

Comparison of Power in Reciprocating Engine and Gas Turbine Engine in Aircrafts

Swrang Thomas Narzary

Bharath Institute of Science and Technology, Bharath University.
Selaipur, Chennai, Tamil Nadu (India)

Accepted 14 April 2015, Available online 27 April 2015, Vol. 4, No. 1 (April 2015)

Abstract

If the weight of an engine per brake horsepower (called the specific weight of the engine) is decreased, the useful load that an aircraft can carry and the performance of the aircraft obviously are increased. Every excess pound of weight carried by an engine reduces its performance. Tremendous gains in reducing the weight of the aircraft engine through improvement in design and metallurgy have resulted in reciprocating engines now producing approximately 1hp. for each pound of weight.

Keywords: t.hp. (thrust horsepower).

1. INTRODUCTION

The useful output of all aircraft power plants is thrust, the force which propels the aircraft. Since the reciprocating engine is rated in b.hp. (break horse power) and the gas turbine engine is rated in pounds of thrust, no direct comparison can be made. However, since the reciprocating engine/propeller combination receives its thrust from the propeller, a comparison can be made by converting the horsepower developed by the reciprocating engine to thrust.

If desired, the thrust of a gas turbine engine can be converted into t.hp. (thrust horsepower). But it is necessary to consider the speed of the aircraft. This conversion can be accomplished by using the formula:

$$t.hp. = \frac{\text{Thrust} \times \text{Aircraft Speed}(m.p.h.)}{375 \text{ mile-pounds per hour}}$$

The value 375 mile-pounds per hour is derived from the basic horsepower formula as follows:

$$1hp = 33,000 \text{ ft.-lb. per minute.}$$

$$33,000 \times 60 = 1,980,000 \text{ ft.-lb. per hour.}$$

$$\frac{1,980,000}{5,280} = 375 \text{ mile-pounds per hour.}$$

It is necessary to calculate the horsepower for each speed of an aircraft, since the horsepower varies with speed. Therefore, it is not practical to try to rate or compare the output of a turbine engine on a horsepower basis.