page 8...*

Efficiency-wise, submetering causes a dramatic decrease in resource consumption right off the bat. It provides essential data for building owners and managers to spot retrofitting opportunities and how some areas of the building compare to others.



The ROI of submetering is indisputable, even if it may seem like a significant investment at

first. Over a more extended period of time, submeters provide crucial information about the condition and the operation of the building. Repairs can be scheduled to program maintenance intervention when convenient at lower costs.

Lastly, submeters also eliminate un healthy arguments between tenants and managers and are an excellent way to settle disputes related to resource consumption and payment.

Considering all that, it is no wonder that more and more property owners and managers are looking into submetering as an effective method for saving costs and helping the environment.

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# Tachometer Working and Types

Tachometer is a device which is used to measure rotational speed of a disk or a shaft of motors or other machines. These devices can either be inbuilt into some equipment which contains moving parts, or it can be a free hand held device which can be used to measure rotational speed in different kinds of equipments. Tachometer is also referred to as revolution counter.

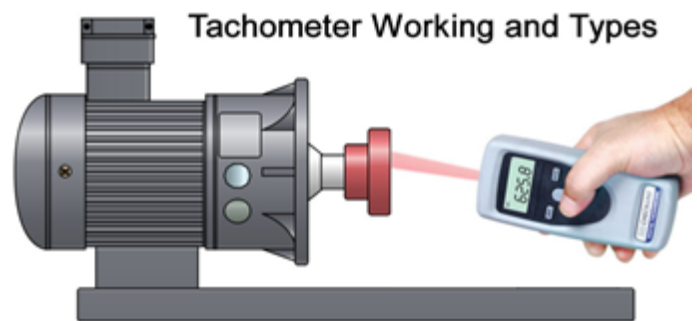
Tachometers which are attached in vehicle show the rate of rotation of the crankshaft of the engine. Flow rates of the flowing fluids can be measured by introducing vanes in the flowing fluid and measuring rotational speed of the vane. Tachometers are also used to measure blood flow rates.

The working principle of tachometer is that if there is a relative motion between shaft of a device and magnetic field then an electromotive force is induced in the coil placed inside the constant magnetic field of the permanent magnet. The developed electromotive force is directly proportional to the speed of the shaft. This implies a linear relationship between the



electromotive force and speed of the shaft.

Although there are mechanical tachometers also other than electrical tachometers, but electrical tachometers are widely used all around because they offer high accuracy and precision and can be operated over a wide range.



## Types of Tachometer:

- AC or DC type of tachometer generator.
- Contact or Non-contact type tachometer.
- Time measurement or frequency measurement type tachometer.

## AC or DC tachometer generator:

In case of DC tachometer generator, the machine whose rotational speed is to be measured is coupled with the shaft of the DC tachometer generator. The armature of the device rotates inside the constant magnetic field of the permanent magnet. This rotation induces an electromotive force. Moving coil voltmeter measures the magnitude of the induced electromotive

force. Resistance is provided in series in order to control heavy currents generated by the armature. Commutator is used to convert the alternating current of the armature into direct current.

In case of AC tachometer generator, the armature remains stationary, but the magnetic field rotates. The rotation of the magnetic field induces electromotive force in the coil. Either the amplitude or frequency of the electromotive force can be used to measure the rotational speed. The voltage is first amplified and then rectified by passing through a filter.

#### Contact or Non-Contact tachometer:

A contact type tachometer is brought in physical contact with the device whose rotational speed is to be measured. A magnetic sensor can be attached in order to display the output in terms of revolution per minute. These types of tachometers are generally pre-installed in the equipment.

A non-contact type tachometer is designed in such a way so that it need not be brought into contact with the equipment whose rotational speed is to be measured. It consists of a laser mechanism, a beam of laser or infrared radiation projected by the tachometer provides the measure of speed directly on its LCD display. It can measure very wide ranges of speed at wide angles.

#### Time or Frequency measurement tachometer

A time measurement tachometer calculates the rotational speed of equipment by measuring the time interval between the incoming pulses. Its reading

time is dependent on the rotational speed of the equipment, but resolution is independent of the rotational speed.

A frequency measurement tachometer calculates the rotational speed by measuring the frequency of the pulses. It is capable of measuring very high speeds. Its reading time is independent of the rotational speed of the equipment and resolution is dependent on the rotational speed of the equipment.

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**BOA**  
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**POSTPONED**  
UNTIL  
**May 2022**

# Assessment and Control of Psychological Hazards in the Workplace

OHS information for employers and workers

## KEY POINTS

- The workplace can be a source of psychological hazards
- Psychological hazards can impact physical and mental health
- Psychological hazards must be included in the hazard assessment process
- Worker training should include psychological hazards
- Reporting and investigation of all incidents involving potential psychological injury should be encouraged
- Focus on prevention by fostering a respectful workplace

## THE HAZARD: What are psychological hazards?

Psychological hazards are elements of the work environment, management practices or organizational practices that pose a risk to mental health and well-being.

Common psychological hazards include exposure to harassment, violence or traumatic events. However, long term exposure to less severe psychological hazards, such as increasing job demands or role ambiguity, can also impact psychological health.

A worker's psychological health can also be affected by the following factors:

### Work organizational factors

- shift work and hours of work
- job security
- workload and pace
- interpersonal relationships
- organizational change
- technological change

### Environmental factors

- indoor air quality
- lighting
- noise

### Personal factors

- work-life conflict
- changing stages of family life
- pre-existing depression, anxiety, substance abuse and other mental illness

# KenKen Puzzle

How to solve the KenKen puzzle:

(Answers on page 16)

- 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

<b>24 x</b>			<b>15 +</b>		<b>3 ÷</b>
<b>5 -</b>	<b>10 +</b>	<b>4</b>			
			<b>3 ÷</b>	<b>120 x</b>	<b>5 +</b>
<b>12 +</b>	<b>12 x</b>				
		<b>10 x</b>			<b>2 -</b>
	<b>5 -</b>		<b>2 ÷</b>		



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# Corrosion Types and Prevention



Corrosion is the process of eating up away of metal surface by the action of the surrounding. Rusting of iron, tarnishing of silver jewellery, formation of green film on the surface of copper etc. are some of the common examples of corrosion which we come across in daily life.

## Type of Corrosion:

1. Chemical or dry corrosion
2. Electrochemical or wet corrosion

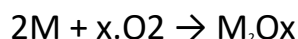
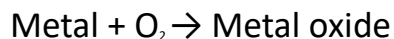
### 1. Chemical or Dry Corrosion:

This type of corrosion due to direct attack by the atmospheric gases like oxygen, carbon dioxide, chlorine, sulphur dioxide, hydrogen sulphide etc. on the surface of metal when metal or surface is kept exposed in the atmosphere for a long time.

#### A) Oxidation Corrosion (Corrosion by $O_2$ ):

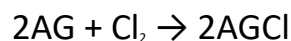
Oxidation corrosion occurs due to attack

oxygen on the metal surface, usually in the absence of moisture. All the metals except noble metal (Ag, Au & Pt) are attacked by oxygen to some extent with the formation of oxide on the surface of metal.



#### B) Corrosion due to other Gases:

other gases like  $SO_2$ ,  $Cl_2$ , and  $H_2S$  etc also cause corrosion to some extent depending upon the nature of corrosion product.



### 2. Electrochemical corrosion or Wet Corrosion:

This type of corrosion occurs when the metal is in contact with moist air or kept dipped in some aqueous medium. Tiny voltaic cells or galvanic cells are set up between two dissimilar metals or between dissimilar parts of the same metal. The metal (more active metal) surrounded by an aqueous medium or moisture has a tendency to pass into solution as metal

ions.



An equal number of electrons are produced at the surface of metal. The positively charged metal ion combines with negative electrons at the same rate at which they are formed. Equilibrium is thus reached and further reaction stops.



The moisture or aqueous medium acts as an electrolyte. Thus, the impure metal in contact with an aqueous medium behaves like an electrolytic cell or galvanic cell and is oxidized. Pure metals do not set up galvanic cell, and hence, do not suffer corrosion. The rate of electrochemical corrosion depends upon the nature of corrosion product. If the corrosion product is an insoluble compound, it acts as a protective coating on the metal surface and further action is stopped. But if the corrosion product is a gas or gets dissolved in the solution, the phenomenon of corrosion goes on unaltered.

## PREVENTION OF CORROSION:

- **Purification of metal**
- **Alloying of metals**
- **Cathodic Protection**

### 1. Purification of metal:

The impurities present in metal are responsible for their corrosion due to formation of tiny galvanic cells. The greater is the amount of impurities, the more will be the corrosion. So the impure metals are purified to control their corrosion.

### 2. Alloying of metals:

The corrosion of a metal can be decreased by making its alloy with suitable element. For example alloying effects of chromium with iron decreases its corrosion resistance due to passivation of metal surface.

### 3. Cathodic Protection:

In this method, a metal which is to be protected from corrosion is made to behave like a cathode either by connecting it to some more active metal or by the use of an impressed voltage on the metal. Thus Cathodic protection of metal can be divided into two types:

- Sacrificial Protection
- Impressed Voltage Protection

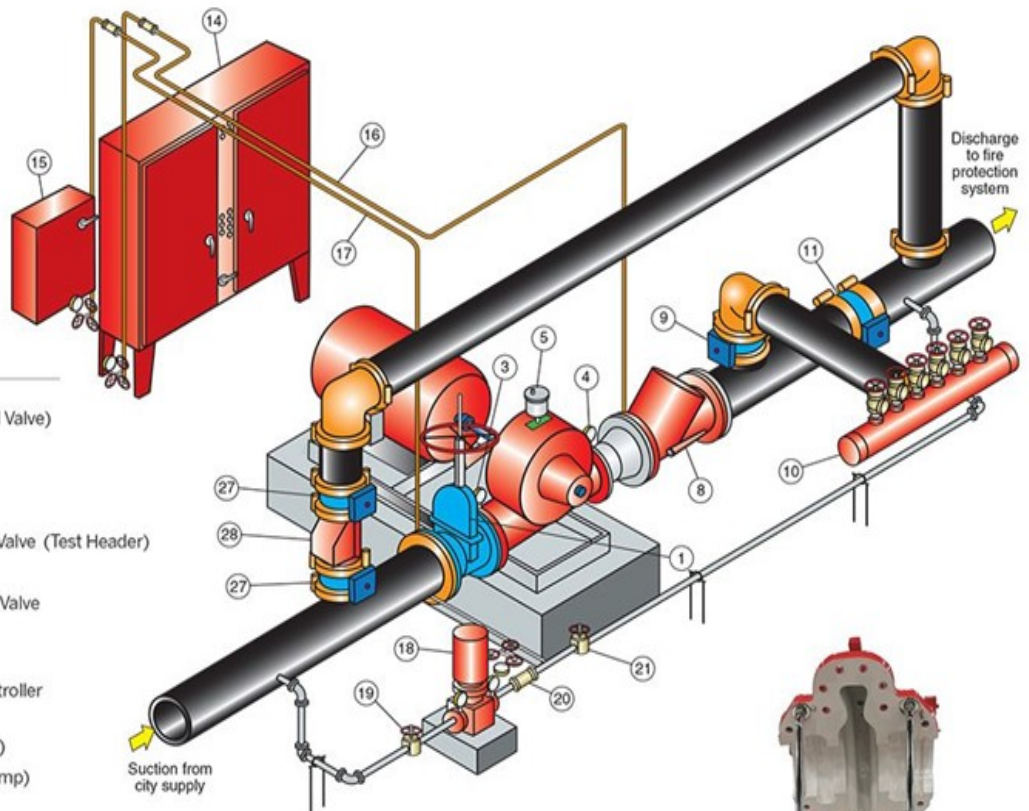
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# FIRE PUMP BASICS

## What is a Fire Pump?

Fire pumps are used to increase the water supply pressure available from public mains, gravity tanks, reservoirs, or other sources. An entire fire assembly consists of a fire pump, driver, controller, and accessories.



- 1 OS&Y Gate Valve (Suction Control Valve)
- 3 Suction Pressure Gauge
- 4 Discharge Pressure Gauge
- 8 Check Valve (Pump Discharge)
- 9 Indicating Gate Valve or Butterfly Valve (Test Header)
- 10 Test Header
- 11 Indicating Gate Valve or Butterfly Valve (Discharge Control Valve)
- 14 Fire Pump Controller
- 15 Pressure Maintenance Pump Controller (Jockey Pump)
- 16 Pressure Sensing Line (Fire Pump)
- 17 Pressure Sensing Line (Jockey Pump)
- 18 Pressure Maintenance Pump (Jockey Pump)
- 19 Isolation Valve (Jockey Pump Suction)
- 20 Check Valve (Jockey Pump Discharge)
- 21 Isolation Valve (Jockey Pump Discharge)

## Types of Fire Pumps

The fire pump itself is just the provider of water flow and pressure; the driver (diesel engine or electric motor) provides the energy needed for the pump to spin and move the water. There are many different types of fire pumps that can be used.

## Centrifugal Pump

A centrifugal pump creates pressure by using centrifugal force (outward force created from rotating an object) to increase the velocity of the water through the rotation of the impeller.



Courtesy of Xylem - AC Fire Pump

# 5th Class Power Engineering Course



## The Online BOMA 5th Class Power Engineering Course:

- Will begin in Feb (exact date TBA) 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
- *\*No prerequisites are required for the course\**

New to the industry? If you are looking to become a building operator, then we recommend taking the Building Operator Level 3 online course. Visit our website for more info: <https://boma.ca/courses-list/building-operator-program/>

If you need further information please contact [info@boma.ca](mailto:info@boma.ca)

## Kenken Puzzle Answer

<sup>24x</sup> 2	4	3	<sup>15+</sup> 5	1	<sup>3÷</sup> 6
<sup>5-</sup> 1	<sup>10+</sup> 5	<sup>4</sup> 4	6	3	2
6	3	2	<sup>3÷</sup> 1	<sup>120x</sup> 5	<sup>5+</sup> 4
<sup>12+</sup> 5	<sup>12x</sup> 2	6	3	4	1
4	1	<sup>10x</sup> 5	2	6	<sup>2-</sup> 3
3	<sup>5-</sup> 6	1	<sup>2÷</sup> 4	2	5



## TEST YOUR OPERATOR IQ ANSWERS

Answers: 1) b 2) e 3) a 4) d 5) b



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# Why energy accountability is the next step in green IT

DANNY BRADBURY

As a CIO, how well are you managing your energy costs – and what's your incentive to do so?

This article from Harvard Business Review explores how companies can better manage their utility bills. It highlights measures such as installing smart building controls, and even suggests installing local renewable energy production facilities, such as photovoltaic solar.

We often talk about the need for a greener IT operation, but to spend much time focusing on reducing energy consumption, CIOs must be accountable for it. Typically, a CIO's energy usage happens in the data centre, or the server room in a small company. If computers are hosted at a colocation facility, then this energy may be charged as part of the contract. If you're running your computers on-premises, then it may be difficult to see how much juice your infrastructure is drawing.

Some of these measures may be useful for CIOs, but they can also create a more efficient energy-accountable IT operation by following some basic guidelines:

## Communicate & create incentives

For CIOs, the problem lies in separation of duty. In many cases, the person responsible for installing and maintaining equipment (the IT manager or data centre manager) isn't the same person responsible for paying the power bill (the facilities manager).

Companies can reduce their power consumption by bringing these two functions together and creating incentives for CIOs to reduce their IT infrastructure's energy consumption.

## Increase energy visibility

A data centre infrastructure management system can help a CIO and their data centre manager to get better visibility into infrastructure energy usage. This category of software draws information from the IT infrastructure to help assess performance, capacity, and power usage. Often linked to sensors distributed throughout the facility, they can help managers better understand their IT infrastructure, and then model it for optimal performance. A DCIM tool may give you the information to model higher-density racks, for example, reducing your power draw.

## Negotiate appropriate contracts

Aggregated energy purchasing contracts can help to leverage your dollar, providing more power at a cheaper price. It will be necessary to work with others on this kind of contract.

There are several energy efficiency measures that IT departments can take to better manage their power, ranging from virtualization and cloud computing through to data centre retrofits. Even something as basic as configuring hot and cold aisles can make a huge difference. Ultimately, though, efficiency and accountability go hand in hand. One can't fully succeed without the other.

*Article reprinted with permission*

## October Meeting Minutes



Chaired by: Mark Arton	Minutes by: Monika Bhandari	Call to order: 5:01pm	Webinar: October 12, 2021
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- **Introduction from Mark Arton**

**Guest Speakers:**      **Eric Balt, Technical Sales Manager at tekmar Control Systems Ltd.**  
**Topic:**                    **tekmar Controls - Product & Application Guide Review for Building Operators**

**New Business:**

- Online/virtual meetings will continue for the time being
- Will send gentle reminders for payment of membership dues; please support us!
- BOA Tradeshow postponed until May 2022
- More webinars to be presented possibly a few a month—share your ideas with BOA Executive
- Visit the website for YouTube videos of last meetings; download BOA Magazine from [www.boacalgary.com](http://www.boacalgary.com)
- Next virtual (zoom) meeting on November 9, 5pm
- Topic will be Ventilation during Covid-19



### JOIN US: TUESDAY NOVEMBER 9, 2021 AT 5PM FOR OUR VIRTUAL MONTHLY MEETING

**Title & Brief: HVAC Ventilation during Covid**

Travis Henkel P Eng. Travis is the Senior Mechanical HVAC Engineer with BSE HVAC. His talk is aimed to bring general understanding of HVAC design principles and how effective engineering control measures can help minimize long-range airborne transmission via ventilation systems in buildings. Now that we are returning to work the focus on the proper ventilation put forward by ASHRAE are followed and monitored by the Building Operators. this will be an interesting talk on a topic that is important to understand as we continue to protect the people coming into our facilities. See below for the invitation link to the webinar. All are invited and if you cant attend please extend an invitation to anyone who would be interested

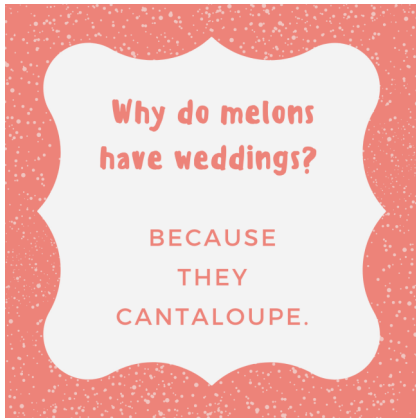
**Guest Speaker: Travis Henkel, P.Eng, Senior Mechanical Engineer, BSE HVAC**

Travis started his HVAC Engineering career while working for the family mechanical contracting business where he was encouraged by the Journeymen Plumbers in his family to pursue and become an HVAC Consulting Engineer. This background set the tone for practically and respect for building Operator and Tradesmen in the field for which the discussion is aimed. We will review HVAC design principles to bring general understanding of their role and discuss how effective engineering control measures may assist both long and short range airborne transmission via ventilation systems in buildings during and after COVID 19.

Travis graduated from the U of A with a degree I Mechanical Engineering and worked on projects over is career with Cheriton/Stanley/Stantec, EarthTech, IMEC, Hidi Rae, Reinbold Engineering, Fluor Canada, WSP Canada and AECOM until recently starting with BSE HVAC.

[Click on the link to register for the BOA Monthly Meeting](#)

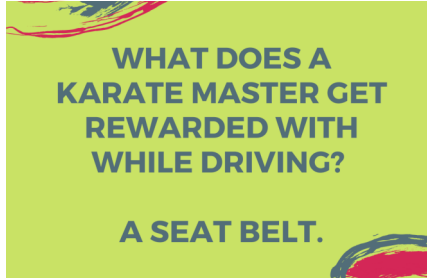




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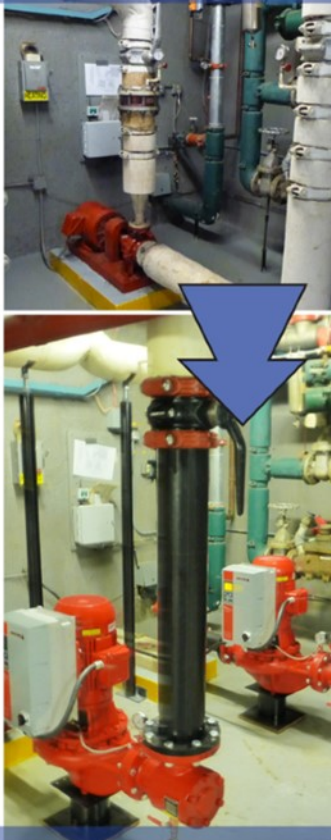
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