HiggsDiesel

V12
E-1000J/G
CONDOR

V4
E-330J/G
HAWK

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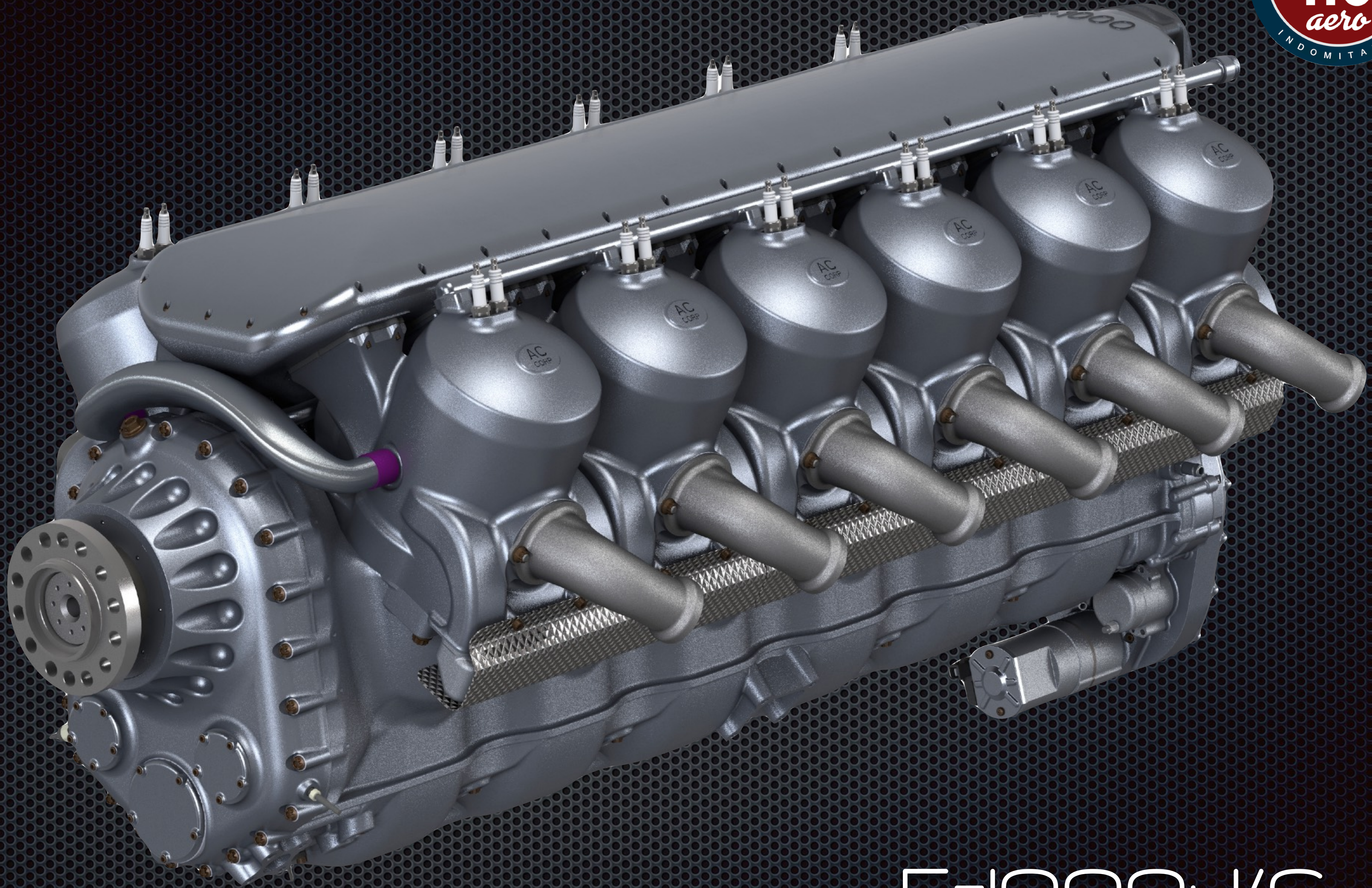

E-1000J/G

1638bhp@5300rpm

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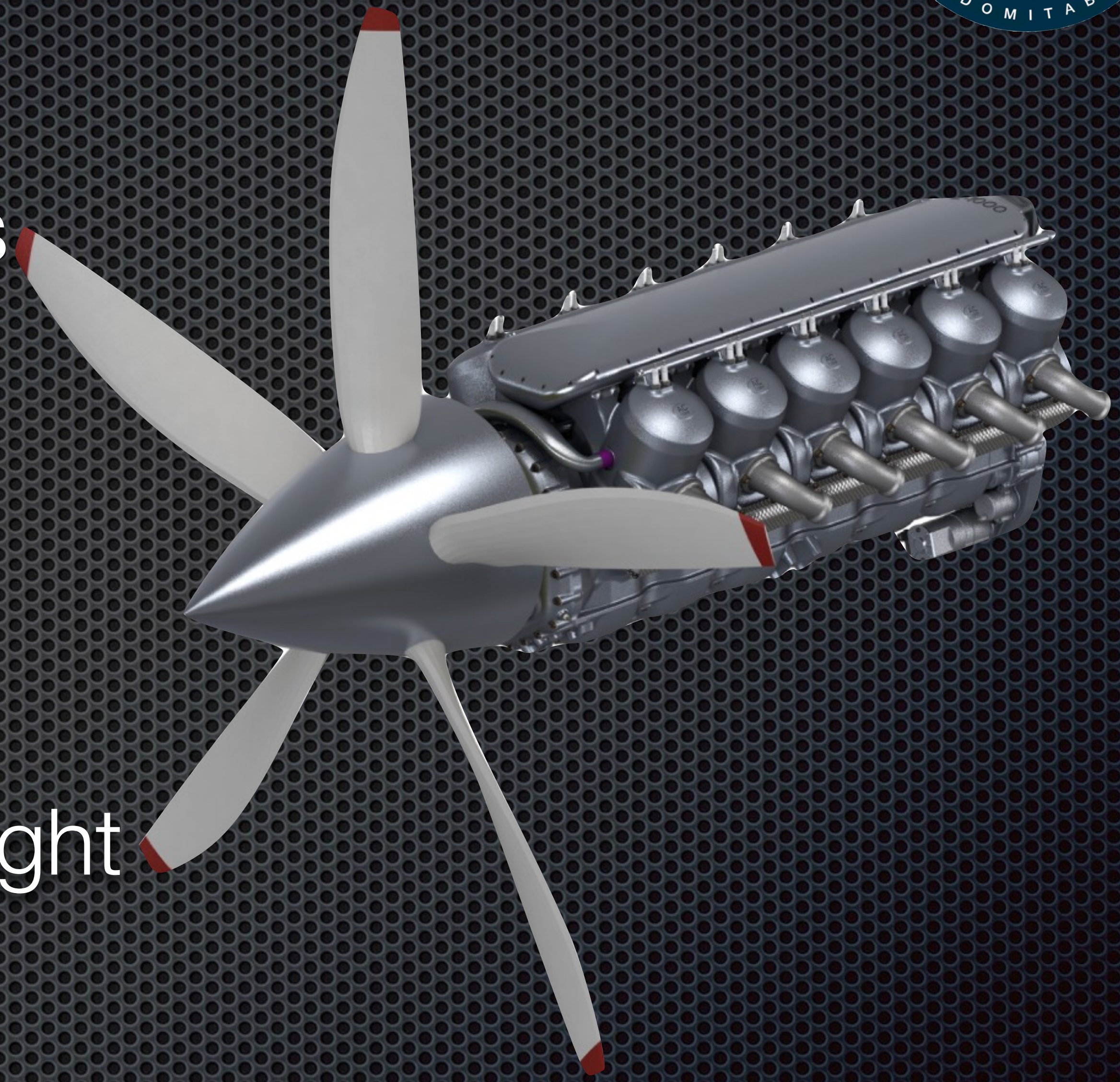
- New concept in high performance aircraft engines
- Unique operating method
- Low part count for high life
- Extremely high power to weight
- Minimum vibration
- Low noise and heat signature



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Specification

V12

E-1000J/G

- 1000 c.i (16.37 liters)
- 1638 bhp (1221kW)* depending on specification max SL power to 50k ft
- weight 664lbs (302kg)
- L 65.51” (1,664), W 24.37” (619mm), H 28.54” (725mm)
- Fuel, Jet fuel (Diesel (EN 590), Jet A, Jet A-1, JP-5, DEF STAN 91-86, JP-8, DEF STAN 91-91, JP-8+100, Chinese Jet Fuel No 3). Gasoline, 80,87,91,95,100LL and all bio derivatives.
- BSFC, 0.380 lb/hp-h (231g/kW-h) Pratt & Whitney PT-6 Turboprop by comparison is 0.507 lb/hp-h (308 g/kW-h) (on approach and idle 0.825 lb/hp-h (502 g/kW-h))

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Technology

- The crankcase, freed from any gas exchange functions, is well lubricated; the working processes being sealed above the piston. Isolation of the crankcase also permits a full pressure lubrication system to be used, as in four-cycle engines.

- Inherent piston cooling characteristics of the combined cycle piston design offer a major durability advantage over conventional two-cycle engines, allowing much leaner fuel delivery than can be sustained with traditional crankcase scavenging, where usually piston overheating and consequent seizure are common.

- This technology operates without complex mechanical components such as cams, valves mechanisms and the other various precision components necessary to operate them.

- The absence of these mechanical components eliminates a large number of moving parts, thereby considerably reducing the costs and maintenance requirements, whilst significantly increasing reliability and retaining the simplicity of the two cycle engine.

- With this novel cycle engine technology, combined with the enormous benefits together with their appealing simplicity, a new generation of light weight high performance power plants can be achieved. Which until now would have been almost impossible.

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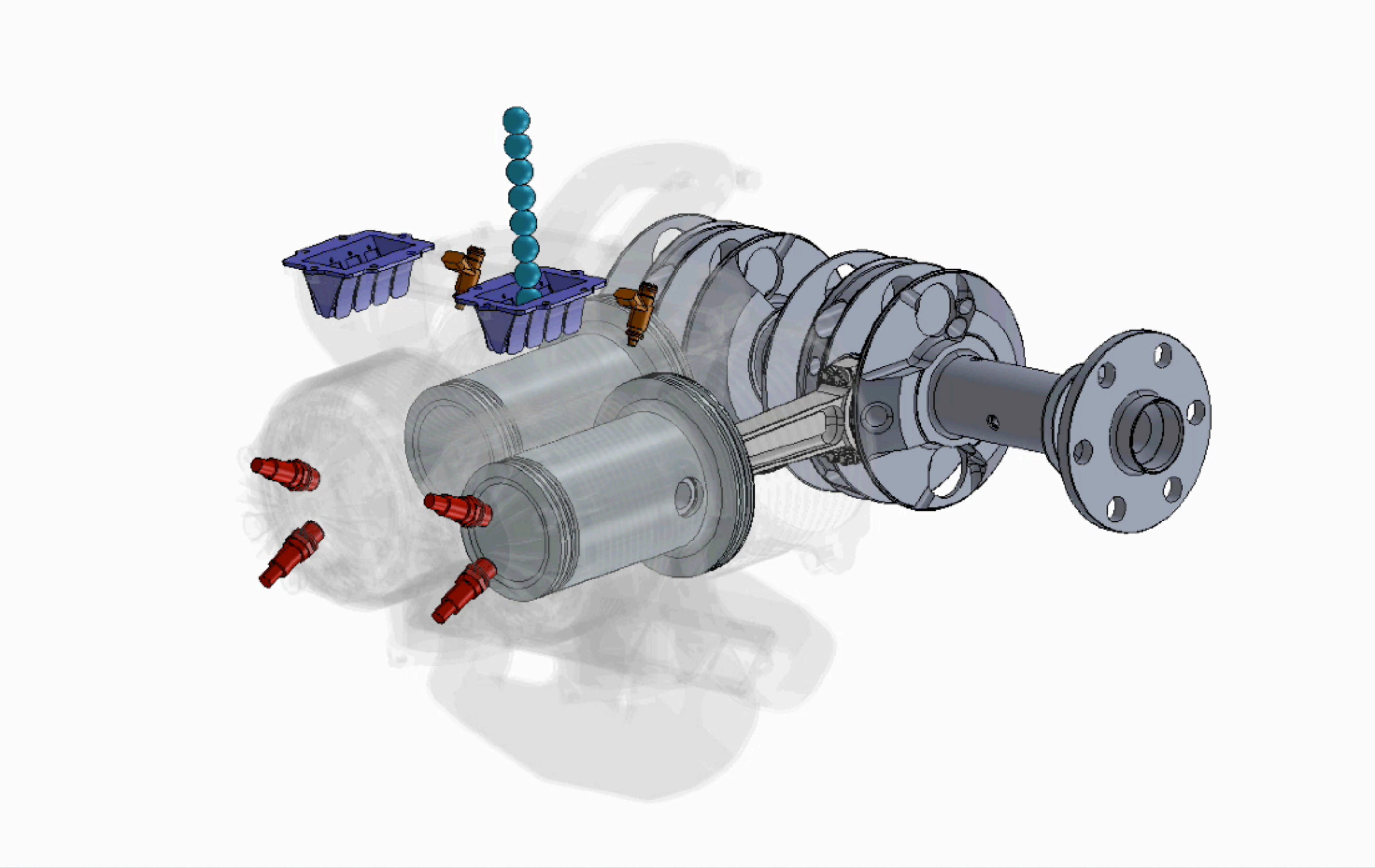
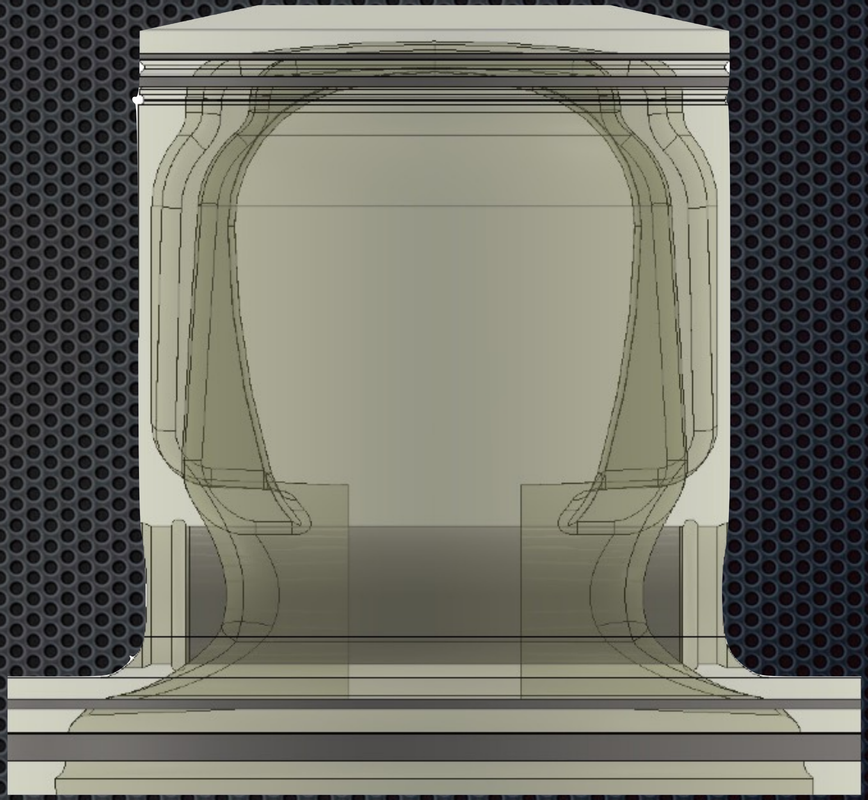
Novel Concept

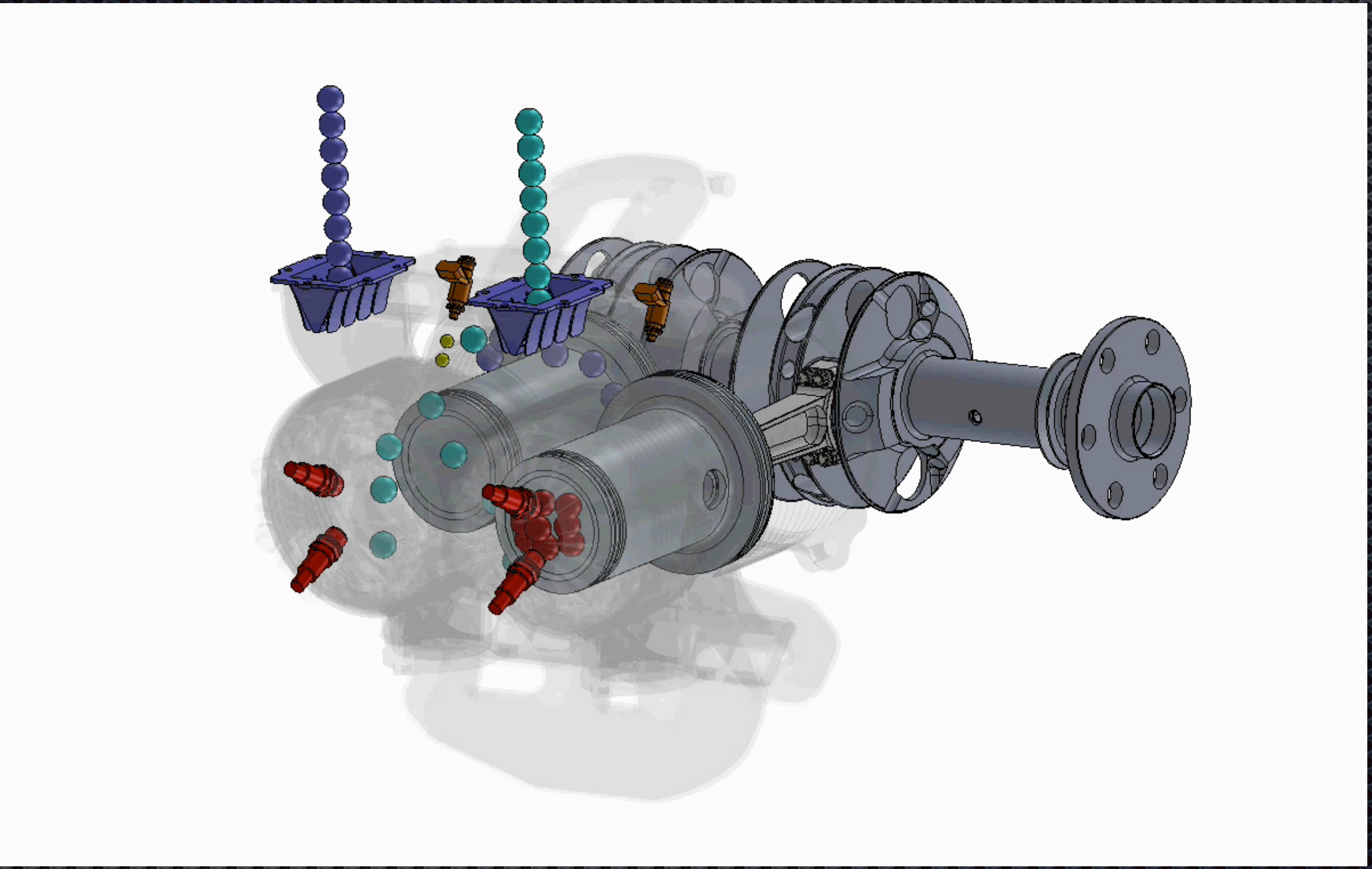




Typical combined cycle piston design

- The use of combined cycle pistons, for charge transfer and combustion, allows the key advantages of two and four-cycle engines to be combined, with the elimination of disadvantages inherent in each of these engine types.
- Using a combined cycle piston in we are able to completely separate the scavenging from the crankcase.
- Isolation of the fresh charge from the crankcase is made possible by the provision of normal four-cycle engine compression and oil control rings on the larger diameter part of the piston

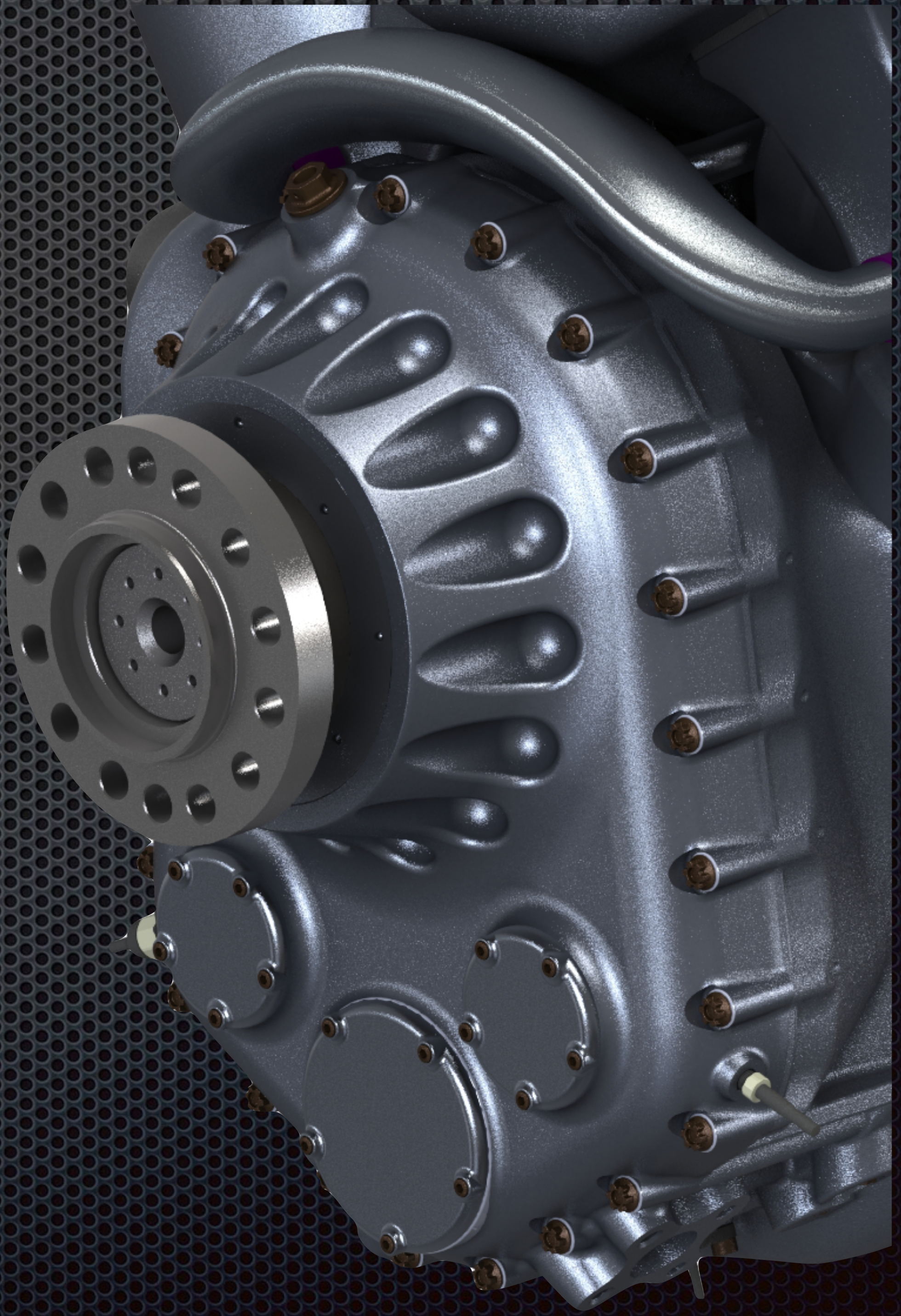
The complete cycle



Gearbox & Accessory Drive

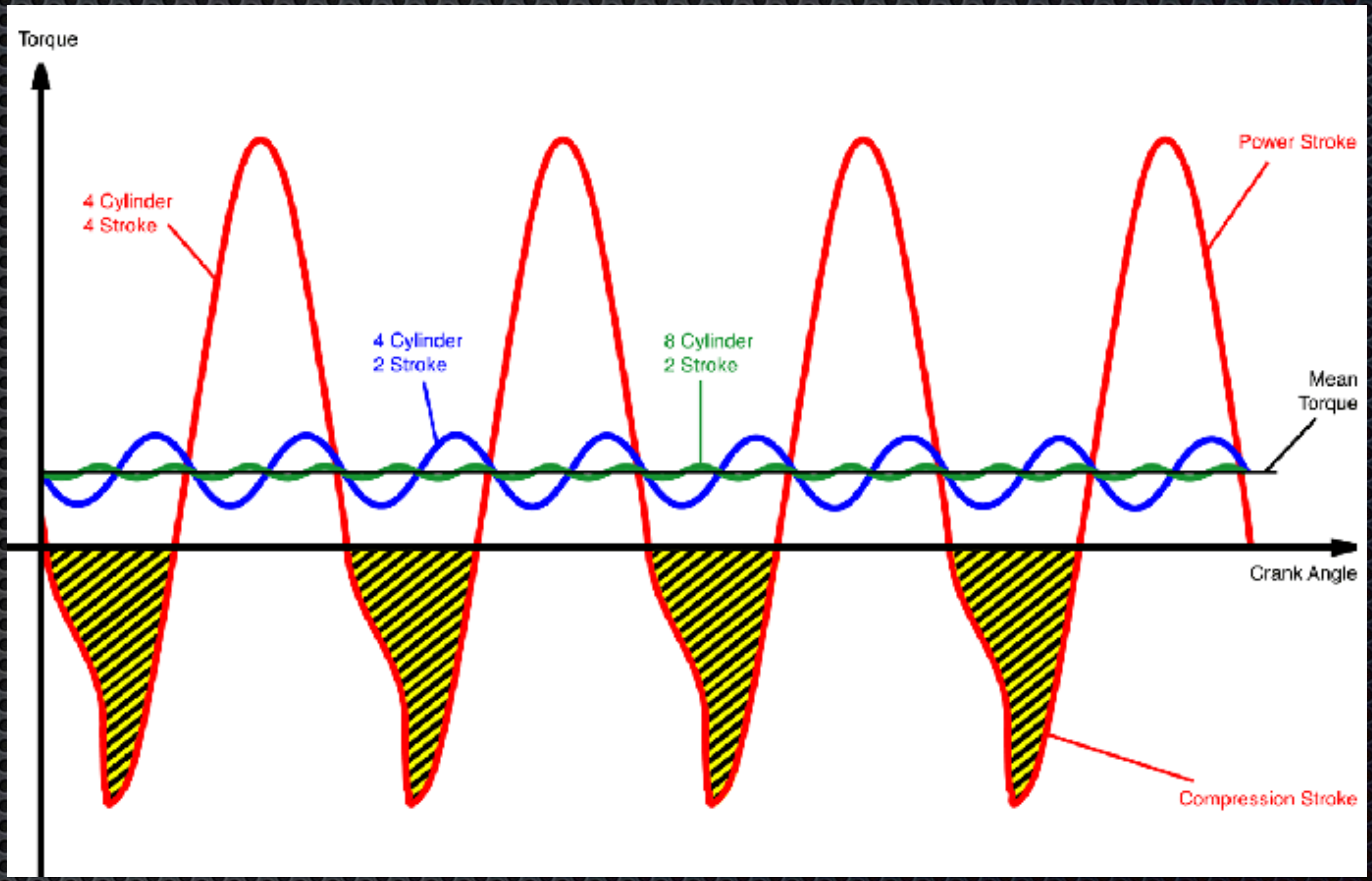
- The engine is designed from the outset to run with a reduction gearbox. Generally speaking the design of such a unit for aviation is complex due to the highly stressed loading and the necessity to remove vibration from the crank, coupled with undesirable instantaneous torque fluctuations, these units tend to be massive, complex and require high maintenance.

- The E1000-J/G and E300-J/G with their low torque fluctuations inherent with a two stroke, allow for a different approach to gear sizing, materials and integration. The gearbox low axial load is achieved by using a double pinion, which is supported independently by it's own bearings and attached to the crank via a spline (no bending transmitted to the pinion). This method allows the torque loading to be shared between the two idler gears with a corresponding increase in service life. The gear-case is an integral part of the crank case with a gear cover containing both rolling elements for load and thrust.



Technology

- extremely smooth output torque, provided by a power stroke from each cylinder for every revolution, retains an advantageous two-cycle characteristic.
- A particularly smooth arrangement, which is also very compact, is provided for in this layout.
- Having excellent balance, and with evenly spaced firing intervals, this gives very smooth torque characteristics, which cannot be achieved in a four-cycle engine with less than eight cylinders.



Red line is a typical 4 cylinder four stroke, the blue line is the CCT 4 cylinder and the green line is a CCT V8. The V12 peak to peak is even smaller

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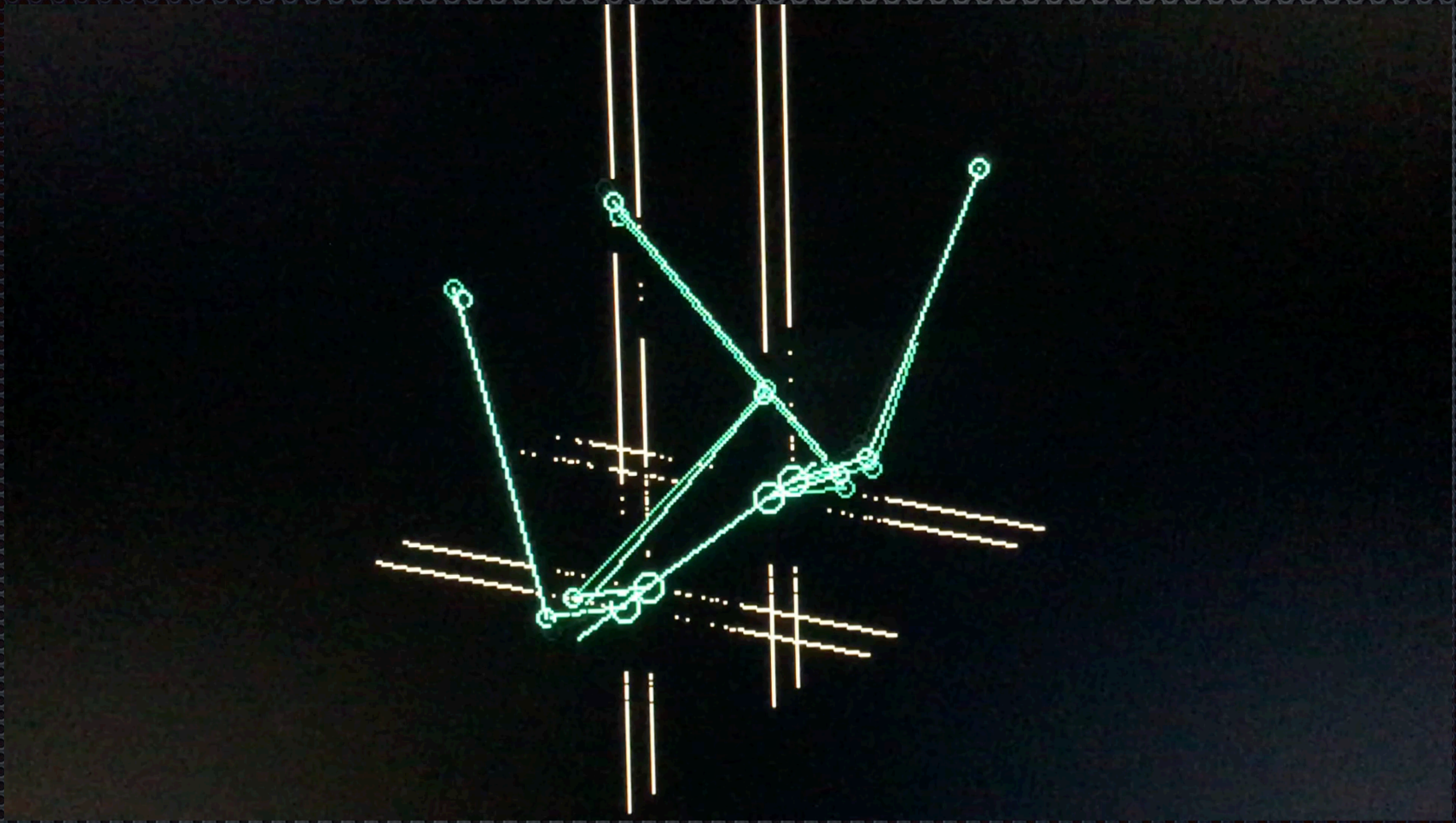

Technology

- It is necessary to emphasize the importance of the very high volumetric efficiency of the traditional piston controlled ports employed by the standard two cycle engine.
- Until now no existing type of inlet valve could produce the essential requirements of presenting the maximum inlet area to the air in the minimum time.
- The new design outlined below, significantly increases both the utility and the efficiency of the of the two cycle engine, which may now be more efficiently scavenged.
- The port layout adopted concentrates the scavenge flow at the wall of the cylinder opposite the exhaust port. This compares with more evenly dispersed scavenge flows common in conventional engines.
- Scavenge flow within the cylinder provides, in effect, a form of stratified charging and explains improvements in fuel economy obtained with such a simple layout.
- This enables combined cycle engines to compete with four-cycle engines in terms of fuel economy, especially under cruise conditions.

COMBINED CYCLE PISTON OPERATIONAL ADVANTAGES

- Conventional 4 cycle wet sump lubrication
- No valve gear
- Low thermal loading of the piston
- High durability with low exhaust emissions
- Compact low mass design
- Extended oil change periods (oil does not degrade)
- Extended maintenance intervals (less parts to maintain)
- Maintenance based on RCM, no TBO

Maintenance

- Our technology eliminates most of the maintenance operations required with conventional two and four-cycle engines. Operating conditions in the crankcase of a stepped piston engine are very similar to those in a four-cycle engine. The copious supply of oil to the working parts minimises wear. However, blow-by gases, to which the bearings and the oil are usually exposed, are isolated above the piston step. Bearing corrosion problems, well known, especially in two-cycle engines, are therefore completely avoided.
- In addition to these more obvious points, analysis of oil, taken from one combined cycle automotive engine, revealed that after 400 hours the lubricant was still within the specification for new oil. Normal degradation of the additives had not occurred.
- in a four-cycle engine all of the oil passes at some time into the high temperature region adjacent to the piston compression rings and is then returned to the crankcase. Therefore in a four-cycle engine all of the oil is exposed periodically to temperatures well in excess of the degrading point of the additive pack. This causes the qualities of the oil to decline throughout the period between oil changes.

Fuel type and consumption

- This platform of engines has been designed from the ground up to be a true multi fuel unit.
- Designed to run on industry standard Jet fuel (Diesel (EN 590), Jet A, Jet A-1, JP-5, DEF STAN 91-86, JP-8, DEF STAN 91-91, JP-8+100, Chinese Jet Fuel No 3)
- Will also run and perform on all gasolines where necessary, 80,87,91,95 including 100LL along with all bio derivitives.
- Hydrogen gas.
- BSFC, 0.380 lb/hp-h (231g/kW-h) Pratt & Whitney PT-6 Turboprop by comparison is 0.507 lb/hp-h (308 g/kW-h) (on approach and idle 0.825 lb/hp-h (502 g/kW-h))

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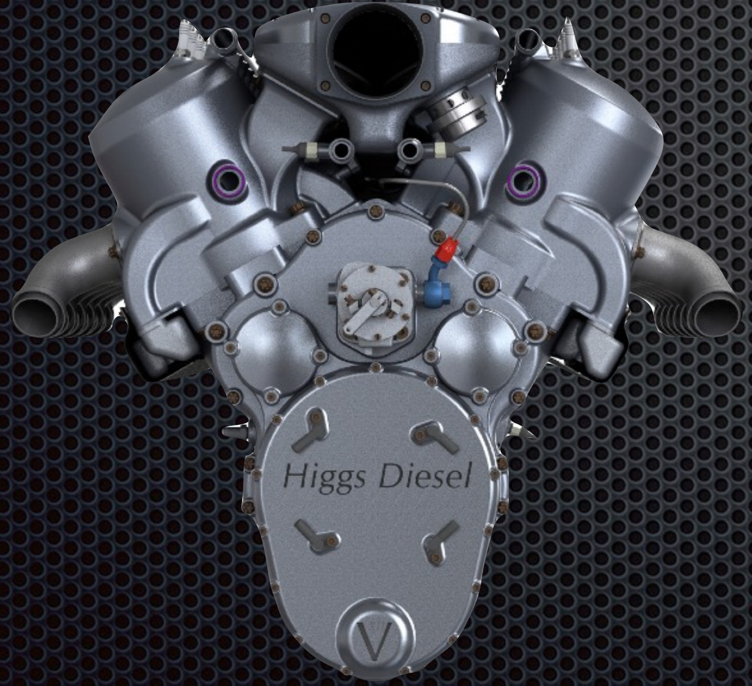
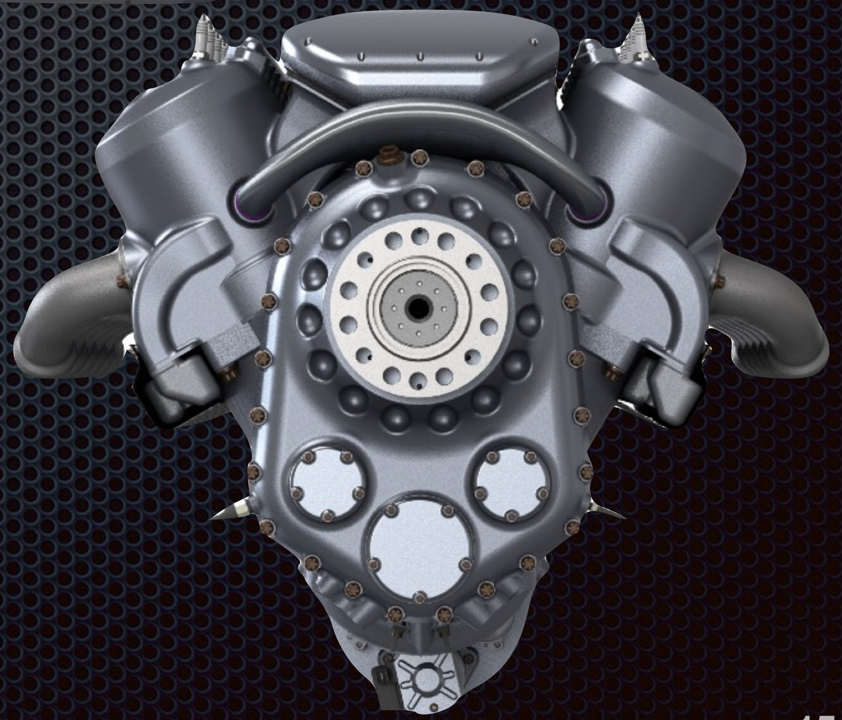
CONDOR

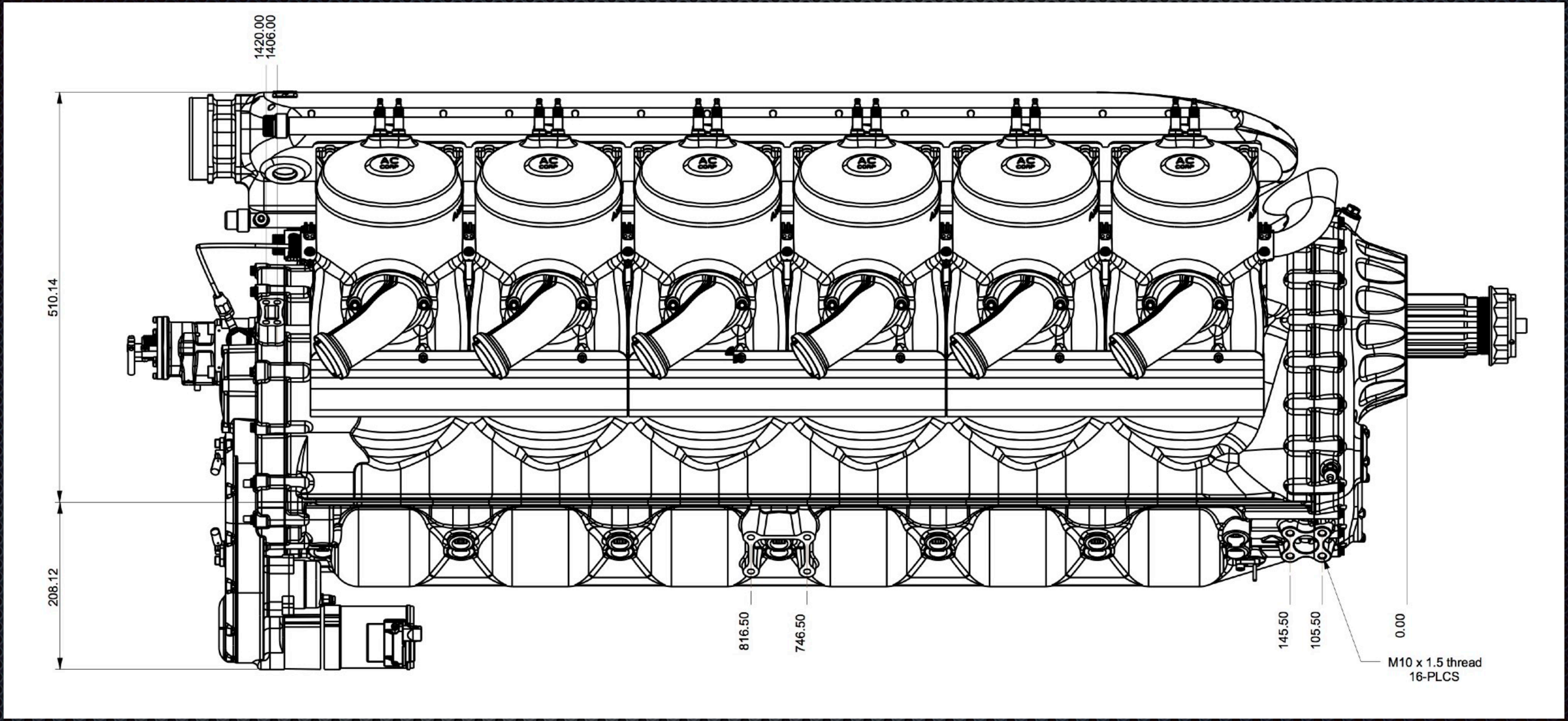
E-1000J/G





- 302kg (664lbs)
- 1638bhp
- Multi Fuel
  - Jet Fuel
  - Gasoline

Basic Dimensions



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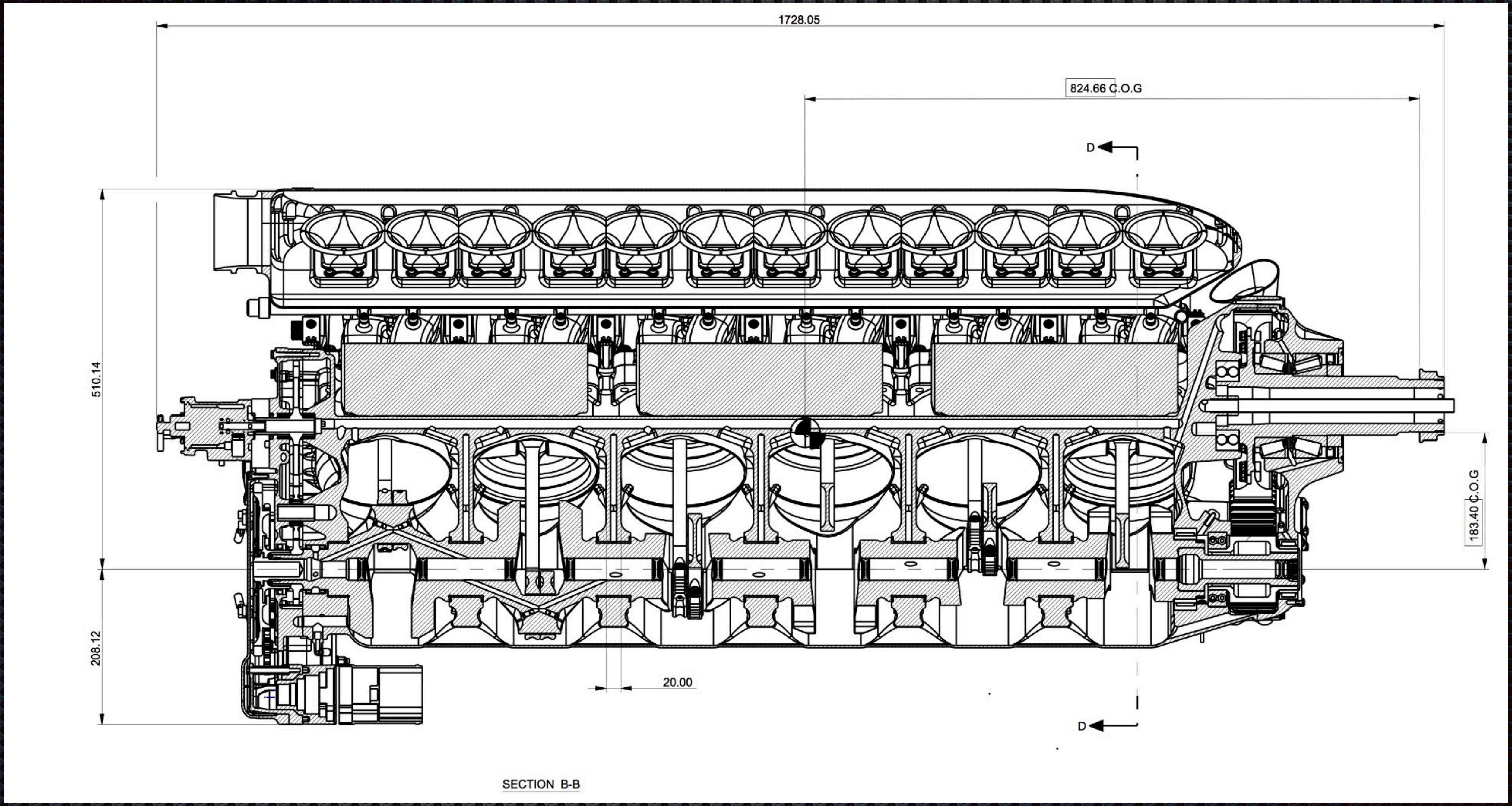

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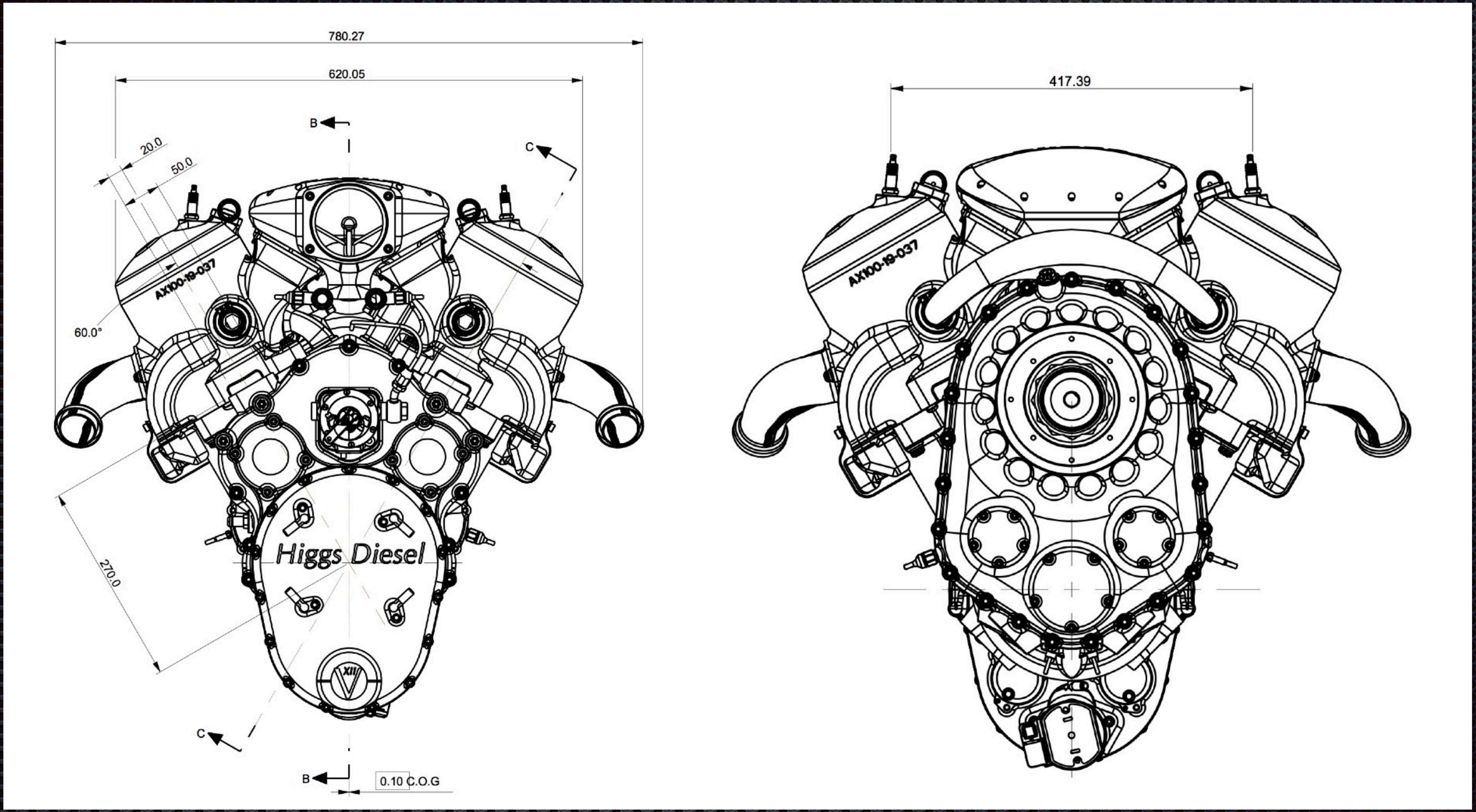


Performance predictions of the naturally aspirated AX-100 engine were conducted to examine power output at altitudes ranging from sea level to 60,000 feet.

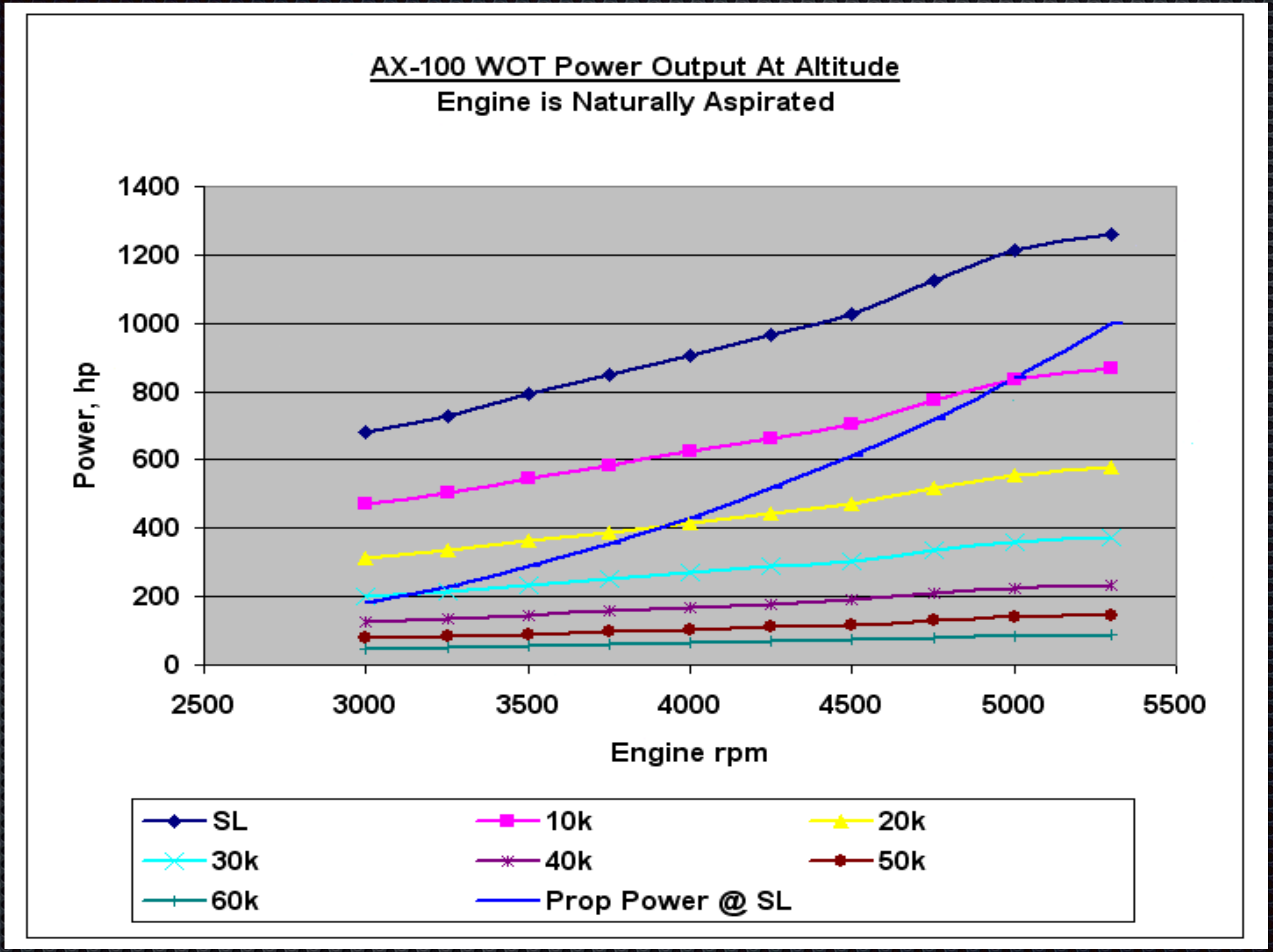
This study reflects the WOT (wide open throttle) performance at the altitudes considered. A propeller power absorption curve is shown for reference. The propeller absorbs 1000 hp @ 5300 rpm at sea level.

As altitude is increased, fuel injection rate is reduced to maintain a best power air/fuel ratio of 12.0 to 13.5 at all rpms.

The power predictions reflect that of an un-tuned engine as inlet and exhaust system ducting have not been defined at this time.

Maximum rated power at sea level is 1259 bhp @ 5300 rpm with corresponding bmep of 94 psi (6.5 bar).

Approximately 930 bhp @ 5150 rpm is available at 8k feet, the maximum altitude requirement for the NA engine.


AX-100 WOT Power Output At Altitude
Engine is Naturally Aspirated
Power, hp
1400
1200
1000
800
600
400
200
0
2500
3000
3500
4000
4500
5000
5500
Engine rpm
SL
10k
20k
30k
40k
50k
60k
Prop Power @ SL

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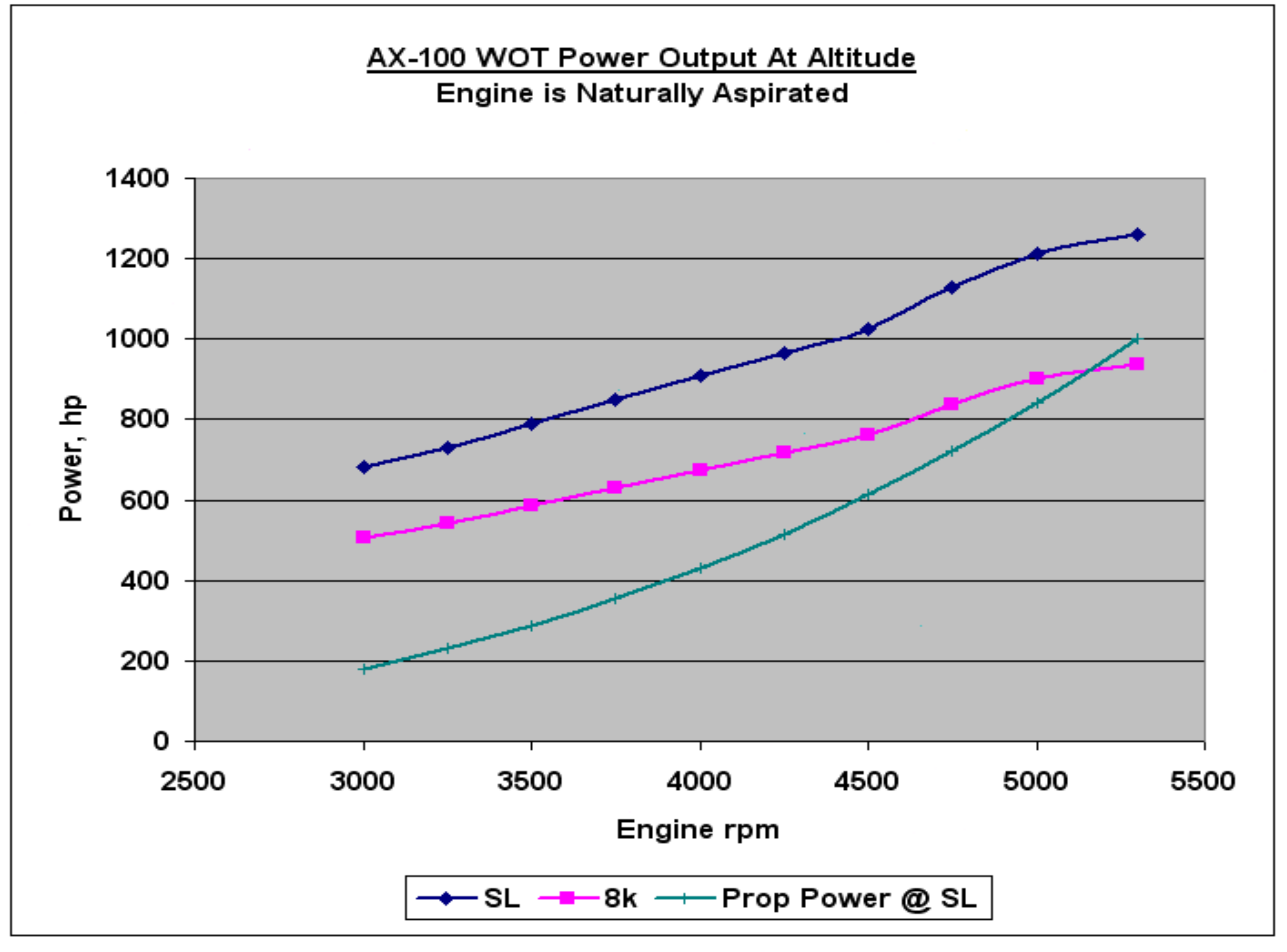

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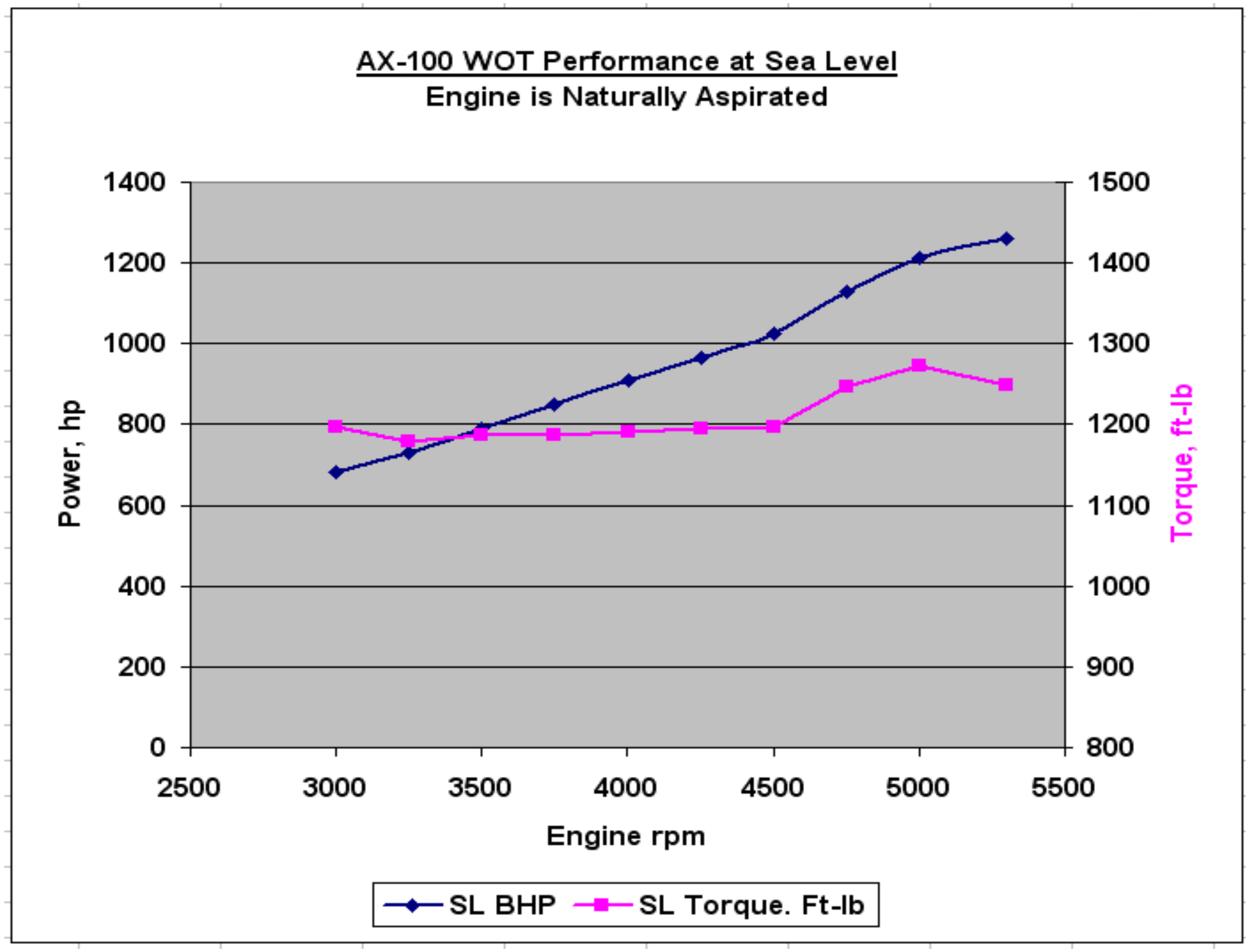
Predicted Brake Horsepower and Torque Available at Sea Level



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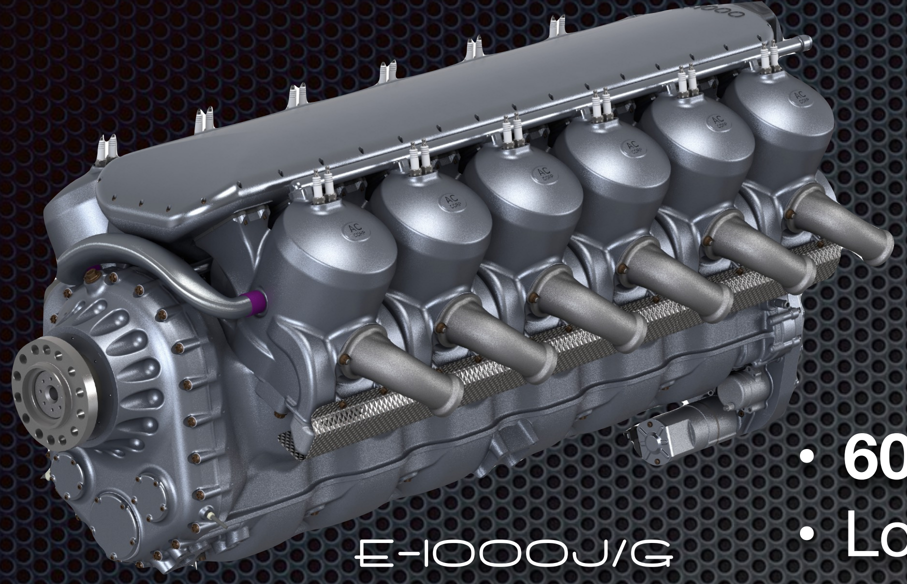
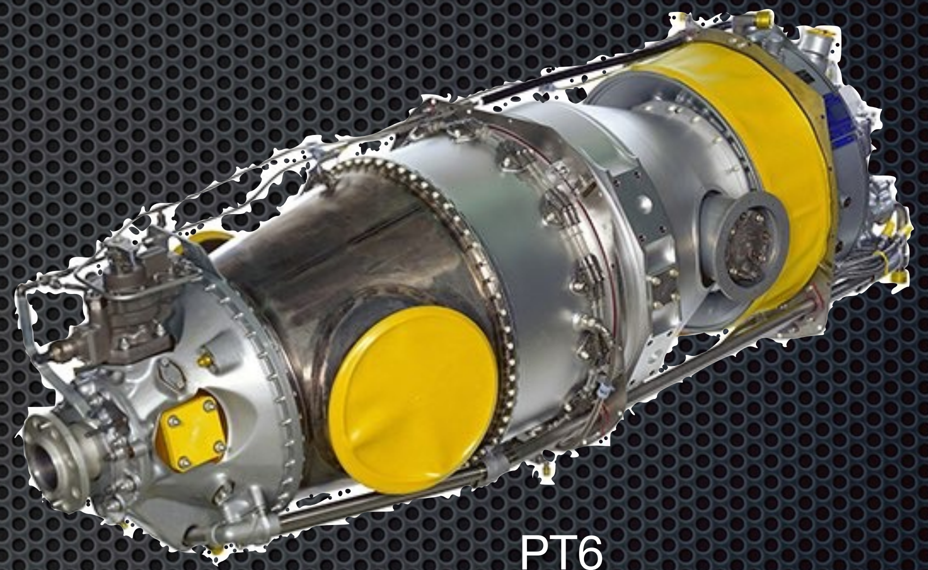
Competition



E-1000J/G

- **60%** mission range increase
- Lower operating cost
- Lower acquisition cost



PT6

Name	Weight	Power Max Continuous	Fuel Consumption
E-1000J/G	302kg (278kg's using magnesium)	1638bhp	BSFC, 0.380 lb/hp-h (231g/kW-h)
Pratt & Whitney PT6	280kg	1585bhp	BSFC, 0.507 lb/hp/h (308 g/kW/h)

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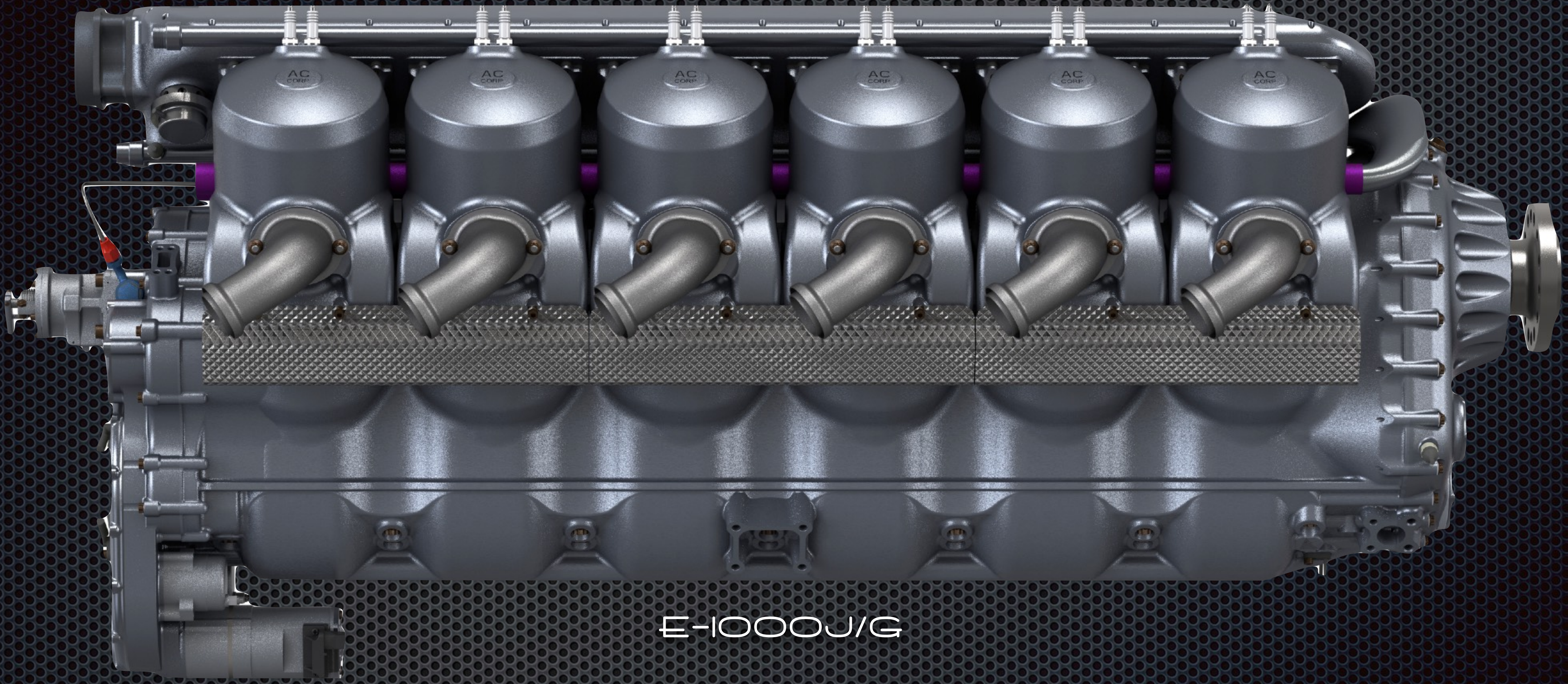
CONDOR



E-1000J/G

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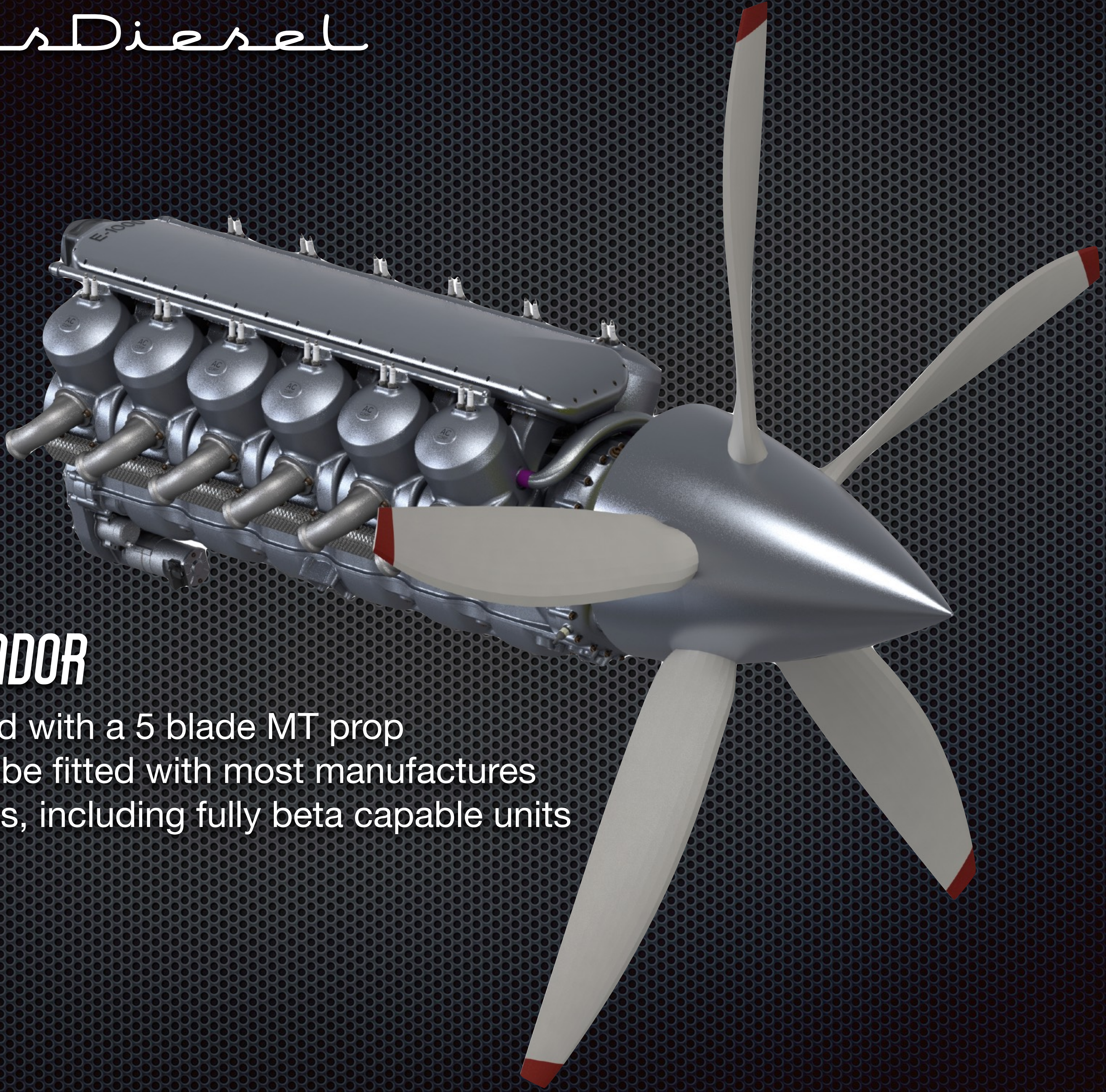

CONDOR

Fitted with a 5 blade MT prop
Can be fitted with most manufactures
props, including fully beta capable units

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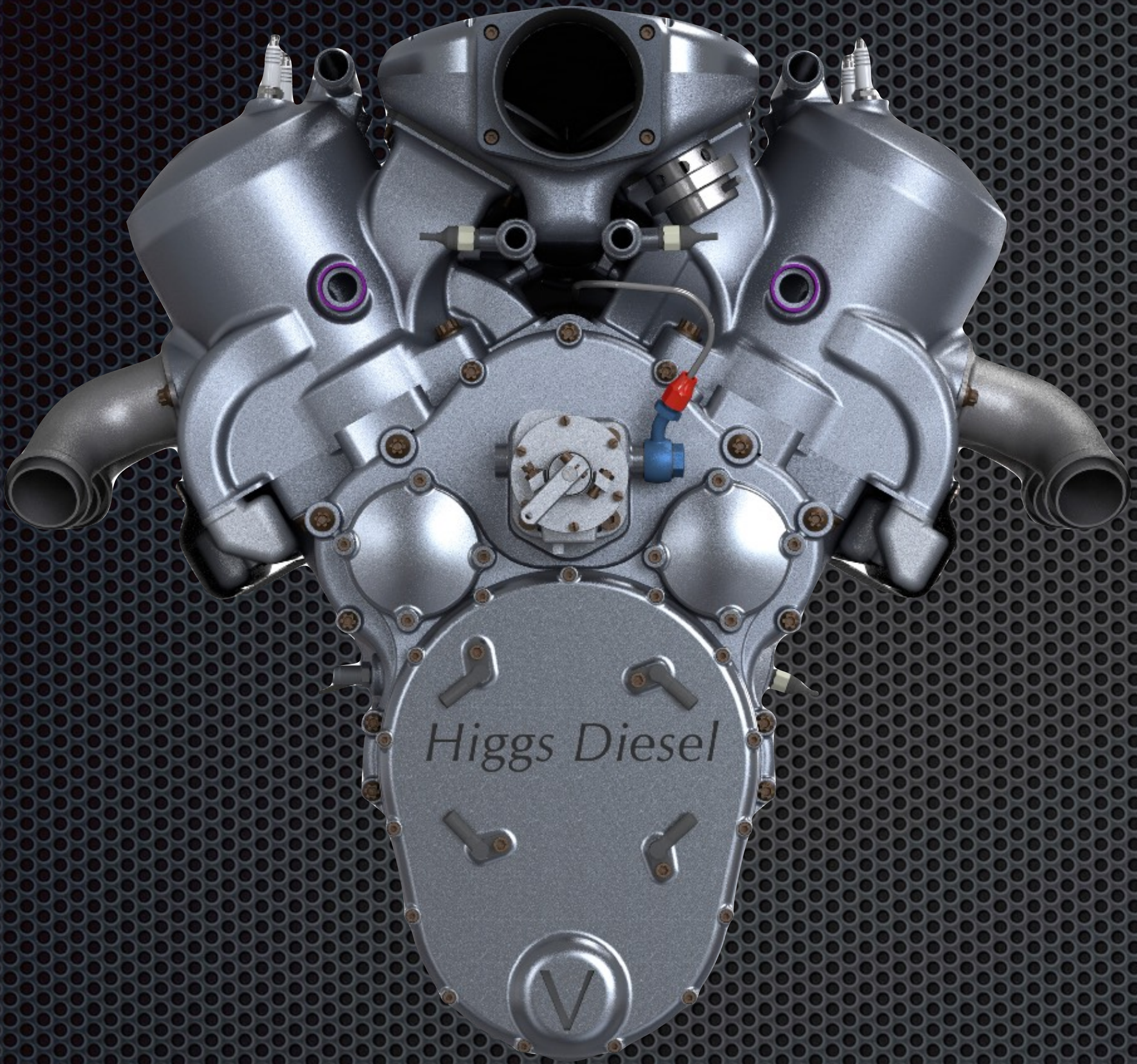
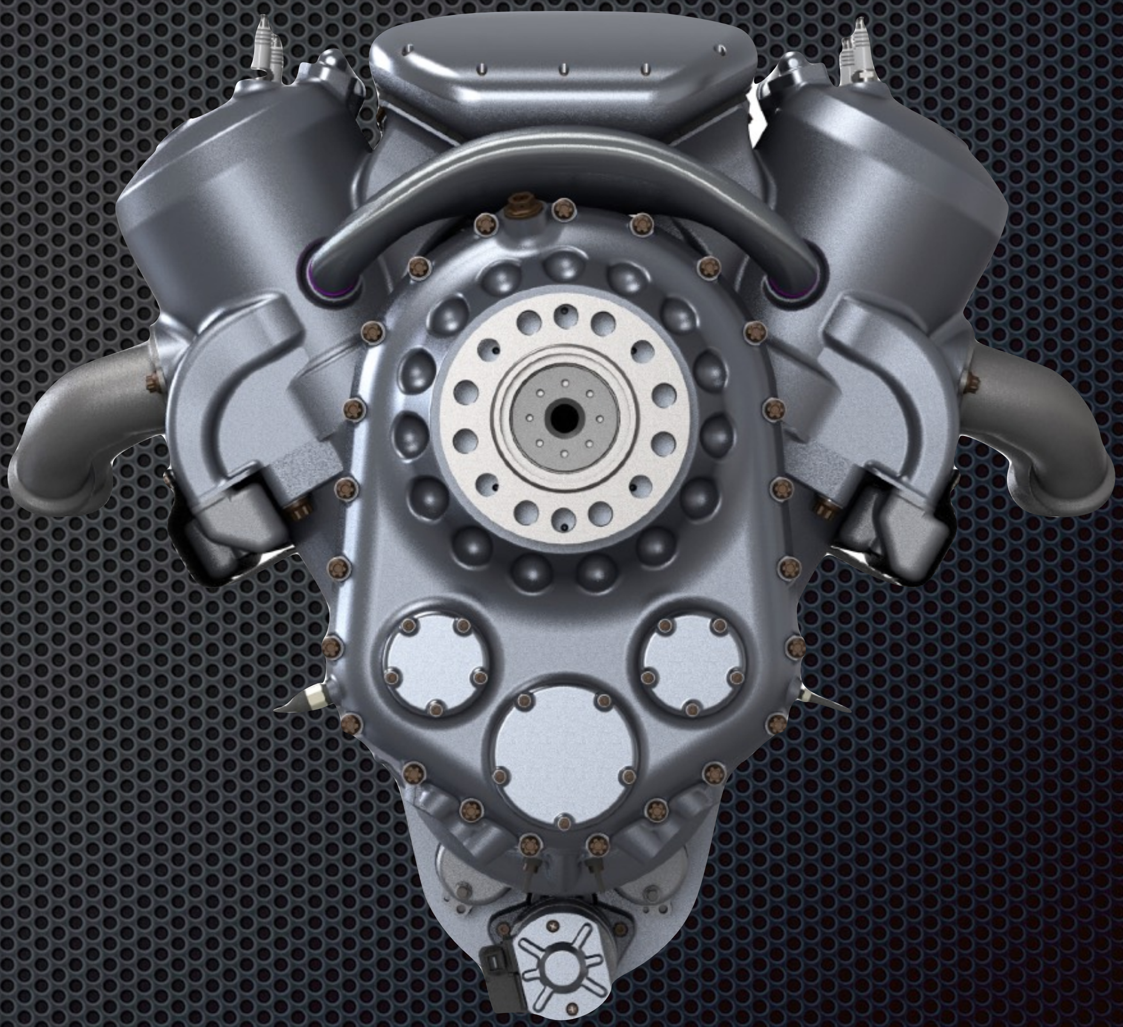


Rear

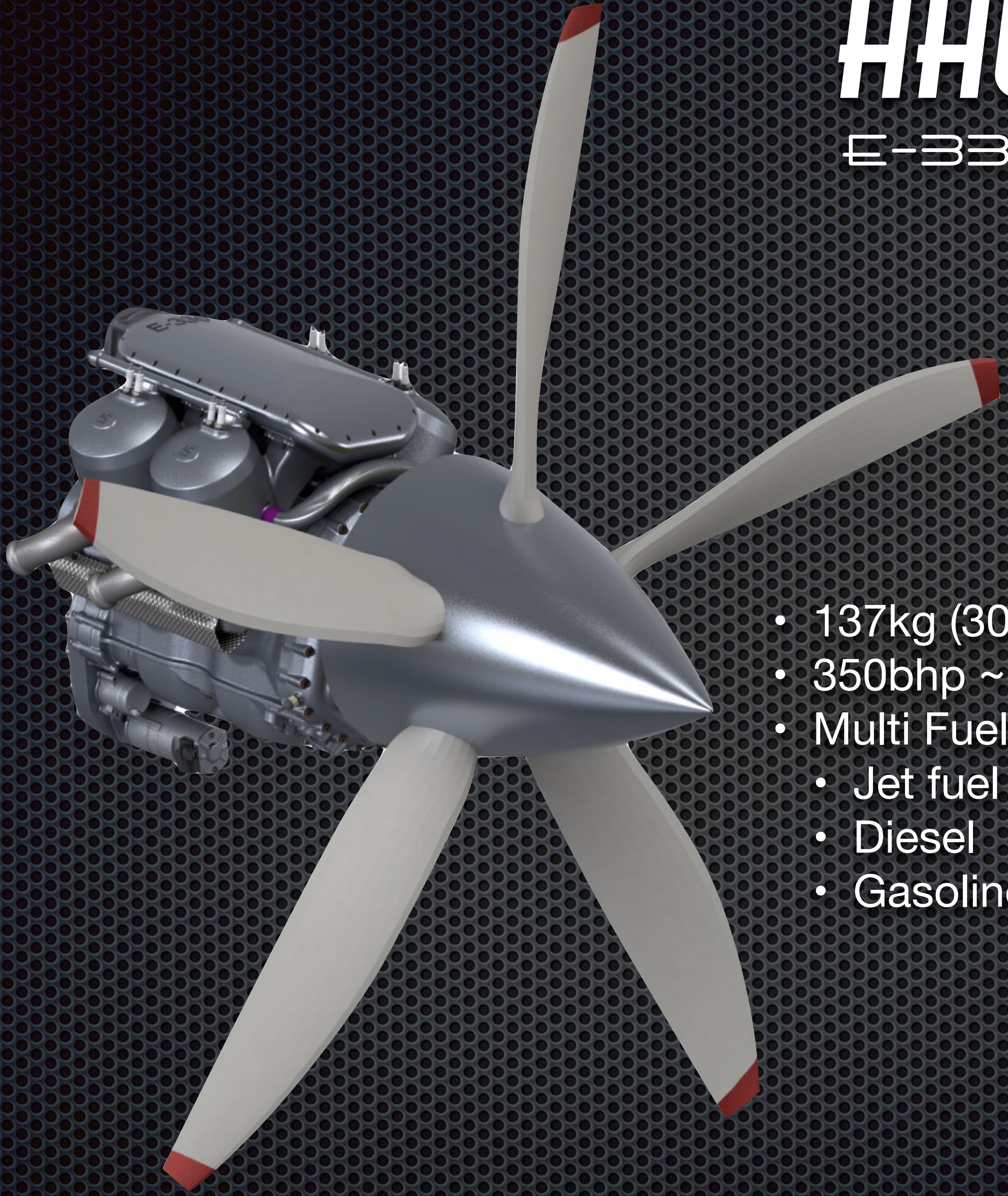


Front

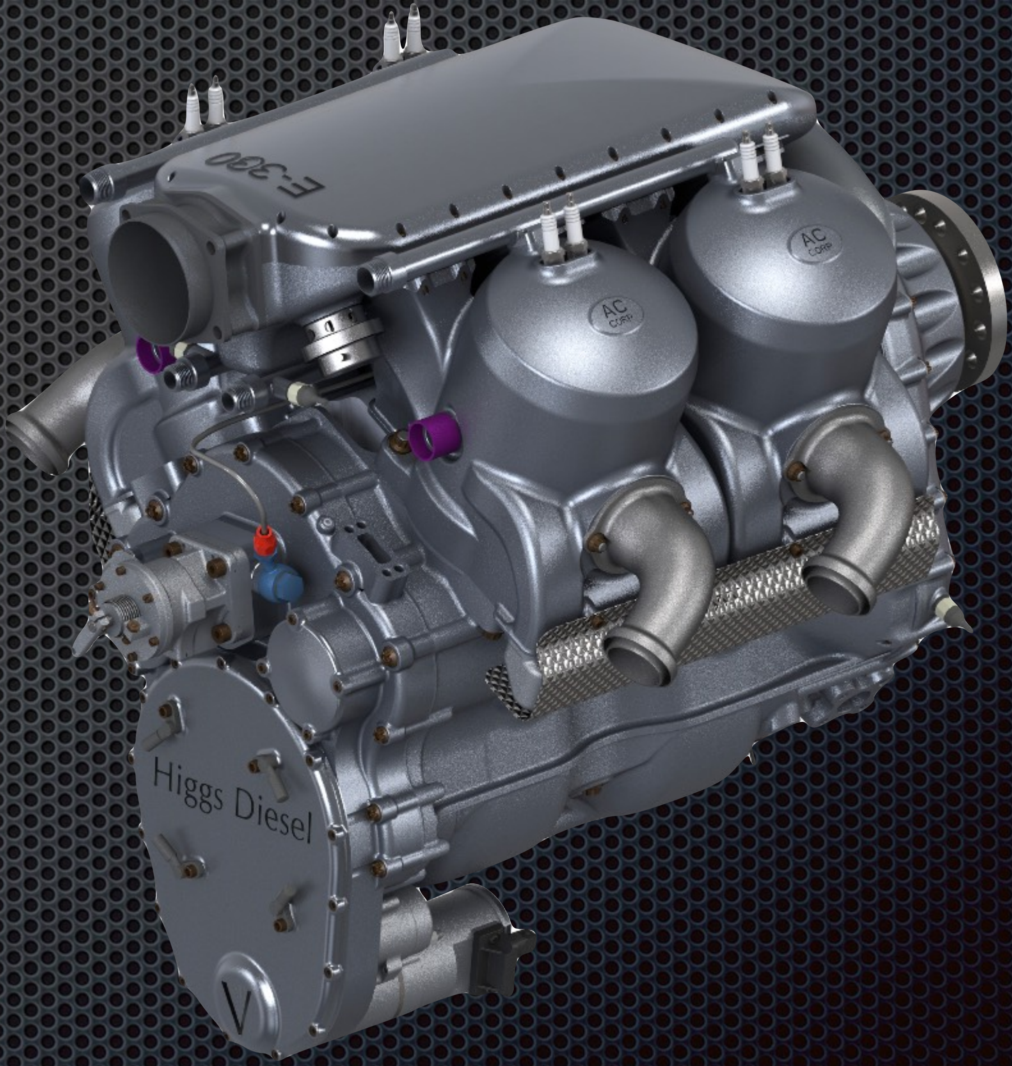
AC aero INDOMITABLE

HAWK

E-330J/G



- 137kg (301.4lbs)
- 350bhp ~ 500bhp
- Multi Fuel:-
  - Jet fuel
  - Diesel
  - Gasoline



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END

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