Simulating space on Earth

Taiyo Nippon Sanso provides **A WIDE VARIETY OF SPACE SIMULATION CHAMBERS** to support the development of satellites and their components

As a leading provider of industrial gases, Taiyo Nippon Sanso has a global supply chain that services a wide range of industries, from steel, chemicals and automobiles to food, medicine and aerospace. The company also designs and manufactures space simulation chambers primarily for researching and developing space technology applications. The chambers use cryogenic and high-vacuum technology to recreate the darkness, extremely low temperatures and ultrahigh vacuum of space, enabling satellite components to be tested on the ground.

They can be used to perform thermal vacuum and temperature cycling tests to evaluate the longevity of satellite components such as the propulsion units of ion engines. By adding solar simulators and vibration-isolation systems for optical satellites, the space simulators can be tailored for a wide range of needs.

The company's reputation for cryogenic and high-vacuum technologies won a commission from the National Institute of Advanced Industrial Science and Technology to build a prototype for our first space simulation chamber in 1965. From those early days, Taiyo Nippon Sanso has developed more than 80 models.

SPACE CHAMBERS IN ALL SHAPES AND SIZES

The chambers come in a wide variety of shapes (including square, cylindrical and shell shaped) and sizes, and are used by research institutes and government agencies to test components and instruments, and even entire satellites.

The smallest chamber, which is currently in development, has a diameter of only 50 centimetres. A mid-size chamber with a diameter of 2 metres was designed to test the Japan Aerospace Exploration Agency (JAXA)'s asteroid explorer Hayabusa and the ion engine of a JAXA planetary probe. Larger ones, 9 metres in diameter, can be used to test components and even whole satellites. The company was also engaged in manufacturing Japan's largest space chamber, which is 13 metres in diameter.

"Our space simulation chambers are highly versatile and can be tailored to meet users' needs," says Kouji Nadehara, general manager at the company's Space and Cryogenic Equipment Sales Department. "They can be used for experiments such as evaluating optical systems, measuring ion-engine durability testing propulsion system."

"Our space chambers can create extremely low temperatures and ultrahigh vacuum environments, as well as the darkness of space," Nadehara says. Pressures in the chambers range from as low as 133×10^{-9} pascals — not far from that in outer space — up to 700 pascals — high enough to simulate the pressure on Mars. The temperature of a key component called the shroud, which generates darkness and low temperatures in the chamber, can be cooled to below 100 kelvin using liquid nitrogen and to below 10 kelvin using liquid helium. It can also be controlled between 273 and 313 kelvin with an accuracy of ±0.1 kelvin.

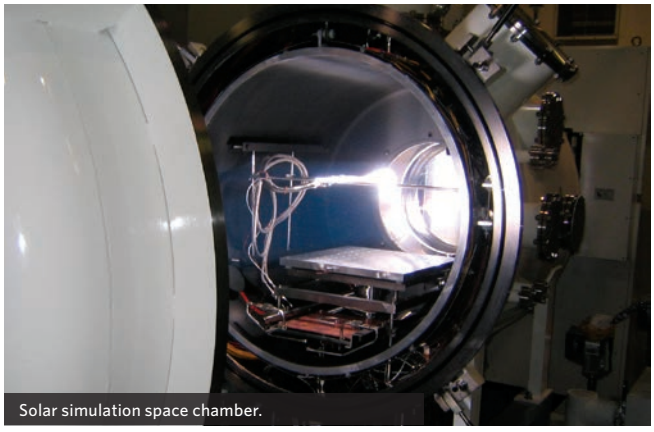
A large space simulation chamber.

WE SPECIALIZE IN BOTH CRYOGENICS AND HIGH-VACUUM TECHNOLOGY

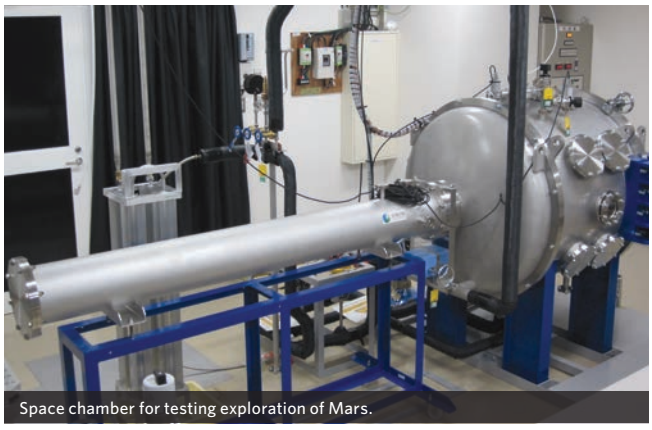
"We specialize in both cryogenics and ultrahigh-vacuum technology." Nadehara says. "We are very keen to explore opportunities to develop new projects internationally." ■

TAIYO NIPPON SANSO
The Gas Professionals

www.tn-sanso.co.jp
E-mail: scesales@tn-sanso.co.jp



Solar simulation space chamber.



Space chamber for testing exploration of Mars.