



**Toronto Branch Membership Newsletter**

**CASI NEWS**

**HAPPY NEW YEAR**

On behalf of the Toronto Branch Executive, best wishes to all CASI Toronto Branch members for a happy, healthy, and prosperous New Year in 2009.

Thanks to everyone who attended our Toronto Branch meetings this past Fall. Please continue to participate at our upcoming events in Winter/Spring 2009. See you there!

*Chris Hayball,  
Chairman, CASI Toronto Branch*

**UPCOMING EVENTS**

Our January meeting will feature our annual CASI President's Tour. On **Thursday, January 22**, current CASI President **Dr. Nashed Youssef** will visit the Toronto Branch, and give a presentation entitled **Meeting Aerospace Industry Challenges in a Changing World**. Nashed is Manager of Advanced Engineering at Pratt & Whitney Canada in Mississauga. Please see the enclosed meeting notice for more details.

Plans for future meetings include a guest speaker from the UTIAS Space Flight Laboratory in February, and an industry tour in March. More information will be available next month.

**RECENT EVENTS**

The Annual Video Night and Trivia Contest was held on November 20, 2008. The evening began with a pizza supper in the cafeteria, during which the Trivia Contest was held. Once again, contestants worked in teams of three, which encouraged greater participation and interaction. The contest covered a broad range of aerospace subjects, past and present, with emphasis on Canadian content.

The top three teams were  
1. Don Band, Sheldon Benner, Mike Orr  
2. Phil Apperly, Fred Black, Lucian Ivan  
3. Pat Harcourt, Anita Simic, Emil

All the winners took home prizes donated by local companies, and by CASI.

Following the Trivia Contest, the video show took place in the lecture hall. A wide assortment of material was screened, including videos on DHC-5 Buffalo Capabilities, Q400 Water Trough Tests, and Transonic Flow, plus a selection of short clips and photo montage covering various aviation incidents, tests, demos, and events.

A detailed report of the evening will be available on the CASI website.

**CASI TORONTO FLYER**

There is a lot of aerospace activity in the Toronto area, and the CASI Toronto Flyer exists to bring the local aerospace news to our members. The Editor of the Flyer is Gillian Clinton, of Clinton Research, also our Branch Secretary. If you have any suggestions for Flyer articles, please contact Gillian at [clintonresearch@sympatico.ca](mailto:clintonresearch@sympatico.ca) or [torontobranch@casi.ca](mailto:torontobranch@casi.ca)

Thanks this month to Mohamed Ali for his articles covering the recent Canadian Space Exploration Workshop and the Canadian Space Summit.

**CASI KNOTS**

Attendance at CASI Toronto Branch events between September and March earns you CASI Knots, which can be redeemed for a discount on the price of your Annual Dinner Meeting ticket. Please come out to our monthly meetings and take advantage of this great incentive program!

**SPREAD THE WORD**

Please help us to publicize our Toronto Branch meetings. Share your meeting notice with friends and colleagues, and print a few copies to post around your school or workplace.

## AERO 2009 CONFERENCE AND AGM

The CASI annual conference will take place this year in Kanata (Ottawa), from May 5-7, 2009, at the Brookstreet Hotel. The Call for Papers deadline for initial abstracts is January 15, 2009. Symposia will be held on Aerodynamics, Propulsion, Aerospace Structures & Materials, and Unmanned Vehicle Systems. Please visit the CASI website ([www.casi.ca](http://www.casi.ca)) for more information.

### CONTACT US

Please feel free to contact any member of the CASI Toronto Branch Executive if you have questions, comments or suggestions regarding the Toronto Branch. Our contact details are given in the Toronto Branch section of the CASI website ([www.casi.ca](http://www.casi.ca)). You can also reach us by e-mail at: [torentobranh@casi.ca](mailto:torentobranh@casi.ca)

## AEROSPACE COMMUNITY NEWS

### JANUARY EVENTS IN TORONTO

The **Toronto Astronomy Festival** will be held at the Ontario Science Centre on **Saturday, January 10**. This day-long event is the kick-off for the International Year of Astronomy 2009 (IYA 2009), and features lectures, workshops, and activities for all ages. The event is free in the hope of attracting and educating the general public about the space sciences. For more information, please visit the Ontario Science Centre website ([www.ontariosciencecentre.ca/calendar](http://www.ontariosciencecentre.ca/calendar)).

The UofT **Astronomy and Space Exploration Society (ASX) Annual Symposium** will be held at UofT's Convocation. Hall on **Friday, January 23**, at 7 pm. Some great speakers are lined up this year, highlighting the theme of 'Expanding Canada's Frontiers'. For more information, please visit the ASX website ([asx.sa.utoronto.ca](http://asx.sa.utoronto.ca)).

*Reported by Mohamed Ali, CASI member and graduate student at UTIAS.*

### CAHS MEETING

The Canadian Aviation Historical Society (CAHS) held its most recent meeting on December 20, 2008 where author and journalist Dave Cook talked about his latest book *Malton Airport: The Early Years*. A lively post-presentation discussion ensued with the audience contributing many anecdotes about the period.

The CAHS is a national organization dedicated to the celebration and documentation of Canada's flying heritage. Regular monthly meetings are held in the fall and winter seasons, at the Toronto Aerospace Museum.

*Reported by Gillian Clinton, CASI member and Principal, Clinton Research.*

### CANADIAN SPACE EXPLORATION WORKSHOP

The Canadian Space Agency hosted the 6<sup>th</sup> Canadian Space Exploration Workshop (CSEW6) at its headquarters in St. Hubert, Quebec, from December 1-3, 2008.

Attended by delegates from across Canada and held only once every few years, the

purpose of the workshop is to invite the space exploration community to present and discuss their ideas amongst representatives from industry, academia and policy-making groups.

Discussions at this year's workshops were centred around the theme of prioritizing Canada's initiatives with respect to the Global Exploration Strategy, specifically the exploration of, and scientific research pertaining to the moon and Mars. The three-day workshop concluded with a summary of the discussions and ideas put forth, and future actions that were to be taken up by the CSA.

*Reported by Mohamed Ali, CASI member and graduate student at UTIAS.*

### CANADIAN SPACE SUMMIT

The 2008 Canadian Space Summit was held on November 21-23, at McGill University in Montreal. Addressing the theme of *What's Next for the Canadian Space Industry*, the summit provided an opportunity for representatives from the government, academia, and industry from across the country to share their thoughts and views on what road Canada's space industry was to take in the near future.

Presentations covered topics ranging from the physical sciences to the financial and business side of the industry. Developing Canadian launch capabilities proved to be an interesting topic that caught the attention of many attendees. The Saturday night banquet had former Canadian astronaut, Marc Garneau, as the keynote speaker.

The Canadian Space Summit is an annual event that is organized by the Canadian Space Society in its effort to promote Canada's contributions in space. Next year's summit is scheduled for November 20-22, in Kingston, Ontario.

*Reported by Mohamed Ali, CASI member and graduate student at UTIAS.*

## **INDUSTRY NEWS**

# **BOMBARDIER**

### **Mozambique Airline Joins Bombardier Q400 Airliner Family**

**Toronto – December 16, 2008** – Bombardier Aerospace welcomes the announcement that LAM-Mozambique (Linha Aérea de Moçambique) will take delivery of a previously owned Q400 high-speed turboprop airliner this week, and will acquire another in the near future. The aircraft are being acquired from a third party and the airline will use them for its domestic and regional services on the African continent.

LAM-Mozambique is among 30 operators worldwide that have Q400 airliners in service or on order to meet their requirements for economical and efficient air travel.

The national carrier of Mozambique and based at Maputo, the nation's capital, LAM-Mozambique currently operates jet and turboprop equipment on 10 domestic routes and regional routes linking

Maputo with Johannesburg, Dar-Es-Salaam, Nairobi and Durban.

"The Q400 aircraft offers three qualities that are essential to Africa's growing air transportation system," said José Ricardo Viegas, Chairman and Managing Director, LAM-Mozambique. "It has excellent fuel economy, its environmental credentials have been praised by operators around the world, and with its Active Noise and Vibration Suppression (ANVS) system, the aircraft offers superb passenger comfort."

"The Q400 airliner has been making steady progress in the African market, and LAM-Mozambique is joining four other airlines on the continent that have selected the aircraft," said Gary R. Scott, President, Bombardier Commercial Aircraft. "Growth in Sub-Saharan Africa is expected to trend upward over time, driven by positive commodity prices and a growing tourism trade which will create a demand for additional aircraft in the Q400 category."

### **Bombardier Sells Eight Q400 NextGen Airliners To Ethiopian Airlines**

**Toronto – November 20, 2008** – Bombardier Aerospace announced today that Ethiopian Airlines has signed a contract to purchase eight Q400 NextGen turboprop airliners, and has taken options on four additional Q400 NextGen aircraft. Including this transaction, the Dash 8/Q-Series aircraft program has recorded firm orders for a total of 1,001 aircraft.

Based on the list price of the Q400 NextGen airliner, the value of the Ethiopian Airlines firm order contract is approximately

\$242 million US, and could increase to approximately \$366 million US if the four options are exercised.

Ethiopian Airlines, the country's flag carrier, made its first flight between Addis Ababa and Cairo via Asmara on April 8, 1946. Today, it operates a fleet of jet and turboprop aircraft to 33 African cities and a total of 20 international points in the Middle East, Asia, Europe and North America.

Ethiopian Airlines won the Brussels Airport Marketing Award for long-haul operations in October, 2008. In the same month the airline also won the 2008 Best Airline in Africa Award from the Akwaaba Travel Market Organization and the 2008 Corporate Achievement Award in Johannesburg in August, 2008.

"The 360-knot speed, low operating costs and environmental credentials of the Q400 NextGen aircraft will enable us to maintain the high standards for which we have received numerous awards," said Girma Wake, Chief Executive Officer, Ethiopian Airlines. "The aircraft's excellent range and payload capability will allow us to deploy it on domestic routes within Ethiopia, as well as on regional routes up to 1,000 nm (1,850 km) from Addis Ababa.

"Another key reason for our selection of the Q400 airliner is its exceptional performance in terms of climb rate, single-engine ceiling and higher take-off weight, and thus greater payload, from hot and high elevation airfields," Mr. Wake added.

"Ethiopian Airlines will utilize all of the extensive qualities of the Q400 aircraft," said Gary R. Scott, President, Bombardier

Commercial Aircraft. "And we welcome this award-winning airline to the growing Q400 airliner family."

The transaction announced today increases Q400/Q400 NextGen aircraft firm orders to 330 aircraft, with 210 delivered as of July 31, 2008.

The Dash 8 turboprop program was launched in 1980. With the introduction of the Noise and Vibration Suppression (NVS) system in 1996, the name was changed to the Q-Series aircraft program, reflecting the aircraft's quiet cabin amenities. The aircraft are in service with more than 100 operators around the world. In addition to their role in commercial airline service, Dash 8/Q-Series aircraft are also operating in coastal surveillance, firefighting, navigator training, medical evacuation, mixed passenger/cargo configurations, laser depth sounding of the ocean floor, resource exploration and many other special mission roles.

## PORTER AIRLINES

### Porter Airlines Breezes into Windy City

#### ***International service returns to Midway Airport with 6 daily flights***

**Toronto – November 12, 2008** – Porter Airlines is marking its first flights today between Toronto City Centre Airport (TCCA) and Chicago Midway International Airport. Porter is the only carrier offering service between these two convenient airports.

The inaugural flight departed TCCA this morning at 6:50 a.m.

as part of an initial schedule of three daily roundtrip flights per weekday and two each on Saturday and Sunday. As of Jan. 8, the full schedule of six daily weekday flights and added weekend service begins.

"This is another milestone in Porter's development and we're pleased to bring our unique service to Chicago," said Robert Deluce, president and CEO of Porter Airlines. "This will change the travel experience between Toronto and Chicago, making it fast, convenient and simple."

Porter is bringing to Chicago its reputation for a refined travel experience, providing passengers with full service and value throughout the entire trip.

"Porter Airlines service offers a great opportunity for Chicago travelers to visit Toronto," said Richard L. Rodriguez, Chicago Aviation Commissioner. "This new international service is a welcome addition to the numerous domestic destinations offered at Midway."

TCCA is one of the most convenient urban airports in the world, situated just minutes from downtown Toronto. From its dedicated terminal, all Porter passengers have access to a modern, comfortable and stylish lounge, including wireless Internet access, refreshments, and computer workstations. While on board, passengers enjoy complimentary premium snacks, wine and beer, a spacious cabin environment with leather upholstery and extra legroom.

Porter flies the 70-seat Bombardier Q400 featuring jet-like cruise speed, revolutionary cabin noise-reduction technology and environmentally-friendly

engines. The aircraft uses 30 to 40 per cent less fuel than regional and narrow-body jets.

Expanded service to further U.S. destinations such as Boston, Washington and Philadelphia is planned as additional aircraft are delivered over the next 18 months.



### **COM DEV to Begin Work on Cospas-Sarsat Global Search and Rescue System**

**Cambridge, ON – December 2, 2008** – COM DEV International Ltd., a leading manufacturer of space hardware subsystems, announced that it has won a contract to begin work on the satellite payload of the global search and rescue system known as Cospas-Sarsat. The Canadian Department of National Defence has awarded the Company a CDN \$14.6 million contract to complete Phase 1 of its Search and Rescue Repeater (SARR) program. COM DEV's role during Phase 1 will include the review and update of design documentation, testing and engineering services, and the development of a SARR simulator. Phase 1 is expected to last two years, with work to be carried out at the Company's Cambridge facility.

"We are pleased to have won our first large search and rescue contract since acquiring a search and rescue repeater line of business as part of a larger purchase three years ago," said John Keating, CEO of COM DEV International. "This program demonstrates the Canadian Government's continued

commitment to providing the satellite payload equipment which forms an essential component of the global search and rescue system. It is an excellent example of how Canadian space technology can be harnessed for the benefit of all humanity."

Cospas-Sarsat was established by Canada, the United States, France, and Russia in the mid-1970s to provide a true global search and rescue system. Once in orbit the SARR will be able to detect signals from emergency beacons and retransmit the signals to receiver stations on Earth. The emergency messages can then be sent to appropriate authorities so that people in danger can be quickly located and rescued. Since becoming operational in 1982, the Cospas-Sarsat system has helped to save over 22,000 lives around the world. As a signatory to the International Cospas-Sarsat Programme Agreement (ICSPA), Canada is committed to providing the satellite payload equipment that is at the heart of the search and rescue system.

Upon successful completion of Phase 1, COM DEV anticipates negotiating to begin work on Phase 2 of the program, which would see the Company build two repeaters for the satellite payload. The SARR equipment will be delivered to the United States for integration onto NPOESS weather satellites being jointly procured by the U.S. National Oceanic and Atmospheric Administration (NOAA) and the United States Air Force. The satellites will operate in a polar low earth orbit with the first launch planned for 2013.

## ACADEMIC NEWS

### UNIVERSITY OF TORONTO

#### **Bio-inspired Wing Design to Revolutionize Aircraft Flight**

By Michelle MacArthur

**Toronto – October 28, 2008 –** It's a bird, it's a plane, it's ... both! While aircraft have always borne a resemblance to their feathered counterparts in the sky, new research at U of T is bringing the two even closer together.

Inspired by nature, mechanical engineering professor Shaker Meguid is currently developing aircraft wing designs that imitate the amazing flight of birds by altering the planform of the wings in order to optimize the aerodynamics for a given flight stage.

"When you observe eagles in flight, you would notice that when they are high in the sky they soar and their wings are fully extended. They are gliding, attempting to increase lift and reduce drag. This helps them to glide effortlessly and navigate for long durations in their search for a prey. However, they fold their wings and go on a fast attack when they dive to catch a prey," Meguid explained.

After studying research on birds, in particular the *Apus apus* (common swift), a bird whose wing-morphing ability makes it an especially versatile flyer and allows it to eat, sleep and mate in the air, Meguid began plans to develop a more effective alternative to the traditional fixed-wing aircraft.

"Morphing implies large seamless shape change. Right now we have aircraft control surfaces that allow discrete morphing such as ailerons and flaps. What we want to do is undergo changes in a seamless fashion, resulting in increased efficiency," he said.

To achieve these seamless transitions in wing shape, Meguid and his research team are combining two types of advanced materials. The first is shape memory alloy (SMA), which contracts when heated above a certain temperature. The second are piezoelectrics, which compress or extend when an electric field is applied to them. They plan on using these materials to allow the wing to change shape and respond to an aircraft's changing mission with an overall reduced system complexity.

Meguid explained how this works using a model developed by one of his post-doctoral fellows, Aarash Sofla. "The shape morphing truss structure ... uses shape memory alloy actuators to achieve bending, twisting and undulating shape changes. The structure consists of tetrahedral truss unit cells, which are connected using a spherical freely rotating joint. The joint provides a means for connecting several struts at a node while ensuring sufficient rotational freedom.

"In addition to increasing an aircraft's performance and adaptability, morphing wings carry many other benefits, including lower costs, reduced pollution and noise during take-off," Meguid added.

Meguid's morphing wing research is funded by the DSO National Laboratories in Singapore, where he founded the aerospace

division at Nanyang Technological University in 2004 while on leave from U of T. This three-year project, which was launched in April, is focusing on developing morphing wings specifically for unmanned aerial vehicles (UAVs), aircraft that are often used for surveillance, imaging and operation in locations where human safety is at risk.

Meguid is looking forward to seeing his morphing UAV wings literally take off as he and his team, consisting of one post-doctoral fellow, one doctoral student and three undergraduates, realize their designs. "It is design and build; it's not a paper exercise," he said. "We will be examining the aerodynamic performance and the mechanical integrity of the successful wing morphing designs and aerodynamic tests will be carried out in a wind tunnel in DSO National Laboratories in Singapore."



## Launching Futures to New Heights



The "Mighty Ducks" team with their flying wing design. L to R: Kari Zacharias, Andrew Lambe, Jonathan Chan, and Nimeesha Kuntawala.

In early April, U of T students enrolled in the Aircraft Design course participated in the Aircraft Design Fly-Off at University of Toronto Institute for Aerospace Studies (UTIAS). Students enrolled in the design course, which is taught by **Joaquim Martins**, Canada Research Chair in Multidisciplinary Optimization, are required to design, build and fly an electric-powered airplane.

The flight-testing took place in the field behind UTIAS. The flights, which students have 15 minutes to make, comprise 20% of the students' final grade. In addition to the scheduled flights, time was also scheduled for free format flights.

Student **Kari Zacharias** (Eng Sci OT8 Aerospace Option) commented that her team, The Mighty Ducks, was nervous prior to their scheduled flight. "We'd done a couple of flight tests during the previous week that...ended in crashes and serious repairs," she commented. Despite a last-minute scare with the team's aileron control, which was fixed with the assistance of a TA and some borrowed equipment ten minutes before The Mighty Ducks were scheduled to fly, the team had a successful flight. "Considering all that, we were thrilled, relieved, and a little surprised that our plane managed to fly so well. It was great to see our work come to fruition that way..."

The test pilot for the flights was AJ Hobby store owner, Jack Humphreys. "All aircraft managed to fly successfully," said Professor Martins. "Many of the aircraft were able to perform aerobatic maneuvers such as loops, rolls and inverted flight." Following the flights, UTIAS sponsored a reception at ground

level for the students and all involved.

## YORK UNIVERSITY

### Canadian "Solution to Pollution" Transmits First Data from Space

**Toronto – December 11, 2008 –**

A space-borne pollution monitor designed and built at York University has transmitted its first data to earth.

The Argus microspectrometer, launched in April aboard the University of Toronto's CanX-2 microsatellite, can accurately detect sources of industrial pollution on earth, to a resolution of one kilometre.

"We're very excited about this. It's a Canadian first," says principal investigator Dr. Brendan Quine, a professor in York's Department of Earth & Space Sciences & Engineering.

Argus will enable scientists to determine local levels of carbon dioxide and other climate change gases by recording infrared spectra, which contain information about atmospheric composition.

Developed in partnership with Thoth Technology, it is the first space instrument to be built and tested in York's space engineering laboratory, part of the university's Centre for Research in Earth & Space Science (CRESS).

The device, which is small enough to fit in the palm of an adult's hand, transmits data via infrared radiation emitted to space.

"In order to get it onto the microsatellite, we had to miniaturize everything," says Quine. To meet that challenge, his team reduced a spectrometer – normally the size of a laser printer – to the size of a box of paperclips. The resulting instrument weighs only 230 grams.

Analysis of data will take months. Quine is confident of its value in the fight against global warming. "A global pollution-monitoring system is critical in order to quantify progress towards emission-reduction targets," he says.

Quine is currently seeking partners for more widespread deployment. "We need to fly a network of about one hundred Argus instruments in order to quantify pollution accurately and build detailed pollution maps."

York University is home to the only undergraduate space engineering program in Canada.

## **MUSEUM NEWS**

### **TORONTO AEROSPACE MUSEUM (TAM)**

#### **CAHS Meetings at TAM**

TAM will be hosting the Canadian Aviation Historical Society's next meeting on **February 21, 2009** which features a talk on the **Silver Dart** timed to coincide with the 100<sup>th</sup> anniversary of Canada's first powered flight. For more information, please visit the TAM website ([www.torontoaerospacemuseum.com](http://www.torontoaerospacemuseum.com)), or the CAHS website ([www.cahs.ca](http://www.cahs.ca)).

### **Flight Simulator**

TAM recently installed an authentic airline flight simulator to enhance educational programs. The simulator rents out for \$15 solo or \$20 dual for a 20 minute flight, with group rates also available for special occasions, such as birthday parties.

The simulator was developed in Russia to train pilots and is modeled on the Antonov An-2 utility aircraft with a full aircraft cockpit and projected visuals integrated with the latest Microsoft software package featuring a wide range of aircraft to fly, from a DHC-2 Beaver on floats and Cessna Citation executive jet.

#### **Educational Programs at TAM**

The Toronto Aerospace Museum has a rich variety of programs for elementary and secondary school students, children and families.

Most special programs run from 10:00 a.m. - 3:30 p.m., and cost \$45 plus 5% GST. For further information and bookings, contact, John Harper, Educational Director, by phone at 416-638-6078 or by e-mail at [education.tam@bellnet.ca](mailto:education.tam@bellnet.ca).

Here is a look at upcoming programs for early 2009:

**February 21 and March 16  
Future Pilots, Level I**  
(Ages 10-14)

**February 22 and March 17  
Future Pilots, Level II**  
(Ages 10-14)

**February 28 and March 18  
Future Pilots, Level III**  
(Ages 10-14)

**January 24 and March 19  
Fun With Flight**  
(Ages 6-9)

**January 31 and March 20  
Astronaut for a Day**  
(Ages 10-14)

## **CASI CORPORATE PARTNERS IN THE TORONTO AREA**

### **BOMBARDIER**

