National Aeronautic
Space Administration

Ames Research
Moffett Field, California 94035-1000

NASA

to Attn of FAC:237-11

January 31, 1992

Mr. Richard McNally
Pegasus Rotorcraft Ltd.
1901 Embarcadero Road
Palo Alto, CA 94303

Dear Mr. McNally,

Based on detailed discussions with you and by studying the videotape of the Pegasus Gyroplane inflight, I believe this aircraft could have potential for the following reasons: The growing ground and air congestion offers great opportunities for vertical lift aircraft as has been identified by numerous recent national studies. There is already a large helicopter fleet worldwide. Some of the attribute of the Pegasus Gyroplane could make it very competitive with the light helicopter for the large number of missions that do not require a hover capability. These include patrol and transport. Market barriers for helicopters have been Due to a relatively high direct operating cost, the adverse effect of unscheduled Maintenance, and negative impact of its external noise characteristics. These Barriers prevent the helicopter from realizing an even larger market. A Helicopter's rotor is always powered, and a tail rotor is required to counteract the Reaction torque. This results in inherently unsteady aerodynamic forces that are transmitted through the rotor hub, controls, power train and engine resulting in high cyclic loads and limited fatigue life. On the other hand, a gyroplane's rotor is relatively simpler. After the jump start, the rotor is unconnected to the engine and is relatively simpler. Properly designed, a gyroplane has the potential to have a lower operating cost, longer life components with possibly more predictable life minimizing unscheduled maintenance. The gyroplane appears to offer the exciting possibility of approaching costs more competitive with a fixed wing aircraft while having vertical take-off and landing capability.

There are other impressive attributes. An important one is safety. Since the rotor is always in autorotation, it lands naturally in the event of an engine failure. A helicopter requires skilled conversion to the autorotation mode. Since the rotational speed of the Pegasus' rotor is significantly lower than a helicopters, its noise signature should be much lower – rotor speed is a most critical noise parameter. Also since flow through a gyroplane rotor is under-to-over the top of the rotor, rotor downwash effects will not be a problem. A helicopter's downwash sometimes can adversely affect visibility and recirculate debris through the rotor.

I am also impressed that the Pegasus Gyroplane has already been certified. Certification of helicopters has taken five years or longer and is thus very expensive. Upgrading the Pegasus to using the latest technology should improve its performance even more. An important feature is the strap pack. The rotor strap pack will not allow blades to go out of phase and should prevent ground resonance.

If you can sell the Pegasus Gyroplane competitively to the Robinson helicopter, you should capture a large market share (since the Pegasus will also carry an additional passenger). Best of luck to you in this promising venture.

John Zuk

John Zuk, PhD
Chief, Civil Technology Office