

Design Activity at McGill and Elsewhere

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Outline

- 1 The Design Engineering [sic] Chair: Design for Extreme Environments (2003–2008)
- 2 The Failed Renewal
- 3 Plans for Continuation After The Second Five Years: IDEA
- 4 Impact of the DE Chair at McGill
- 5 The ICE Lab
- 6 Design Activity Outside McGill: Stanford's d.school

Design for Extreme Environments

A NSERC Chair in Design Engineering



McGill



**NSERC
CRSNG**

McGill University, Montreal, Canada



The DEE Team

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Prof. K. Fraser, ECE
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Prof. P. J. Zsombor-Murray, ME

CEAM: Dept. of Civil Engineering and Applied Mechanics

ECE: Dept. of Electrical and Computer Engineering

FoE: Faculty of Engineering

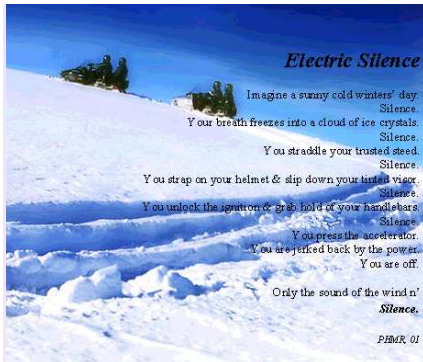
ME: Dept. of Mechanical Engineering

MMME: Dept. of Mining, Metals and Materials Engineering

SoA: School of Architecture

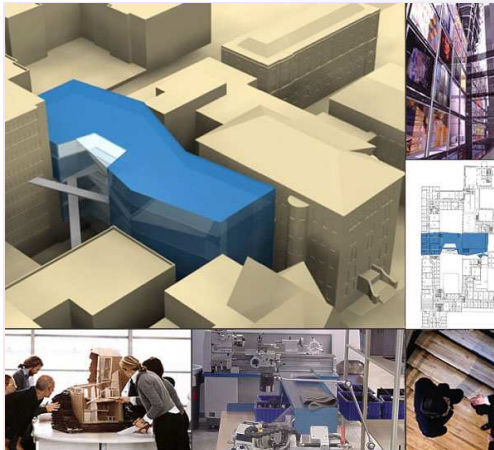
Our Mission

The creation and development of a culture of robust design and sustainability among mentors and trainees



Our Vision

An educational environment with interdisciplinary projects at the undergraduate, graduate and postdoctoral levels



Networking

Networking with all nodes of CDEN and with design environments of recognized excellence from all over the world

- Active participation in CDEN: Organization of the Session “Design for Extreme Environments” at the 2nd International CDEN Conference: *From Inspiration to Innovation*, July 18–20, 2005 in Kannanaskis, Alberta, Canada
- Promotion among McGill Undergraduate students of the Student Design Competition during the 2nd International CDEN Conference
- Networking with all (11) NSERC Design Engineering Chairs
- Links with: Lund (SE) University’s Design Centre; ABB Robotics R&D Centre, Västerås, SE; GM Research, Warren, MI; d.school, Stanford, CA; etc.

The Failed Renewal

Postmortem

- Hostile members of NSERC's Visiting Committee (Two extremely active members of ASME's DTM)
- Lack of strength in the FoE support in both the renewal document and the site visit
- After a visit of a FoE group chaired by the Dean to the NSERC hqs, nothing materialized, the Dean of the time left McGill shortly thereafter

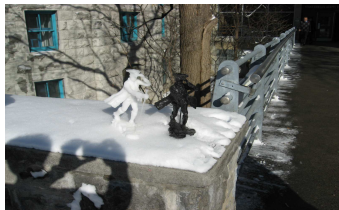
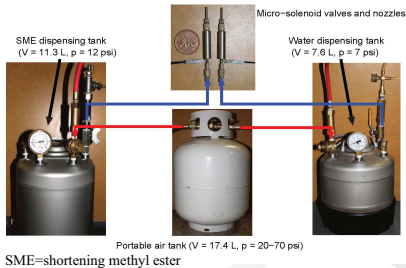
Plans for Continuation After The Second Five Years: IDEA

- D. Covo and J. Angeles promoted the concept of IDEA within the FoE and outside of McGill
- Looking for external financial support: visit to a McGill benefactor (P. Lambert, CCA)
- Recent proposal by D. Covo to the FoE on the use of the RVH Building: Design Centre

Impact of the DE Chair at McGill

- \$200k/year for five years from NSERC; in-kind from industrial partners
- One *Assistant Professor* position created and funded 100% by the DE Chair in the first five years
- The ICE Lab, SoA
 - mini-contract with The Coca-Cola Co. on the occasion of the 150th anniversary of the Coke bottle
 - continuation of the ICE Lab activity
 - a) as a provider of model production to UG students of the SoA and
 - b) further research, at U. Laval's *Laboratoire de robotique* using foam as deposition material
- Intensive collaboration with the industrial partners of the DE Chair: 123 Certification; MDA Corporation; Opal-RT; etc.
- The ICE Lab concept led to the idea of LIPHE (Lab for Integrated Prototyping in Hybrid Environments), a CFI-funded lab, as proposed by a new Assistant Professor at the SoA, in collaboration with J. Angeles and D. Pasini

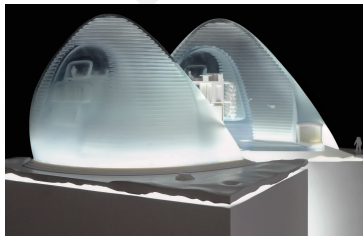
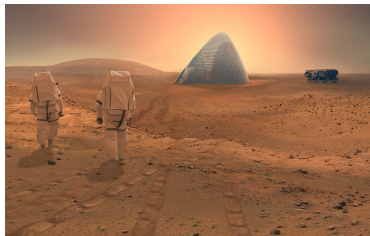
The ICE Lab



Rapid-freeze Prototyping

3-D Printed Habitat Challenge

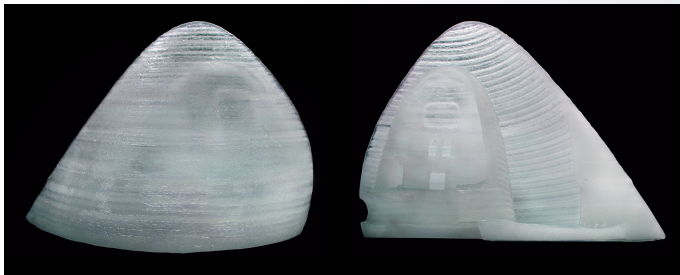
A design competition, sponsored by NASA and America Makes, at the World Maker Fair on September 27, 2015. The first prize went to Team Space Exploration Architecture (SEARCh) and Clouds Architecture Office for their design, Ice House, the second prize to Norman Foster's firm



- : Two views of the CAD rendering of the winning entry

Rapid-freeze Prototyping

The rapid prototype



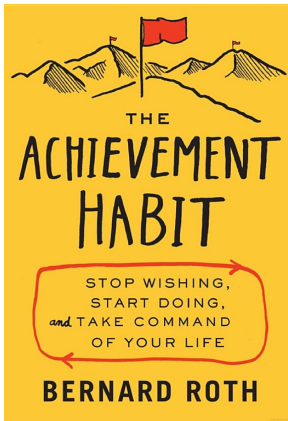
- : The prototype fabricated at McGill University's Ice Lab, under the care of Dr. Eric Barnett and Prof. Pieter Sijpkens

Design Activity Outside McGill: Stanford's d.school

- The concept started in the 70s with an UG course in ME, created by Prof. Bernard (Bernie) Roth: The Individual and Technology
- B. Roth, Academic Director of the d.school. Book: *The Achievement Habit*, HarperCollins Publishers CA, 2015
- Course evolved into retreats that were intended to promote creative (a word despised by Roth) thinking and techniques for problem-solving
- Pioneers of what became the d.school:
 - Robert (Bob) H. McKim, industrial designer by profession, teacher of visual thinking at Stanford's ME Department. Book: *Experiences in Visual Thinking*, Brooks/Cole Publishing Company, Monterey, CA, 1972
 - James (Jim) L. Adams, ME Professor. Book: *Conceptual Blockbusting: A Pleasurable Guide to Better Problem Solving*, W.W. Norton & Co., Inc., New York, NY, 1974

The Achievement Habit

This book best describes the history of the d.school in a quite casual way



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Acknowledgments

Notes


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