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DYNA CAM ENGINE

(*use of Dyna cam in I.C engines*)

S.Bharathkumar S.Kesavan P.Nagarajan A.Tamilbharathi

MECHANICAL DEPARTMENT
VELAMMAL ENGINEERING COLLEGE
SURAPET, CHENNAI-600066
TAMILNADU

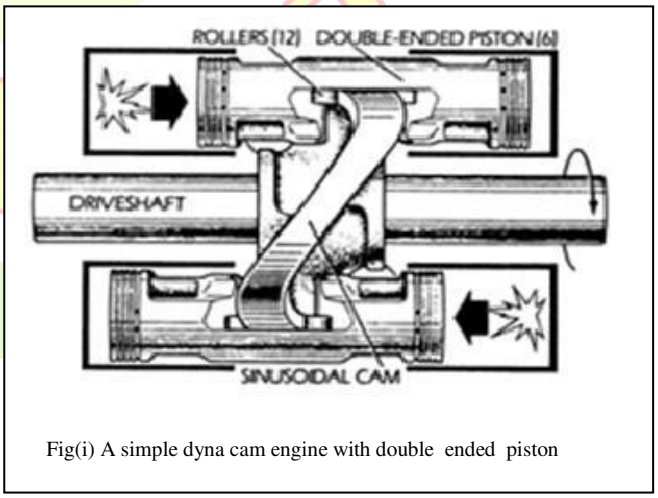
ABSTRACT-The Dyna-Cam is not a miracle engine, it is just a different configuration with unique advantages. It produces high power and torque. It has 12 cylinders and 6 double ended piston.The piston is cut away on the central interior portion and which is connected to a sinusoidal cam. Sinusoidal cam is fixed over a driveshaft. If piston moves back and forth main cam rolls also causing the shaft to turn. Because of the design of the main cam each of the 12 cylinders fires with every revolutions of the shaft. The engine can be described as a freepiston, axially cam drive engine.

INTRODUCTION

` The original engine is patented and the Company has now made patent applications and received patent pending status for additional features that have been refined. Activity and contacts from the website indicate that there are a lot of buyers for this new engine technology. The first production engine has been assembled and completed initial testing. The Company has had to design and build a custom dynamometer on which to complete engine testing. After testing has been completed on the first engine, it was installed in an aircraft like a Cessna 182 or a Piper Cherokee that will be able to demonstrate the engine's performance capability Additional installations are being discussed with owners of several experimental homebuilt aircraft, including, a LancAir, an RV6, a custom designed pusher fashioned after the Long Easy, a new designed homebuilt called the Atlantica, and several others, including a Sea Bee, a Seawind homebuilt, and possibly a Cessna 185. The initial Dyna-Cam Engine to be manufactured and sold is rated at 200 HP. The engine is 13" in diameter, 40" long and weighs 300 pounds with basic accessories. It has unique features and major benefits over conventional engines of similar weight and power.The benefits include lower manufacturing costs in equal production, 50% smaller size, 50% fewerreplacement parts, better fuel economy, smoother operation, lighter weight, plus nearly 100% higher torque enabling the engine to turn high efficiency propellers with lower noise output.

DESIGN OVERVIEW

The engine has two identical cylindrical blocks that each have six cylinders arranged parallel around the main shaft located in the center. Cylinders of both blocks line up so that six double-ended pistons can fire back and forth between the aligned cylinders of each block Each free floating piston is cut away on the central interior side and fits with precision around a 9" diameter, four lobe, sinusoidal cam that is keyed to the main shaft. As the pistons fire back and forth, the main cam rolls through the pistons causing the central shaft to turn. All moving surfaces are roller bearing surfaces. Another smaller 5" cam is attached to the main shaft at the outer end of each block. As each valve cam turns, it pushes against hydraulic lifters which push against the poppet valves inside each cylinder head. The engine is a 4-stroke engine. Because of the design of the main cam, each of the twelve cylinders fires with every revolution of the shaft, in contrast to three times with conventional six-cylinder engines. The engine can be described as a free piston, axially cam-drive engine.



Fig(i) A simple dyna cam engine with double ended piston

External accessory systems manage air intake, fuel, oil flow, cooling and exhaust. All accessory systems operate similar to standard systems used on conventional engines and may be easily updated with the latest state-of-the-art technology. Devices used on normal piston engines can be adapted to the Dyna-Cam Engine for achieving the lowest possible emissions or higher power output, i.e. electronic ignition, state of the art emissions devices, or high tech fuel

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injection. Higher torque at lower RPMs and reduced internal friction allow more work to be accomplished by the Dyna-Cam for the same measured quantity of fuel when compared to the conventional piston engine.

The functional and operational design of the Dyna-Cam Engine is complete. Forty prototype units have been tested and rebuilt resulting in the final design that was certified. Minor changes have been completed to expedite assembly and facilitate cost effective mass production. The first engines are now in production and purchase orders and down payments are being taken.

ADVANTAGES

The Dyna-Cam is a good design and seems to offer important advantages, particularly for aviation, due to the RPM at which the horsepower is developed. There is no need for prop reduction gears which is in itself significant. The Dyna-Cam is not a miracle engine, it is just a different configuration with unique advantages.
The Dyna-Cam engine has the big advantage that an earlier version was tested and used successfully for over twenty years by the U.S. Navy as the power plant for the Mark 46 torpedo which is discussed further on the page titled R&D. This proved that the basic design of the piston and cam actuation was a success.
Compared to conventional engines of similar horsepower, the Dyna-Cam has demonstrated these *Major advantages*:

1.Higher Power & Torque
2.Easier to Rebuild
3.Higher Reliability
4.Quieter Operation
5.50% Fewer Parts
6.50% Smaller Size
7.Better Fuel Economy
8.Longer Time Between Overhauls
9.Very Fast Throttle Response
10.Liquid Cooled
11.Less Weight
12.Smooth "vibration free" Operation
13.Lower Maintenance Cost

SPECIFICATIONS

With small turbine shape, the Dyna-Cam takes 50% less space for installation yet produces twice the torque output.Depending on the success of our initial engine and possibly additional funding, larger and smaller engine sizes may be developed, to deliver more or less horsepower, turbo, or supercharged engines and engines fueled by diesel or jet fuel.

KEY SPECIFICATION

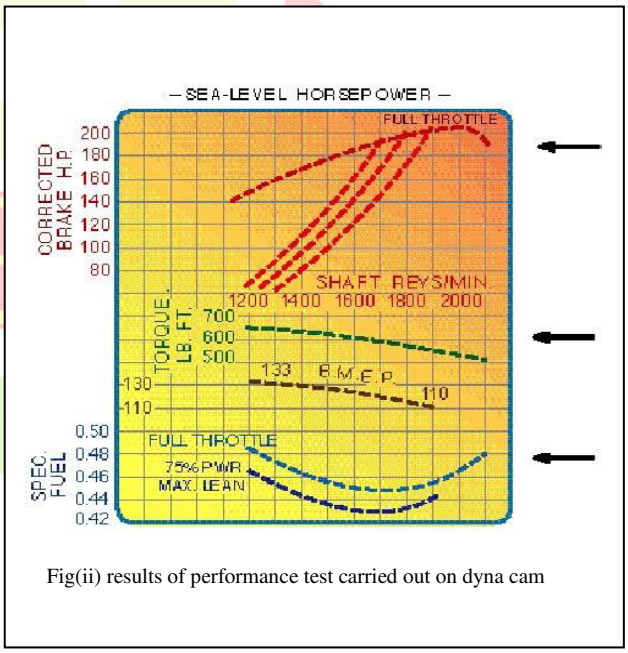
1.200 HP @ 2000 RPM
2.175 HP @ 1600 RPM
3. 650ft.lb torque @ 1200 RPM
4.525ft.lb. torque @ 2000 RPM
5.373 Cubic Inches
6.265 Lbs Dry Weight
7.12 Cylinder, 6 Piston
8.3.25" Bore - 3.75" Stroke
9..40 Lb./Hp-Hr @ Cruise
10..47 Lb./Hp-Hr @ Full pwr.
11.Fuel Injected
12.Dual Ignition or Single
13.13" Diameter x 40" Lengt

FUELUSED

When supercharged or turbocharged, the Dyna-Cam will still produce over 95% of its original power when fueled by compressed natural gas (CNG) or propane.
When conventional engines are modified to use low emissions fuel like compressed natural gas or propane, they lose up to 30% of their power.
To be fueled by CNG or propane, the Dyna-Cam engine only has to have the proper fuel system attached.
Potentially, motor homes and busses will be able to use Dyna-Cam engines fueled by CNG, propane or unleaded gasoline, which will result in lower emissions, lower vibration and lower noise levels. Diesel is also used as a fuel in dyna-cam engine.

PERFORMANCE

Results achieved during the FAA Certification tests



Fig(ii) results of performance test carried out on dyna cam

200 HP @ 2,000 RPM
650 ft lb of Torque @ 1200 RPM
BSFC of .47 @ Takeoff
.43 @ Cruise
.40 @ 65% Cruise

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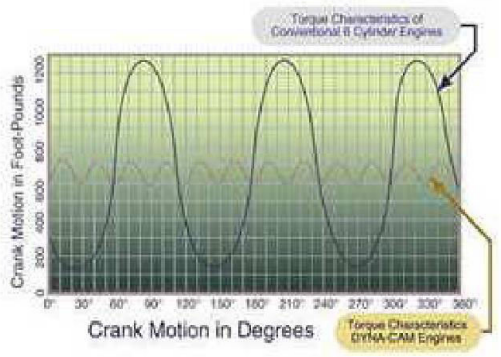
TORQUE CHARACTERISTICS

Dyna-Cam has Smooth Operating Characteristics because it has 12 Smaller firing impulses per revolution versus 3 larger firing impulses of conventional 6 cylinder engines. This means the Dyna-Cam has less vibration, less shaking and quieter operation!



Fig(iii) Torque characteristics of a dynacam engine

WHY BUY A DYNA-CAM? - THE COMPETITION FOR 200 H.P. ENGINES

FEATURE DYNA-CAM LYCOMING OR CONTINENTAL V-8 CAR ENGINE TURBOPROP (TURBINE /JET) DIESEL TRUCK ENGINE
SIZE (WIDTH) 15" 32" 31" 15" 40"
WEIGHT 265 LB 295 LB 500 LB 175 LB 2,000 LB
PART COUNT 1,000 2,600+ 4,300+ 1500 4,500+
MAX. TORQUE PRODUCED 650 FT-LB 380 FT-LB. 275 FT-LB UNDER 100 FT-LB 700 FT-LB
TIME BETWEEN OVERHAULS (TBO) 2,000 HOURS 1,800-2,000 HOURS 1,000 HOURS 3,000 engine 1,000 hot section 3,000+ HOURS
MAN-HOURS
REQ'D TO REBUILD 18 HOURS 30 HOURS 40 HOURS 80 HOURS 50 HOURS
PRICE FOR NEW ENGINE
FOR AIRCRAFT USE $30,000 $35,000 $30,000 (Machined Special) $200,000 $12,000
NOT FOR AIRCRAFT
ADDITIONAL FACTS
ENGINE/PROPELLER NOISE LEVEL 50% less 85dB/76dB 95dB/90dB 95dB/90dB 110+dB/95dB 100+

FAA CERTIFIED YES YES NO YES NO
VIBRATION LEVEL VERY LOW HIGH MODERATE VERY LOW VERY HIGH
PROPELLER RPM 2,000 full pwr
1,600 cruise 2,700 full pwr
2,400 cruise 2,700 full pwr
2,300 cruise 2,000 full pwr
1,800 cruise N/A
FUEL CONSUMPTION .47 at full power
.40 at cruise .60 At full power
.46 at cruise .50 At full power
.41 at cruise .70 At full power
.55 at cruise .39 At full power
.33 at cruise
METHOD OF COOLING LIQUID AIR LIQUID AIR LIQUID
MARKETS TO BE TARGETED sportbuilt a/c
GA aircraft
boating military racing vehicles
recreation fleet AIRCRAFT ONLY boating - vehicles, - fleet vehiclest - racing AIRCRAFT ONLY vehicles
boating
military
ENGINE RPM 2,000 full pwr
1,600 cruise 2,700 full pwr
2,400 cruise 5,400 full pwr
4,600 cruise 80,000 full pwr
65,000 cruise 2,100 full pwr
1,500 cruise

The results and analysis about the dyna cam engine and its proceedings towards practical uses were discussed ant its features comparing with other engines are tabulated .Thus the comparison gives the exact pros and cons of the dyna cam engine and it has about more advantages when compared with the other cams.

COMPRARISON

Air Quality Management District, and Los Angeles Regional Technology Alliance for different variations of the same Dyna-Cam Engine. About 40 prototype engines were built by the Herrmann Group and another 25 built by the Dyna-Cam Group since they acquired the engine and opened their shop. A new patent was granted to Dennis Palmer and Edward Palmer first in 1985 and then several more around 2000 to Dennis Palmer. In 2003 the assets of the Dyna-Cam Engine Corp were acquired by first Aero-Marine Corp. who changed their name to Axial Vector Engine Corporation.[12] Axial Vector then totally re-designed the cam engine. Axial Vector's new engine, like many of the others on this list, suffers from the "put in everything" problem, including piezoelectric valves and ignition, ceramic cylinder liners with no piston rings, and a variety of other advanced features. It has almost no similarity to the original Herrmann and Dyna-Cam Engine since the Dyna-Cam Engine used conventional valves, piston rings, accessories, had no unproven ceramic materials and actually flew in a Piper Arrow and also powered a 20-foot (6.1 m) Eliminator Ski Boat for over four years.

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FEATURE	DYNA CAM	CONTINENTAL	V-8 CARENGINE	TURBINE JET	DIESEL TRUCK ENGINE
SIZE	15”	32”	31”	15”	40”
WEIGHT	265LB	295LB	500LB	175LB	2000LB
MAX TORQUE	650FT-LB	380FT-LB	275FT-LB	100FT-LB	700FT-LB
MAN HOURS REQ TO REBUILD	18 HOURS	30HOURS	40HOURS	80HOURS	50HOURS
FAA CERTIFIED	Yes	Yes	No	Yes	no
VIBRATION	VERY LOW	HIGH	MODERATE	VERY LOW	HIGH
ENGINE RPM	2000 full power 600 cruise	2700full power 700 cruise	5400 full power 5000 cruise	80000 full power 5000 cruise	2100 full power 500 cruise

ASSEMBLY & MAINTENANCE

1. Easily disassembled (about 1/3 the time of a conventional engine)
2.Parts easily taken out and replaced
3.Engine can be rebuilt in field, without going into the rebuild shop
4.Repair parts slip together and entire engine is re-assembled with only a ring compression tool until final bolt-up
5.Lower echelon maintainabilty

TESTING AND VERIFICATION HISTORY

Dyna-Cam Engine technology has had many levels of refinement. There were five different levels of prototype development and ten generations of piston development. After many refinements and years of development the Dyna-Cam Engine was built for aircraft and helicopter use and received FAA Certification. The current design has evolved from over 40 sets of engine blocks built into running engines for testing. After successful test flights were completed in a Piper Arrow 4-place aircraft. All final prototype research and development, aircraft installation and flight testing was successfully completed using only one Dyna-Cam Engine. The total testing program was comparable to running an engine well over 2,000 hours of normal running conditions. The current prototype Dyna-Cam Engine has demonstrated good reliability in all testing to date. Dynamometer testing of the Dyna-Cam Engine has substantiated 200 HP and 650 ft. lb. of torque. Prior testing of the Dyna-Cam Engine has resulted in the engine running over 3,000 hours without failure or rebuilding.

APPLICATIONS

1. AIRCRAFTS

After testing has been completed on the first engine it could be installed as the front engine on a Cessna Skymaster. And now it is also installed in aircrafts like, a LancAir, an RV6, Atlantica, Cessna 185 and several others.

2. BOATING (MARINE)

One of the largest markets for high performance, high torque engines, is the marine industry. About 200,000 engines are sold into this market each year and these amounts to several billion dollars per year in sales. The Dyna-Cam Engine is smaller, lighter, and has far greater torque output than any engine in this industry in comparison to its power levels. The expanded market of marine applications should help bring down the costs of manufacturing the engine and should allow it to be more affordably priced for the end user.

3. HEAVY-DUTY VEHICLES

While our initial focus will be on producing and selling the Dyna-Cam Engine into the aircraft markets, we believe future variations of the engine may also prove useful in the heavy-duty vehicle market. As trucks and tractors operate in more environmentally sensitive areas, it will be very important to have an alternative power plant that can be outfitted with a low emissions fuel system.

4. INDUSTRIAL USES

Dyna-Cam engines will have numerous potential industrial applications. Industrial Generators provide a powerful source of standby emergency power. The Dyna-Cam can be fueled by either compressed natural gas (CNG), liquid propane (LP) or auto gas and used as the power plant for a variety of electrical generators (gensets) or pumping systems like the ones pictured below. Generator sets that must be located on tops of the buildings they supply frequently cause annoyance to the residents due to the noise and vibration, especially like the large, diesel version below, left. Matching the gensets with a Dyna-Cam engine will offer lower vibration and noise levels while still enjoying the longevity more like a diesel engine. A genset like the one shown below, right, outfitted with a Dyna-Cam Engine, could supply hospitals, recreation facilities or any number of places where alternative or emergency power supply is needed.

5. WIG & HYDRO CRAFT

One of the newest applications where new, light weight powerplants like the Dyna-Cam may be able to help achieve better performance in the future, is in the area of WIG (Wing in ground effect) flying boats. Many of the designs have a long history of development, but the importance of the WIG design is just beginning to gain widespread appreciation. One of the more successful commercial WIG craft is shown below.

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RESEARCH AND DEVELOPMENT

Research and development on the basic engine is complete and the engine is ready to build. Any new R&D will consist of continuing research and review of all the latest state-of-the-art technology that is being developed throughout the industry with regard to improvements to engine accessory systems or alternative fuel capabilities. Most new improvements in engine technology are external to the engine block and are expected to be easily adaptable to the Dyna-Cam Engine design. No significant R&D will be pursued unless new funds are raised specifically for a given R&D task such as possible future modifications to run on diesel or jet fuel

CONCLUSION

As we have seen the advantages of working of dyna cam engine, due to its high power and torque, this is going to make a revolution in the forth coming years. This engine can also be used for various domestic purposes because of its vibration less character. In the years to come we may see, the dyna cam engine ruling the formula-1 track.

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