

VOL. 5
ISSUE: 4
2006
OCT-DEC

SATOP:
NEW YORK

SATOP

3-2-1

S A T O P
SPACE ALLIANCE TECHNOLOGY OUTREACH PROGRAM

DBA Helps Automation Correct
Heat-Up Element Design

Syncoeur & Micro Aerospace Solutions
Improve Heart Bypasses

Banner Bay Marine Finds Smooth
Sailing Thanks to UCF

SATOP RTA Leads to Course
Structure Changes at RPI



DBA Helps Automation Correct Heat-Up Element Design

With his Coal-Trol thermostat and power unit, Neil Waelder solved the challenge of maintaining a constant temperature in a home heated with anthracite coal.

Now, with SATOP's help, Waelder is on his way to creating an automatic fire starting device for coal burning stoves and furnaces.

When Waelder founded his company, Syracuse-based Automation Correct, in 2003, he did so to develop technology for the validation of automation systems. While working on this long-term technology, he decided to create new technology for temperature control of living spaces heated by coal burning appliances. "My goal is to bring coal appliances into the modern era – they desperately need new technology," Waelder said. "Once I had the temperature issue solved with Coal-Trol, I started to look for a user-friendly, automatic way to ignite a coal fire. Right now, there's really no easy way to do that."

Currently, starter bags or "mice" – small pyrotechnic devices – are the best way to ignite a coal fire, but are one-time use products and can create unwanted smoke. Waelder, a control system engineer, began designing a heating element controlled by a proprietary sequencing microprocessor. "Nothing off the shelf in terms of heating elements would fit," he said. "I designed an element that, from an electrical and temperature standpoint, worked fine. But I needed advice on how to improve the prototype design to guarantee a desirable lifecycle."

Waelder had previously utilized SATOP after hearing about the program from his brother who is the Facility Manager at Everson Museum of Art, which also had received assistance from SATOP. He again decided to approach the program for help, this time with the heating element design challenge. Jay Jerose, SATOP NY Project Engineer, matched Waelder's Request for Technical Assistance (RTA) with Jim Jones, Principal Investigator with Design By Analysis, an active Gold level SATOP Alliance Partner in New Britain, CT.

"Jim has nearly 20 years of experience performing structural, thermal and fluids-related design and analysis tasks

– including heat transfer and flow analysis in high temperature applications – so he was ideally qualified to work on this RTA," said Jerose.

"The challenge was to estimate the temperature field from applied current and recommend geometry changes to reduce the thermal stresses, provide as uniform an electrical field as possible, and have the recommended geometry remain easily manufactured," said Jones, who has worked on numerous RTAs for SATOP.

Waelder's initial geometry was a serpentine length of rectangular cross-section with 90-degree corners at each change of direction. Jones took Waelder's CAD drawings and conducted a Finite Element Analysis to model the thermal response and properties of the design. Jones recommended rounded corners to lessen the variation in the electrical field due to the change in direction and to also reduce mechanical stresses.

With Jones's recommendations in hand, Waelder fabricated new heating elements incorporating the rounded edge design. The elements are undergoing life testing in Automation Correct's facilities as well as selected field facilities.

Waelder looks forward to finalizing the automatic ignition device design and enjoys thinking about how his innovation will make life easier for the people who heat their homes with coal.

"As a solid fuel, anthracite coal has many positive attributes – it's clean burning, economical, and is a domestic product of eastern Pennsylvania – so I'm glad to create technology that will help the folks who burn coal in their homes," he said.

With regard to his experience with SATOP, Waelder gives the program high marks, saying, "The quality of the engineers who can be accessed through SATOP is amazing. I have no idea how I'd find such a quality resource on my own. And now I can tell people that burning coal really is rocket science!"

