



JA44AA over Japan North Alps. Image taken at 11,850 ft. pressure altitude. Helicopter is on laser scanning course with 18 inches of manifold pressure and an indicated air speed of 42kts. Density altitude 13,126 ft.

# Aero Sensing Breaks R44 Raven II High Altitude Record -Japan North Alps

Tatsuhiko Sumi, CEO

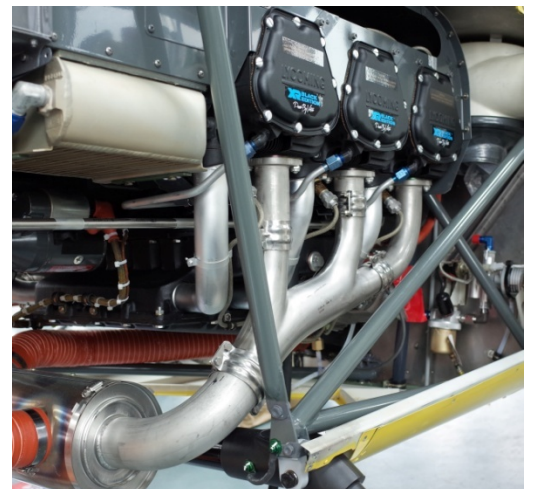
November 12, 2017 Osaka City, Japan

Dear Mr. Victor Sloan

I run an Aerial Laser Scanning company in Osaka, Japan called Aero Sensing, Inc. Our mission is to provide high precision topographical surveys including photography and 3D airborne measurement data for clients.

Our company has a state-of-the-art specially designed laser scanning pod that is mounted under our Robinson R44 Raven II helicopter that includes a 3D laser scanner and two digital camera systems. We have incorporated an onboard computer and rack system which is located at one of

**“Power-By-Victor”  
XR BLACK EDITION VII Engine**



the aft seats to capture our 3D laser scanning data. Typically, a 6 seat or larger turbine helicopter is used for terrestrial 3D laser scanning, although we use a smaller more cost effective 4 seat piston powered helicopter to provide our services at more competitive prices. The R44II is powered by a 245 HP six cylinder Lycoming IO-540-AE1A5 normally aspirated engine.

The drawback of using this helicopter in 3D laser scanning is that we have to figure out ways to reduce the payload we carry since the piston engine is less powerful than a turbine engine powered helicopter. The 3D laser scanning equipment is heavy, so we are always forced to minimize our load. Even after minimizing the load, the total helicopter weight can easily reach the maximum takeoff weight with two crew members, equipment and full fuel on board.

During the helicopter 3D laser scanning operations, it is crucial that we maintain the same distance between the helicopter and the terrain surface. Therefore, when we scan mountainous areas, the helicopter needs to climb and descend continuously while scanning the terrain surface.

Descending is easy, but climbing is sometimes very difficult. As the altitude becomes higher the air becomes less dense, so the climb

rate is reduced with the reduction of available thrust.



It often happens that we cannot maintain a consistent distance above terrain level during scanning operations. This happens especially when we are climbing because of the less dense air at higher altitudes prevents a successful scanning operation.

Since we established Aero Sensing, Inc. in 2007 we have been hesitant to accept aerial scanning missions for high altitude operations due to the

inability of the helicopter to maintain a consistent distance from the terrain during the course of the scanning operation.

However, things surrounding us have totally changed in the spring of 2017 since the installation of the XR Black Edition VII engine in our helicopter was performed.

Prior to the installation of the XR Black Edition VII engine we had to decline our clients' requests that

would require us to fly at altitudes over 8,000 ft.

Our helicopter was equipped with a Lycoming IO-540-AE1A5 factory new engine at the time and couldn't produce the necessary power needed to perform high altitude missions.

**Tatsuhiko Sumi CEO & Mr. Ikawa**





**Japan North Alps Yariga-Take Peak 10,434 ft. JA44AA in 800 ft/min climb at 9,000 ft. Climb continued to 11,850 ft. over Hotaka-Dake Peak.**

It was less than two months after we started flying with the XR Black Edition VII engine installed that we found out we still had enough climbing rate at around 9,000 ft. In the summer of 2017, we then decided to try high-altitude laser scanning and found that we could now perform high altitude operations. Later in September we accepted a high-altitude scanning mission and successfully completed the scanning of Japan North Alps whose peaks exceeded 10,000 ft. Since we had to fly at such high altitude, both the scanning operator and I had to fly with heavy oxygen bottles onboard the helicopter as well. The helicopter was operated at a gross weight of 2,500 lbs.

The XR Black Edition VII engine ran smoothly even at above 10,000 ft. pressure altitude with a

sharp throttle response. We went to higher terrain and finally reached a pressure altitude of 11,850 ft. without any loss of rotor speed. Prior to the installation of the XR Black Edition VII engine with the original Lycoming factory new engine

installed, we couldn't maintain the necessary altitude above the terrain at flight levels of 8,000 ft. pressure altitude and above. The outside air temperature during this flight was 3 degrees Celsius at 11,850 ft. (PA), which means that the density altitude was almost 13,126 ft. We also had very turbulent air over Japan North Alps with very strong downdrafts encountered. The XR Black Edition VII engine enabled us to maintain the necessary altitude for scanning operations even in the strong downdrafts at 13,126 ft. (DA). This was a great surprise to us as the laser pod adds weight to the helicopter and also increases aerodynamic drag of the helicopter.



**Tsukuba Aviation, Tsukuba City, Ibaraki Prefecture, Japan**

I am proud to say that I have climbed to the highest altitude in my life in the R44 II with the XR Black Edition VII engine.

Due to the limited available thrust of the original Lycoming new engine we were never able to climb above 8,000 ft. to perform scanning operations. Therefore 8,000 ft. had been our previous altitude record. With the XR Black Edition VII engine installed we broke that record by 3,800 ft. and

established 11,850 ft. as our new altitude record.

More than 80% of Japanese land is mountainous area and we are forced to keep climbing and descending over the mountains as part of our mission. The XR Black Edition VII engine is very reliable and produces enough power to conduct flight measurements at high altitude. It is like a strong heart of a marathon runner.

Now we feel assured that we can conduct high-altitude laser scanning operations which had previously been considered as missions only realized by big turbine helicopters.

We would like to extend our sincere appreciation to Victor Aviation for its admirable job of cutting through the barriers in this strictly regulated field of aircraft engines and expand our aerial scanning operations to now include high altitude operations.

Sincerely,

AERO SENSING, INC.  
Tatsuhiko Sumi, CEO



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