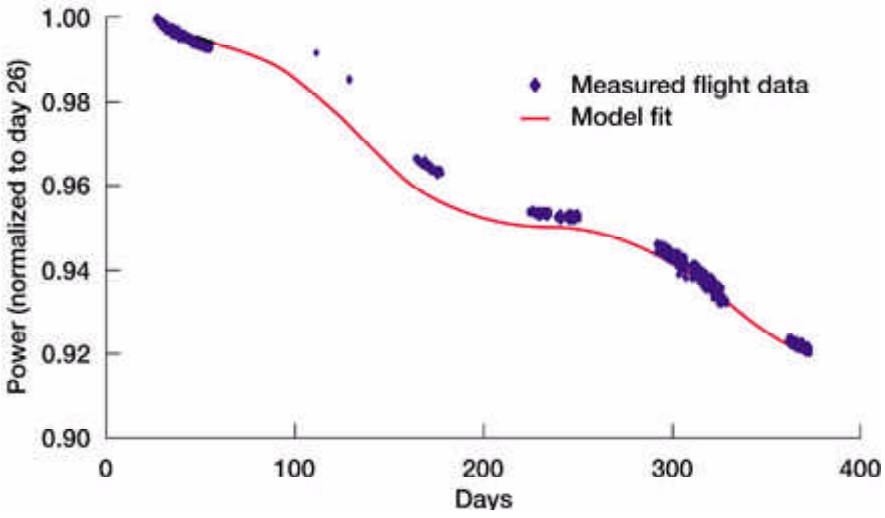
SAVANT—Solar Array Verification and Analysis Tool Demonstrated

The photovoltaics (PV) industry is now being held to strict specifications, such as end-of-life power requirements, that force them to overengineer their products to avoid contractual penalties. Such overengineering has been the only reliable way to meet such specifications. Unfortunately, it also results in a more costly process than is probably necessary. In our conversations with the PV industry, the issue of cost has been raised again and again. Consequently, the Photovoltaics and Space Environment Effects branch at the NASA Glenn Research Center at Lewis Field has been developing a software tool to address this problem. SAVANT, Glenn's tool for solar array verification and analysis is in the technology demonstration phase. Ongoing work has proven that more efficient and less costly PV designs should be possible by using SAVANT to predict the on-orbit life-cycle performance.

The ultimate goal of the SAVANT project is to provide a user-friendly computer tool to predict PV on-orbit life-cycle performance. This should greatly simplify the tasks of scaling and designing the PV power component of any given flight or mission. By being able to predict how a particular PV article will perform, designers will be able to balance mission power requirements (both beginning-of-life and end-of-life) with survivability concerns such as power degradation due to radiation and/or contamination. Recent comparisons with actual flight data from the Photovoltaic Array Space Power Plus Diagnostics (PASP Plus) mission validate this approach (see the graph).



Normalized power output versus day of mission for the PASP Plus GaAs (Gallium Arsenide) cell experiment.

Until now, there has been no reliable, simple way to design a PV article with respect to how life-cycle performance would be affected by factors such as radiation-induced performance degradation. The current state of the art consists of large amounts of

information divided among several books. Even with this information at hand, it can take an expert from 3 weeks to 2 months to perform a partial analysis of PV life-cycle performance versus radiation degradation (as an example). SAVANT can perform the same analysis in less than 5 minutes. This technology demonstration tool vastly improves the current state of the art with respect to PV design and should allow industry to meet specifications without overengineering their products. This tool is being developed in-house in cooperation with the Ohio Aerospace Institute and the Naval Research Laboratories.

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