

Rolls-Royce CLEEN III Program Overview



Mark Gritton

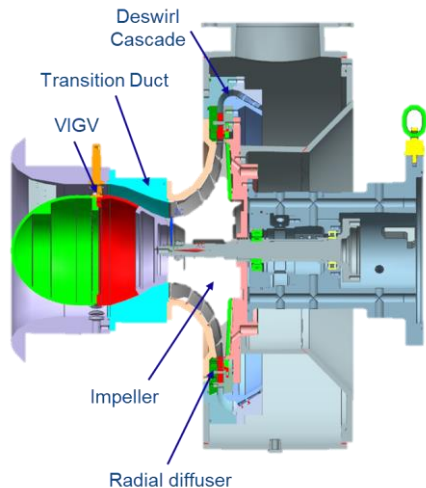
4 May 2022

CLEEN Consortium Public Day Charts, Virtual Meeting

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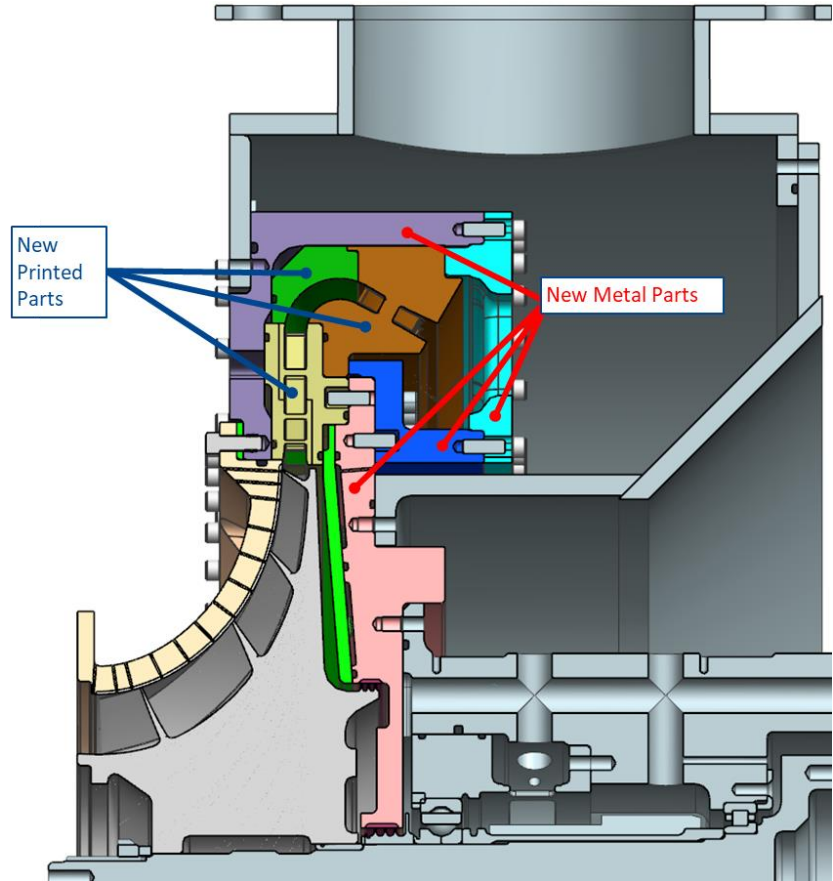
CSTAR Rig



- Rolls-Royce is developing advanced centrifugal compressor stage technologies to improve the overall performance of a high overall pressure ratio axial-centrifugal compression system.
- The goal of the work is to improve both component efficiency and surge margin while reducing the physical size of the machine.
- The effort includes design, fabrication, and assessment of candidate technologies, including testing in the Centrifugal Stage for Aerodynamic Research (CSTAR) rig at Purdue University.
- Through this approach, concepts are progressed from TRL3 to TRL5.

CSTAR GEN2.5 CF Compressor Rig

- **Rig allows for inexpensive printing of downstream diffuser and deswirler geometries**
- **Enables optimization of the diffuser and deswirler as a system**
- **Diffuser technologies to be studied include injection holes and end wall contouring**
- **Deswirl technologies to be studied include vane configuration and recirculation holes**





CLEEN III CSTAR Test Sequence

	2022												2023												2024														
	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6													
Internal Research																																							
Gen 2.5 Build 3																																							
Gen 2.5 Build 4																																							
Gen 2.5 Build 5																																							
Gen 2.5 Build 6																																							
Gen 2.5 Build 7																																							
Final Report																																							

Testing planned from 2022 Qtr 4 through Qtr 1 2024

