

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Structures I - Development and Verification (Space Vehicles and Components) (1)

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MECHANICAL THERMAL DEVELOPMENT OF SUMBANDILASAT, SA'S FIRST NATIONAL
SATELLITE

Abstract

Sumbandila (which means "pathfinder" in Venda) was launched on 17 Sept 2009, becoming the first South African National Satellite. It was designed and built by SunSpace in a record time span of 9 months for the technical team and with a shoestring budget of US\$1.5m (excluding launch and ground infrastructure). The owner of the satellite is the South African government.

Due to the time scales and the budget the mechanical thermal development of the satellite could not include a physical qualification model and therefore no qualification thermal balance testing could be done. This meant that the satellites' thermal development was to a great extent solely done by means of mathematical simulations. The simulations mainly concentrated on the nominal imaging orbit the satellite would be exposed to. No subsystem vacuum thermal testing could be done, meaning that the satellite was not correlated before launch and that all correlation will be done in-orbit.

A further effect of the budget and time constraints was that the use of special and long lead-time thermal materials could not be considered, this included MLI, heatpipes, radiators and heater. Thus forcing the thermal design to make use of internal conduction and space-radiation by means of surface coating only.

In this paper the design methodology to accomplish the task of keeping the structure mounted solar panel temperatures within operating limits, while not exceeding the strict imager temperature in a small compact satellite, given the severe constraints on types of thermal solutions that could be considered, are presented.