

# Launching Complex Systems Solutions

Unparalleled spacecraft structural and thermal analysis

## Magellan Aerospace

Magellan Aerospace is a global aerospace company that provides complex systems solutions and assemblies to aircraft and engine manufacturers, as well as for defense and space agencies worldwide. Magellan designs and manufactures systems and components for aerospace, military and space markets, and supplies engine and component repair and overhaul services. Magellan's major customers include Airbus, Boeing, NASA, the Canadian Space Agency, BAE Systems, and Lockheed Martin.

With more than 50 years of experience, Magellan provides customers with solutions for space missions that span sounding rockets and payloads, space shuttle payloads, satellite missions and International Space Station payloads.

## Key Projects

Magellan was responsible for designing and manufacturing SCISAT-1, the first Canadian-built atmospheric research satellite since the 1971 ISIS-2 mission. SCISAT-1 launched in 2003. Magellan built the complete spacecraft bus for the CASSIOPE spacecraft that launched in 2013. Magellan was the bus subcontractor for the three RADARSAT Constellation Mission (RCM) spacecraft, launched in June 2019.

Incorporating Maya HTT's expert input as an integral consultant and innovation partner contributed significantly to the success of these complex missions.

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### Success at a Glance

- Shorter product development cycles
- Enhanced engineering performance
- Improved product quality

# CASSIOPE

## Challenge

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CASSIOPE (CAscade, SmallSat and IOnospheric Polar Explorer) is a small hybrid satellite. Its structure is an assembly of aluminum and composite honeycomb panels held together with machined aluminum brackets and stringers. The hexagonal spacecraft is 1.8 m wide and 1.4 m high, and has a mass of roughly 490 kg.

Magellan required structural analysis support to validate the materials selection, preliminary and detailed design of the honeycomb panels, and provide a skilled review of the overall structure.

## Solution

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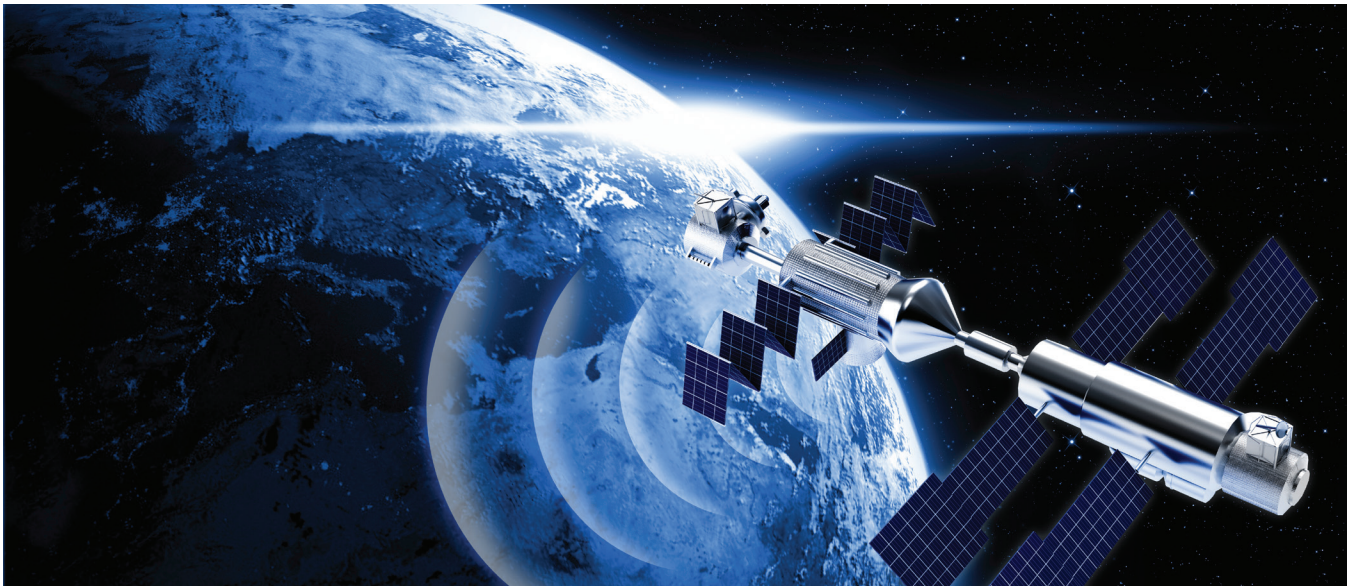
Maya HTT performed the preliminary and detailed structural analysis of the CASSIOPE spacecraft, including spacecraft panels, composite solar array panels, and bus units.

## Results

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With the support of Maya HTT, Magellan delivered a superior and simpler honeycomb panel design. Maya HTT also helped to reduce the number and type of panel insert connections, and provided lessons learned and tips for optimizing parts moving forward.

Magellan considers Maya HTT the authority in spacecraft structural and thermal analysis. Maya HTT's analytical skills, consulting experience and in-depth knowledge of the software solutions contributed to the success of this project. Magellan found Maya HTT to be one of most reliable subcontractors, working day and night on complex issues to get the job done, both on time and within budget.



# RADARSAT Constellation Mission

## Challenge

RCM, Magellan's largest space program to date, required the design of a new and more complex spacecraft structure, complete with its own subsystems. Magellan's designers needed the benefit of a dedicated structural analysis team that could quickly support the design process.

## Solution

Magellan and Maya HTT jointly elaborated on the CASSIOPE spacecraft structural design to produce the more complicated RCM spacecraft design.

Maya HTT validated the design by:

- Creating detailed finite element method (FEM) models of the assembly
- Performing linear static, dynamic, acoustic, thermoelastic, and optimization simulations
- Supporting the spacecraft modal test
- Performing subsequent finite element (FE) model updates

Maya HTT also defined subsystem environmental specifications and delivered the reduced spacecraft FEM models for the launch vehicle coupled loads analysis.

Maya HTT's assistance during customer meetings throughout the years helped drive the design and identify critical areas. The team achieved successful preliminary and critical design reviews, and provided a complete report for all the structural analysis work, including safety margins consistent with the final product requirements. They also provided consulting support for their TMG thermal and structural simulation software.

## Results

### Driving design and defining complex specifications

The Maya HTT team quickly performed simulations, calculated loads, and provided feedback on how the parts needed to change and how to increase structural performance to successfully fulfill the project requirements.

Maya HTT's contributions went beyond supporting the RCM project through complex simulation processes: Maya HTT also developed software to simplify and automate calculations and invested a great deal of time in increasing the efficiency of work performed on Magellan's behalf.

**“ We would design basically our best guess at what the parts would have to be, and then Maya HTT would do some preliminary analysis and calculating loads on it to give us feedback as to how to make them more efficient. They were involved with us during meetings with the customer and throughout the years of the program to drive the design. ”**

Harold Dahl

Engineering Manager,  
Space Systems Group

## Complex challenges require highly skilled expertise

Maya HTT helped Magellan develop and adopt solutions for space missions, including the RCM, the CASSIOPE spacecraft project, Priority Technology (PT) 3, and spacecraft Power Control Unit, and Command & Data Handling Unit avionics units.

With Maya HTT's assistance, Magellan was able to shorten product development cycles, enhance engineering performance, boost product quality, and save time and money. Magellan still partners with Maya HTT and places confidence in their ability to provide structural analysis and support aerospace projects. Magellan remains enthusiastic about its ongoing relationship with Maya HTT.

**“ Maya HTT's unparalleled expertise was key in improving spacecraft, subsystem and component design performance. Their advanced numerical algorithms, application experience, and custom software development assisted in unique problem-solving such as model reduction and process automation. ”**

Harold Dahl

Engineering Manager, Space Systems Group



## About Maya HTT

- Industry leading software developer and provider of engineering services in CAE, Product Lifecycle Management (PLM) and Datacenter Infrastructure Management (DCIM)
- Extensive experience in design, analysis, systems integration and deployment
- Specializing in mechatronics, thermal, fluid and structural analysis, and composites
- Technological partner, software editor, and provider of Siemens CAD/CAE/PLM solutions for more than 30 years
- Worldwide customer technical specialist support

