Research News
umanitoba.ca/research

Examining the stuff roads are made of

Forget about potholes – the real problem is in the pavement

BY SEAN MOORE
Research Promotion

Springtime supplies fodder for many weather-related conversations, but for drivers, these seasonal discussions are usually dominated by potholes – the automobile's perennial enemy. Reasonably, some drivers wonder what researchers are doing to rid our roads of these hazards.

But Ahmed Shalaby, civil engineering, said spending time researching potholes would be like researching a symptom while ignoring the disease.

"Potholes are an indication the road has failed, and there is not a good treatment for them," he said. "What we should be doing is designing roads that do not deteriorate to the point of having potholes."

Shalaby and his graduate students are researching ways to improve roads by using different aggregates and binding agents in concrete mixtures. They are tweaking the recipe of both asphalt concrete and portland cement concrete, the latter of which has been around in one form or another since the days of Ancient Egypt.

Photo by Sean Moore

Ahmed Shalaby, civil engineering.

Portland cement concrete consists of aggregates – fine particles like sand and course ones like gravel – that are mixed with water and powdered cement to cause a chemical reaction that results in a solid structure. Asphalt concrete is similar except it has an asphalt binder.

"You're dealing with semi-processed materials, which means you have fewer controls over the consistency of the product and that creates problems," he said. "You're not going to change the materials used in road construction, but you can now predict whether they are durable or not."

Shalaby's pavement laboratory is determining the characteristics and material properties of various mixtures. With each quarry mining a slightly different material, it is important to know the subtle variations in their properties.

To determine the strength of mixtures he exposes them to temperatures ranging from –30 C to 40 C. He also places samples in a device that repeatedly pounds them with roughly two tons of force (the weight an average semi-trailer tire distributes) while sensors measure how the mixture reacts.

"We're looking at small, incremental changes, but even those changes end up saving a lot of money," Shalaby said.

He noted that the province will spend roughly $400 million on roadways annually over the next five years, so a five per cent improvement in a roadway's lifespan could mean significant savings for taxpayers. Currently, concrete pavement lasts 35 to 50 years, while asphalt pavement lasts about 20 years.

Shalaby is also researching the surface texture of pavements. He uses a Photometric Stereo Imagining System, a digital camera mounted in a wooden box the size of a kitchen table, which takes 3D images of a roadway's surface and allows him to assess the surface's skid resistance.

"We're looking at the surface of the road to improve our understanding of friction and breaking distances under inclement weather. The objective is to improve safety on roads and airfields," he said.

"It's basically designing roads to make them last longer and make sure they are safe. Safety is the overriding issue, and that's one of the more frustrating parts; sometimes you can't do your research fast enough to come up with results and see them in practice. But a lot of the work we've done has been implemented already."

Sean Moore has recently joined the Research Promotion office. If you have research story suggestions please feel free to contact him. Sean can be reached at 474-7184 or e-mail sean_moore@umanitoba.ca .

Nutrition conference is first of its kind

BY FRANK NOLAN
Research Promotion

Next month, scientists from across Canada will gather in Winnipeg for a four-day conference focused on the rapidly growing field of nutrition research.

The Canadian Nutrition Congress, being held at the Winnipeg Convention Centre from June 18 to 21, is a joint meeting of the Canadian Society of Animal Science, the Canadian Society for Nutritional Sciences, and the Canadian Section of the American Oil Chemists' Society. This is the first congress of its kind in Canada, and it is being organized by researchers at the University of Manitoba.

"We wanted to create synergy in terms of nutrition research across the country," said congress chair Jim House, animal science. "The goal is really to bring together researchers in a range of fields so that they can share ideas across disciplinary boundaries."

The event includes symposia on some of today's hottest topics in human and animal nutrition, from trans fats and omega-3 fatty acids, to animal feed formulation and the intestinal health of cattle and swine. The plenary symposium, like many of the other sessions, spans both areas. It will focus on the optimum fatty acid profile for human health, as well as the modifications that can be made in animal nutrition to help meet that profile and the challenges faced by the food industry in altering the lipid composition of food products.

"There is growing demand by consumers for meat, eggs, milk and other animal products to have a certain nutritional profile," House said. "The question is, what exactly is that profile? This is where animal scientists can work with the human nutrition community to really define the profile we should be aiming for."

Another session will focus on a compound called conjugated linoleic acid (CLA), which has been the subject of intense research around the world.

"CLA is one of those nutraceuticals that has two very distinct sides to it," said Peter Jones, director of the Richardson Centre for Functional Foods and Nutraceuticals, and a member of the Canadian Nutrition Congress organizing committee. "There is a large body of data that show it to have many potential health benefits, from reducing cancer risk to improving blood lipid profiles. On the other hand, there is also evidence that it can produce undesirable effects, so researchers are working very hard to fully understand it."

There is so much interest in CLA that a full-day satellite workshop has been set up at the Richardson Centre. The CLA workshop is being organized by McGill University researcher Stephanie Jew, and supported by the Advanced Foods and Materials Network (AFMNet), one of Canada's Networks of Centres of Excellence.

Photo by Frank Nolan

Peter Jones, left, director of the Richardson Centre for Functional Foods and Nutraceuticals, and Jim House, animal science.

"The CLA Workshop will showcase the very latest findings," she said. "We've received abstracts that range from studies of blood pressure to human clinical trials on body weight and glucose intolerance, so it will highlight a very broad range of CLA research."

Abstracts for both the Canadian Nutrition Congress and the CLA Workshop are being accepted until May 15. For more information about abstract submission, or to learn more about the Congress, including a program and a list of speakers, please visit the Canadian Nutrition Congress website at: www.cnc2007.ca

Bringing Research To Life

Research News is Published
by the Office of the Vice-President (Research)
Comments, submissions and event listings to:
stefaniu@ms.umanitoba.ca
Phone: (204) 474-9020 Fax (204) 261-3475