***The New Architecture of Phase Change***

Computer Assisted Ice Construction

Top of Form



Bottom of Form

At McGill University (Montreal, Québec) engineers and architects are working together to explore the possibilities of rapid prototyping (RP) systems for construction with ice. Recent developments in robotic computer numerically controlled (CNC) structure-building methods have revealed unchartered territory for the water-to-ice phase change process in architecture.

In 2006, professors Pieter Sijpkes (Architecture) and Jorge Angeles (NSERC Chair in Design Engineering) received a three-year $173,000 Social Sciences and Humanities Research Council (SSHRC) research creation grant for a project entitled *The New Architecture of Phase Change: Computer Assisted Ice Construction*. Based in the School of Architecture, this three-year study utilizes CNC digital fabrication in an attempt to construct objects at varying scales out of ice.

Working with PhD student Eric Barnett, faculty members Thomas Balaban and David Theodore as well as with students from the faculties of engineering and architecture, this ground-breaking program builds on experimental teaching and research into the design of ice structures by adapting McGill’s impressive expertise in rapid prototyping and engineering design for extreme environments.

Currently, the practical applications of this project range from commercial and industrial form modeling to the ice-tourism industry. For instance, small-scale ice models represent economical alternatives for producing intricate 3D models of architectural objects, be they scale models of buildings, site models, or building details. Similarly, rubber casts can be made from ice originals to produce high-quality copies at will. Ultimately, the final result of this project will generate inhabitable, environmentally-friendly and digitally-fabricated ice structures at an architecture scale. If an ice structure can be erected in a matter of hours using mechanized and computerized construction methods, applications may go beyond simply creating ice hotels and buildings. This technology may even allow us to envision a lunar colony built entirely by machine.