

Space BD Inc., one of the leading Japanese startups in space sector, was founded to lead the establishment of self-sustainable economy surrounding space by valuing both technological evolution and business development. To realize our vision, we took off as a launch service provider using ISS platform to lower the hurdles to enter space business for non-space sectors. As of the result, we became the largest launch service providers in Japan, and now are developing peripheral business by leveraging the experiences and knowledges accumulated in launch services.

Nowadays, numerous new space companies are developing innovative technologies incorporating such as AI, Machine learning, and edge computing technologies to increase the instrumental performance and expand the technological possibility in space. What we had an eye on is the fact that, for those cutting-edge technologies to be widely adapted and commonly used, it inevitable to prove its reliability and performance in space. Unproven technologies cannot be accepted especially in this industry; therefore, Space BD is here to lead the way in providing a reliable in-orbit demonstration (IOD) service for the technology developer to accelerate the series of development process. The ISS is the only manned platform in space, and the flexibility unique to a manned platform brings a large advantage for customers. Here are some examples of our users.

As one of Space BD's core services, we provide an IOD missions for payload or component developers by using an external platform of the ISS Kibo module called "i-SEEP". i-SEEP was developed by JAXA, and now Space BD acts as a commercial service provider to promote and provide its service globally. Our first customer was a Spanish company named Satlantis, and we helped them to test their Multi-Spectral Bands Camera in orbit by using our i-SEEP platform.

Another example of its use was to validate and receive Technological Readiness Level (TRL) 9 for an automated docking system developed by a German Company named iBOSS. This payload was integrated by an U.S. company, Skycorp, to be installed on the i-SEEP platform. This automated docking system was developed to be a universal standard for in orbit logistic service. As a first step, they chose to validate its technical performance using the i-SEEP platform.

I will elaborate more on the reasons for those users above to choose i-SEEP as their validation platform/opportunity. From the beginning, the IOD service using the ISS external platform has provided advantages in terms of reliable data acquisition via a stable infrastructure of the ISS, provision of accurate environmental conditions during the data acquisition, and flexible operation scenario free from the restriction caused by the orbital life or limited power source unlike the satellite IOD mission. In addition to its advantages, the amount of data which can be acquired by the space instrument is increasing due to the

advancement of the technology, i-SEEP is now adding a different perspective of the advantage which enables to extract an effective means of experimentation during the user's demonstration phase by processing and selecting the necessary information in the hardware which is installed in the pressurized area of the ISS. After the data is processed, user can downlink only the information which matters, or user can choose to bring back the hard disk itself to earth by taking the advantage of re-supply vehicles. From the examples above, both scenarios were performed. For the Multi-Spectral Bands Camera, we selectively downlinked the data which mattered for the customers by accessing and sorting out the data stored in the ISS pressurized area. As for the Automated docking system, in addition to the periodical downlink of the experimental data, the payload itself which stored all the experimental data will be brought back on earth for the further analysis.

The advantage can also be brought to those users who would like to validate their technology step by step or part by part. This flexibility is only possible since the ISS is a manned platform, and it gives wider implementation options.

The needs to perform more complicated and flexible validation mission will increase as the technologies evolve.

Space BD firmly believe that the role of leading and accompanying the way to the commercialization of the new technology and product will be a key to the skyrocketing growth of space technologies and industry.