

HARMONICS

The Engineering Explorations Newsletter

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WHAT IS ENGINEERING?

There are many definitions of engineering. Three of them appear in the shaded boxes on this page. From these definitions, engineering certainly sounds important, but what does it all really mean? The truth is many people have no idea what it is that engineers do.

...the art or science of making practical application of the knowledge of pure sciences, such as physics, chemistry, biology etc....
Webster's Dictionary

...any act of planning, designing, composing, evaluating, advising, reporting, directing or supervising, or managing any of the foregoing, that requires the application of engineering principles, and that concerns the safeguarding of life, health, property, economic interests, the public welfare or the environment.
Canadian Council of Professional Engineers

We learn about what other people do by being exposed to them in our daily lives. For instance, just about everyone has gone to school at some point in their lives, so we all know what teachers do. Also, most people have been to visit a doctor or a dentist, so again most of us can say we know, at least generally, what doctors, dentists and other health care workers do. You could probably tell people what hair dressers, astronauts, waiters, airplane pilots, psychiatrists, trappers and police officers do. And of course we all know what actors and actresses do.

It is often through actors and actresses that we begin to understand things about people who we may not get to meet or see in our communities. Actors and actresses are story tellers. So are newspaper and television reporters. In fact, most of the people involved in producing television, movies, radio and newspapers are story tellers. Because of their talents we learn about people and places we wouldn't normally hear about.

Think about the careers you may have learned about from television and the movies.

...the profession in which a knowledge of mathematical and natural sciences gained by study, experience and practice is applied with judgement to develop ways to utilize the materials and forces of nature, economically for the benefit of mankind.
American Society of Engineering Education

- Geneticists - Jurassic Park, The Lost World
- Lawyers - JAG, LA Law
- Police Officers - The X-Files, NYPD Blues, Due South
- Doctors and Nurses - ER, Chicago Hope, Dr. Quinn Medicine Woman

Very few people tell us stories about engineers, and so it is not surprising then that many people do not realize what engineering is all about. And that is unfortunate, because while we are not exposed to engineers on a daily basis, we are exposed to the results of the work engineers do almost every minute of every day of our lives.

These newsletters will help to expose you to the many branches of engineering and the many people who are involved in the profession. It will also introduce you to people from your own communities who practice engineering, and (hopefully) help you learn how engineering and engineers could contribute to economic development in your community. So, we haven't answered the question, "What is engineering?" because the answer would take up more space than we have on this page. Over the next school year you will receive *Harmonics* four times. We think at the end of the year you might begin to have an answer to the question yourself.



NATIVE ENGINEERS

A place to meet engineers from your community.

Name: Joe Deom. Sr.
Nation: Mohawk, Kahnawake
Profession: Civil Engineer
School: City College of New York
Degree(s): Bachelor of Civil Engineering
Favourite thing about job: Applying what he has learned and watching projects unfold.

As a young man, Joe Deom knew he wanted to work in construction. His father, wanted him to go to college and not to be an iron worker. They both got what they wanted, Joe went to City College of New York and became a Civil Engineer. He now runs his own business, Joe Deom and Associates, in Kahnawake with his son, Joe Jr., and daughter-in-law.

Mr. Deom's expertise is in the area of municipal engineering, this means he deals with water delivery, sewage, road construction and other infrastructure projects. His company recently did an environmental assessment of the proposed site for Kahnawake's new cultural/hotel complex and determined that the it was not suitable because construction on the site would have too much of an impact on local wildlife and wetlands. Consideration of the environment is very important to Mr. Deom and is one of the ways he weaves his engineering knowledge with traditional values.

What skills did engineering give you?

The ability to tackle all types of problems in an objective manner, not just engineering problems but social problems too.

Do you think engineering plays a role in economic development?

Yes, engineering allows for the practical implementation of economic development initiatives, so it is important.

Do you think studying math and scien are important for young Native people?

It is important to study math and science. They are a stepping stone to a wide variety of fun and interesting careers.

City College of New York is a small university located in New York City. In addition to the School of Engineering, it also has schools of Nursing, Architecture and Environmental Studies and Education. You can get more information about City College of New York by writing to the Office of Admissions, Administration Building, Room 100, 138th St. & Convent Ave., New York, NY, 10031; calling (212)650-6977; or looking on the Web at <http://www.ccnyc.cuny.edu>.



Confederation Bridge Opens

The World Wide Web is a wonderful resource for doing research and also having fun. If you want to find out more about engineering check out these sites.

American Society for Engineering Education (ASEE) Precollege Pages
<http://www.asee.org/pre/pre.html>

Many of your questions about engineering can be answered here. You'll also find a section which outlines different types of engineering (there are over 100) and links to other cool sites.

American Indian Science and Engineering Society (AISES)

<http://www.colorado.edu/AISES>

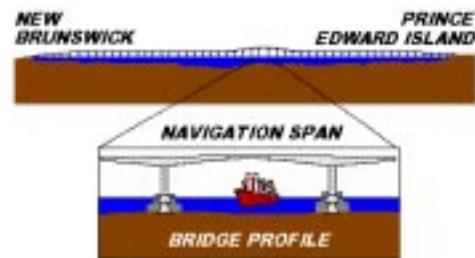
AISES is great resource for finding about engineering and its links to traditional culture. AISES runs summer camps and seminars. You can also start a chapter at your school.

For those of you who are interested there is a Canadian equivalent to AISES called **CASEA**. CASEA stands for Canadian Aboriginal Science and Engineering Association. You can get more information by writing to:

CASEA
22 College Street, 2nd Floor
Toronto, Ontario
M5G 1K2
Tel: 416-972-0212
Fax: 416-972-0217

If you know of any science Web sites or other resources you think would interest other students let us know about them. You can reach us at the addresses listed on page 6 of *Harmonics*.

In 1873, when the people on Prince Edward Island voted to join Canadian Confederation they were promised a year-round link to the main land by the federal government. For 124 years that link was provided by a ferry service which ran across the Northumberland Strait between PEI and New Brunswick. As the population grew and tourism to the island increased, the cost of providing ferry service also increased. There were other problems too. In the winter high winds blow through the Strait and it is cold enough for thick ice to form on the water. Ferries were often delayed or canceled due to dangerous weather or ice conditions, stranding travelers on one side of the Strait or the other.



Source:
<http://www.peinet.pe.ca/SCI>

In June 1997, the ferries were finally replaced by a permanent link, the Confederation Bridge. The bridge is one of the most challenging engineering projects ever built. Its design and construction were completed over 4 years by more than 2000 people. The final structure is massive. It is nearly 12.9 kilometers long - about the length of 117 football fields. It weighs almost 3.5 billion kilogram. If the average person weighs about 70 kilograms (155 lbs) the bridge is the equivalent of 50,000,000 people - more than one and a half times the population of Canada!

Confederation Bridge actually consists of 65 separate sections which were each built on land and then moved into precise positions by a satellite-guided floating crane. It is designed to last for 100 years withstanding the driving winds and crushing ice of the Strait and even impacts with passing ships. At the same time the bridge was designed to have little environmental impact on the ecosystems within and surrounding the Strait.

For more information about the Confederation Bridge check out <http://www.peinet.pe.ca/SCI>



COMMUNITY PROFILE

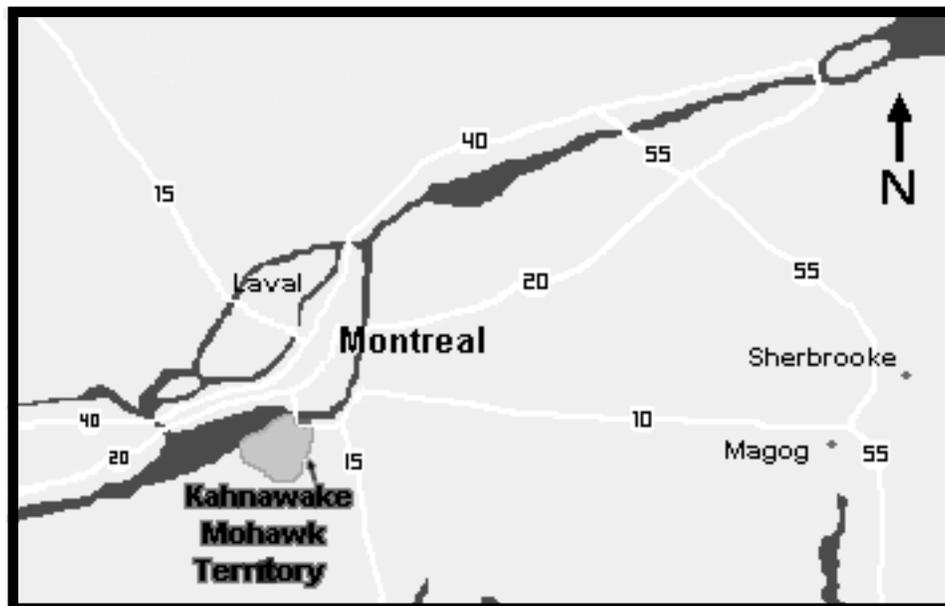
Kahnawake, Mohawk Nation

Hi, my name is Jerilyn Horne. I am from Kahnawake, Quebec, a reserve just south of Montreal. You can see Kahnawake on the map below. This summer I worked as a summer student researcher for the Native Access to Engineering Programme at Concordia University. I have been associated with the project since the pilot run of Engineering Explorations summer science camp in 1994. This fall, I will be entering my first year at Concordia University in the four year Early Childhood Education Programme.

This summer, my reserve has been going through quite a few changes. Our roads have been undergoing heavy construction. They are not only being re-paved but curbs and sidewalks are being added for convenience and to give the town a face-lift. Although paving roads is quite a routine, seasonal task for construction workers everywhere, the engineers in my community have been busy. They are responsible for providing accurate

measurements, reading blue prints and at the same time changing our water pipes. The maintenance and improvement of the reserve's infrastructure is not only providing a new, cleaner look to the town but more importantly is providing a greater sense of security - when the new piping system is finished we will have cleaner, purer tap water in our homes.

There are also several other projects in different stages of development in Kahnawake. The largest is the development of a Hotel/Cultural lodge. This project is scheduled to begin in May 1999 and is aimed at increasing tourism in Kahnawake. The entire tourist site will include among other things, a museum/interpretation center, a sugar shack, riding stables, nature trails, bed & breakfasts, and a stadium. Although the site has not been finalized, a lot of 110 acres along one of the routes in the reserve has been proposed. Environmental assessments will be done before any site is chosen.



FUN FACTS AND THINGS TO THINK ABOUT



Did you know there are over 100 fields of engineering?

How do reindeer keep from freezing in the winter?

They use anti-freeze! Well, actually they eat lots and lots of moss, which contains chemicals that help them keep their body fluids warm. When the weather gets really cold these chemicals prevent the reindeer from freezing solid.

Source:
National Geographic World
<http://www.nationalgeographic.com/media/world>

Web Words

Bit: The smallest unit of computer data; either 0 or 1.

HTML: The language used to create Web pages; it stands for HyperText Markup Language.

Internet: The huge collection of inter-connected networks and computers all over the world. The World Wide Web is only a part of the Internet.

Modem: A device which connects your computer to a phone line and allows access to other computers.

Source:
Discover Learning
<http://www.discoverlearning.com/>

The human heart is one of the most efficient pumps ever designed. It beats on average 100,000 times a day. That means by the time most people are 20 it has beat about 730,500,000 times! How old would the average person be by the time it has beat 1 billion times?

You must be the change you wish to see in the world.
- Mahatma Gandhi



PUZZLES AND GAMES

Somewhere in a very far away desert there is a beautiful treasure. Unfortunately for treasure hunters the protectors of the treasure have placed it on a tiny island in the middle of a square lake. The lake is not very big, each of its sides measure 40 feet in length. Not too far to swim for most treasure hunters, but the protectors of the treasure are very crafty, they have filled the lake with acid rather than water.

The shortest distance to the island is from the middle of each side. It is just over 19 feet. Near the lake a construction team has left a bunch of wooden planks. Each plank is 16 feet long, 16 inches wide and 2 inches deep. They are certainly strong enough for you to walk on, but they are not long enough to span even the shortest distance across the lake to the treasure. You have no tools - no rope, no nails, no glue, nothing - there is not a store within 2 days walk of the island. Can you get across to see the treasure anyway?

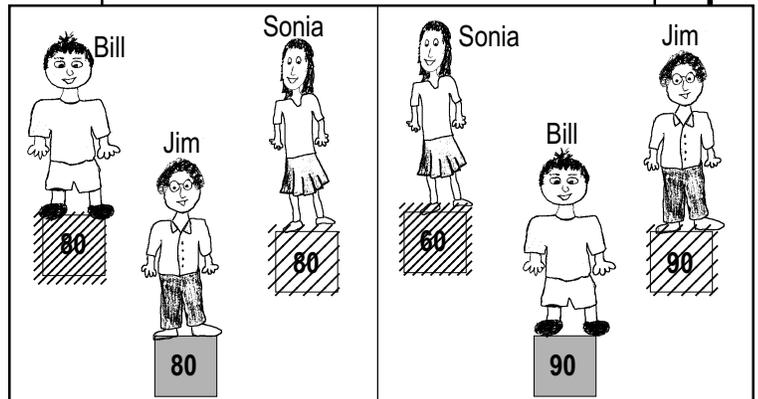
Source: The Grey Labyrinth, <http://www.wx3.com/labyrinth/>

Can you name an Aboriginal nation for each of the twenty-six letters in the alphabet?

Not all scales are accurate: they can flatter or depress people by giving weight that either too low or too high. Three friends - Bill, Jim and Sonia have just weighed themselves on three different scales. The readings indicate that they all weigh the same. "There's something wrong," Bill tells Sonia, "because I am obviously heavier than you." So they all try different scales and get completely different results.

Using the picture below and knowing that one of the scales reads 10kg too low, another 10kg too high and the third is completely accurate how much does each friend weigh?

Source: Science et vie junior, June 1997



We'd like to know what you think. You can send your answers by mail, email or fax just see the addresses below. Be sure to include your name, age, grade and address on anything you send in. Your answers could appear in a future issue of *Harmonics*.

Why do we often get thirsty when we eat salty foods?

All about us

Native Access provides culturally relevant learning opportunities in science, math, engineering and technology to Aboriginal students and their teachers across Canada.

Established in 1993, the project's ultimate goal was to increase the representation of Aboriginal peoples among the ranks of practicing engineers and scientists in Canada.

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You can reach us at:

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Kingston Ontario K7L 3N6

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URL: www.aboriginalaccess.ca

