# Why the Rotapower® engine's unique attributes are essential for the Skycar® and Neuera volantors?

- **Power to Weight ratio**. Because the Rotapower® engine generates three times as much power for its weight than competing piston engines, the Skycar® 400 can carry a 33% greater payload.
- **Noise**. Unless one has witnessed a standard 200 hp auto engine under full power on a dynamometer, it is difficult to appreciate how loud an engine at maximum power can be. To take off vertically, the Skycar® 400 will be producing 360 hp from its engine and three times as much from its electric motors. No existing engine producing this much power could be muffled down to 70 dba as required for operating within city limits. A compound version of the Rotapower® engine has demonstrated an unmuffled noise level so low that when muffled, it will be well below 70 dba.
- **Vibration**. Aside from the turbine engine*, no existing engine besides the rotary has the ability to be hard mounted (no rubber isolation mounts). Hard mounting of the engine is essential in a ducted fan application in order to keep the clearance between the fan and the duct to a minimum (0.05" or less which maximizes thrust).
- **Size and shape**. Aside from the turbine engine*, no engine besides the rotary is both round enough and small enough to fit within the diameter of the fan hub diameter and not block the flow. A piston engine would require mounting the engine outside the duct and gear it to the fan which is complicated, unreliable, and expensive.
- **Providing pitch and roll control**. This can be accomplished by changing the thrust from selected multiple ducts in three different ways.
    - Spoiling or blocking the flow in selected ducted fans.
    - Changing the fan blade angle (pitch) of selected fans. This approach would require a large number of fail-prone, very complicated, and expensive components.
    - Changing the fan speed. The rotating inertia of a piston engine is too high to allow a quick enough RPM change, however, in this regard the rotary engine is absolutely unique. The rotor and crankshaft are very light to start with, but more importantly, the rotor is rotating at 1/3 the output shaft speed. The lighter weight and much lower rotating speed of the rotor results in an engine response time 15 times faster than a competing powerplant, except for some electric motors (10% change of thrust in 50 milliseconds).
- **Lubrication system**. Oil metering is viable because oil needs only be delivered in very small amounts to the three or less roller bearings. This significantly reduces the size of the engine and allows it to operate in any altitude.
- **Compounding Suitability**. The rotary engine is particularly adaptable to being compounded which results in:
    - 95% lower noise (unmuffled)
    - 50% lower exhaust temperature
    - 25% better fuel economy

*While the turbine engine competes with the rotary engine in size, shape, and vibration, it has the following limitations:

- Rotating inertia is far too high to use the simple and efficient change of RPM for pitch and roll control.
- Requires a gearbox to reduce RPM.
- Is extremely difficult to muffle because the human ear is very sensitive to its high frequency exhaust.
- Very costly to acquire (over 10 times cost per hp).
- High fuel consumption (approximately 3 times higher than the rotary or piston engine).