Centrifugal Impeller for Pediatric Total Artificial Heart

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Need:
Cardiac defects are the #1 cause of birth related deaths with no long term treatment strategy.

Objective:
Improve the geometry of a more compact pediatric centrifugal impeller while maintaining pressure rise and flow capacity.

Solution:
Impeller models were created using the Taguchi Design Optimization Method to evaluate the following geometric characteristics.

Results:
When tested from 1750 to 2250 RPM, all final models produced a pressure differential $>$70 mmHg and flow rate $>$1 L/min. As predicted by the Taguchi Method calculations, Model 1 is the top performer and satisfies all requirements.

Conclusion:
Improved impeller geometry will allow for model to be scaled down and used intracorporeally.

Impact:
Future iterations of Dragon Heart will help to alleviate high demand for pediatric heart transplants.