



CASE STUDY /

Creotech Instruments Creates Next-Generation Microsatellites with Multiphysics Simulation

"Ansys multiphysics tools provide a highly integrated environment and have greatly improved the speed and affordability for developing our new HyperSat microsatellite platform. We are planning environmental testing in the near future that will surely validate the results we received from Ansys structural and thermal simulations. This will allow us to confirm the soundness of our design. A necessity for our success, Ansys simulations significantly help speed our product to market, enabling a satellite to be conceptualized, developed and launched in the shortest time possible."

Tomasz Zawistowski

Project Manager / HyperSat Creotech Instruments / Piaseczno, Poland

Repairing orbiting microsattellites is impossible due to extreme logistical challenges. Satellite engineers must ensure that equipment is space-proven and extremely reliable prior to launch. The process for creating individual components of the satellite generates high costs, requiring satellite integrators to meet stringent design requirements and satisfy high production process standards. Creotech Instruments' use of multiphysics simulation effectively addresses these difficult challenges.

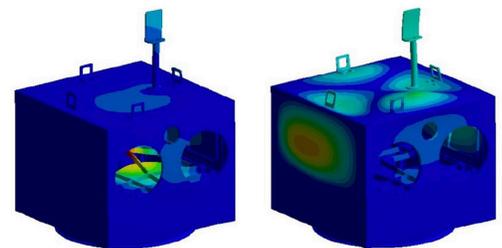
/ Company Description

Creotech Instruments develops the HyperSat, a modular, versatile microsatellite platform, weighing as little as 10 kg (22 lbs) to 60 kg (132 lbs). A leading electronics equipment designer and manufacturer, the company implements leading-edge methodologies developed by the European Space Agency to develop, assemble and integrate critical equipment that meets space standards. Poised to become a major satellite integrator, the company possesses significant experience in providing state-of-the-art instruments, certified personnel and cutting-edge development facilities to support current and emerging space initiatives.

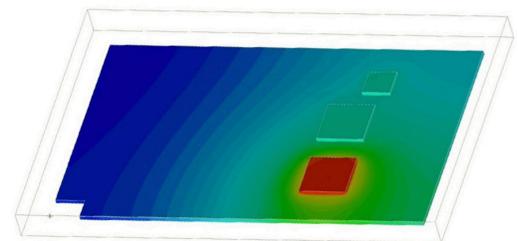
HyperSat will soon play an integral role in technological and scientific space missions, transmitting critical radio, telecommunications, optoelectronic and radar data. Featuring a standardized design, it requires little customization, driving low production costs, rapid integration and higher reliability. This allows HyperSat to play a significant role as a competitive platform in the space sector.

/ Challenges

Overcoming the hurdle of developing affordable and reliable orbital microsattellites requires highly sophisticated simulation software. Multiphysics simulation is integral to create virtual prototypes of satellite components, modules and subsystems, enabling our engineers to analyze their design and verify their expected operation before hardware manufacture begins. Simulation is the only method available to perform our analyses and cannot be substituted by any other means except for testing, which is prohibitively expensive and time-consuming.



HyperSat's satellite structure modal analysis results (Ansys Mechanical).



HyperSat electronics board thermal analysis results (Ansys Icepak).

/ Engineering Solution

Our engineers relied on Ansys software to execute critical tasks:

- Structural analysis – conducted static and dynamic analysis to create the satellite's mechanical structure design, enabling compliance with key regulations. (Ansys Mechanical)
- Thermal analysis – performed steady and transient state analysis of mechanical structure and equipment to help design the satellite's thermal control systems. (Ansys Mechanical, Fluent, Icepak)
- Radio antenna simulations – modeled required antenna performance characteristics, accelerating the overall antenna development process. (Ansys HFSS)
- Large-scale system analysis – calculated power integrity to drive faster evaluation of PCB power-related issues. (Ansys SIwave)

/ Benefits

Ansys simulation software plays an integral role in our design activities. Without simulation, we would rely on testing alone, which is prohibitively expensive and time-consuming. Simulation boosts our productivity, delivers enhanced efficiency and, due to our products' complexities, offers the only means for performing our analyses. Simulations software helps us create models that are:

- Profitable
- Reliable
- Innovative
- Cost-effective
- Scalable

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