Centrifugal Impeller for Pediatric Total Artificial Heart

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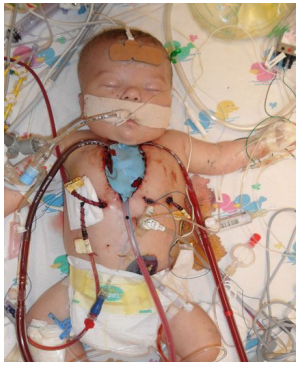
Need:

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

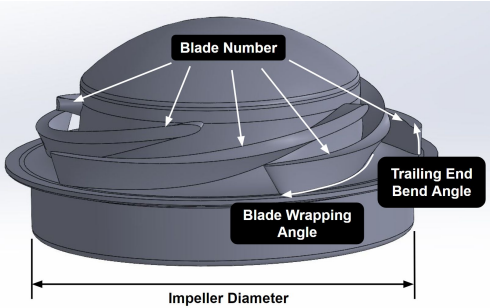


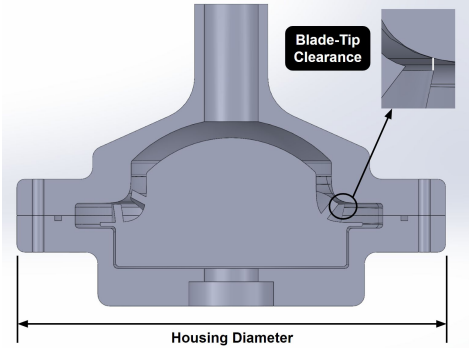
Objective:

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

Solution:

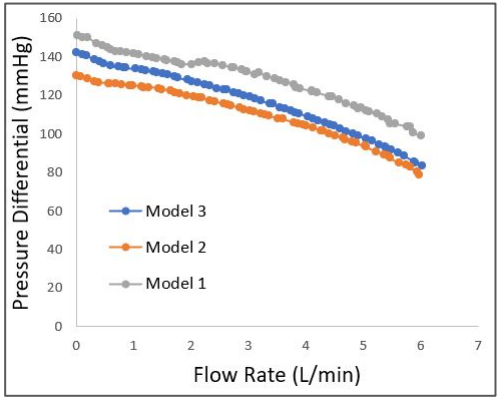
Impeller models were created using the Taguchi Design Optimization Method to evaluate the following geometric characteristics.





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.



Simulation Results				
Requirement		**Design 1**	**Design 2**	**Design 3**
Pressure Generation	**> 70 mmHg**	123 mmHg	109 mmHg	105 mmHg
Fluid Stress	**< 200 Pa**	137 Pa	149 Pa	95 Pa

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.