PERMANENTLY DISPLAYED AT THE "VOLANDIA" MUSEUM OF FLIGHT THE RECORD-BREAKING LASER THAT FLEW OVER ANTARCTICA FOR THE FIRST TIME TO REVEAL THE SECRETS OF THE OZONE HOLE.

A unique laser, developed in 1995 by an Italian company, operating on a Russian stratospheric aircraft flying 21.500 meters high, made possible important measurements concerning the ozone hole over Antarctica. After a large number of missions, it will be permanently exposed hereafter at Volandia, the Museum of flight, in Varese.

A record-breaking flight, **21.500 meters high** over Antarctica **to reveal the secrets of climate changes and the mechanisms regulating the stratospheric ozone layer**. The **protagonist** of such challenging mission was the LIDAR (LIght Detection And Ranging), **a remote sensing laser system** considered one of the most important instruments to investigate the atmosphere. **The pioneer of the innovative technology at the heart of the system, which is entirely Made in Italy, is Quanta System, an Italian company based in Solbiate Olona (Varese).** A whole year of researches, planning and technical trials which involved a group of engineers and technicians coordinated by the **Eng. Antonio Raspa**, Advanced Technologies Project Leader at Quanta System. Today, after almost 500 hours of flight, this **laser will be permanently exhibited at the Volandia Museum of Flight in Somma Lombardo**, to be admired by everyone and remembered throughout history.

The mission had the **study of the ozone hole** as ultimate goal, investigating **the reduction in stratospheric ozone concentration over Antarctica and, in a less extended way, over the Arctic**. The numerous measurements have demonstrated that this phenomenon is linked to the accumulation of chlorine in the stratosphere: these particles pile up in the clouds where the stable chlorine composites transform into reactive species responsible for ozone destruction. **The concentration of chlorine in the stratosphere increased notably** in **the last decades**, with consequent reduction of the ozone layer, owing to the **increase of industrial composites released in the atmosphere**, such as **chlorofluorocarbons**.

After the first satellite measurements, which highlighted the ozone hole in 1984, **several research activities have begun**. **Quanta System created a series of lasers to study the atmosphere** from fixed sites based in certain locations in Antarctica. In 1993 there was a turning point allowing the study of climate change with instruments installed on board of the Russian stratospheric spotter **Myasishchev M55**. **The first mission of Lidar started in 1995 flying 21.500 meters high, a record-breaking altitude never reached again by any other civil laser. After that day, several missions were launched around the world**, from Finland and Brazil to Seychelles, conducted on behalf of **APE (Airborne Polar Experiment), CNR (National Research Council), University of Roma La Sapienza, and PNRA (National Research Program in Antarctica).**

“ We are proud to be the “fathers” of such an important avionic instrument, thanks to which in the early 90s it was possible to start measuring climatic changes, certainly a hot topic amongst the most discussed in the late years – said **Paolo Salvadeo, CEO of Quanta System** – and we are also happy that from today on this Made in Italy hi-tech prowess is celebrated with a permanent exhibition at the Volandia museum, true temple of science and flight. During three decades, many scientists and researchers pushed themselves down to Antarctica, in extreme conditions, to deepen their studies in different scientific fields, ranging from climatology to biology, from glaciology to the study of the atmosphere. Furthermore, this laser represents beyond doubt a clear example of excellence, especially in this field, amazing the world and providing essential and crucial data for the international scientific community. The idea of acquiring measurements directly from the sky was launched in 1993, and the proposal was embodied in the creation of a number of automated tools to be installed **on board of the Myasishchev M-55**, **the ex-Russian ‘Spy Aircraft’ able to fly 22 km high, next to the stratosphere border.**
Quanta System accepted this technological challenge: **Eng. Raspa and other phenomenal technicians, Eng. Carlo Malvicini and Franco Masiero,** worked together with **Eng. Carlo Raffini** and the **current president of El.En Eng. Gabriele Clementi** (who particularly focused on the design of a special power supply system able to work in the rarefied atmosphere) to developed a unique system **that still holds the record of the maximum operational altitude for airborne laser devices**".

The laser represents the heart of the device, indeed it is employed as transmitter in the **LIDAR** (Light Detection and Ranging) system, which is a remote sensing technique **(optical radar)** invented by **Massachusetts Institute of Technologies (MIT)**. In 1962 this institution used that from the Earth, measuring for the first time worldwide the Earth-Moon distance. The LIDAR operates similarly to a Radar, nevertheless it uses light instead of radio waves. **The return signal generated by laser pulses at high intensity is analyzed and, according to collected data, numerous chemical-physical measurements of the atmosphere can be carried out, in addition to the precise calculation regarding the distance of an object**. Thanks to this system, it was possible to measure other parameters of the atmosphere, such as **height, stratification and density of stratospheric polar clouds, the properties of the particles these clouds contain, temperature, pressure, humidity, winds, and the concentration of gases as ozone, methane and nitrous oxide.**

Thanks to a thirty years activity concerning the collection of data from the LIDAR systems and through their crossed elaboration, **it was possible** to identify with high precision the mechanisms which are responsible for ozone layer reduction. Moreover, collected **experimental data** allowed to **confirm the mathematical models currently used to study the phenomenon, to predict its evolution in the next decades, and to estimate the time needed for a possible recovery intervention.**
The use of LIDAR revealed a **decrease of CFCs in the atmosphere**, linked to the limitations set up, at international level, in the use of these compounds, starting from the **signing of the Montreal Protocol**.

Quanta *System* *is an Italian company founded in 1985 based in Solbiate Olona (VA), belonging to the international group El.En from 2004, and a world leader in the production of lasers for three scientific fields: aesthetic medicine, surgery and art. Three divisions united by one principle: to improve the quality of life of patients and to take care of people. Founded as a spin-off of one of the largest research centers in the field of lasers and optics worldwide, Quanta System has taken the first steps in high-energy physics, plasma physics, spectroscopy and light-matter interaction. The first lasers for the restoration of art works were developed in 1994, whereas the activities in the field of medical lasers for dermatology and aesthetic medicine were launched in 1997. In 2008 the company developed its first surgical lasers, which have today significant market share internationally. As trusted partner of healthcare facilities, doctors, institutions and organizations engaged in scientific projects, the activities of Quanta System are also aimed at European and international research programs, in collaboration with prestigious universities and research centers around the world.*

Volandia *comes from the recovery of the historical Aeronautical Officine Caproni founded in 1910 in Malpensa. A park and a museum dedicated to the DREAM OF FLIGHT: over 60,000 square meters of pure industrial archeology, ten minutes' walk from Malpensa Terminal 1 and from Malpensa Express Station.*
Volandia represents a dive into the history of aviation and space.
The museum has several areas: from pioneering balloon flights to the convertiplane, perfect fusion between horizontal and vertical flight, going through the various forms of flight, the fixed wing, rotary wing, the drones, the aircraft and flight simulators.
Volandia tells the exciting adventures of aviation in all its forms, from the pioneering flights of the early XX century to the conquest of space.

QUANTA SYSTEM SpA
Antonio Raspa – Alessandra Barbanti

Tel. + 39 0331 376797
alessandra.barbanti@quantasystem.com
antonio.raspa@quantasystem.com

VOLANDIA
Marco Reguzzoni
Tel. + 39 0331 230007
reguzzonimarco@gmail.com

FOUND!
Valerio Giacomoni – Matteo Gavioli – Alessandro Conte
Tel. + 39 02.20.40.42.12
valerio.giacomoni@foundcomunicazione.com
matteo.gavioli@foundcomunicazione.com
alessandro.conte@foundcomunicazione.com

December 2015