

KJ66 REVAMP

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KJ66 REVAMP

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Introduction

The KJ66 is an obsolete model Jet Turbine Engine used mainly by people starting the hobby for static testing. Our team set out to improve the design of the engine for performance and make it competitive with newer models.

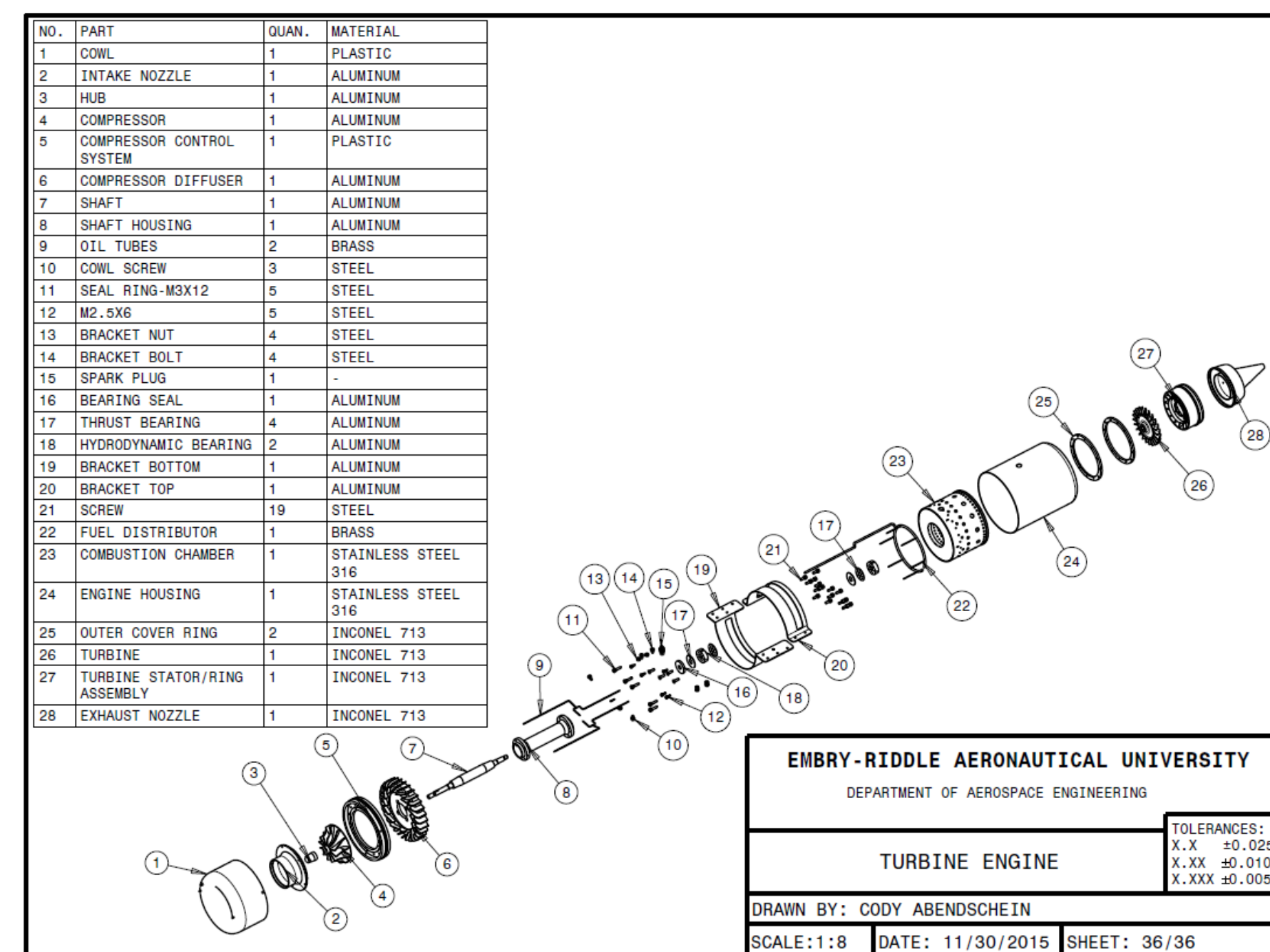


Figure 1. Exploded view

Solution

Several parts were modified for performance and maintenance.

- Hydrodynamic bearings
- Cowl
- Removable turbine stator vanes
- Exhaust cone strut
- Mounting brackets
- Compressor diffuser
- Shaft Housing
- Shaft
- Compressor control system
- Intake Nozzle
- Engine Housing

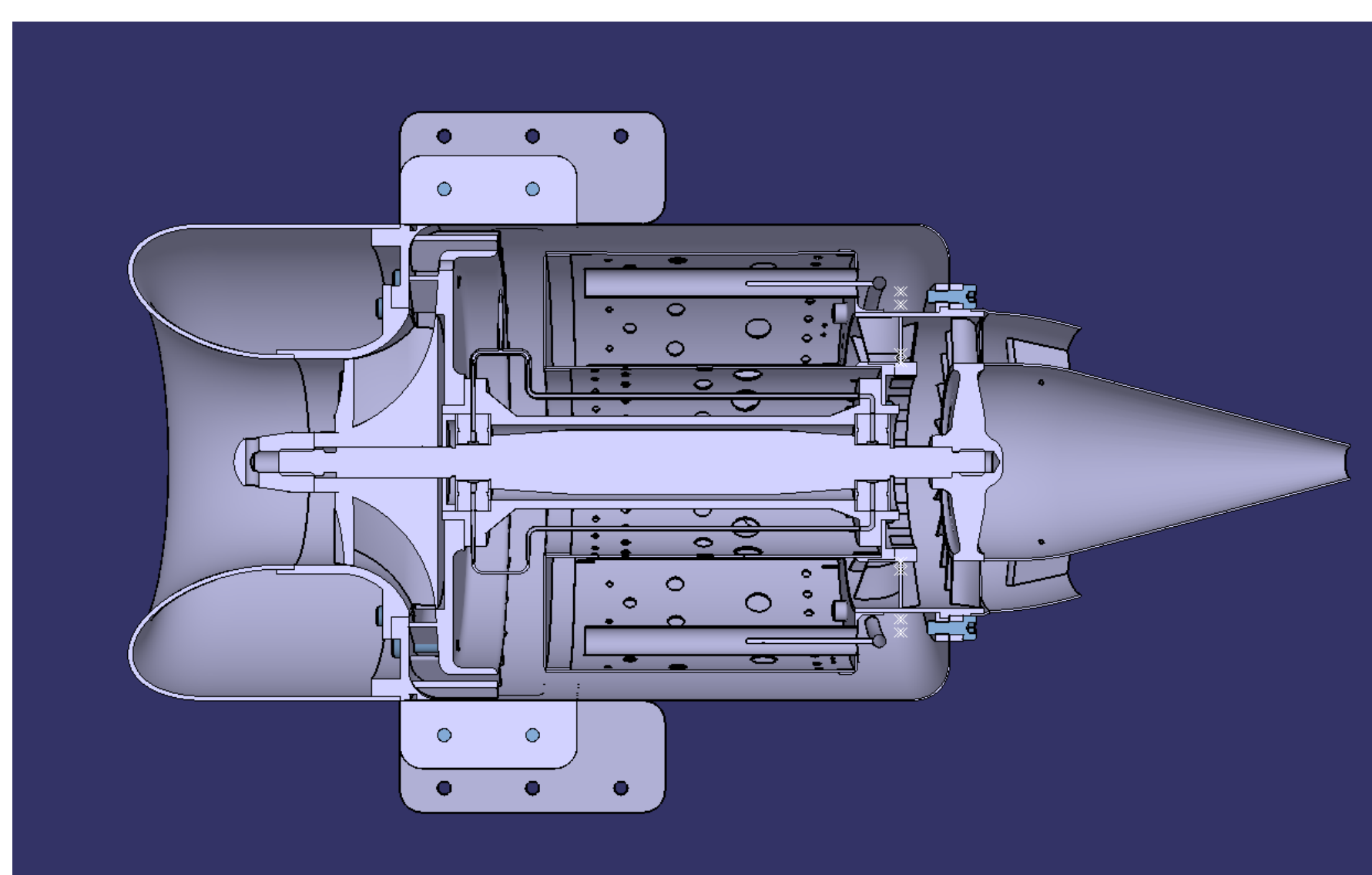


Figure 2. Full section view

Methodology

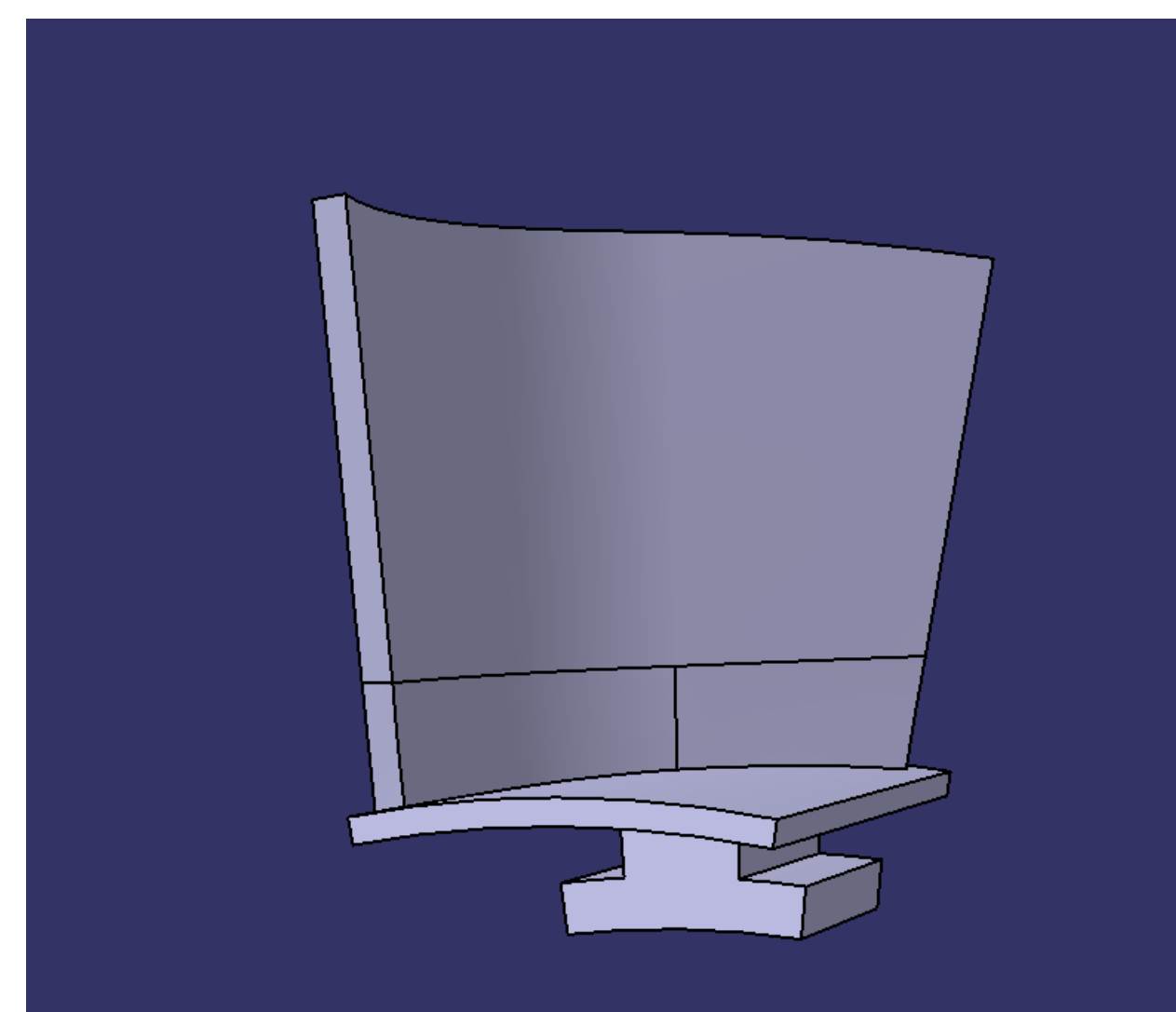


Figure 3. Turbine stator vane

- Removable from ring
- Cost efficient
- 16 for inner turbine ring

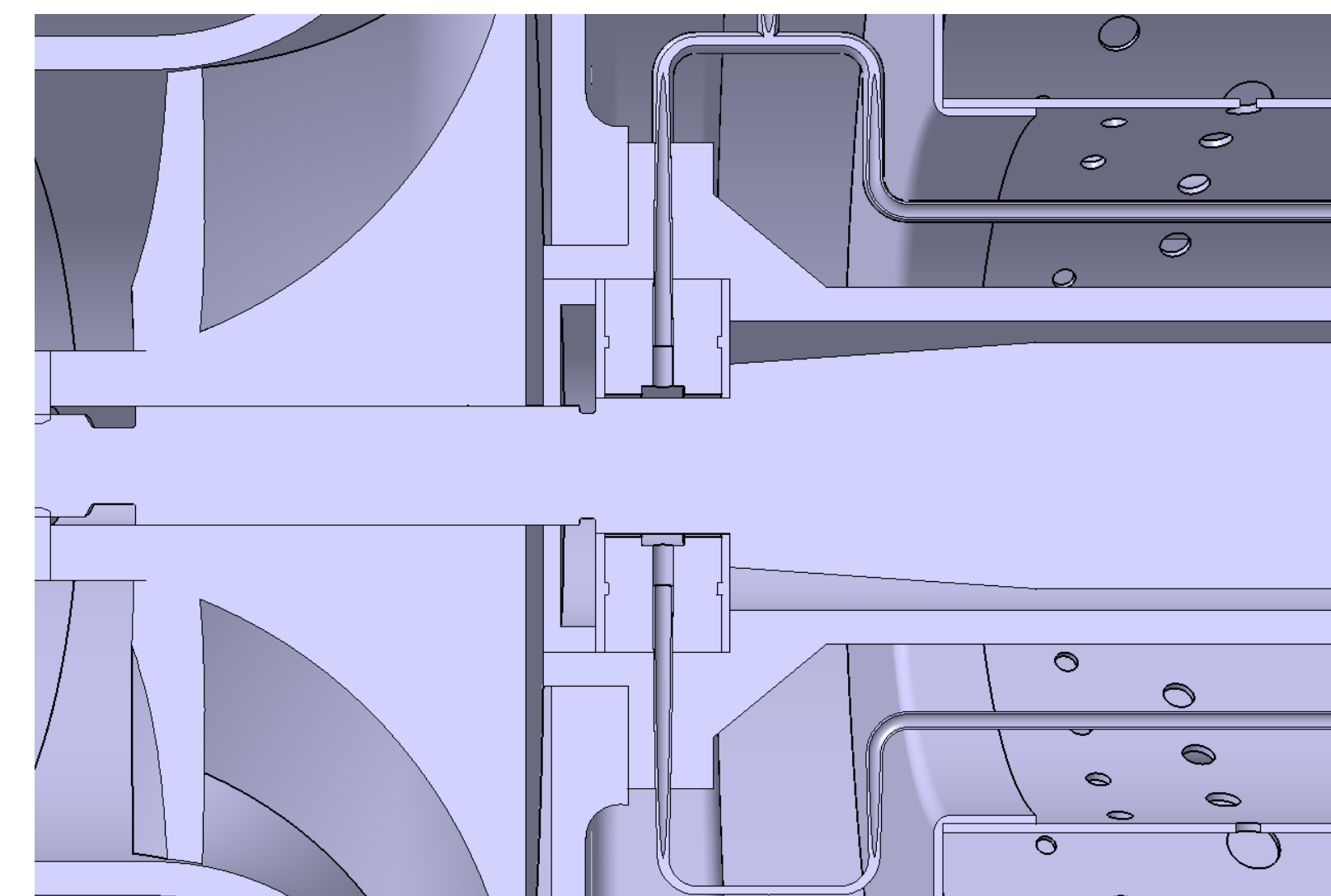


Figure 4. Hydrodynamic bearings

- Cheaper (lathe machined part)
- Quieter than Ball bearings
- Oil cooling
- Efficient for High RPM conditions



Figure 5. Cowl

- Aerodynamic upgrade
- Aesthetics
- Good location for storing electronics (ex. FADEC)

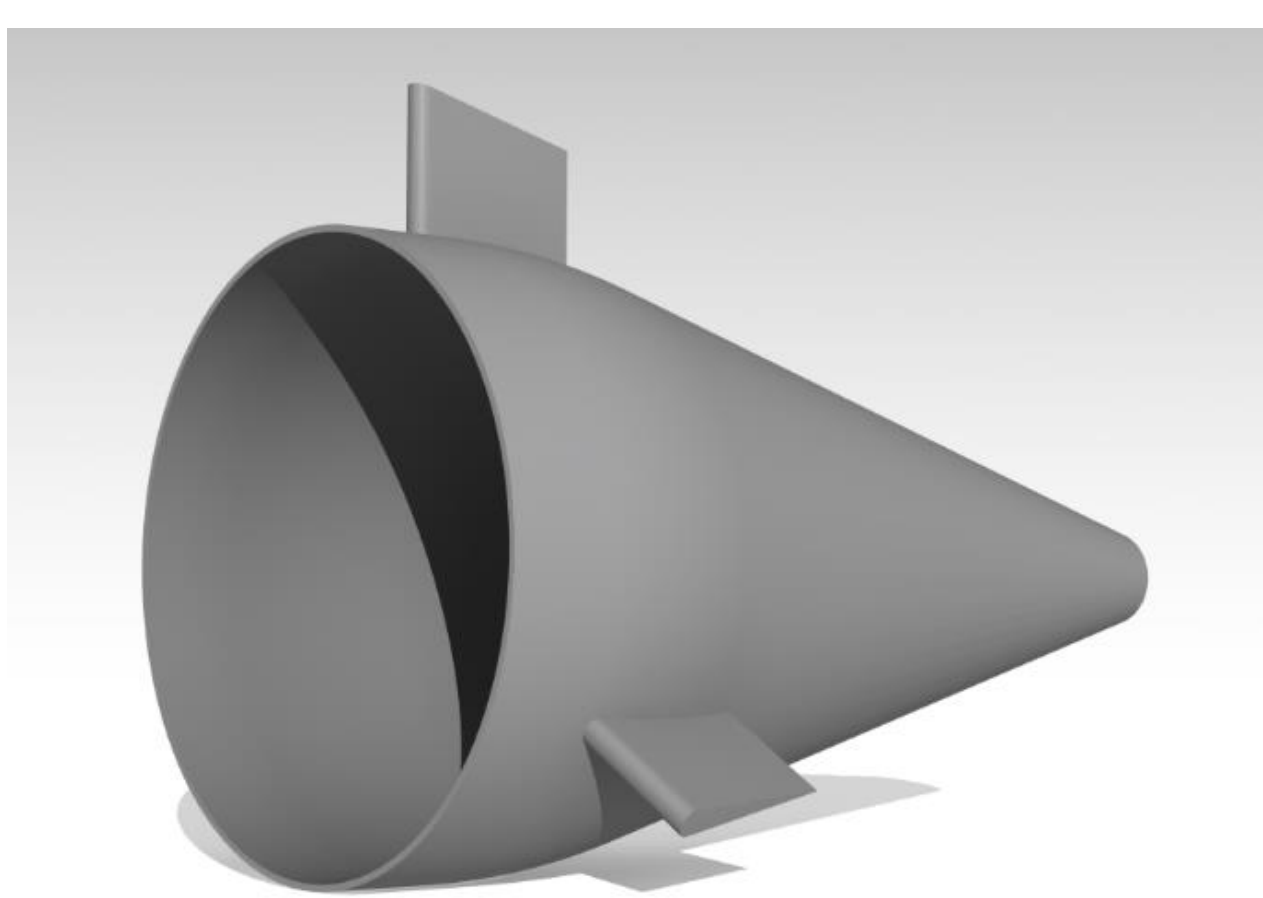


Figure 6. Exhaust cone struts

- Required modification for our setup.
- Replaced springs on engine Housing.
- Struts have Aerodynamic features

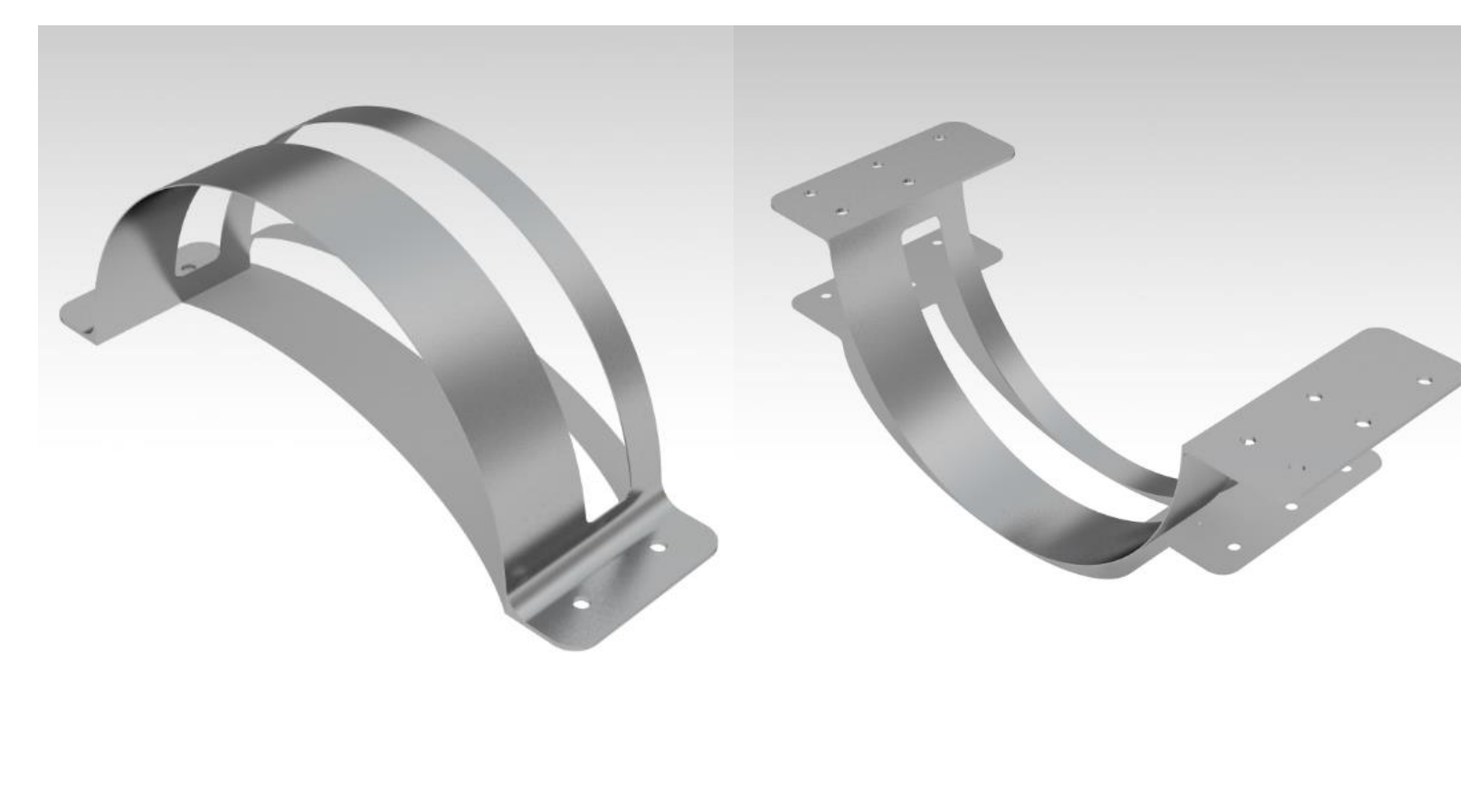


Figure 7. Mounting Brackets

- Used by many Model Jet Engines
- 4 fasteners squeeze the engine housing
- 6 fasteners on the bottom mount hold the engine to a structure.

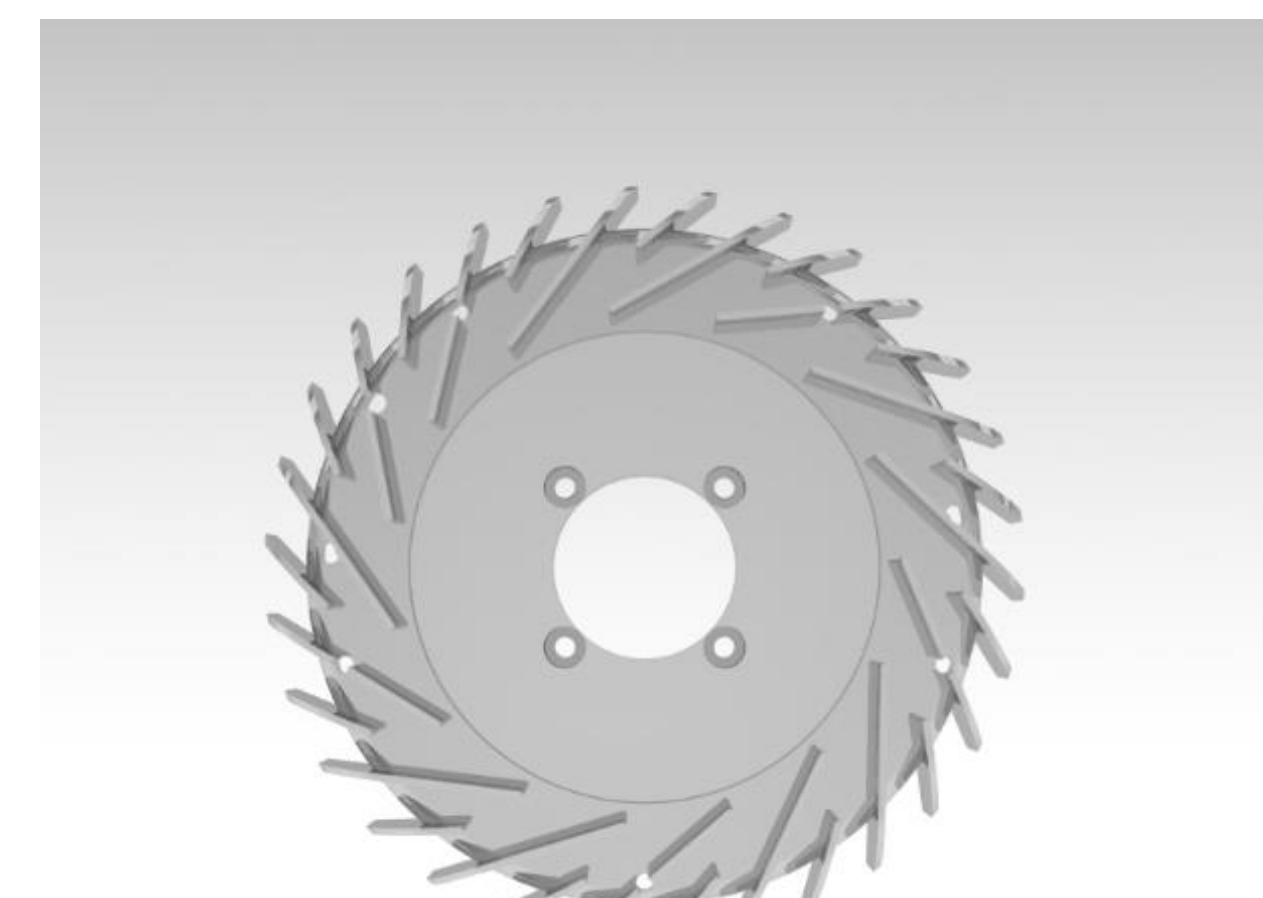


Figure 8. Compressor diffuser

- Guide vane shape and location modification.
- Less Screws
- More air compression
- Better air direction

Materials

Stainless Steel 316

- Corrosion resistance
- Heat resistance
- Melting point – 2550 °F
- Used for combustion chamber

Brass

- Used for tubing
- Easy to shape (bend)
- Lower chances of sparks

Plastic

- Cheap cowl material
- Lightweight

Aluminum

- Cheap
- Lightweight
- Easy to manufacture

Inconel 713c

- Nickel-chromium alloy
- Castable
- Oxidized layer formed when exposed to heat

Steel

- All Standard Bolts used

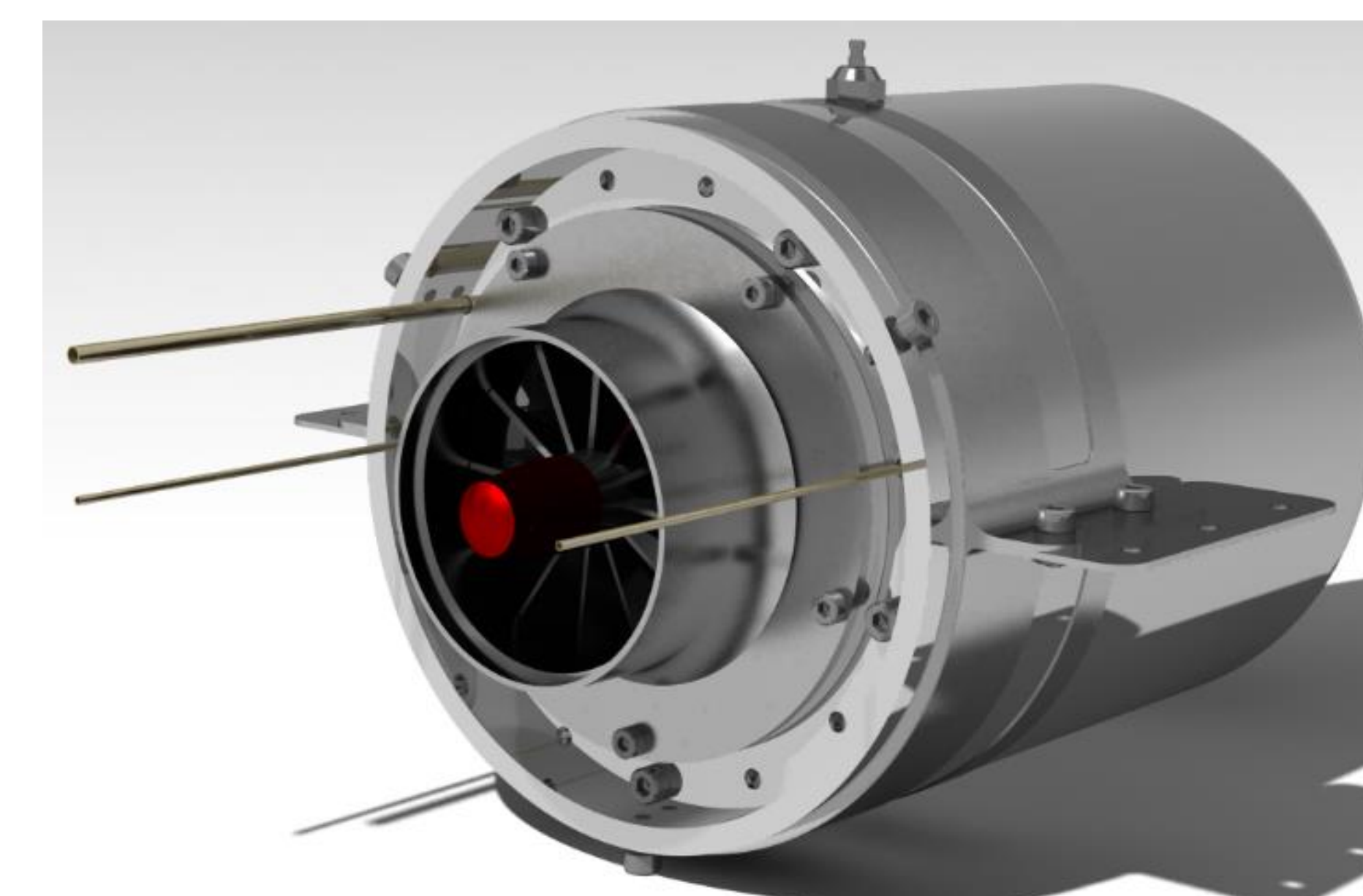


Figure 9. Engine with no cowl

Results

Table 1. The Calculations our team made for finding the price of the Jet Engine.

Part Name	Cost	Source
KJ66 Jet Engine (Turbine, Compressor, Combustion Chamber, Cowl, Ball Bearings, Exhaust Nozzle, and Housing)	~\$1,170.00	AliExpress.com
Ball Bearing	- ~\$133.35	HobbyandEngineeringSupplies.com
Fluid Dynamic Bearing	~\$21.32	CustomPartNet.com
Existing Fuel System	- ~\$25.00	RCGroups.com
Fuel Systems Tubing	~\$6.02	OnlineMetals.com
Fuel Systems Manufacturing	~\$25.00	AliBaba.com
Cowl	(Included in KJ66 Jet Engine)	-
Mounts	~\$17.90	JetCat.de
Fasteners	~\$12.00 (not added because already included in the Jet Engine)	HomeDepot.com
Total Cost	~\$1081.89	

Table 2. The comparison of our upgraded product and others with similar specifications in the market.

Jet Engine	P80 SE	P60 SE	KJ66 (upgraded)
Diameter (mm)	111.76	82.55	107.4
Mass (lbs.)	2.9	1.87	2.221
Thrust (lbs.)	22	13	16.77 (gtba.co.uk)
Price	\$2195.00	\$1995.00	~\$1081.89

Conclusion

After incorporating the new parts and making calculations our group has produced a product that is competitive in the market and outperforms some leading turbine engines in terms of cost, thrust, and weight.

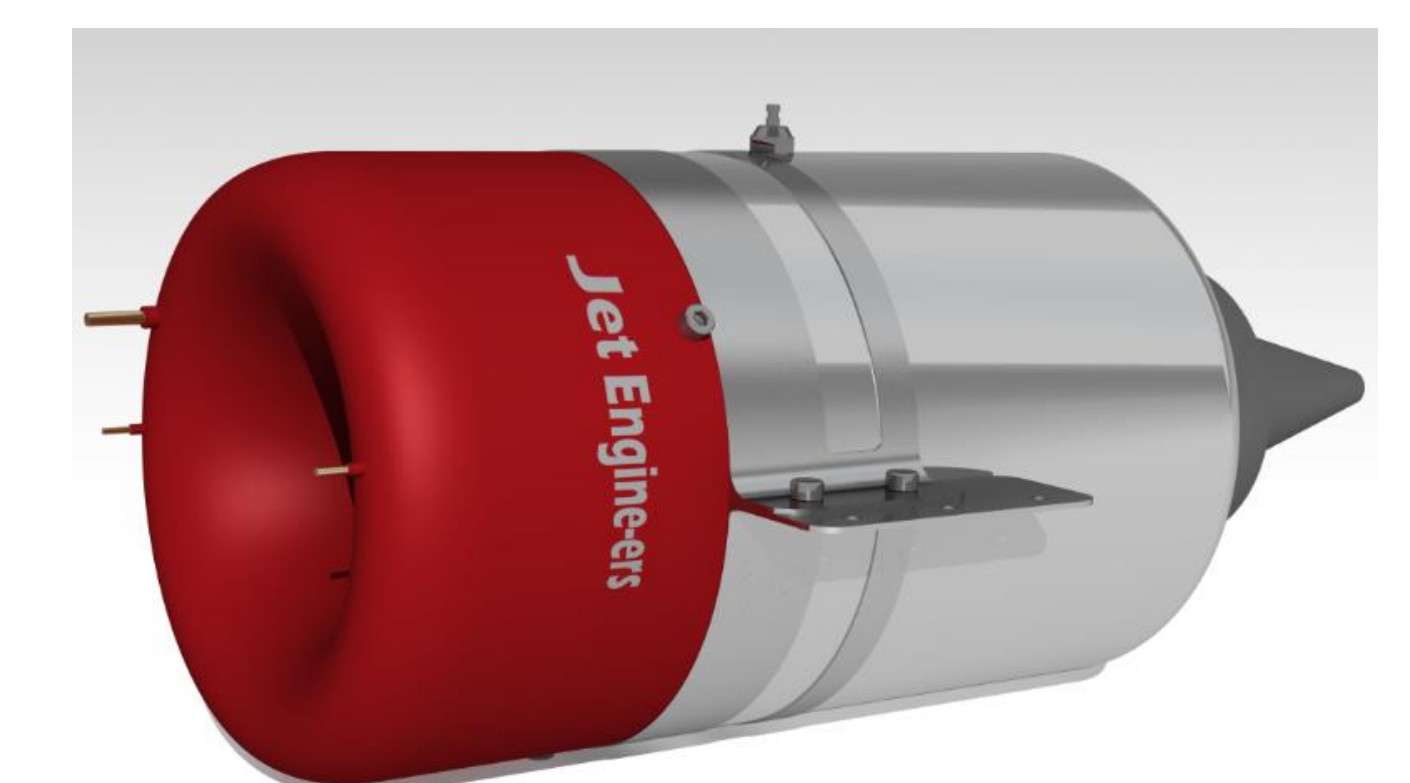


Figure 10. Full rendered jet turbine engine

Acknowledgements

Modified plans like the compressor diffuser, shaft housing, shaft, compressor control system, intake nozzle, and engine housing were provided by the John-Tom.com website.