

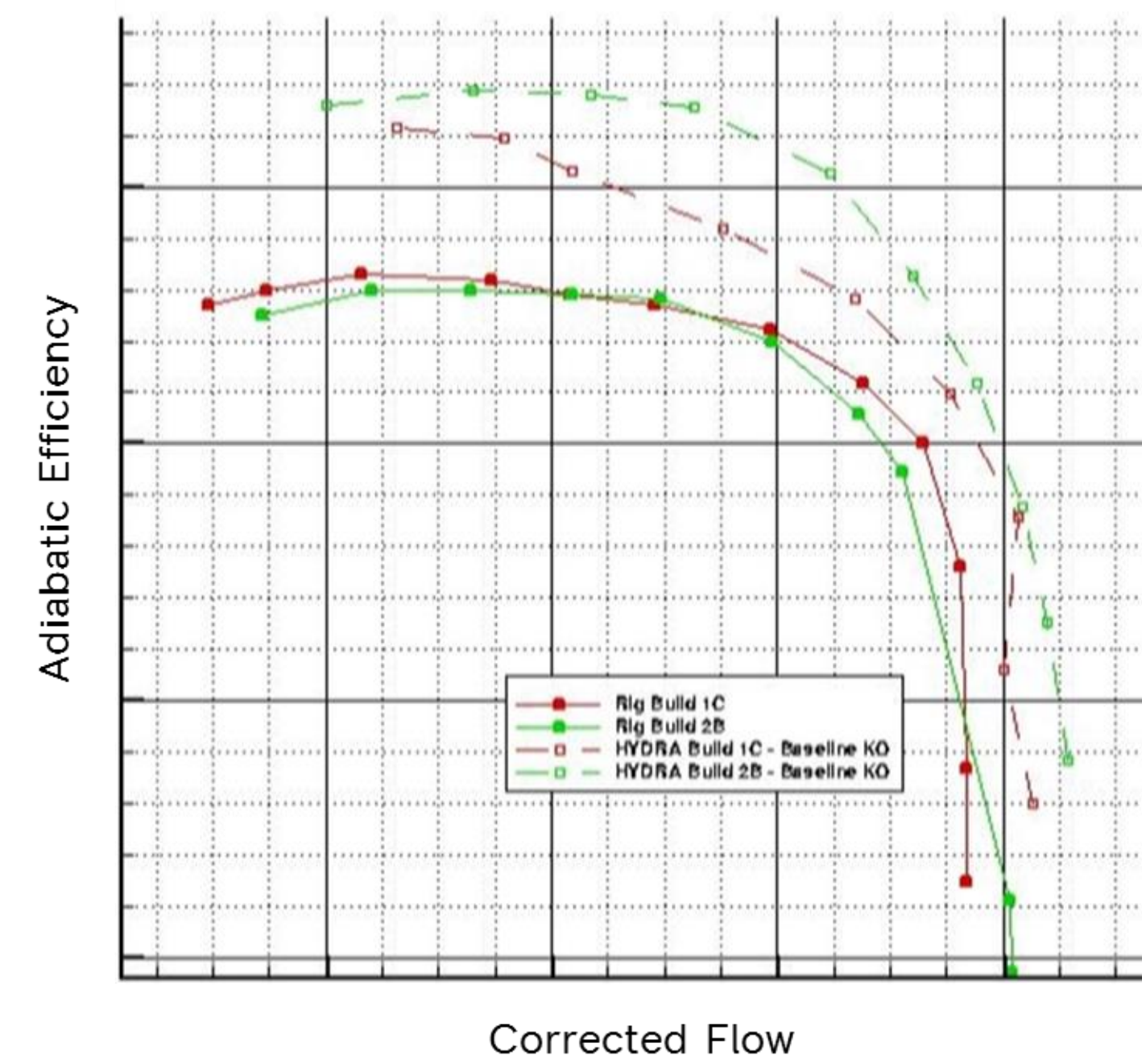
Project: Verification and Validation of Models

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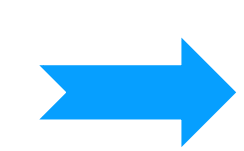


Some business observations

- Predictions not matching reality
- Limited understanding of uncertainty
- More system-level models developed
- Increased reliance on simulation



How can we gain trust in our modeling and simulation?



Verification and Validation (V&V)

Develop a V&V framework

For high-consequence models at varying levels in the system hierarchy that is accessible for the industrial community leveraging Purdue, Rolls-Royce, and V4i partnerships and resources

Specification, Planning, and Prioritization Activities

Ranking System: 1 Low Importance, 3 Moderate Importance, 9 High Importance

Physical Phenomena	Adiabatic Efficiency	Total Pressure	Total Temperature	Flow Rate	Velocity (Vaneless Space/Diffuser)	Surge Margin	Total
Phenomena #1	1	1	1	1	1	1	6
Phenomena #2	1	1	1	1	1	3	8
Phenomena #3	3	3	1	3	3	3	16
Phenomena #4	9	9	3	3	9	3	36
Phenomena #5	9	9	3	3	9	3	36
Phenomena #6	3	3	3	3	9	3	24
Phenomena #7	1	1	1	1	1	1	6
Phenomena #8	9	9	3	3	9	1	34
Phenomena #9	1	1	1	9	3	3	18
Phenomena #10	3	3	1	1	9	3	20
Phenomena #11	3	3	1	3	9	3	22

Experiment and Model Design

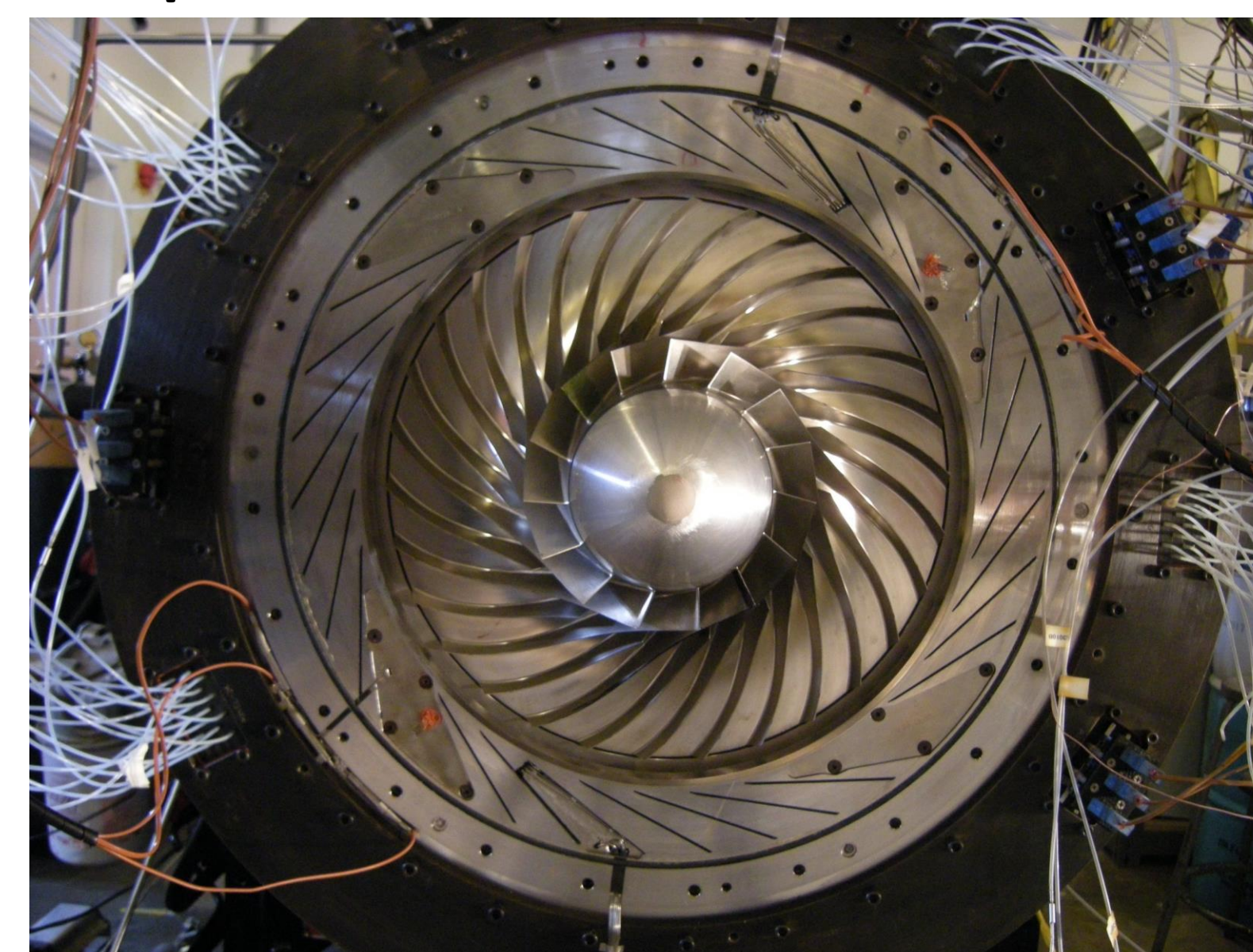
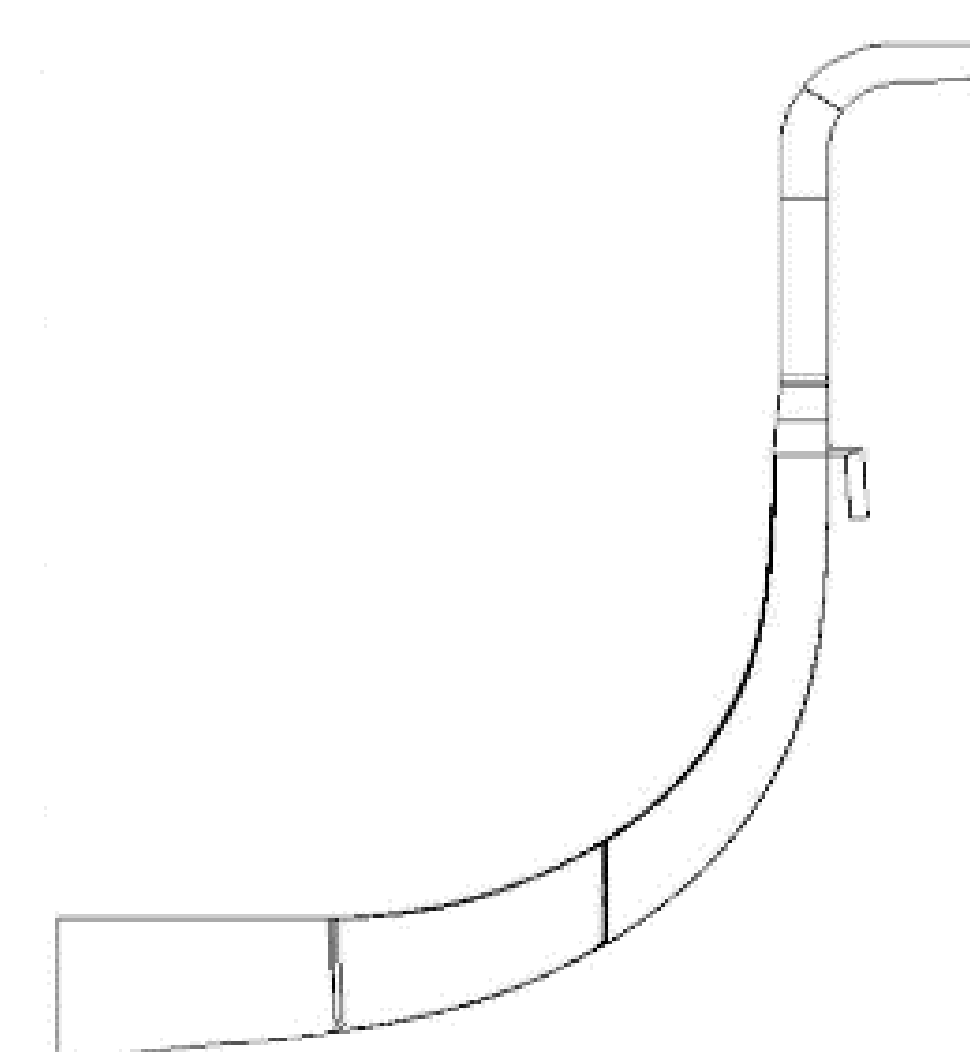


Image 1: Purdue University CSTAR compressor

Purdue Centrifugal STage for Aerodynamic Research (CSTAR)

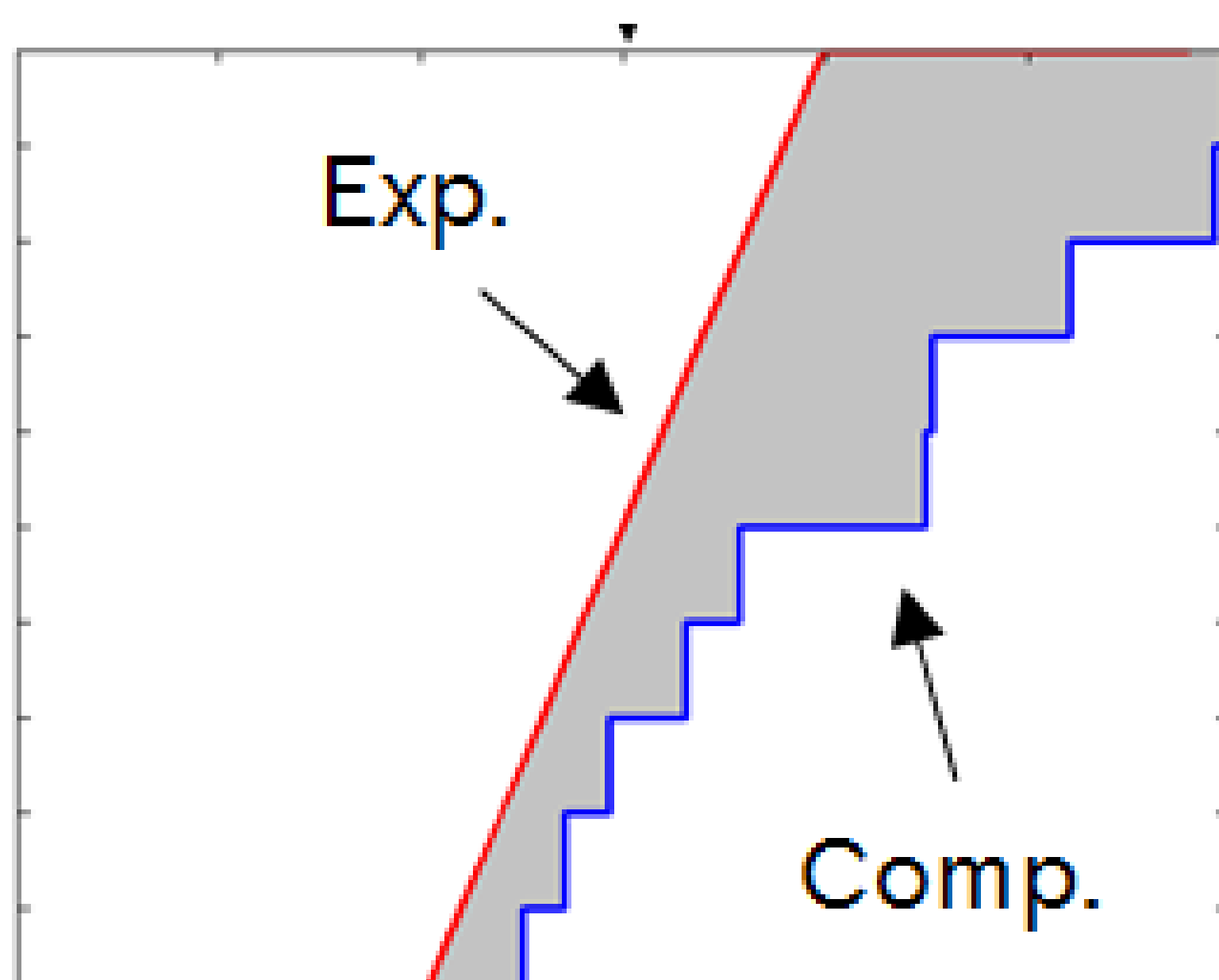
Experimental Rig
Front View



Rolls-Royce HYDRA
CFD Model
Meridional View

Assessment of Model Accuracy

Provisional Results (Future Work) – Do Not Cite



vs.

