

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)
New Technologies, Processes and Operating Modes Enabling Future Human Missions (7)

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AUDIBLE NOISE CONTROL METHOD IN MANNED SPACE LAB

Abstract

With the development of the manned space engineering in China, space lab is building recently years for astronaut to work and live in space for long-term. Therefore, it is paid more attention than ever that how to control the noise in pressurized module with a low level for a habitable environment. Generally speaking, steady noise below 65dB (A sound pressure level) in work area and 55dB in sleep area is acceptable for astronaut. It is faced to us that how to control the noise in pressure module based on the real condition in space lab, such as noise source distribution, equipment layout and interiors designed. The main contents are presented in this paper as below:

1. The noise control approaches in ATV and ISS are surveyed and discussed.
2. The noise sources, such as fan, gyroscope, magnetic valve, etc., are recognized in space lab. Then, characters of noise sources and the noise energy frequency distributing are analyzed. At last, low-frequency noise is focused on the noise control in system design.
3. Measure the acoustic absorption coefficient of interiors through experiment test. Compare the mass, fireproofing, noise absorption, manufacturability, toxicity of interiors, Nomex material interior is selected in space lab.
4. Passive noise control approach is provided such as absorb, insulate, eliminate the noise and isolate the vibration of the noise source. In detail, silencer box is used to absorb the noise. Noise sources are eliminated with interiors and structure through layout. Noise is absorbed by foam and interiors in spread path. Damping shock absorber is used in vibration assemble.
5. Calculate method of the noise energy distribution in space lab is provided. Calculation result shows that the noise distribution in space lab meets the requirement that noise below 65dB in work area and 55dB in sleep area.
6. Real noise distribution is measured in space lab with ground test. The results show us that the noise control approach is effective and the calculation method is reliable. Noise control method in space lab satisfies the astronaut requirement.