



# ENGINEERING AND PEO: THE FIRST 80 YEARS



by Dwight Hamilton

In this special edition, *Engineering Dimensions* takes a look back at the association's past and the world of Canadian engineering around it.

**T**wo years into the “Roaring ’20s” Toronto took the Stanley Cup, but it was hoisted over the shoulders of a team called the St. Pats. The same year the CFL’s Grey Cup was won by a squad from Queen’s University and Britain’s House of Lords admitted its first woman. Ten dollars got you a membership in the newly formed Association of Professional Engineers of Ontario (PEO) and annual dues were half that, which was about the price of a rocking chair from the Eaton’s catalogue at the time.

### THE OPENING ACT

When the *Professional Engineers Act* was first passed back in 1922, anyone and everyone could practise engineering as long as they didn’t call themselves “professional engineers,” which was restricted to PEO members. It would not be until the Act was “closed” in 1937 that the right to that title came with an exclusive right to practise engineering.

The young PEO began to set the stage for licensure and professional accountability, however, by adopting its first ethics code

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only a year after its formation. Membership at the beginning of 1923 was 478. Four years later, Elsie Gregory McGill, P.Eng., became PEO’s first female member. Something of a celebrity, McGill was the first woman to graduate in electrical engineering from the University of Toronto, the first woman in North America to graduate in aeronautical engineering, and the first woman to design, build and test her own airplane.

The Second World War acted as a catalyst for technological innovation and this progress heightened the need for public protection where engineering was involved. In 1946, the *Professional Engineers Act* was amended and the meaning of “professional engineering” was made more specific to include “engineering works and installations relating to airports, airfields and landing strips and relating to town and community planning.”

In 1947, PEO presented its first Professional Engineers Gold Medal to the Rt. Hon. Clarence Decatur (“C.D.”) Howe, P.Eng., dubbed by historians as the “Minister of Everything.” Instrumental in organizing Canada’s production effort for the war, Howe’s era in the federal government also saw the birth of megaprojects like the St. Lawrence Seaway, the Trans Canada Pipeline, the Trans Canada Highway and the precursor to Air Canada.

In 1948, a well-defined Code of Ethics was adopted by membership referendum and approved by the Attorney General. PEO was also given the power to pass by-laws including the new code and ones that define unprofessional conduct, gross negligence and incompetence.

Here are some more milestones in PEO’s 80-year history:

**1957** PEO begins a program for certifying engineering technicians in an attempt to upgrade their status, standardize their qualifications and relieve shortages of technical personnel. Four years later the Ontario Association of Certified Engineering

Technicians and Technologists is formed as an offshoot.

**1961** PEO creates an employment service due in large part to the fallout of the Avro Arrow cancellation. Today, this function is performed by the Ontario Society of Professional Engineers.

**1961** The PEO Chapter System is established.

**1969** A new *Professional Engineers Act* was passed by the Ontario Legislature, giving PEO control of such titles as “consulting engineer” and its variations.

**1975** The Consulting Engineers Division was separated from PEO, receiving its charter and being renamed Consulting Engineers of Ontario.

**1976** The Professional Organizations

Committee of the Ontario Law Reform Commission launches a comprehensive review of the *Architects Act*, the *Law Society Act*, the *Notaries Act*, the *Professional Engineers Act* and the *Public Accountancy Act* and their respective self-governing bodies.

**1980** *Engineering Dimensions* is launched. The *Gazette* supplement (produced by PEO Legal and Professional Affairs) is first published in 1982. The first PEO publication was a newsletter entitled the *Bulletin*, founded about 1925 in order to inform a growing membership about committee and Council activities. Over the years, titles such as *The Professional Engineer in Ontario*, *Ontario Digest*, *The Professional Engineer* and *The Link* have served to keep Ontario engineers up to date.

**1984** A new *Professional Engineers Act*, (Bill 123) was passed that changed substantially the definition of professional engineering, established new classes of licence, increased the number of councillors, particularly those appointed by

the government, and eliminated the residency requirement.

**1986** PEO elects its first female (and youngest) President, Claudette MacKay-Lassonde, P.Eng. Women subsequently served as President in 1993 and 1997.

**1989** The Women in Engineering Advisory Committee (WEAC) is formed to propose measures leading to the full participation of women in engineering. Currently, women make up about 21 per cent of university engineering students and about 7 per cent of the total number of licensed engineers in Ontario.

**1993** The experience requirement for qualification as a P.Eng. is changed from 24 to 48 months.

**1993** The association adopts a simplified common name, Professional Engineers



Ontario, and modernized logo to enhance recognition.

**1995** PEO moves to its current location at 25 Sheppard Ave. W. in Toronto.

**1998** The Engineer-in-Residence program, which pairs professional engineers with school teachers to deliver science projects to students, is launched.

**2000** PEO begins to implement recommendations from the 1998 Admissions,

Complaints, Discipline and Enforcement (ACDE) Task Force report, strengthening PEO's regulatory function, while improving the efficiency and transparency of its processes.

**2000** A referendum on advocacy is held showing overwhelming support of those who voted for such services to be separated from PEO.

**2001** The Ontario Society of Professional Engineers is incorporated

and PEO begins to divest itself of non-regulatory programs and activities transferring them to the newly formed society.

**2001** PEO adopts a new Strategic Plan, focusing on its future as solely a licensing body. ❖



## over the years

### Massey-Harris combine

In 1937, Thomas Carroll, an engineer at the Massey Toronto works, developed a self-propelled combine that replaced the manual labour of 300 men. Its impact on agriculture has been profound; farm implement manufacturers had struggled for 150 years on the concept. Combines today have the same design elements found in the first prototype Carroll introduced in Argentina. An industry leader, Massey-Ferguson tractors have also been the world's most popular since the 1960s.

### Microwave radio relay system

Telecommunications in Canada after the Second World War was poised for extensive expansion, but there was a significant problem. Pre-war technology (poles, wires and cables) was not feasible for a country its size. The feasibility of using microwaves for telecommunications was demonstrated in 1948 with a wireless telephone call between PEI and Nova Scotia. Lobbying for a similar coast to coast system began shortly after. The longest such system in the world was completed in 1958: 139 towers spaced about 50 km. apart stretch from Victoria, B.C. to Sydney, N.S.

### The pacemaker

Just after the Second World War, medical researchers at the University of Toronto's Banting and Best Institute and John Hopps, P.Eng., of the National Research Council observed in an experiment that the heart stops when muscular contraction failed at low temperature. When it's artificially stimulated, it behaves in a normal fashion. Hopps then produced a device that could fire single electrical pulses at appropriate rates to control heartbeat. The first pacemaker was installed in a human body in 1958.

### St. Lawrence Seaway

The building of the seaway proved to be a colossal task for engineers and contractors: a coordinated project site stretched over 560 km from Montreal to Lake Erie. There's a drop of over 180 metres from Lake Superior to sea level and impassible rapids and waterfalls along the way. About 20,000 people (including 500 engineers) built bridges, canals, dams, railways, and hydro-electric generating stations in Canada and the U.S. Several towns had to be relocated. When it opened in 1959 it became a vital economic link between the North American heartland and the markets of the world.

### Ski-Doo

Armand Bombardier's first snowmobile was built when he was just a 15-year-old boy and was the motor from an old Model T Ford attached to a propeller and four runners from a horse drawn sleigh. But in 1959 he introduced the "Ski-Dog," which through a typographical error in company literature became known as the Ski-Doo. Today, the name is still synonymous with the snowmobile and Bombardier Inc. is a world-renowned manufacturer of aerospace and transportation equipment.

### Alouette I

With the Alouette I satellite, Canada became the third nation to enter the spaceage. In an agreement with NASA, John Chapman, P.Eng., and a team from the Defence and Research Telecommunications Establishment designed and built two identical satellites that can monitor the ionosphere from above. At first the project was riddled with engineering problems—but new technologies like transistors and solar cells helped. The first was launched from California's Pacific Missile Range at 2:06 a.m. EST on Sept. 29, 1962 from a two-stage Thor-Agenda rocket. Under the direction of Chapman, Canada began to develop its own system of satellite communications in the late 1960s, known as the Anik series. Canada's first remote sensing satellite, Radarsat, was launched in 1995.

### Avro Arrow

Books and movies have made the Arrow a Canadian legend. Why were the planes and the blueprints destroyed? How were the Americans involved? Did KGB spies steal the plans? The sudden cancellation in 1959 of what was considered by many to have been the world's most advanced jet fighter at the time has been said to mark a turning point in Canada's industrial development. Many of Avro's engineers ended up working for the U.S. space program.

### The 401

Canada's first freeway may have been the Queen Elizabeth Way, opened in 1939, but the Macdonald-Cartier Freeway (Highway 401) is its most significant. The "main street of Southern Ontario" opened in 1968 and has been called the single most important element to change the social and economic pattern of the province. Most of its population is concentrated in a 30-km corridor through which the route's 820 km of pavement and concrete runs.

### Canadarm

A month before the Apollo astronauts walked on the moon, NASA went looking for partners for its "Space Transportation System." Canada's contribution is a 15-metre-long robot arm analogous to a human one. Computers control electric motors that power a structure made from graphite-reinforced tubing. When it debuted out of the cargo bay of the Space Shuttle Columbia in 1981, an astronaut said: "It's a remarkable flying machine and it's doing exactly as we hoped and expected."

### Confederation Bridge

Stretching over an incredible 12.9 km this bridge is the longest in the world to span ice-covered waters. It utilizes a multi-span concrete box girder structure and was built using segmented precast construction, in which components were produced in a 60-hectare staging facility and then placed by a heavy-lift vessel. Costing about \$1 billion to build, the structure is predicted to last a century. Opened in 1997, the route is open to two lanes of traffic 24/7 and it takes about 10 minutes to cross from Bordon-Carleton, P.E.I. and Cape Jouriman, N.B., if you keep to the speed limit.

### Trans Canada Highway

Although the government passed the *Trans Canada Highway Act* in 1949, it wasn't until 1962 that the road was declared open and even then a third remained unpaved. The 7800-km. network is now the longest paved road in the world and was built by upgrading existing routes and filling in the gaps between. Of particular difficulty was about 260 km of formidable brushland, muskeg and Precambrian shield that lie between the Montreal River and Marathon, Ont. Supplies had to be brought in by rail, light aircraft or barge from Lake Superior.

### IMAX movies

What would revolutionize big screen cinema premiered at Expo 70 in Osaka, Japan. William Shaw, P.Eng., developed a single movie projection system three stories tall, with the aid of an Australian "rolling loop" mechanism. The film, 10 times larger than conventional 35mm format, is advanced horizontally in a smooth, wave-like motion. During projection, each frame is positioned on fixed registration pins, and the film is held against the rear lens element by a vacuum.

### CN Tower

The American Society of Civil Engineers has classified this structure as one of the "Seven Wonders of the Modern World" and it is still in the *Guinness Book of World Records* as the tallest building on the planet. Completed in 1976, it stands over 553 metres high and cost about \$300 million in today's dollars to build. The tower is made primarily of 40,000 cubic metres of concrete and took 1537 workers almost four years to complete. Over 2 million visitors a year examine the view from its observation decks.

### SkyDome

It is the only stadium in the world with a fully retractable roof. Spanning over three hectares and comprising four panels, the roof runs on a 566.7-KW system of steel tracks and bogies; one panel is fixed, one rotates 180 degrees and two telescope forward. They are made up of steel trusses covered by corrugated steel cladding with a single-ply PVC membrane acting as weather-proofing. Finished in 1989, the structure could enclose St. Paul's cathedral.