

**Preference: Oral Presentation**

**Integrating Ceramic AM piece parts into Products:  
Challenges and Opportunities**

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Sandia engineers are exploring the use of high tolerance lithography based ceramic manufacturing (LCM) to prototype ceramic piece parts integral to our products. In this talk we will discuss the practical considerations of designing LCM parts for brazing into higher level assemblies. A discussion of the mechanics of the brazing process will be used to contextualize the design constraints.

Test data and a model of a ceramic braze pull test will be used to evaluate the complex failure of said joints. Weibull strength of the LCM ceramic material as compared to a traditional ceramic will be presented. Limitations in using this data to perform Weibull analysis within FEA will be described in detail and a new method will be proposed. The new method offers the fidelity needed to capture multi-modal failures one would expect to see in a ceramic part that has been brazed into a subassembly. The possibility of a low temperature annealing procedure will be suggested to minimize stress. Additionally, metrology of sample LCM parts will be presented with a description of how their tolerance limitations impact performance. Finally, time permitting, discussion on iso-geometric analysis (IGA) will be included.

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SAND2022-xxxxx