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Considerations for improvements to the 25 TW Saturn high-current driver

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The Saturn X-ray generator is a 2.5 megavolt, 10 megampere electrical driver at Sandia National Laboratories. Saturn has been in operation for more than 30 years. A plan is under development to identify key areas of the machine, improvement of which would benefit operational efficiency and reproducibility of the system. Saturn is used to create high-dose, short-pulse intense radiation environments for testing electronic and mechanical systems. Saturn has 36 identical modules driving a common electron beam bremsstrahlung load. Each module utilizes a microsecond Marx generator, a megavolt gas switch, and untriggered water switches in a largely conventional pulse-forming system.

Achieving predictable and reliable radiation exposure is critical for users of the facility. In decades of continual use with minimal opportunities for research, improvements, or significant preventive maintenance, the facility has declined in the number of useful tests executed for customers.

We will show data relevant to present-day performance of Saturn and areas being studied to maximize performance while considering operational efficiency and sustainability.

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