IPRO 317
Summer 2008
Design & Build Chicago Scale Model for Dynamic Disaster Simulation

General Information:

The objective of this project is to design and construct a 3-D, reduced scale model for a portion of downtown Chicago. The model will be primarily used to test and simulate the likely performance of fire defense strategies in case of fire or other catastrophes related to public health.

The problem includes design and building of the Chicago City scale model. The basic concept for the model is a modular, acrylic structure sitting atop a rigid base with opaque sides. The components of the model will be base, streets, city blocks, and buildings. The highlight of the model will be lighted by a projector along with the use of LED's built into the base structure, which will illuminate the various sandblasted acrylic features of the model based on input from a computer interface.

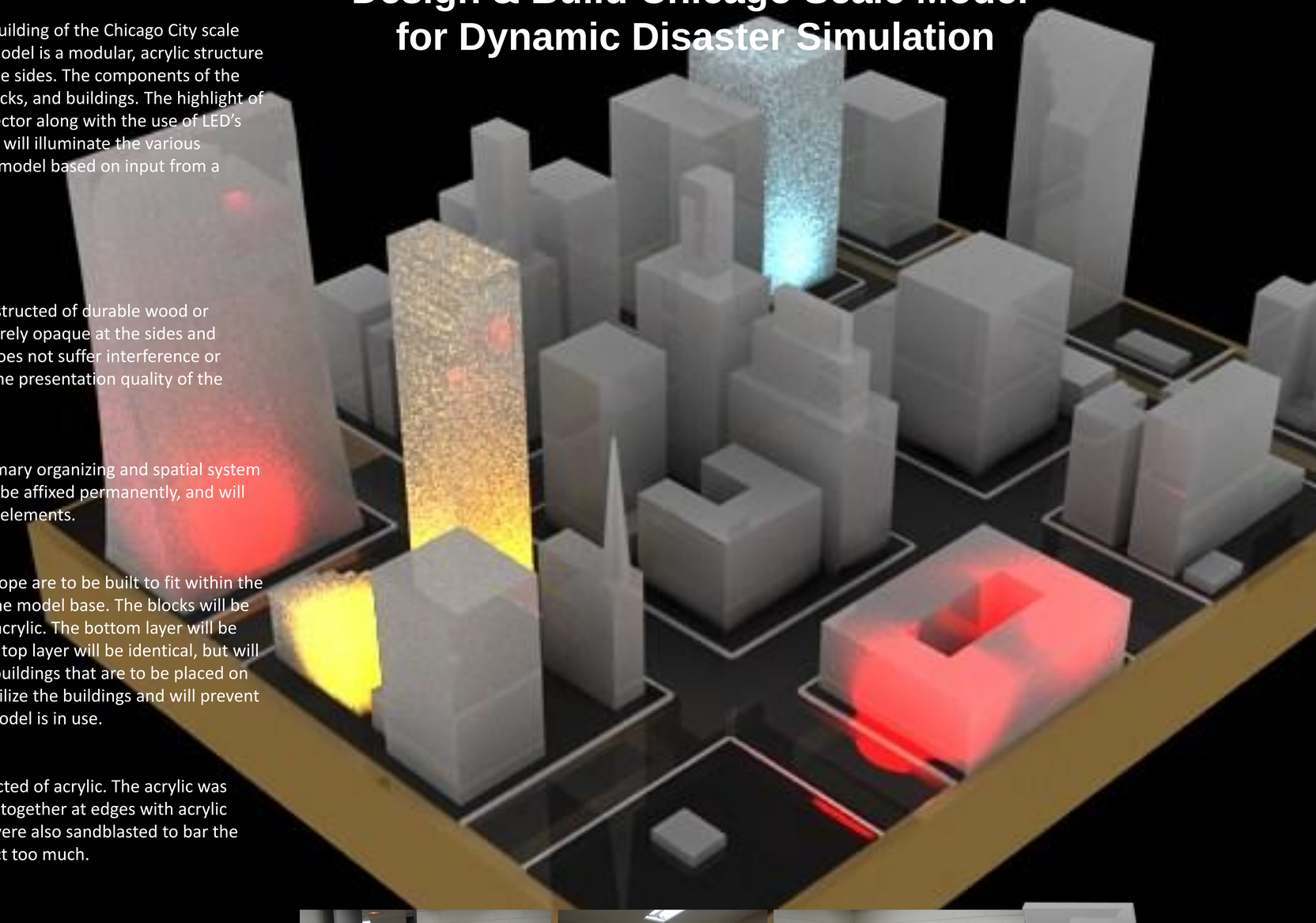
Description:

Base:
The base of the model is to be constructed of durable wood or aluminum. The base should be entirely opaque at the sides and bottom, so that light from within does not suffer interference or leakage, which would undermine the presentation quality of the model.

Street System:
The street system will form the primary organizing and spatial system of the model. Roads and alleys will be affixed permanently, and will give order and rigidity to the other elements.

City Blocks:
The city blocks within the model scope are to be built to fit within the street and alley system affixed to the model base. The blocks will be constructed of double-thick, clear acrylic. The bottom layer will be uncut, providing a stable base. The top layer will be identical, but will have cutouts to accept the model buildings that are to be placed on the model. These cut-outs will stabilize the buildings and will prevent buildings from shifting when the model is in use.

Buildings:
Individual buildings will be constructed of acrylic. The acrylic was milled and/or laser-cut, and joined together at edges with acrylic bonding. The individual buildings were also sandblasted to bar the light emitted from the LED to reflect too much.



Methodology/ Brainstorm/ Work Breakdown Structure

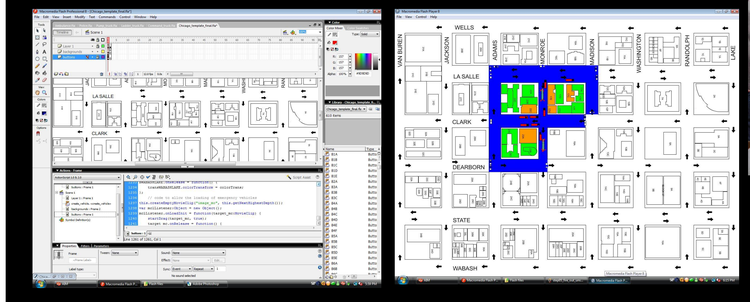
Milling Team: Team will explore the various types of acrylic bonding methods and finalize a strategy. The team will be responsible for completion of the model, including wrapping up the milling process on the CNC machine, sandblasting all buildings, bonding buildings and proper labeling and placement of buildings.

Molding Team: Team will research different materials to prepare a molding cast, in order to meet temperature requirements, be cost effective and gain ease of manipulation. Team will experiment different forms of model making and provide small mock-ups.

Projection Team: Team will develop scheme to properly portray computer simulated disaster scenarios using the LED lights on the base of the model. The team will also research possible LED controllers and lamp implementations, while considering scalability, practical application, and prospective computer control methods. Part of the team will consider applicable projector models in regards to overall practicality and revise existing base design for optimal rear projection performance and durability.

Flash Software:

Some screenshots of the programming Interface.



Simulation user input and program editing.