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Gamma-Type Stirling Engine



I manufactured every part of this engine in the machine shop. As a result of the experience, I became familiar with vertical CNC milling, turning, band saw, and finish manufacturing.



Many parts of the engine are built to tolerances under ± 0.005 ". The piston and piston tube were made to a tolerance of ± 0.001 " and further lapped for a smoother fit. GD&T standards also played an important role. For instance, it was critical that the hole pattern for the heat sink match that of the mounting block.

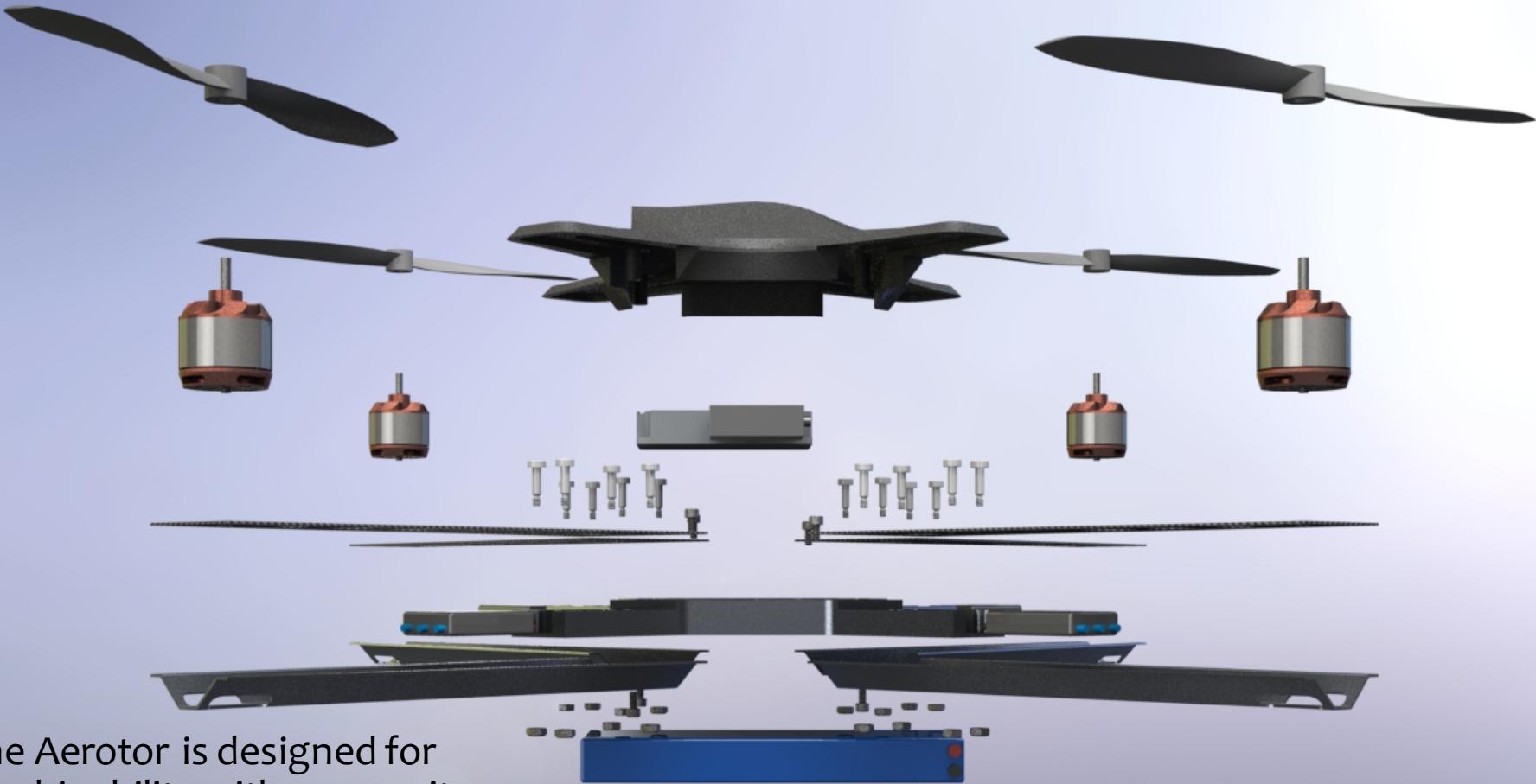
The high accuracy flywheel was machined using a ProtoTrak CNC mill. It took over 8 hours to be cut from a single aluminum cylinder. It allows the engine to run whisper-quiet at over 900 RPM.



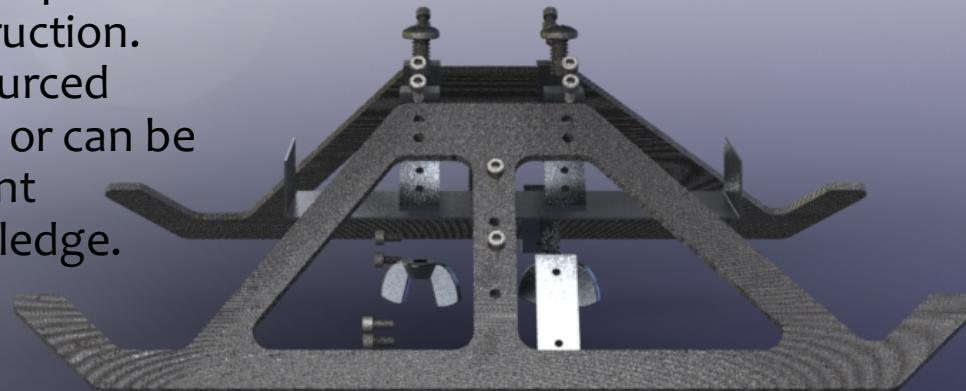
Aerotor Quadrocopter

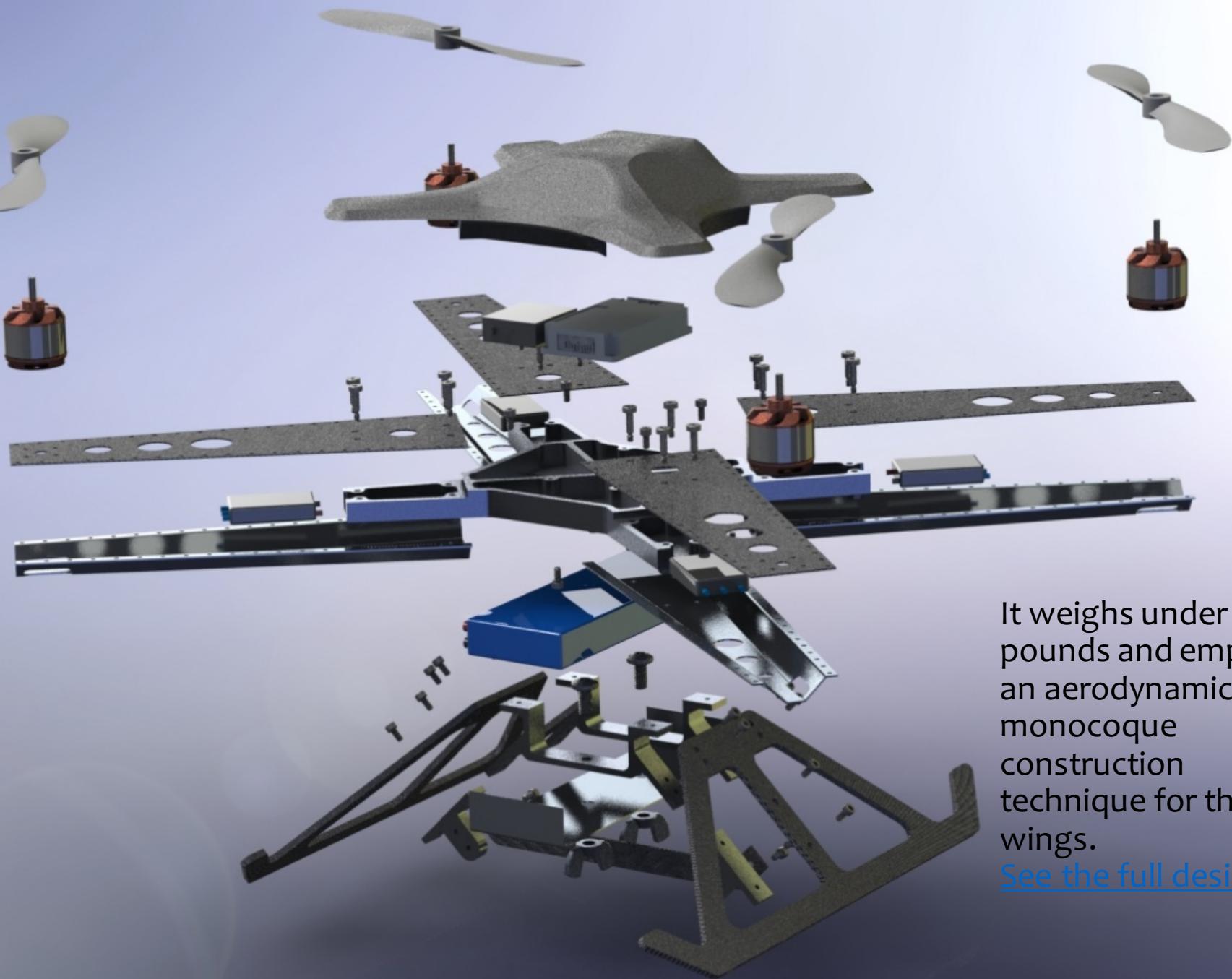


A concept quadrocopter, built for speed and inspired by the lines of the F-22.



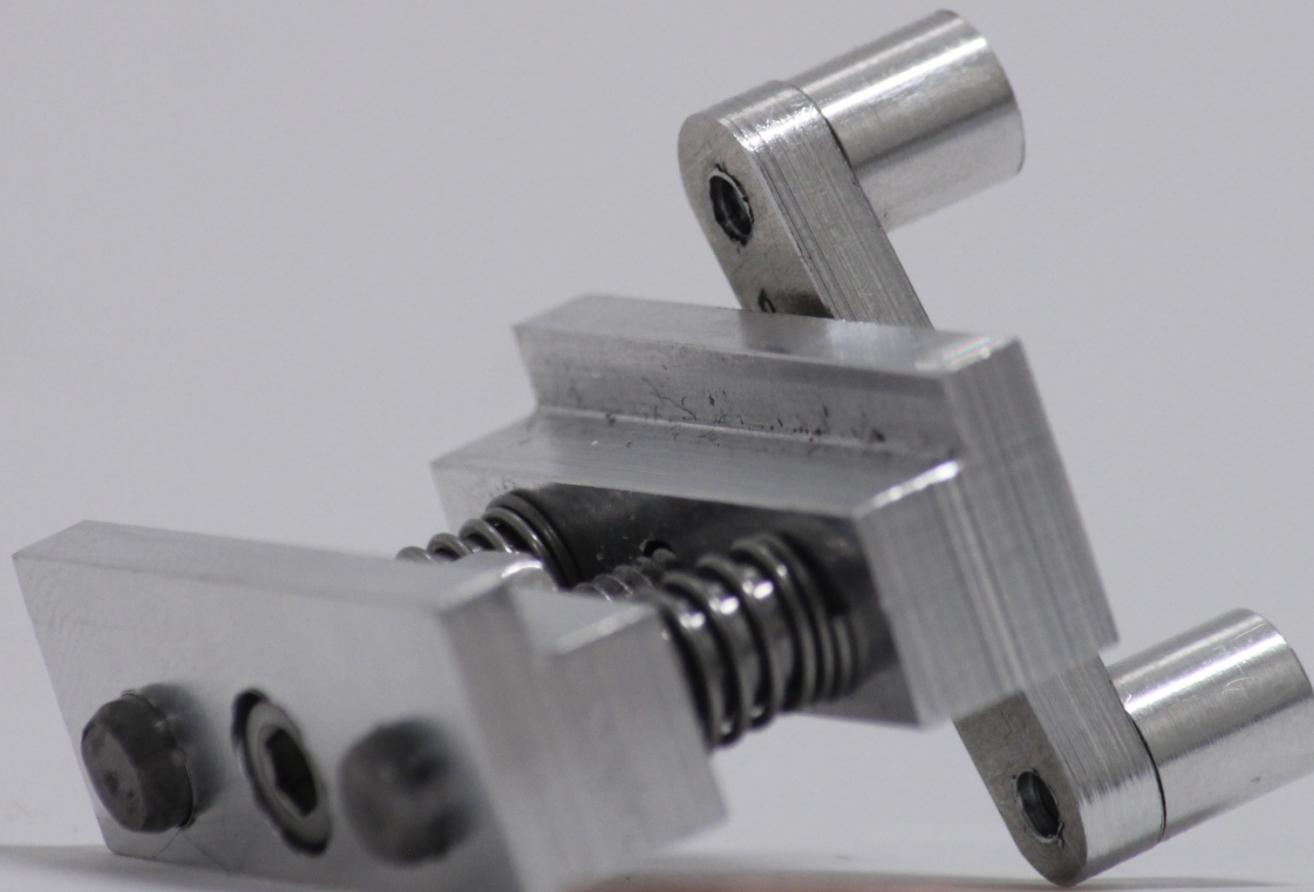
The Aerotor is designed for machinability with composite and aluminum construction. Each part is either sourced from McMaster-Carr, or can be made using my current manufacturing knowledge.

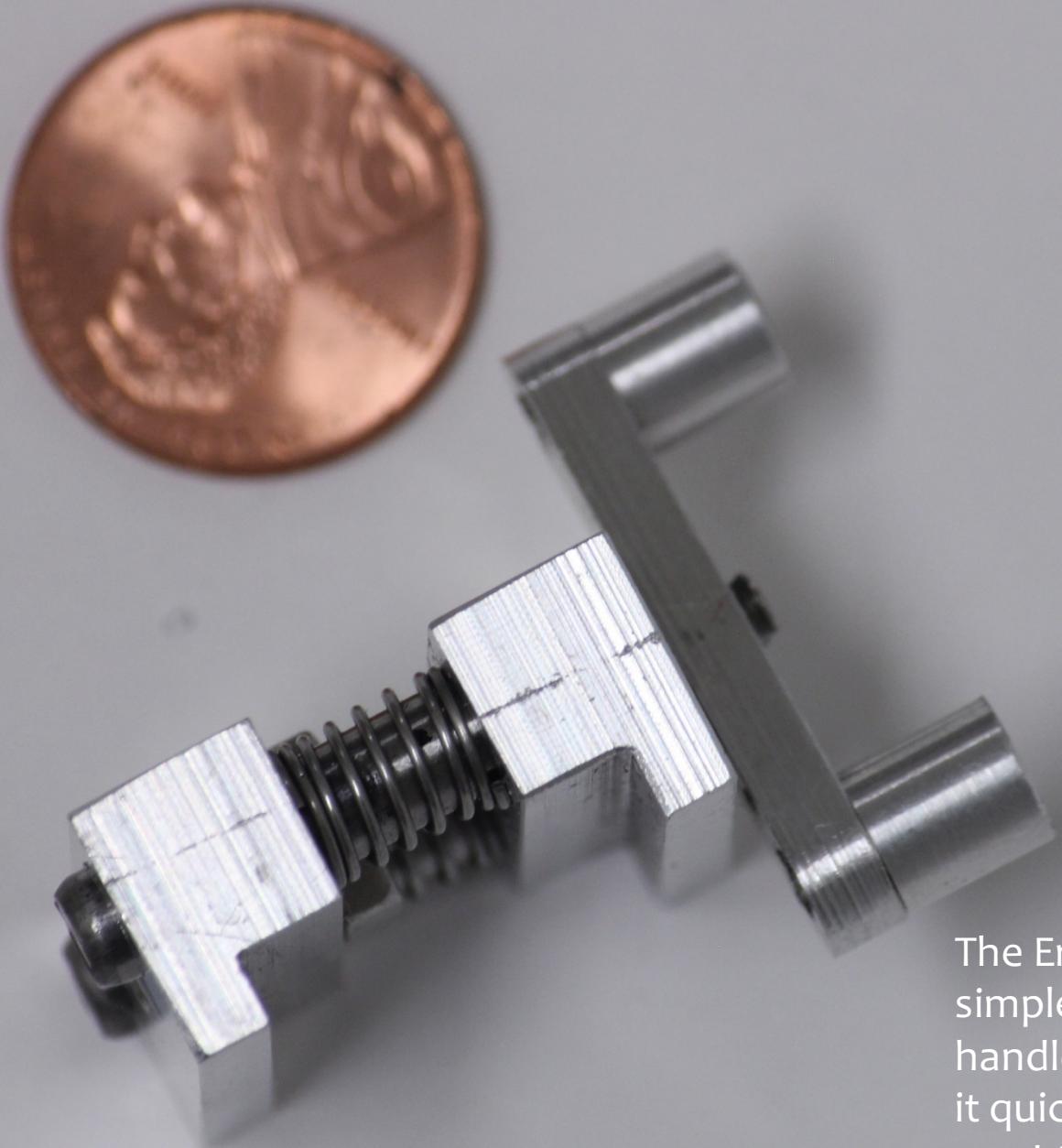




It weighs under three pounds and employs an aerodynamic monocoque construction technique for the wings.
[See the full design.](#)

Ergonomic Vice Stop





The Ergonomic Vice Stop is a simple innovation. The tool-less handle allows the user to attach it quickly and securely to a machine without a wrench.

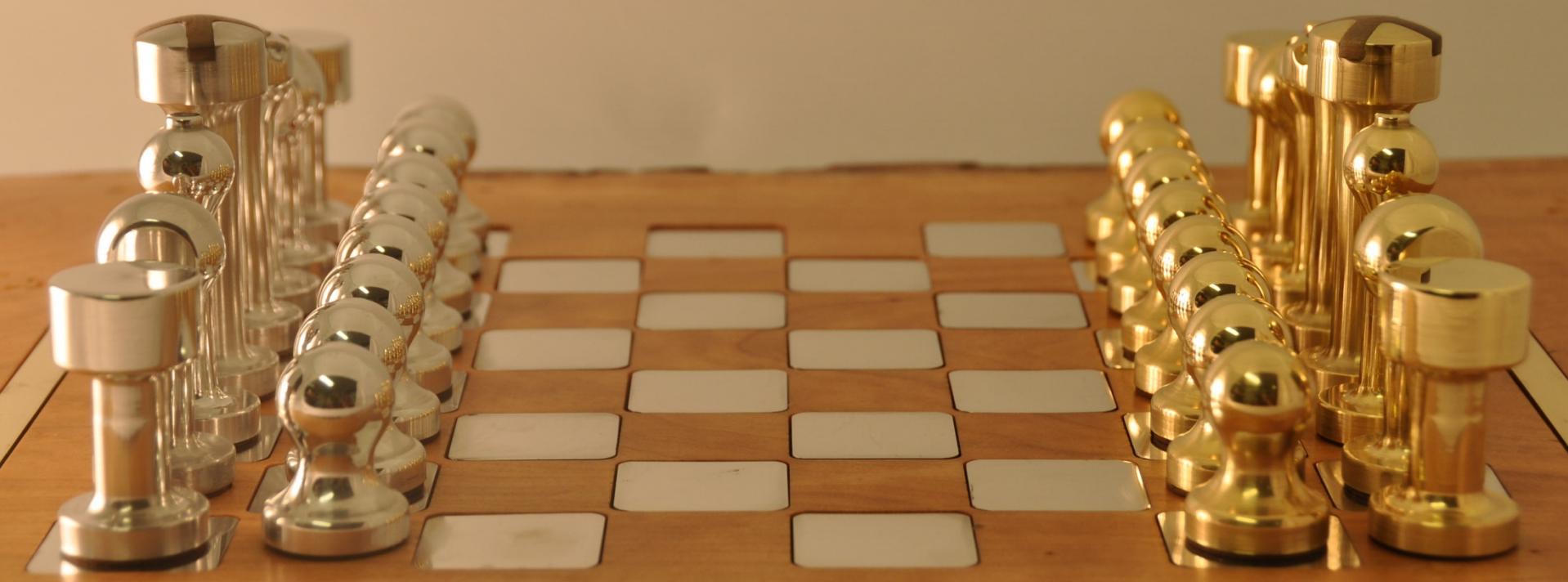
Mod-Organic Chess Set





This chess set was made as a group project for IPD501. The pieces were turned from brass and aluminum bar stock on a Haas TL-1 CNC lathe. They were finished using a ProtoTrak CNC mill and then sanded and polished using a manual lathe.





The board was made from a single plank of cherry wood with a living edge. We cured and finished the wood, and then routed pockets in order to inlay polished aluminum squares for the spaces. The brass inlays on either side of the board indicate the correct play orientation.





The King and Queen were inlaid with hardwood.

(King shown in aluminum, Queen in brass)

The wood and the channels were cut on a ProtoTrak. Then the wood was pressfit into the channels and sanded until flush.



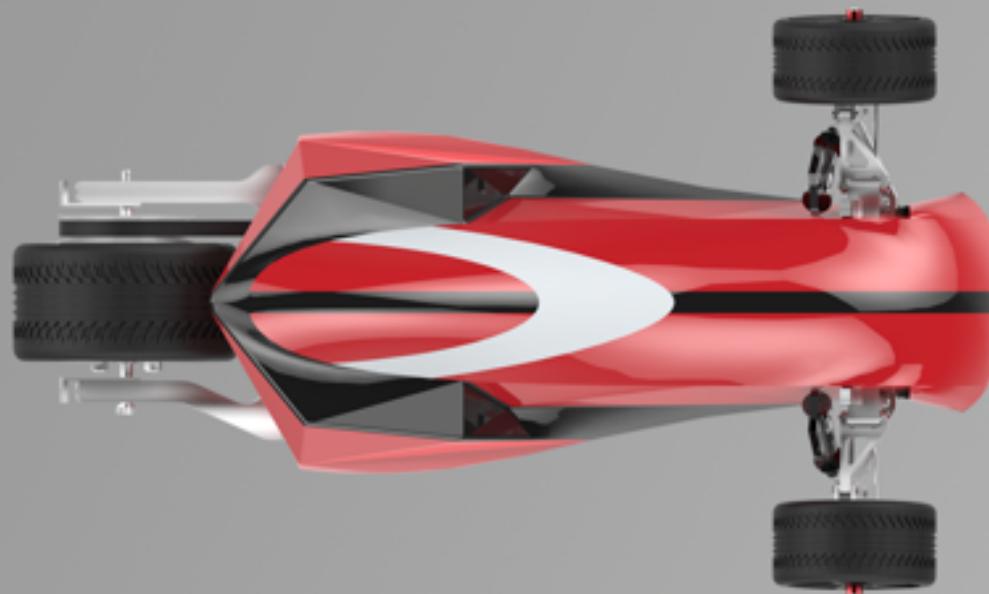
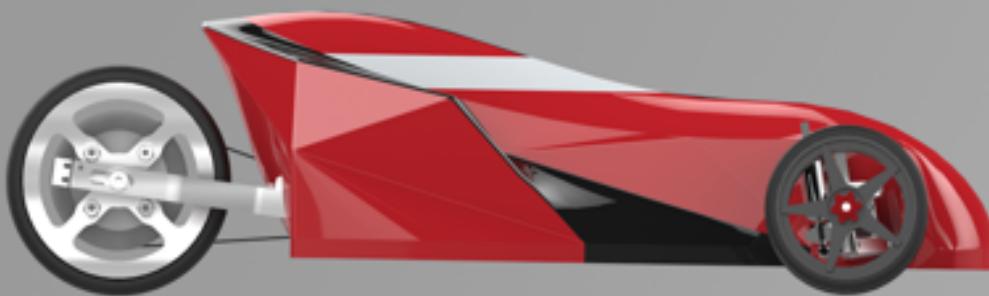


We made a deerskin pouch to keep the pieces in when not in play.

We also covered the bottoms of the pieces in the same leather, in order to protect the board.

F3

A RC Racer



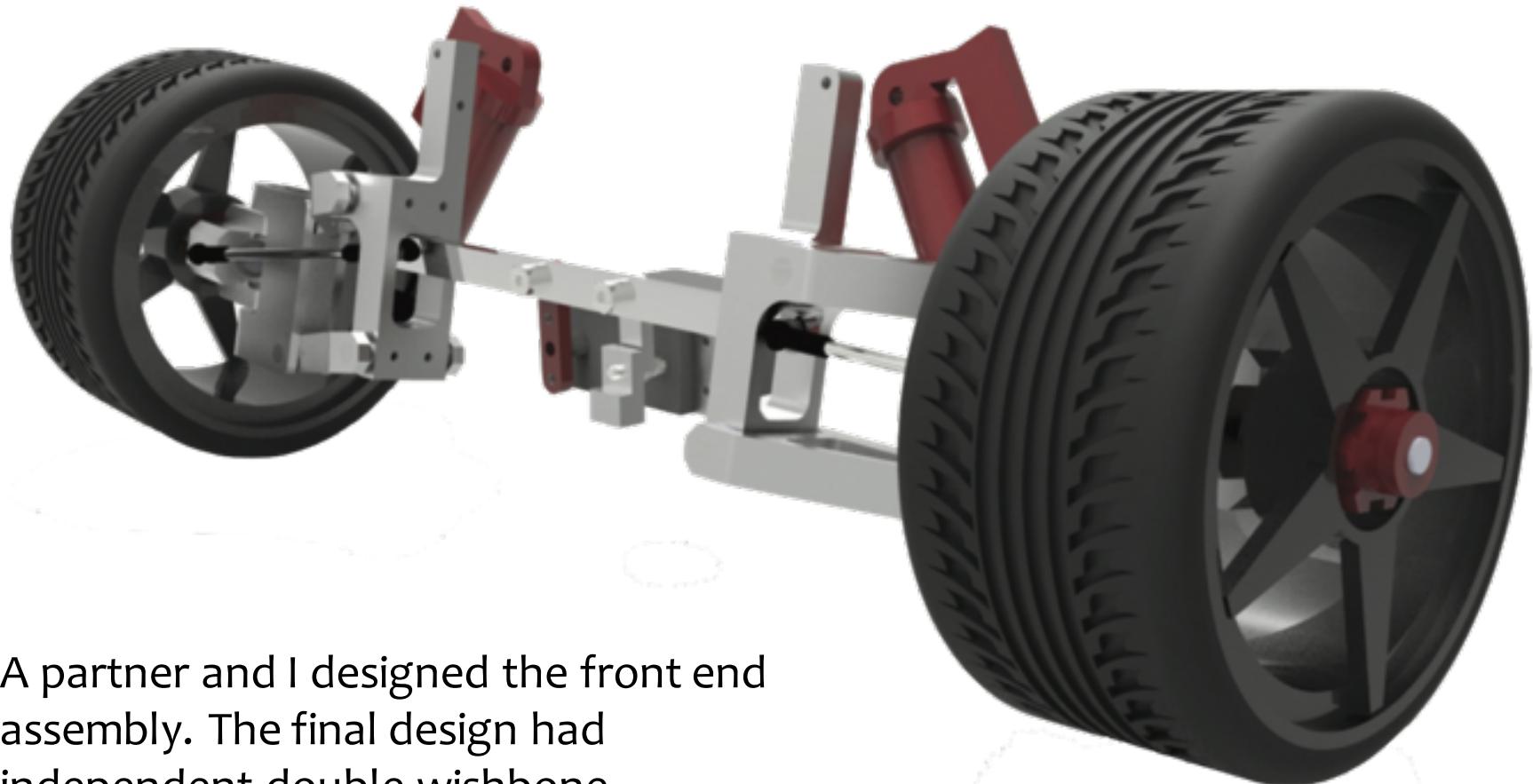
Designed and manufactured as the final project
for IPD 501 at the University of Pennsylvania

A sleek and wicked fast three wheeled RC dragracer, taken from concept sketch to final build in 3 ½ weeks.

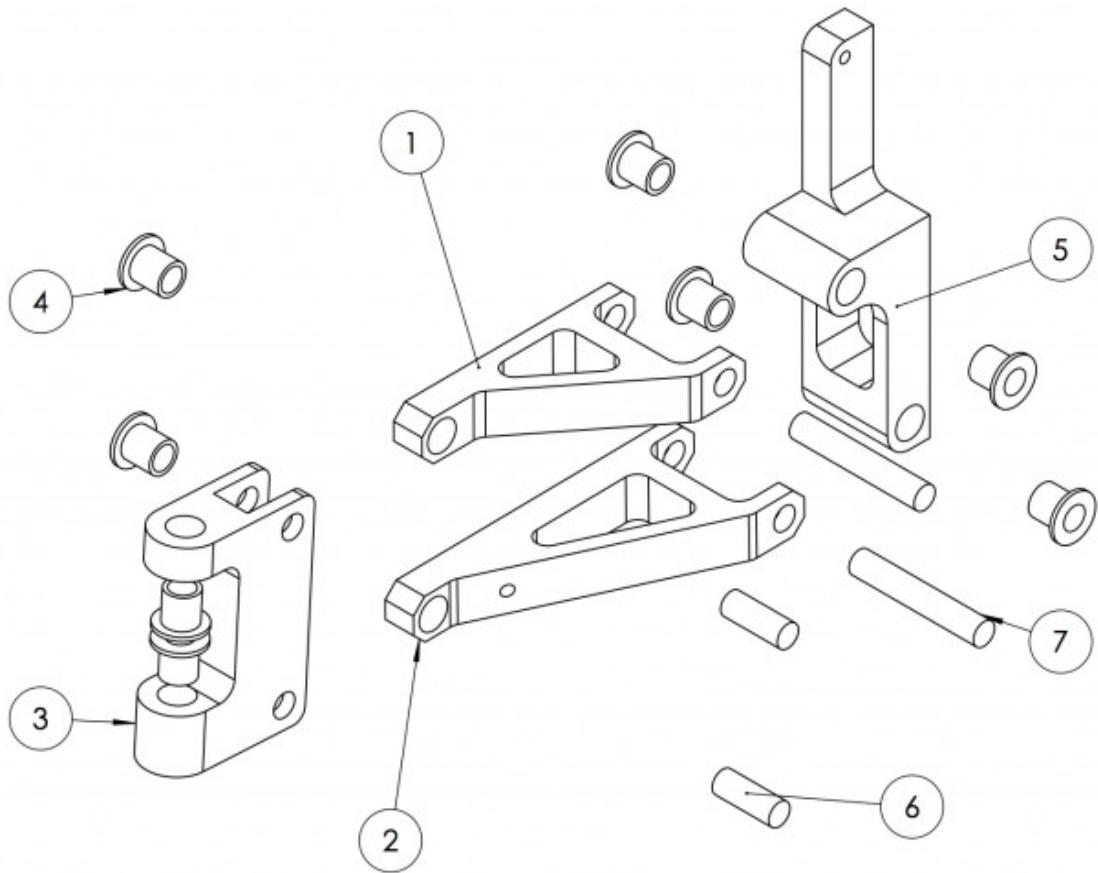


I built the F3 racer as part of a team of eight for the final project in IPD 501.

Every component of the car was custom designed and machined in house. It had a theoretical top speed of over 70mph.



A partner and I designed the front end assembly. The final design had independent double wishbone suspension, and adjustable Ackerman steering to reduce bump steer.



We used FEA to optimize the performance components for weight and strength. Then we generated CAM files in SolidCAM, and machined the parts on a 3-axis mill.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Top A-Arm	Awaiting Machining	1
2	Bottom-A-Arm	Awaiting Machining	1
3	Front-Upright	Awaiting Machining	1
4	6627K11	Ready to Order	8
5	Mounting-Post	Awaiting Machining	1
6	Outer-A-Frame-Axle	Awaiting Machining - From 201 Stock	2
7	Inner-A-Frame-Axle	Awaiting Machining - From 201 Stock	2







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