rpc RESEARCHER

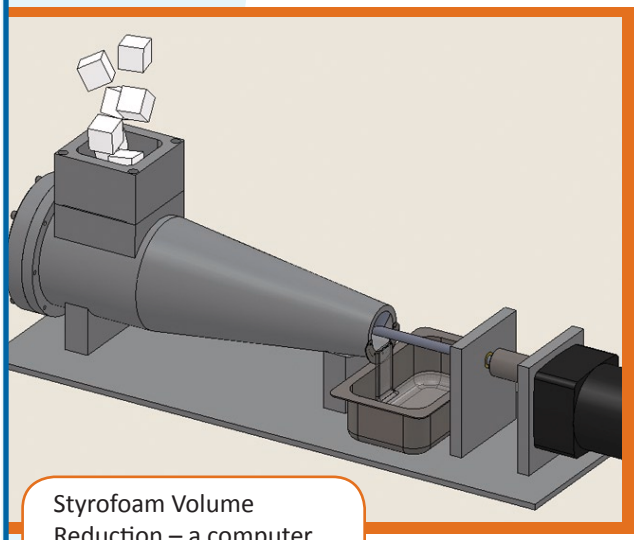
SPRING 2011

RPC engineers bring ideas to life

By Alexandra Davis

RPC's Mechanical Systems and Diagnostics department works with clients from a wide range of different sectors to develop exciting new products.

Department Head John Aikens said anyone from a small startup company to a large nuclear power utility might come to RPC looking for a solution to a problem.



Styrofoam Volume Reduction – a computer generated model is one of the first steps in developing a new product.

He said the 15 members of his department work closely, both as a team and with clients throughout the process, generally moving from a rough idea to a working prototype in a matter of a month or two.

Aikens said the engineers, technologists and machinists who work in the department focus on providing exactly what the client is looking for within a given budget.

"First, we'll go through a process where we'll make a conceptual design for the client," he said. "We could make some concept drawings or buy a selection of materials and build a few mock-ups to satisfy what the client wants."

"When they're happy with the concept, and it does what they'd like it to do, we'll go into the detailed design. In this phase, we'll actually choose the final materials, part dimensions, colors and hardware."

"When you build a prototype you can easily go through two or three iterations just to make it work. Once you finalize it, usually what we'll give to the client will be an actual working model of what they wanted so they can now carry out tests with the prototype or show it to investors."

He said that in recent years, many clients are focused on developing green products that will help them implement processes that have less of an impact on the environment.

Aikens said that he recently worked with a client from Nova Scotia to develop a prototype that dramatically reduces the volume of Styrofoam.

"When you buy any kind of item like a TV or a computer there's a huge chunk of Styrofoam packing material with it," he said. "It has to go to the landfill, and it's very costly because of the volume. This client's idea is to dissolve the Styrofoam using an innovative machine and an environmentally-friendly chemical process."

He said his department was able to successfully develop a table-top prototype that dissolves Styrofoam into a substance with a molasses-like consistency, and reduces its volume by as much as 97 per cent.

"He's going to do some tests now," Aikens said. "His next step will be to make a commercial-size device which he hopes he can tow behind a truck and go to landfills and offer the service to reduce the volume of the Styrofoam."

He said the department can develop prototypes for just about any company that's experiencing an engineering challenge, including a utility such as NB Power, a pulp and paper mill, a food processing company and many more.

"Anyone might come to us, really," he said. "If they have an idea for an invention, or a problem that needs to be solved, we can take them through the process and help them out."

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SCIENCE & ENGINEERING

Dioxin - A food safety concern

By Alexandra Davis

Staff members in RPC's organic analytical services department are dedicated to testing food and animal feed samples to detect trace levels of contaminants such as dioxins.

Section manager Dr. John Macaulay said the term dioxin encompasses a number of different compounds. He said they first became a public concern in the 1960s when they were discovered as a byproduct in the manufacturing of Agent Orange, a herbicide defoliant used during the Vietnam War. Later they were found to be a byproduct of pulp and paper mill processes.

Over time, he said, the pulp and paper industry discovered ways to reduce dioxin levels significantly. However, he said these new methods didn't eradicate dioxins completely.

"Even though the pulp and paper industry reduced their levels, the attention turned to the effect of these contaminants on the food chain, on the health of the environment in general and on human health," Macaulay said. "The shift in emphasis from environmental to food samples evolved through the '90s and continues today."

He said dioxins often make their way into the food chain through animal feed. Although the production of all fat containing foods has the potential to increase our dietary exposure to dioxin, there's been a focus over the years on dioxin contamination in the aquaculture industry.

"Some of the components in animal feed are fishmeal and fish oil, which are basically recycled components from fish waste," he said. "Any dioxin in these components also ends up being recycled, resulting in increased contamination in the tissue of animals consuming the feed."

Since dioxins are fat soluble, they are easily passed up the food chain until they reach humans, Macaulay said. Dioxins have a half-life of about seven years in the human body.

He said that anyone who eats meat, fish and dairy products ingests some level of dioxins, and it's only when food is highly contaminated that toxicity levels become a concern.

He said that researchers don't know the exact level at which dioxins become toxic in humans, or all of the effects that can be attributed to exposure. Through animal testing, he said, scientists have learned that the level of toxicity varies drastically between similar species, and they've observed adverse effects such as tumours.

Macaulay said a skin condition called chloracne is the only effect that can be linked directly to dioxin poisoning. It can cause severe lesions on people who have been overexposed to dioxins, and they can last for long periods of time.

"There are all kinds of other potential effects to the nervous system and the immune system, as well as cancer and learning disabilities in children," he said. "The issue is trying to tie the cause and effect together with complete certainty."

He said that RPC tests samples from companies around the world to determine whether dioxin levels are below the regulated limits.

He said dioxin contamination can have devastating effects on the food industry. His department tested samples from an incident a few years ago that happened in

Section manager Dr. John Macaulay analyzes samples for dioxin contamination on a state-of-the-art High Resolution Mass Spectrometer (HRMS).

Chile, when pigs were exposed to high dioxin levels through their feed.

"A lot of the samples ended up coming to us and we analyzed quite a few of them over a period of several months," Macaulay said. "In that time, there was a quarantine on quite a few of the slaughterhouses and farms in Chile. Until the source of the contamination was discovered, it was a big issue with millions of dollars of losses."

He said some companies submit samples on a regular basis to ensure their products are not contaminated. RPC may also do testing on many samples at once for clients such as environmental consultants who are investigating a site with potential contamination.

Macaulay said companies must continue to be vigilant about monitoring levels of dioxins in their products as the public continues to become more concerned about food safety issues.

"I think there's been a growing awareness," he said. "I think that's because of incidents of contamination over the years."

DIOXIN: DID YOU KNOW?

- In early January 2011, news was reported of dioxin contamination of eggs, pork and poultry in Germany. This is the latest example of food and animal feed contamination scares that have occurred over the years.
- Agents Orange, Purple, Pink and Green were the dioxin-containing defoliant herbicides used during the Vietnam War. The colours correspond to the paints used to mark which drums contained which chemicals.
- Certain marine sponges and other organisms are natural sources of dioxin.
- Consumption of meat, dairy and fish products is responsible for over 90% of dioxin in the human body.
- The half life of dioxin in the human body is about seven years.
- Industrial emissions of dioxin have decreased by over 75% in the past 20 years.
- Dioxin is about 2000 times more toxic to guinea pigs than it is to hamsters.
- RPC conducts dioxin analysis for clients on four continents.

Open for business! RPC opens a location in Moncton

RPC is pleased to announce the establishment of our new satellite laboratory in Moncton. We have acquired the Moncton laboratory formerly operated by Caduceon Laboratories of Ontario, and are located at 150 Lutz Street in the downtown core. The Moncton branch carries out accredited microbiological analyses on site, and serves as a depot and local point of contact for RPC's wide variety of other services.

The Moncton location will allow us to offer improved turnaround on most services to RPC clients as well as former clients of Caduceon. Michael Lawlor supervises the Moncton Laboratory, and can be reached at 506.855.6472 or by email at michael.lawlor@rpc.ca.

Up close and personal with... Josh Perry

It's difficult to give a short answer when asked what we do at RPC. From analytical services to engineering and investigations it's often hard to see the common thread of our organization. However, we all have the same goal: finding solutions to our clients' technical challenges, and we take pride in assisting our clients along the way. Enter **Josh Perry, Client Services Supervisor**.

Josh started working at RPC in 2002 as a Chemical Technician in the Organic Analytical Services department. After shaking sep funnels and preparing samples for analysis, he then moved on to the dioxin laboratory. In 2006, Josh had the opportunity to join the client services team. His lab experience proves to be an asset when addressing client questions and overseeing projects from proposal to final report.

Josh often acts the initial contact when a client approaches us with a particular need. Quite often it's a need that spans more than one of our six departments. It's that diversity he says he loves about his job. Every day is different. One day he may be overseeing operations in the sample receiving area, the next he might be out meeting new clients.

On his off days, when he's not spending time with his wife Gaby, you might find him at the local rink playing hockey. However, he's looking forward to warmer weather when he can relax on the river and take in some fly fishing.

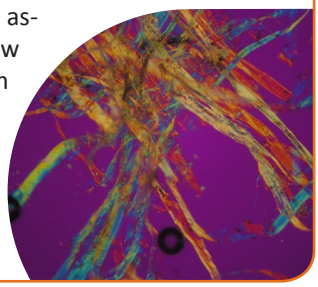
If RPC can help you with your technical challenges, please contact Josh at josh.perry@rpc.ca or by calling 506.460.5765.

Advanced Asbestos

RPC's **Karla McLellan** recently attended a course at the McCrone Research Institute in Chicago called **"Advanced Asbestos Identification"**.

This course covered sample preparation and quantitation techniques including gravimetric methods. RPC will now be analyzing floor tile samples with an ashing and acid washing technique to aid in fibre identification. The fibres in floor tiles are usually so small that they are hard to find, so this method will be an improvement over PLM analysis alone.

The course also covered asbestos look alikes and how to differentiate them from asbestos fibres, as well as heated and chemically altered samples.



Newly Accredited Analytical Services

We are pleased to advise that we have recently become accredited for several new food analyses, including total dietary fibre, B-Carotine and vitamin A. As well, our inorganic lab has become accredited for phenols testing, and our genetics group has added presumptive testing of semen and of human blood to their scope of accreditation.

Our accrediting body is the Standards Council of Canada. Accreditation of analytical services is a very expensive process requiring the lab to follow comprehensive quality standards and subject themselves to regular, on-site audits from the accrediting body. Accreditation is the customer's assurance that high technical standards are followed; beware of labs that advertise their membership or relationship with a laboratory association - if they don't say they are "accredited by... " then you can bet they are not!

You can see our full scope of accreditation at:
http://palcan.scc.ca/specs/pdf/28_e.pdf

Contact Us

If you have questions or comments on our newsletter please contact us. We'll be happy to respond. Email: news@rpc.ca
The RPC Researcher newsletter is published quarterly.
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