

NCC USES COMPOSITES TO CREATE COMMERCIAL SOLUTION

When Thomas Schiff met with the National Composite Center (NCC), he was hoping composite technology might be the solution to a weighty problem. A graduate of Ohio University, Schiff majored in business administration while studying art and photography.

Today he owns the Cincinnati CityBeat alternative newsweekly and is director of the Cincinnati Financial Corporation. Schiff has worked with panoramic photography since 1994, using a Hulcherama 360 Panoramic Camera, which exposes a continuous strip of film as it rotates on its tripod mount.

Schiff brought tripods in three sizes to NCC for evaluation and analysis. The largest was five feet tall with the capability of telescoping to an additional length of 35 feet. The thin-gauge aluminum tripod weighed 47 pounds. Schiff was often required to carry the tripod several hundred yards causing considerable discomfort to his arms, back and shoulders.

“Our goal was to reduce the weight by 35 percent,” said NCC Engineer Jim Hickey. Commercially available carbon tubing was the material of choice to replace the tripod’s aluminum components. Lighter yet stronger, carbon would reduce the tripod’s weight while maintaining its structural integrity. Other

components would need to be completed in-house. Hickey used machining processes to produce adaptor clamps out of nylon. Hardware and handles for the clamp units were ordered.



Tom Schiff with large lighter weight carbon tripod.



Tom and NCC Engineer Jim Hickey with other smaller-sized tripods.

The project was broken into three steps. First, Hickey constructed a replica of the large tripod while reducing its weight. The second step required Hickey to create a telescoping center capable of extending an additional eight feet for a medium size tripod. For the project’s final step, a new center leg mount was developed capable of supporting a telescoping center that could extend 12 feet. The results were significant.

The large tripod, produced from carbon, weighed a total of just 19 pounds, a weight reduction of 60 percent. The new tripod also retained the same height capability as the original aluminum tripod.

After publishing three books, including Panoramic Cincinnati (1999) and Panoramic Parks of Cincinnati (2005), Schiff was part of a touring exhibition that opened at the Cincinnati Art Museum. His most recent photographic work has been published in the book Panoramic Ohio: The Bicentennial Collection. He is now working on photographing architectural sites for studies on American architecture and Frank Lloyd Wright.

COMPOSITE ADVANTAGE TO MANUFACTURE BRIDGE DECK FOR SUMMIT COUNTY

Composite Advantage will manufacture a 4000 square foot fiber reinforced polymer (FRP) bridge deck for Summit County, Ohio. The bridge deck is part of NCC’s C4I initiative. Originally

erected in 1954, the Hudson Run Road bridge over Wolf Creek is located in the city of Barberton, south of Akron.

The rehabilitation involves new steel beams and the new deck. The eight inch thick deck has been designed and tested for HS 25 loading. The deck consists of 17 panels. Most are rectangular with dimensions of 34 feet by eight feet. Some panels are cut at an angle to accommodate the bridge skew. The deck will be covered with an asphalt wearing surface.



Testing performed in NCC's large scale test machine

The deck will be a sandwich construction molded using the vacuum infusion process. The skins will be multi-axial glass fabrics and vinyl ester resin. NCC member company WebCore Technologies will supply a high strength, high stiffness Tycor core. Another NCC member, Polynova Composites, will provide an imbedded infusion medium to assist in the molding of the thick section. The deck is

scheduled for installation in September 2006.

NCC CO-SPONSORS HEEDS™ TRAINING

NCC has teamed with Wright State University to co-sponsor a software course called Introduction to Automated Design Optimization With HEEDS™. HEEDS (Hierarchical Evolutionary Engineering Design System) is a product of Red Cedar Technology, Inc. The course is scheduled for June 27 – 28 at Wright State University's College of Engineering and Computer Science.

NCC formed a partnership with Red Cedar in 2005 to add HEEDS to its lineup of design optimization capabilities. Red Cedar Technology, headquartered in East Lansing, Michigan, is a leading provider of multi-disciplinary design optimization software, solutions and technology. Its proprietary optimization strategies are recognized world-wide as the most powerful and innovative approaches for engineering better products and processes.

HEEDS is a Computer-Aided Engineering (CAE) software tool that performs automated design optimization over a broad and multidisciplinary range of applications while driving existing CAE analysis and simulation tools. It eliminates tedious and repetitive design tasks by capturing and automating the analysis and design steps that engineers use today, and

it employs a unique intelligent mathematical search strategy to quickly identify better product designs and process solutions. HEEDS™ provides an intuitive and powerful environment for capturing the engineering analysis workflow, and then performing design exploration, design optimization, and design robustness assessment.

Designs may be improved in terms of quality, performance, mass, manufacturability, cost, or any other measures that are important for a given problem. While manual design approaches may be limited to a handful of iterations due to time and resource constraints, HEEDS™ can perform hundreds or thousands of design iterations automatically in a fraction of the time required to perform a few manual iterations.

This two day session offers a hands-on introduction to process automation, design optimization and design of experiments using the HEEDS™ software. The following topics will be covered:

DAY 1:

The first day of training is designed to provide an overview of the basic methods and strategies used in design optimization, including use of the HEEDS™ software interface to set up and solve several example problems.

- Process Automation – capturing work flow of



- a design synthesis process
- Design Optimization – set up and solution of automated design searches
- Design of Experiments – assessing design sensitivities

to sign up contact marketing@redcedartech.com.

DAY 2:

The second day of training focuses on advanced methods and strategies, and introduces several customer case studies to illustrate the application of HEEDS™ in real engineering design scenarios. Several hours will be allotted to answering questions related to specific design problems of the participants.

- Topology Optimization – identifying critical loadpaths through material placement optimization
- Customer Case Studies
- Participant Case Studies and Questions

This two-day session will be presented by highly experienced Red Cedar Technology staff. Attendance will be limited to no more than 20 participants. The cost is \$450.00 per person. A limited number of students may attend free of charge. For more information or