

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
Future Space Transportation Systems Verification and In-Flight Experimentation (6)

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SYSTEM VERIFICATIONS FOR REPEATED OPERATION BY REUSABLE VEHICLE  
EXPERIMENT

**Abstract**

To obtain some key technologies for the construction of reusable space transportation systems, we progress in the system verification studies by a flight demonstrator. The demonstrator is called “reusable vehicle experiment, RV-X”. Development of RV-X system has been made by maximum use of existing components and technical outcomes obtained from technical demonstrations for reusable sounding rocket in ISAS/JAXA and related researches for the future RLVs. Study objectives of this activity are 1) system architecture study for repeated flight operations, to demonstrate quick turnaround operations, inspection between flights, maintenance planning, damage / failure tolerant design method to greatly reduce the loss-of-vehicle probability, 2) life controlled and frequently repeated use of cryogenic propulsion system and its flight demonstrations, 3) guidance and control study for the advanced returning flight method of vertical landers and its flight demonstrations, and 4) demonstration of advanced technology for future RLVs. In the flight tests, we will demonstrate pump fed and deep throttling engine, gimbaling attitude control for vertical landing by lift-off and landing with powered flight, a quick turnaround operation, returning flight and landing by engine cut-off and re-ignition, and so on. Advanced technical items such as aerodynamic control, propellant management, composite cryogenic elements will be also demonstrated. In this paper, present status of preparations for RV-X flight demonstrations are presented.