

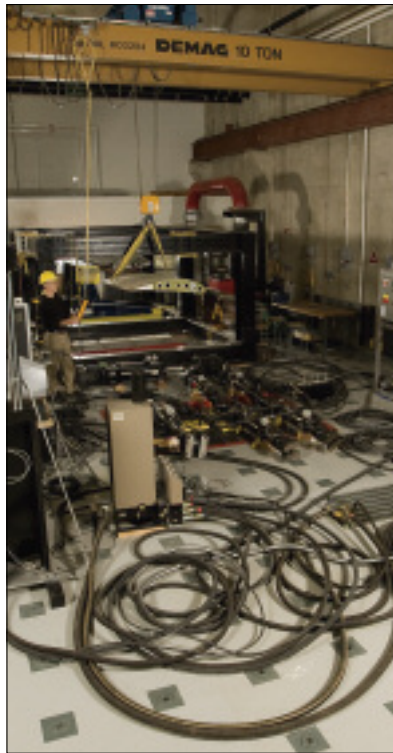
Ideas on the Edge

Torture Chamber

**RYERSON RESEARCH
ENGINEER ZOUHEIR
FAWAZ DOES BAD
THINGS TO AIRCRAFT
COMPONENTS, SO
THEY WON'T DO BAD
THINGS TO US.**

If the cavernous room at Ryerson University looks a little scary...well, that's because it is. This is a high-tech torture chamber, complete with loops of heavy chain, bone-crushing presses, fiery furnaces and thick electrical cables that snake ominously across the floor. The good news is that all of these cruel devices are used solely on...aircraft components.

Anyone who has ever flown knows that planes are subject to a lot of stress: wings flex and twist in flight; joints and components are jolted during take-off, landing and turbulence; freezing air and hot sun batter the fuselage. Over thousands of flight cycles, these forces can result in cracks and other forms of



material fatigue. If undetected, the wear and tear can culminate in catastrophic failure—and terrible front-page news.

That's why Dr. Zouheir Fawaz and his colleagues are using all their grim-looking hardware to crush, stretch, twist, bend, freeze and scorch the next generation of aircraft materials and parts. The high-tech mayhem is being inflicted at Ryerson's FRAMES—Facility for Research on Aerospace Materials and Engineered Structures—compressing a lifetime of hard use into months or even days. The focus of the facility, funded in part by the Ontario Innovation Trust, is on testing new materials being used to build lighter,

more fuel-efficient planes.

One example: the fibre-metal laminate used for the upper fuselage of the new Airbus 380 “super jumbo”

double-decker jet. The material comprises thin sheets of aluminum sandwiched with layers of adhesive containing long parallel strands of fine glass fibre. The result is very light and very strong—a sort of

RESEARCH THAT MATTERS REAL-WORLD BENEFITS FOR ONTARIANS:

- increased aircraft safety
- leadership in the economically significant aerospace sector



ZOUHEIR FAWAZ

Project: Facility for Research on Aerospace Materials and Engineered Structures (FRAMES)
Institution: Ryerson University
Research Sector: Engineering
Principal Investigator: Zouheir Fawaz
Trust Investment: \$512,709
CFI Investment: \$512,709
Total research investment from all sources: \$1,135,457

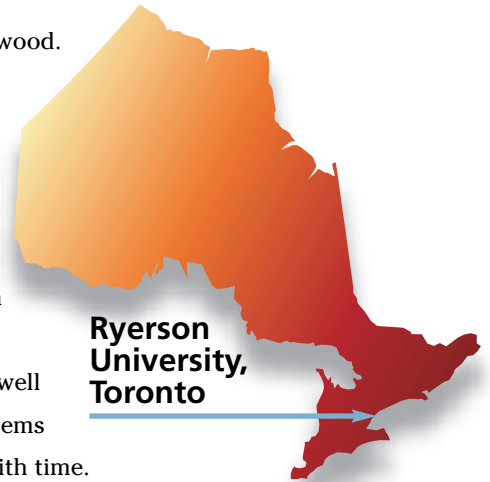


high-tech version of plywood.

The material, of course, has already been extensively investigated by Airbus. But on-going testing will lead to improvements in how such laminates are made and repaired—as well as uncovering any problems that may emerge only with time.

And because Ryerson is a public institution, FRAMES is making the results available to a wide audience. “Everybody can benefit,” says Dr. Fawaz, “hopefully first and foremost, the Canadian aerospace industry.”

Fibre-metal laminates are just one of several new and exotic aircraft materials FRAMES is testing; they’re also looking at new generations of carbon fibre composites.



**Ryerson University,
Toronto**



And in a unique new initiative, Dr. Fawaz and his colleagues are developing a system of fibre optic sensors that can be embedded in aircraft materials to constantly monitor how they’re holding up under the day-to-day torture of real world use.

The goal: new aircraft that are stronger, lighter, more environmentally friendly—and safer than ever.



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Infrastructure for Innovation About the Ontario Innovation Trust

The Ontario Innovation Trust was created in 1999 by the Government of Ontario to invest in research equipment and facilities at Ontario’s universities, colleges, hospitals and other non-profit research institutions. The Trust is governed by a volunteer Board of Directors, according to the terms of a Trust agreement established by the Ontario government. A small permanent staff looks after day-to-day operations.

Since its inception, the Trust has committed almost \$843 million to strengthen Ontario’s position in the global marketplace of ideas. This represents more than a third of the \$2.44 billion in total funding that has been invested in Trust-supported projects.