

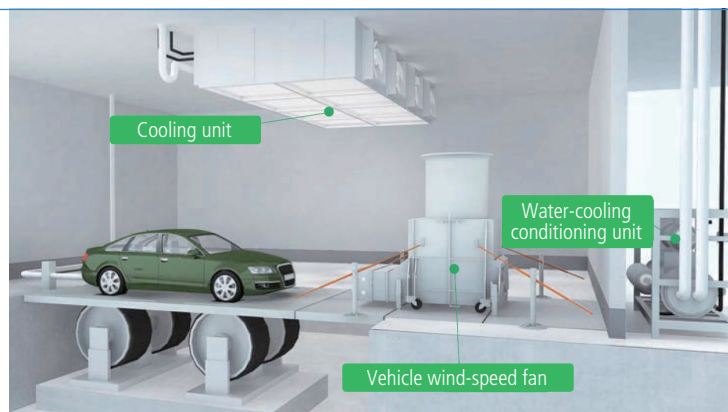
Technologies supporting automobile development

Environment Test Room

Automobiles are utilized everywhere around the world. Temperatures vary from extremely high to extremely low among different regions and fluctuate dramatically during a single day in certain regions. Some regions are high in humidity. As the climate varies from region to region, it is indispensable to conduct tests using test equipment so that automobiles can be driven safely at each location. The “environment test room” assists in conducting tests for research, development, design and quality control of completed automobiles and automobile parts.

What is the environment test room?

Normally, automobile manufacturers are equipped with a bench testing facility called “test bench,” chassis dynamometer, engine dynamometer and other drive-train testing equipment. The room in which such equipment is installed—i.e., the “environment test room” that corresponds to the space around such equipment—requires advanced technologies, including the technology for precisely-controlled air conditioning, energy-saving technology for efficiently providing the “environment” required in the tests, and technology that enables centralized management and monitoring of the operational status of each system.



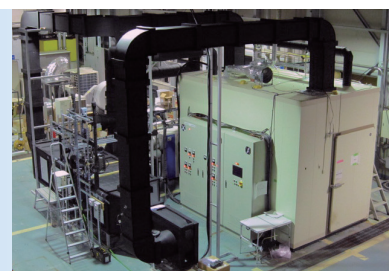
Tests conducted in environment test room

Engine starting test
(Hot start, cold start)

Engine cooling test

Fuel consumption test

Air-conditioning performance test



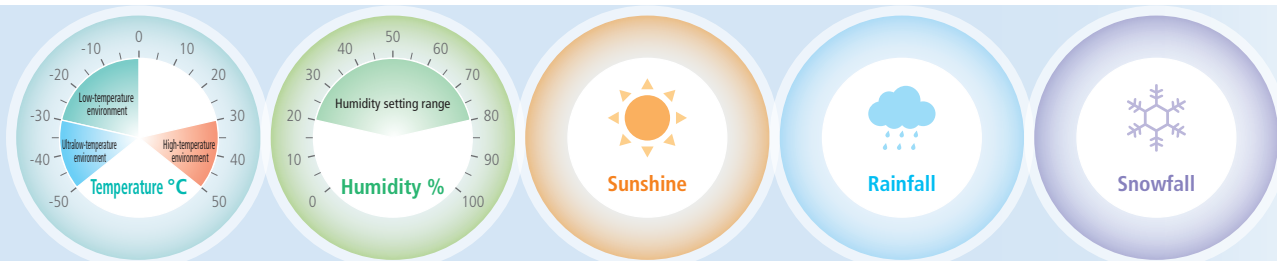
Background to Need for Advanced Technology

Upon conducting the tests referred to above, it is necessary to keep environmental conditions in a constant state to ensure that data will be reproducible and consistent. This gives rise to the need for technologies to reproduce temperature, humidity, sunshine, rainfall, snowfall and other natural environmental conditions at high precision while saving energy. Our ability to freely reproduce the necessary environment indoors without being at the mercy of actual weather allows us to conduct tests not only at low cost but also in an efficient manner. Given that countries have been tightening their

environmental regulations in recent years, there is a demand for creating an environment tailored to the testing requirements (objectives) of vehicles and engines, rather than all-weather facilities that consume large amounts of energy.

Accordingly, it is indispensable to have knowledge of and experience in comprehensive air conditioning designing to build an environment test room. Taikisha offers an environment test room tailored to each customer's needs by leveraging the air conditioning technology it has nurtured over many years.

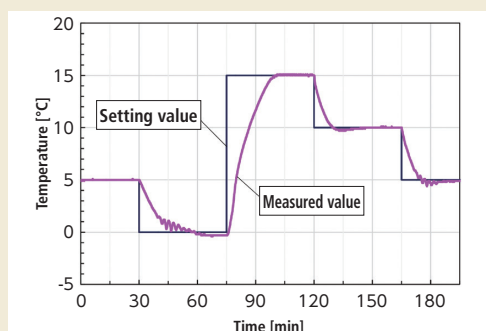
Environment required in environment test room



Characteristics of environment test room provided by Taikisha

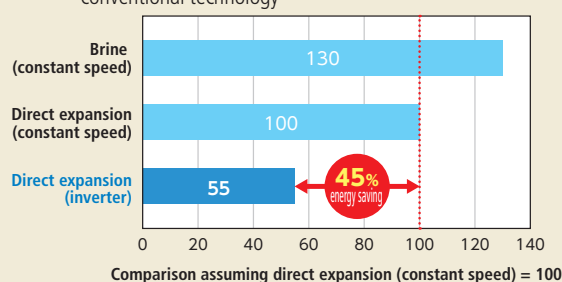
Broad temperature and humidity settings, high precision of control

- Realized broad temperature and humidity settings, high precision of control and less time taken to modify testing conditions.



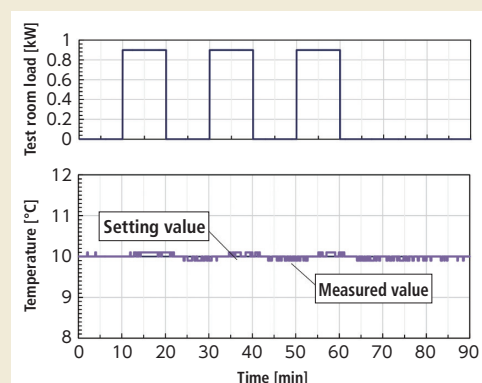
Reduced energy consumption by 45%

- Developed proprietary compressor inverter control technology and reduced energy consumption by 45% compared to conventional technology



Speedy tracking when testing conditions are changed, stabilization of testing conditions

- Simple adaptive control embedded in the conventional control system enables speedy tracking when testing conditions are changed, as well as stabilization of testing conditions against fluctuations in test load.



Seamless switching between cooling and heating

- Taikisha has independently developed a seamless direct-expansion outdoor unit, which is capable of switching between cooling and heating in a seamless manner.

It controls the air that exits from the air-conditioning equipment so that its temperature is constant by smoothly responding to fluctuations in outside temperature and changes in weather.

Column

Snowfall facilities based on application of core technology

Taikisha's environment test room is capable of reproducing snow in the form of crystals similar to natural snow, as well as blowing snow (i.e., snow accumulated on the ground being lifted into the air by strong wind).

With our snowfall facilities, we provide support to clients in conducting environment tests by reproducing assumed conditions when automobiles are being driven, including such phenomena as virgin snow that piles up on the vehicle body in the form of crystals, blowing snow that sticks to the vehicle body and wipers, and snow that clogs the radiator while the automobile is in motion.



Blowing snow



Crystallized snow

Message from the responsible person



Yuji Ohno, Senior General Manager of Research and Development Center, Green Technology System Division

Future outlook

Going forward, we will seek to further boost the performance of the environment test room by improving temperature stability/tracking ability, energy-saving performance and system reliability and reducing environmental impact.

Specifically, we will introduce AI control and monitoring to improve stability and tracking ability as well as energy-saving performance. At the same time, we will seek to improve system reliability through the early detection of signs of faults and leakage of refrigerants based on the operational status of facilities.

For the reduction of environmental impact, we will shift to eco-friendly facilities by adopting natural refrigerants and new refrigerants for refrigerants used in devices, not to mention energy saving.

Taikisha is committed to meeting clients' requests in a sophisticated manner through these technologies.