

# Commercial Microgravity Flight Services

## Request for Information

### Description

This notice issued by the National Aeronautics and Space Administration (NASA), Neil A. Armstrong Flight Research Center (AFRC), Edwards, CA is a Request for Information (RFI) for Microgravity Flight Services or MFS. The intent of this notice is to obtain information on commercial capabilities to provide brief periods of near zero, partial gravity, and hyper-gravity conditions, collectively referred to here as microgravity, and associated capabilities for payload integration, safety, and airworthiness for various Government research, technology development, and training missions. Attached to this notice is a Draft Performance Work Statement (PWS) that contains the technical and operational requirements for the NASA Microgravity Mission. NASA has successfully achieved this mission and fully met the attached requirements by use of a slightly modified C-9 (military variant of the DC-9 commercial transport) aircraft flown, operated, and maintained by NASA flight and ground crews.

Microgravity flights provide a unique "reduced gravity" or "zero-g" environment as well as hyper gravity (1.1 through 1.8 times normal earth gravity) and simulated Lunar, Martian, and asteroid gravity levels for research in areas such as fluid physics, combustion, material sciences, and life sciences, engineering development (for the International Space Station and other space hardware programs); for education; and for astronaut flight crew training.

The typical operation involves one or more self-contained experiments that are installed on the platform and activated in flight during the microgravity periods by a human operator. Data is recorded, and experiments are often photographed. Upon completion of the flight, the experiment is removed to be refurbished and prepared for future flights. The experiments are usually observed and/or tended during flights by a human experimenter.

Reduced gravity parabolic trajectories and increased gravity constant-g maneuvers are normally within the design envelope of Federal Aviation Administration (FAA)-certificated jet transport aircraft; however, the repeated parabolic trajectories may constitute additional duty cycles that manufacturers did not consider in the design of their aircraft and engines.

In the recent past, aircraft and flight services were contracted by NASA to provide these services and were operated in accordance with FAA Advisory Circular (AC) 00-1.1A, "Public Aircraft Operations". Under this AC, NASA was responsible for determining the airworthiness and flight safety of the Contractor's microgravity aircraft operations and maintenance. As a "Public Use" aircraft operation, NASA reviewed and approved any deviations to Federal Aviation Regulation Part 21, 23, 25, 27, 33, 35, 43, 61, 63, 65, 67, 91, and 121 as needed to accomplish NASA

research missions in accordance with the intent of the AC 00-1.1A and applicable NASA policies. Consequently, contractors for NASA Microgravity Aircraft services were required to maintain a program that allows sufficient NASA insight to approve FAA regulatory deviations for the NASA mission while the contractor aircraft was operated as Public Use. Upon the completion of a NASA mission the aircraft was returned to its original civil status and returned to service under FAA airworthiness regulations. It was the responsibility of the contractor to ensure compliance with all FAA regulations when returning an aircraft to civil use.

NASA is assessing the feasibility of obtaining microgravity flight services on a purely commercial basis. In such an operation, the provider will operate as a “civil aircraft” and bears full responsibility for airworthiness, flight safety, and mission assurance, and these services do not require Public Aircraft Operation (PAO – ref. AC 001.1A) with commensurate NASA airworthiness approvals. Recognizing the ability of industry to provide microgravity flight services to the public at large, responders are required to provide information on the practicality of providing this service to NASA in accordance with the attached NASA PWS utilizing certificated aircraft with an FAA approved maintenance and operations plan that does not depend upon NASA airworthiness authority under a Public Aircraft Operations concept.

Under a non-PAO concept, NASA will provide limited airworthiness oversight for payload design and payload integration for NASA payloads only. In accordance with its policy [NPR 7900.3C](http://go.usa.gov/sWt9) (<http://go.usa.gov/sWt9>), NASA will also perform an initial airworthiness review including a physical inspection of the proposed aircraft and detailed review of its maintenance records.

Responders are required to provide information regarding their aircraft and engine manufacturer’s engineering evaluations that demonstrate the suitability of their aircraft and engines for the microgravity mission. The manufacturer’s engineering evaluations shall include recommendations for aircraft and engine modifications, operations, life limitations, structural monitoring, and maintenance.

Responders are required to provide information regarding their aircraft operations and maintenance per Title 14 CFR Part 121 or 135 , and any additional FAA requirements to meet the microgravity mission.

Interested parties having the required specialized capabilities to meet the requirements must submit a capability statement. All maintenance and operational actions required to support the microgravity flight service mission must be addressed in the capability statement.

In addition to the previously listed requirements, the Capability Statement shall include the following:

1. Does your organization have the capability to provide the services as described in the attached PWS? If so, please describe your capabilities and performance history for the following. Include other pertinent capabilities.

- Describe your capabilities to meet the requirements of the attached PWS.
- Describe the platform environment you can provide for experiments, including the number of independent experiment packages you are capable of accommodating per flight, the maximum volume and mass of experiments, the types and sources of power, environmental conditions and ability to vary environments, and ability to accommodate human flight participants
- Describe any restrictions on payload contents (e.g. mass, volume, battery types, gasses, temperatures, etc.)
- Describe your typical flight profiles for microgravity conditions, including a zero-g parabola (altitude/airspeed profile, as well as partial g-level profile) and hyper-gravity maneuvers up to 1.8 gravities

2. Provide a rough order of magnitude (ROM) estimate for annual contract costs using the attached Respondent Cost Metric and Proposed Performance Metric spreadsheets. Please show any formulas used to calculate costs.

3. How would you manage a microgravity program including maintenance and operation of the aircraft; customer support; and payload integration?

- Describe the aircraft make and model you would propose using to provide these services
- Describe your engineering capability for integrating custom payload types
- Describe your airworthiness and flight safety processes, and how you intend to operate within FAA approval guidelines as an FAA-certificated aircraft.
- Describe your base of operations to support microgravity flight operations. Describe the location of your airfield and microgravity flight operations, and your access to aircraft ground support equipment and fuel.
- Describe your capabilities for payload integration, including how you assess the airworthiness of payloads and how you isolate payloads from aircraft systems
- Describe your ground facilities for experimenter preflight preparation and postflight maintenance of their experiments
- Describe your capabilities to provide special systems, such as lighting, intercom, precision gravity monitoring, etc.

4. What, if any, are the barriers to utilizing your aircraft to provide microgravity flight services as a certificated aircraft? Include how you would eliminate or mitigate potential barriers to utilizing your aircraft as “Other than a Public Aircraft.”

5. How do you plan to certify airworthiness and approve any necessary modifications to the aircraft type certificate?

6. What, if anything, would you require from NASA in order to provide microgravity flight services and other proposed services while operating your aircraft as a certificated aircraft?

7. Provide specific comments on the technical and operational requirements and the ease or difficulty you would have in meeting them.

8. What other recommendations or concepts of operation do you have on how to provide Microgravity Flight Services to support the NASA mission?

9. NASA is interested in innovative approaches to achieving this mission, including use of smaller aircraft types (biz jet class rather than transport class), multiple aircraft types, or other innovative approaches including a multiple-award contract for achieving the full range of requirements from more than one vendor. Please provide any constructive suggestions toward this end. Explain the advantages of your suggested approach and potential barriers to executing the controlled gravity mission that you believe would be resolved by your approach.

10. As the requirement becomes more defined, we will consider other NAICS Codes. Please provide any input that may be beneficial to consider when selecting the NAICS code for Microgravity Flight Services.

Responses must include the following:

1. Name and address of firm and the name of the author of the suggestions.

2. Size of business; average annual revenue for the past three years and number of employees.

3. Whether the firm is a large business, Small Business, Small Disadvantaged Business, 8(a), HUBZone Small Business, Women Owned Small Business, Veteran Owned Small Business, Service-Disabled Veteran Owned Small Business, or one of the Historically Black Colleges and Universities/Minority Institutions.

4. Number of years in business.

5. Affiliate information: parent company, joint venture partners and potential teaming partners.

## **INDUSTRY DAY**

An Industry Day will be held from 7:30 am to 4:00 pm on December 9, 2014 at the AERO Institute in Palmdale, CA. During the morning of Industry Day, the requirements listed in the PWS and the ROM will be discussed in detail. In the afternoon, one-on-one sessions will be held between AFRC and industry representatives. In order to attend the Industry Day, you must notify the Contract Specialist and Contracting Officer in writing by December 5, 2014 and provide the names of those that will be in attendance.

Please submit all questions in writing by December 5, 2014 so they can be addressed during Industry Day. After Industry Day, the question's period will re-open for additional questions until December 12, 2014. Any questions received after December 12, 2014 may not be answered before the RFI submission date of January 19, 2015.

In accordance with FAR 15.201(e), responses to this notice are not offers and cannot be accepted by the Government to form a binding contract. The Government is under no obligation to issue a solicitation or to award any contract on the basis of this RFI. The government will not reimburse responders for any cost expended to provide the information requested. Respondents will not be notified of the results.

No solicitation exists; therefore, do not request a copy of the solicitation. If a solicitation is released it will be synopsisized on FedBizOpps and on the NASA Acquisition Internet Service (NAIS). It is the potential offeror's responsibility to monitor these sites for the release of any solicitation or synopsis. This notice does not constitute a Request for Proposal, Invitation for Bid, or Request for Quotation, and is not to be construed as a commitment by the Government to enter into a contract. This document is for information purposes only to allow industry the opportunity to submit ideas and recommendations on the feasibility of utilizing external NASA sources to provide microgravity flight support and/or other services for the NASA mission.

NASA will not affirmatively release any information received in response to this RFI to the public, but may use information received in developing the best approach for a contract strategy. Any information submitted in response to this RFI that is marked as "Confidential Commercial or Financial Information" will be considered as voluntarily submitted in accordance with the Freedom of Information Act.

NASA Clause 1852.215-84, Ombudsman, is applicable. The Center Ombudsman for this acquisition can be found at [http://prod.nais.nasa.gov/pub/pub\\_library/Omb.html](http://prod.nais.nasa.gov/pub/pub_library/Omb.html).

The solicitation and any documents related to this procurement will be available over the Internet. These documents will reside on a World Wide Web (WWW) server, which may be accessed using a WWW browser application. The Internet site, or URL, for the NASA/AFRC Business Opportunities home page is

<http://prod.nais.nasa.gov/cgi-bin/eps/bizops.cgi?gr=D&pin=24>. It is the offeror's responsibility to monitor the Internet cite for the release of the solicitation and amendments (if any). Potential offerors will be responsible for downloading their own copy of the solicitation and amendments, if any.

Reference: NASA Documents

1. DCP-X-046, Dryden Centerwide Procedure, Code X, Fatigue Risk Management
2. NPR 1800.1C, Chapter 2.0, NASA Procedural Requirements for Occupational Medicine, Section 2.15, "Shift Work and Balancing Work-Rest Cycles"  
NPR 8715.3A, NASA General Safety Program Requirements
3. NPR 7900.3C, NASA Aircraft Operations Management Manual
4. NPR 8621.1B, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping

Reference: FAA Documents & Public Law

1. Advisory Circular AC 00-1.1A, "Public Aircraft Operations"
2. Title 14 of the Code of Federal Regulations (14CFR)
3. Title 49 U.S.C. §§ 40102(a)(41) and 40125

Points of Contact:

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Mail Code:

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