



CANADIAN PRAIRIES GROUP OF CHARTERED ENGINEERS

NEWSLETTER

Winter 2017 Edition

2017 Annual General Meeting

The 2017 CPGCE Annual AGM was held on February 8, 2017 at 6:30. A list of the 2017 Executive Committee can be found on the CPGCE website.

The Executive is always actively recruiting new volunteers to the team.

Science and Engineering in 2016

Computer programming is allowing us the opportunity to understand viruses better than we ever have before.

New research has shown promise of creating a universal flu vaccine. Look inside to find out more about this topic and other Science and Engineering breakthroughs of 2016.

2016 was Another Great Year for Technical Presentations



Check out this issue of the newsletter to see the big changes at the Calgary Airport and learn about the new system.

With a newly constructed terminal, and state of the art equipment, YYC Airport has once again made a mark on the Alberta Engineering Scene.

Message from the Acting Chairman Nigel Shrive

Dear Members

2016 was a year with many unexpected outcomes. For me, it was the departure of Colin Pollard as Chairman, and me stepping in as a past-chair on an interim basis. It was a pleasure to work with such a dedicated and energetic group – CPGCE is in good hands!

I would like to thank all members of the executive for their hard work, enthusiasm and sense of humour.

I would like to thank Colin for his tireless efforts on the executive over the past years, many as secretary. Mohammed Jaffer is also leaving the committee after many years of service, the last as past chair. We wish them both all the very best in the future. While we have several members willing continue on the executive, it is always helpful to have new ideas and more help. If you have an interest, please do consider joining the committee – try coming to a few meetings to see how we operate and have fun in the process – then decide.

We begin the New Year with the disappointment of cancelling the AGM at Fort Calgary: we will re-arrange to hold it before one of the technical meetings in the spring. These begin with a talk on February 8, on the scale model of the Avro Arrow, that Canadian plane that was ahead of its time. The venue will continue to be the Danish Canadian Club. The topics for the rest of the year are varied as usual, so we hope they will attract your interest. If you have topics for which you would like us to find a speaker, please let any

member of the executive know. In addition to technical presentations, we will continue to support the “Present Around the World” competition of the IET.

Very best wishes to everyone for a wonderful 2017. Let’s hope the economy picks up and the city becomes vibrant and alive again
See you at the next technical meeting

Nigel Shrive
Interim chair

2017 Present Around the World Competition

The Annual Present Around the World Competition (PATW) will be held at the University of Calgary on March 25, 2017 at 1pm. Calgary has a long history of winners and the organization committee is excited to meet this year’s competitors. The CPGCE has proudly supported this event and provided judges since it was first organized in 2011.



Spectators are welcome to the event and it is a great way of getting to see young talent from Calgary exhibiting some of the newest concepts in Science and Engineering. For more information, visit <http://conferences.theiet.org/patw/> or email editor_newsletter@cpgce.org.

Technical Presentation Summaries

Ending the Guessing Game for Infectious Patients

September 14, 2016

Robert Mayall – PATW Winner 2015, PhD Candidate

Robert Mayall was the 2015 Calgary Present Around the World (PATW) contestant. An initiative of the IET, PATW has students and young professionals around the world give technical talks on a variety of topics. Contestants are judged on their ability to give a clear and engaging presentation. Robert was extremely successful in the competition, winning the Calgary local competition, the Americas finals in Trinidad and then the global finals in London, making him one of the first Americas contestants to ever win the competition.

Robert's presentation started with a review of current practices for determining cause of infection among patients presenting to the emergency room. These practices are out of date and slow, meaning it can take up to 72 hours to determine what type of pathogen is infecting someone. This delays treatment and often means the wrong antibiotics are used, which contributes to antibiotic resistance. This is also an issue when considering the potential for pathogenic agents to be used as weapons. Better sensor technologies are needed to be able to rapidly identify threats both for human health and for security.

Robert gave a very interesting talk outlining his PhD work on building a nano-bio sensor for recognizing different types of bacteria and pathogens. Using proteins from the immune system, the sensor measures changes in resistance caused by the interaction of pathogenic bacteria with this sensor. Using this approach, concentrations as low as one bacterium per mL have been able to be detected. The sensor is also specific for a single class of

bacteria, showing no response to viruses or other classes. By applying the same approach using other proteins, different types of pathogens can be detected, allowing for broad range identification. An interesting mix of biology and engineering, Robert's talk was an engaging presentation on next generation sensors and spurred some great discussions in the Q and A session.

"Calgary Airport Authority Airside Services and Airfield Compliance"

October 12, 2016

A joint-presentation by:

Bernie Humphries, YYC VP Operations

Roy McLeod, YYC Director, Airside Services

Doug Francoeur, YYC Director, Airfield Compliance

The presentation commenced with a brief introduction of the presenting team and several informative slides on Calgary's two airports. The Calgary International (YYC) and Springbank (YBW), both of which are the operational responsibility of Mr. Humphries and his directors.



These airports were transferred from Federal ownership to the Calgary Airport Authority (CAA) and established as non-share capital, not-for-profit corporation in 1992 and 1997 respectively under the Regional Airports Act of Alberta. YYC holds the airport Federal lands under an 80-year lease which expires in 2072. All operating surpluses are re-invested in the airports.

The mandate of the CAA is to manage and operate the two Calgary airports in a safe, secure and efficient manner for the general benefit of the public and to advance economic and community development by promoting and encouraging improved airline and transportation service and an expanded aviation industry.

The CAA defines its operations in three sectors: Domestic, Transborder (USA), and International. The top destinations in each sector are Vancouver and Toronto, Houston and Las Vegas and London and Cancun. YYC is one of Canada’s top transportation hubs and it has embraced as its motto the “Grow the Hub” slogan. Our international airport serves 78 destinations and manages 240 aircraft departures daily.

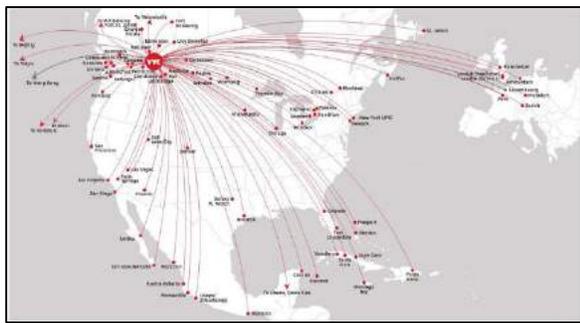


Figure 1: YYC Destinations

In 2015, YYC ranked 4th in the country, in terms of passenger traffic with 15.5 million arriving and departing passengers, which is about 42,500 passengers a day ranking after Toronto, Vancouver and Montreal.



Figure 2: YYC Ranking

In economic terms, the CAA contributes \$8.28 billion to the local economy both directly and indirectly employs 48,000 Calgarians.

In terms of infrastructural development in the Transportation sector, CAA has recently completed two \$2 billion mega-projects with the addition of a new 14,000 ft runway in 2015 and a new terminal building in 2016. The latter will commence operations at the end of the month.



Figure 3: Runway 17L/35R

1 million m2 of concrete pavement and 5000 runway & taxiway lights



Figure 4: New International Terminal Building

The new terminal has an in-terminal luxury hotel, custom electric vehicle transportation between terminals, fully automated baggage-handling, self-check in, customs kiosks, and over 100 retail shops in –terminal.



Airside Services Directorate is responsible for outside operations both Airside (around the runways and taxiways) and Groundside (roads, parking lots and land on the public side of the security fences).

Primary duties include:

- Snow Removal of Taxiways, Runways, Aprons & Groundside Infrastructure

- Line Painting: runways, taxiways, aprons & roadways
- Maintenance of security fence lines & access gates
- Maintenance of the green spaces on the airfield
- Maintaining paved surfaces (patch & repair)
- Maintenance of roadways and drainage systems (groundside)
- Fleet maintenance
- Foreign Object Debris Control on runways, taxiways and aprons.

This is accomplished by 32 operators, working two daily shifts.

The fleet supervisor oversees the maintenance, repair and replacement of 100+ major vehicles worth \$30 million.

The snow moving equipment includes blowers, sweepers, loaders, plows, graders and dump trucks, as well as chemical spray trucks, spreader trucks, backhoes and bobcats.



Figure 5: Specialized Equipment for Clearing Snow

Specialized equipment is used to clear the large runways in astonishingly short time intervals.



Figure 6: Sweeper Data

Each sweeper is powered by two 500 HP Caterpillar diesels

The operators and equipment operating in echelon are able to clear the 2 square kilometer main runway in 2 sweeps in 20 minutes. March and April have the heaviest average winter snowfalls but major blizzards can dump 25 cm of snow in a day and usually occur in May.

The typical resource plan for a major snow event requires:

- 1 Supervisor/Inspection Vehicle (Staff Vehicle #36)
- 4 Runway Sweepers (wire bristle brushes are replaced every 40 hours)
- 3 Apron Sweepers
- 3 Taxiway Sweepers (also used on South Aprons)
- 1 Plow/Sand Truck, used for sanding cargo roads, service gates
- 1 Grader, used for back plowing and removing compacted snow
- 1 Loader/Ramp Hog on Apron I, supports Apron Sweepers
- 1 Loader/Ramp Hog to Cargo & De-icing Aprons
- 1 Snow Blower for windrows on main taxiways

De-icing of runways also requires trained

operators and chemical spray trucks. Major snow events are managed like military operations.



Figure 7: Line Painting

- With the addition of the new runway & new terminal apron we now apply annually 66,000 liters of paint and 96,000 lbs. of glass bead which provides reflectivity of paint markings at night.



Figure 8: Security Fence



Figure 9: Vegetation Management

- Our airfield is approximately 5,154 acres in size, of which roughly 581 acres is paved
- The remaining 4,573 acres or 7.1 square miles must be maintained, mowed and/or weed controlled
- We work with our Environmental group on vegetation and wildlife management practices.



Figure 10: Pavement Repair

The Fleet maintenance mechanics are responsible for maintaining everything from weed whackers to the massive 8x8 Oshkosh fire trucks of Fire Hall 13.

They operate out of a brand new 5 bay 15,000 sq ft repair shop with overhead cranes and pits sized for the largest equipment.



Figure 11: Fleet Maintenance



Figure 12: Fleet Maintenance 2



Figure 13: Foreign Object Damage



Figure 14: OSHKOSH 8x8 Fire Truck



Figure 15: YYC's Fire Trucks (Red)



Figure 16: Project Work

In 2014 YYC completed the largest airport runway in Canada (14,000 ft long) but cannot rest on such laurels. Maintenance work is ongoing.



Figure 17: Additional Airside Surface Expansions

Apron IX is a new 330,000 m² facility for air cargo. YYC has added a new hard surface north of Concourse A and new de-icing recycling on Apron II. This deals with the unexpected odd bee swarm.

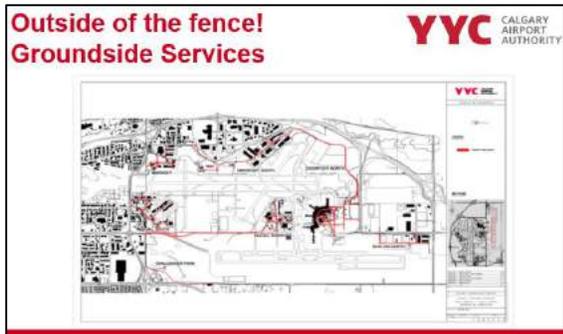


Figure 18: Upkeep of Track Five

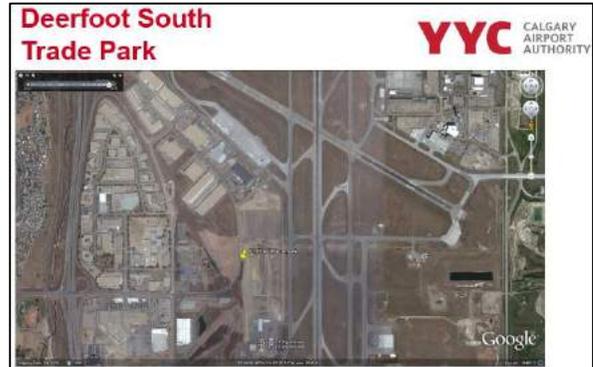
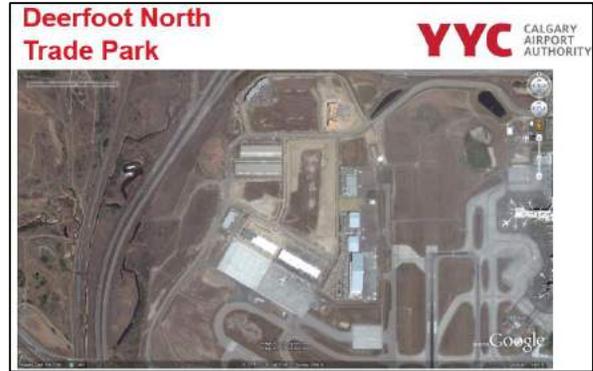
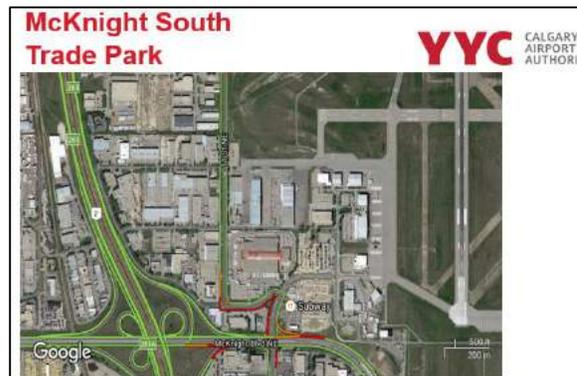


Figure 19: Bee Swarm

10,000 tonnes of Waste materials removed each week!



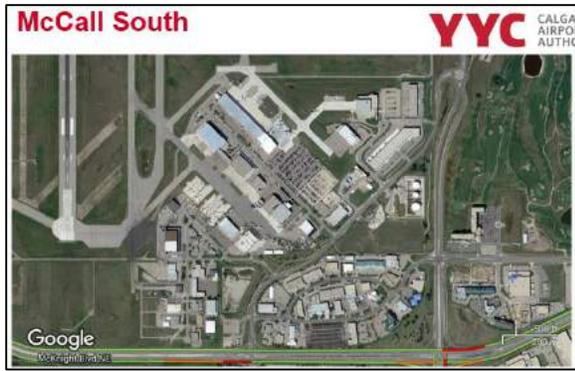


Figure 20: Parking Lot Maintenance



Figure 21: Ground Side Services

Wind Energy Development in Western Canada, Yesterday, Today, and Tomorrow
November 9, 2016

Jeff Wearmouth, P.Eng

The presentation commenced with a brief introduction to the Wind Energy in Western Canada; how it developed in Alberta, British Columbia and Saskatchewan, innovative

developments and its current status. More recent technological advancements, challenges, opportunities and the market trends were discussed.

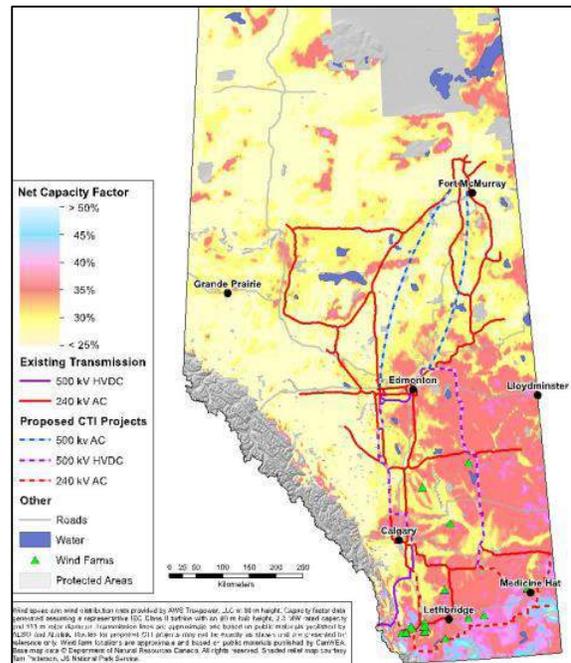


Figure 22: Alberta Net Capacity Factor

The early developments in the wind turbine designs started with a vertical axis wind turbine (VAWT); aptly called as “egg-beaters” design. In Western Canada, similar egg beater wind turbines were built around 1990s, initially set up at a research station near Pincher Creek. As the major components like the generator and gearbox were located closer to the ground, the service and maintenance were easier.



Figure 23: Egg Beater Turbine

The inherent structural challenges of the egg beaters and subsequent innovations led to the present day horizontal axis wind turbine (HAWT). The European designed “Bonus 150” in 1993, became a standard platform.



Figure 24: Three Blade Wind Turbine

The increased development and use of wind farms in Alberta came with Alberta’s Small Power Producers (ASPP) Act in 1991. The presentation highlighted some of the challenges of operating a wind turbine, challenges particularly faced in Canada. The Western Canadian technology contributions included safe cold weather operations, de-icing of rotor blades and anemometer, and the Bat Avoidance Studies.



Figure 25: Cold Operations in Alberta

The presentation continued with a discussion of the growth of wind energy over the years, and the current installed capacity.

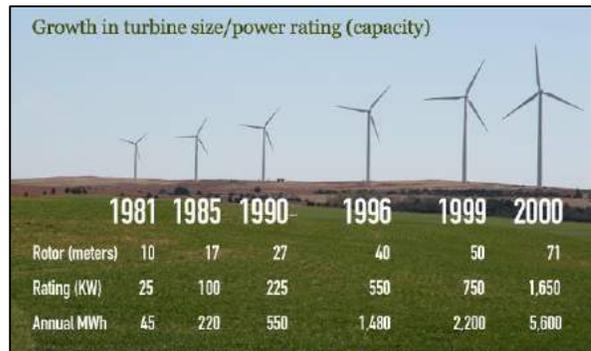


Figure 26: Growth in Turbine Size and Power Rating

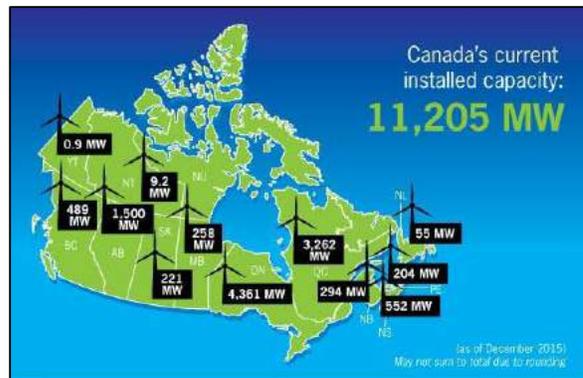


Figure 27: Canada's Current Installed Capacity

An interesting trend in size and capacity of wind turbines, comparisons with solar and other power generations, and the future of wind turbines were discussed.

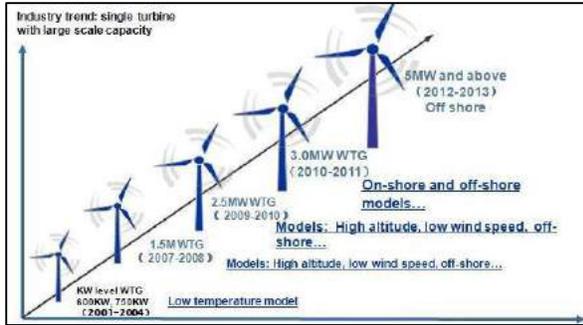


Figure 28: Industry Trend

The presentation was very educative as well as interesting and was attended by a record number of attentive audience. The Q&A session followed with a lively discussion concluding the presentation.

Scientific breakthroughs of 2016

1. A 19-year-old BC native Ann Makosinski has been named the Forbes top 30 under 30 list. Her inventions include a flash light powered by the heat of the human hand and a mug that allows you to charge electronic devices using the excess heat from your drink.
2. A potential universal flu vaccine was designed by a team of researchers in Washington State using a computer program that allows them to see how a complex protein will fold. This new technology has opened up the doors to many such breakthroughs in 2016.

Just for Fun...how Engineering Solves All Kinds of Problems

The following pictures were sourced from the internet. The original ownership is unknown.



Figure 29: Tree through fence. Source Unknown



Figure 30: Bridge Support. Source Unknown



Figure 31: Toilet Door. Source Unknown

Annual General Meeting 2017

The 2017 AGM was held on February 8th at the Canadian Danish Club and the following members were elected for positions. All always we encourage all members to participate, vote, or volunteer for positions on the executive.

POSITION	EXECUTIVE OFFICER	UK INSTITUTION	CONTACT
Executive Officers			
Chairman	Nigel Shrive	ICE	Chairman@cpqce.org
Vice-Chairman	Steve Nevin	IMechE/IET	ViceChairman@cpqce.org
Past Chairman			PastChairman@cpqce.org
Treasurer	Mario Micallef	ICE	Treasurer@cpqce.org
Secretary	Rick Marshall	IMechE	Secretary@cpqce.org

Executive Members			
Deputy Treasurer	Emily Hicks	IET	Deputytreasurer@cpqce.org
Webmaster	Rick Marshall	IMechE	Webmaster@cpqce.org
Awards	Emily Hicks	IET	Awards@cpqce.org
Newsletter	Mia Jovic	IET	Newsletter@cpqce.org
Membership	Niamh Ní Chróinín	ICE	Membership@cpqce.org
Communication, Marketing & Outreach	Niamh Ní Chróinín	ICE	Communication@cpqce.org
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Technical	Arun Kumar	IMarEST	Technical

Technical	Bob Salt	IMechE	Technical
Technical	David Dean	IET	Technical
Technical	Derrick Stableford	IET	Technical
Technical	Oluseyi Smith	IET	Technical
Technical	Niamh Ní Chróinín	ICE	Technical
Technical	Richard Coldbeck	IET	Technical
Technical	Ron Wong	IStructE	Technical

Sponsoring UK Institution Liaison Members			
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Institution of Engineering & Technology	Richard Coldbeck	IET	IET@cpgce.org
Institution of Mechanical Engineers	Bob Salt	IMechE	IMechE@cpgce.org
Institution of Structural Engineers	Ron Wong	IStructE	IStructE@cpgce.org

Acknowledgements

The Editor would like to express their gratitude to everyone who submitted a story, wrote an abstract for the newsletter, and send a joke in. If you have a story you would like to see included, please contact Mia Jović at editor_newsletter@cpgce.org.