

Lights, Camera, Action!

Grass Valley Video Camera Modeling using FloEFD™

For more than 50 years Grass Valley has been the premier video technology solutions provider that broadcasters and video professionals turn to for imaging, video and media solutions. Grass Valley Netherlands BV develops and manufactures professional cameras for the broadcast market.

Their award winning cameras are a result of their commitment to innovation and performance to camera design and engineering excellence. Their range of system cameras have captured the world's highest profile, most prestigious events as well as local news and public affairs programming.

More Power means more Heat

When it comes to the design of these modular cameras, many factors must be considered as the units consist of the head, which contains sensors and video

processing, and the body that houses the electronics to transmit HD signal back to the studio. As broadcast video cameras consume a lot of power, cooling the camera's electronics is very important, making thermal design critical to any new development.

Grass Valley's latest camera was expected to consume more power, and hence produce more heat, than their existing designs. Grass Valley decided to invest in a Knowledge Transfer Project sponsored by M2i (Material Institute for Innovation), to investigate the use of virtual prototyping to optimize the thermal design. The project was supervised by B.V. Ingenieursbureau H.E.C. (HEC), who recommended using a CFD modeling tool such as FloEFD™. The 3D fluid flow and heat transfer analysis tool would be able to provide the insight necessary to ensure the best possible design.



Figure 2. Baseline model of existing camera

Analysis & Results

To gain proficiency and confidence in the simulation technology, HEC advised Ir. E. Schmit, the Mechanical Architect working on the project to first build a model of an existing camera.

With just three days of training from HEC, and under their guidance, Ir. Schmit was able to use FloEFD Embedded within their PTC Creo CAD system to build a model of Grass Valley's LDK 8000 Elite WorldCam Multi-Format HD Production Camera, for which experimental prototype test data was available.

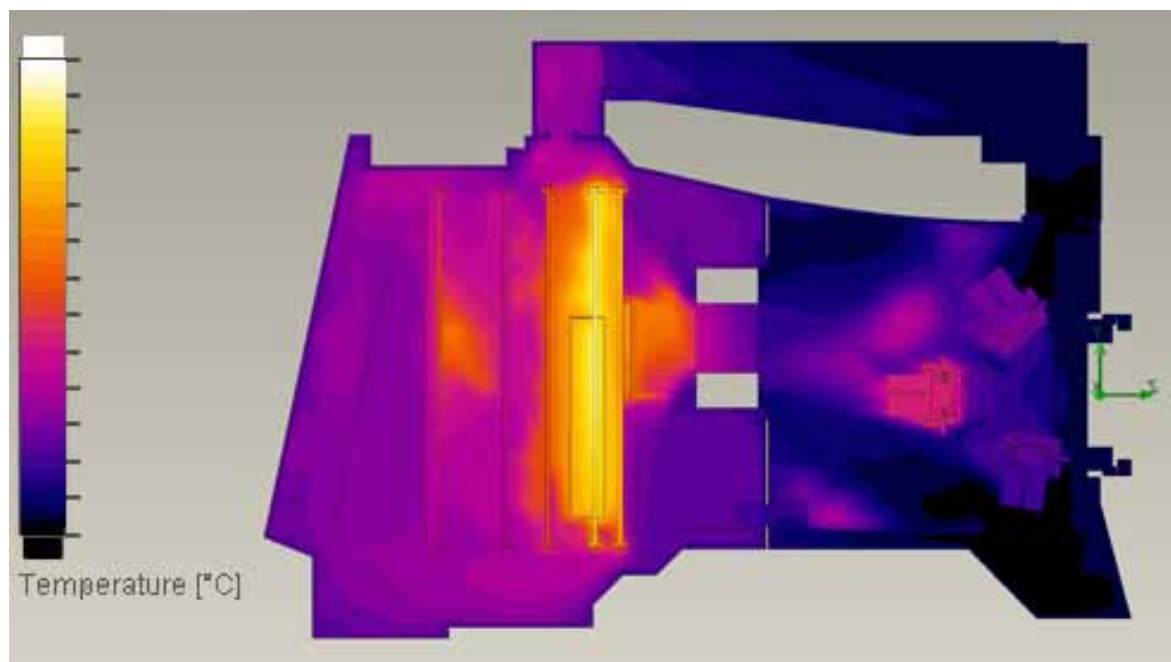


Figure 1. FloEFD results closely matching experimental data



"Working with FloEFD I had a very positive experience. It is a user-friendly package that is fully integrated into our development software - ProEngineer Creo. It has a very intuitive interface and offers many opportunities to produce insightful results. We have much more insight into the heat flow within the camera and have been able to make a number of changes to the design very early in the project that would have taken much more time to make later on. I think it's well worth the investment and we will certainly use FloEFD in future projects." - Ir. E. Schmit, Mechanical Architect at Grass Valley Netherlands BV

The temperatures observed in the simulation (Figure 1) were found to be in close agreement with the measured values for this camera, showing less than 10% variance. The total airflow through the camera was even closer to the measured value, <5%. Ir. Schmit was also able to estimate the noise level produced by the fan with a rule of thumb based on the differential pressure and flow through the fan, this also proved to be closely matched to the results created in FloEFD.

In addition, FloEFD provided numerous amounts of simulation data that would be very difficult to get from a physical prototype. Data such as the distribution of the total air flow through each vent, the pressure differential across the fan, the fan flow rate and of course the direction and temperature of the air flows within the camera. These data results were used to make predictions of how the new design would perform. Based on the simulated model, a number of five design iterations were used to improve the cooling concept, finally resulting in the optimal design.

Having successfully completed the Knowledge Transfer Project, Grass Valley Netherlands BV have now been able to make FloEFD an integral part of their product development process.

Acknowledgements:

Grass Valley www.grassvalley.com
 B.V. Ingenieursbureau H.E.C.:
www.hecbv.nl
 M2i (Material Institute for Innovation):
www.m2i.nl

