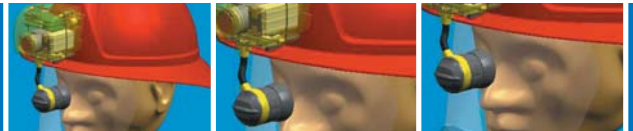


Thermal imaging system helps firefighters “see” through smoke

The Sage-DVIRC design team used Solid Edge to meet packaging challenges and tight deadlines for helmet-mounted viewing device

Siemens PLM Software

www.siemens.com/solidedge



► Issues:

Develop hands-free imaging system for smoke-filled areas

Package components within compact housing to minimize size and weight

Introduce at trade show ten months away

► Approach:

Model entire system in Solid Edge® software

Use solid models to: place components; design sheet metal housing; meet high-temperature molding requirements

Export solid models for stereolithography, thermal analysis, tooling design

► Results:

HelmetVue thermal imaging system is the lightest helmet-mounted system currently available

Working prototype was displayed at International Association of Fire Chiefs show

System is now in production using tooling developed from Solid Edge models

SAGE TECHNOLOGIES, LTD.

- The company's first thermal imaging system had to be compact, waterproof, heat resistant and ready for introduction at the annual fire chiefs' convention.

Seeing through smoke

Firefighters frequently find their vision restricted by smoke. Yet often they must make their way through smoke-filled buildings to search for people trapped inside. Sage Technologies decided to address this need with a vision system based on infrared technology. An infrared system would let firefighters see areas of heat, such as that coming from a human body, even when normal vision is completely blocked by smoke.

The company faced a number of challenges in designing the system. Because firefighters already have a great deal of equipment to carry, hands-free operation was a must. After deciding on a helmet-mounted system, Sage's first challenge was making the system as small and lightweight as possible. "We couldn't have this huge thing protruding off the front of the helmet," says Wes Sheridan, principal engineer at Sage. Components, such as the camera, display, battery and circuit board, had to fit into a housing not much bigger than a deck of cards. Second, to perform reliably in the field, this system had to be completely waterproof and resistant to extreme heat (in excess of 500°F). Third, to gain the attention of the firefighting community, Sage wanted to introduce the product at the annual international convention of fire chiefs, which was ten months away.

For help with the design, Sage turned to a local resource, Delaware Valley Industrial Resource Center (DVIRC), an economic development organization that aims to boost the competitiveness of manufacturers in southeastern Pennsylvania. "We had worked with Sage previously on a portable video system for firefighters," explains Christopher Yatsko, manager of DVIRC's Product Development Center. "When they came to us with the idea for an infrared vision system, we knew it was a project we wanted to handle in solids."

Solid advantages

The design team chose Solid Edge because it outperforms all other programs in four areas critical to this project: drafting, sheet metal modeling, overall ease of use and built-in drawing management. "Solid Edge's sheet metal modeling tools were especially important because the housing was very small yet we needed to incorporate space for insulation,"

Solutions/Services

Solid Edge
www.siemens.com/solidedge

Client's primary business

Sage Technologies, Ltd. is a systems engineering company that provides portable vision systems, automated information technology systems and defense systems to the public and private sectors.
www.gosage.com

Client location

Willow Grove, Pennsylvania
United States

“The beauty of having the HelmetVue designed in Solid Edge was that we could see how things went together before building prototypes.”

Wes Sheridan
Principal Engineer
Sage Technologies

“People can come up to speed quickly on Solid Edge.”

Carlton Johnson
Senior Mechanical Engineer
Delaware Valley Industrial
Resource Center

Yatsko explains. “Overall Solid Edge is easier to use than other solid modelers. And I don’t know of any other solid modeler that has design management tools built in. On projects like this that require multiple iterations, we need those capabilities.”

DVIRC engineers began by modeling the infrared camera, display, battery, circuit boards and other components as Solid Edge part models. A Solid Edge Voyager Program member, Alamar Systems, saved time by providing a library of pre-built fasteners in Solid Edge format. Next, the engineers developed several component arrangements to minimize the overall size of the unit. The software’s sheet metal environment was used to create the brackets for mounting the components. Once the layout and bracket design was complete, the housing was designed. A laser scan of a representative firefighter’s helmet provided data to create a solid model of a helmet. From a Solid Edge users’ group web site, DVIRC downloaded a Solid Edge model of a 50th-percentile human head.

Lightest system available

Solid Edge’s intuitive interface made it easy to modify models, which happened frequently on this project. DVIRC went through several iterations to find the most compact configuration of parts within the housing. Some modifications were made to adapt to changing camera specifications. And because parts of the system would be molded from high-temperature plastic, considerations such as shrinkage and draft angles led to other changes.

DVIRC exported Solid Edge models to a stereolithography service to create a working prototype to show potential customers. Stereolithography was also used to create soft tooling from which test parts were made. These were evaluated in actual fire settings before going to hard tooling. Solid geometry was exported to finite-element analysis software for thermal analysis. Files were transferred in Parasolid® software format to the company that made the tooling for the injection-molded plastic parts. Because Parasolid, the geometry engine used by Solid Edge, is widely supported, there were no data translation errors.

The result of this work is the HelmetVue thermal imaging system. At 16 ounces, it is the lightest helmet-mounted system currently available. Able to attach to all popular firefighter helmets, HelmetVue includes a quick-release feature that facilitates fast transfer between firefighters. Its ergonomic design lets users see both thermal and normal views. The power source is nine-volt battery that lasts three hours. When it needs changing, it takes only seconds thanks to a quick-release door on the battery compartment.

A working prototype of the HelmetVue system was ready for display at International Association of Fire Chiefs show. The reaction from the firefighting community was very positive. With the system now in production, firefighters gain a powerful tool to help them perform their vital and dangerous work.

► For more information, contact your local Solid Edge representative:

► **Contact**

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