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Montréal  
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H5A 1L6  
FAX pour soumissions: (514) 496-3822

**SOLICITATION AMENDMENT**  
**MODIFICATION DE L'INVITATION**

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

Comments - Commentaires

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**Issuing Office - Bureau de distribution**  
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Montréal  
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H5A 1L6

<b>Title - Sujet</b> Space Technologies Development	
<b>Solicitation No. - N° de l'invitation</b> 9F063-140572/A	<b>Amendment No. - N° modif.</b> 005
<b>Client Reference No. - N° de référence du client</b> 9F063-140572	<b>Date</b> 2015-04-18
<b>GETS Reference No. - N° de référence de SEAG</b> PW-\$MTB-575-13154	
<b>File No. - N° de dossier</b> MTB-4-37358 (575)	<b>CCC No./N° CCC - FMS No./N° VME</b>
<b>Solicitation Closes - L'invitation prend fin</b> <b>at - à 02:00 PM</b> <b>on - le 2015-05-06</b>	
<b>F.O.B. - F.A.B.</b> <b>Plant-Usine:</b> <input type="checkbox"/> <b>Destination:</b> <input checked="" type="checkbox"/> <b>Other-Autre:</b> <input type="checkbox"/>	
<b>Address Enquiries to: - Adresser toutes questions à:</b> Jurca, Anca	<b>Buyer Id - Id de l'acheteur</b> mtb575
<b>Telephone No. - N° de téléphone</b> (514) 496-3378 ( )	<b>FAX No. - N° de FAX</b> (514) 496-3822
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b>	

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Instructions: Voir aux présentes

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<b>Name and title of person authorized to sign on behalf of Vendor/Firm</b> <b>(type or print)</b> <b>Nom et titre de la personne autorisée à signer au nom du fournisseur/</b> <b>de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b>	
<b>Signature</b>	<b>Date</b>

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**PROJECT TITLE: Space Technologies Development**

The above mentioned Request for Proposal (RFP) is hereby amended to answer questions received:

**1. For Priority Technology 2 (PT-2) - Light-weight high performance water color imaging spectrometer**

**Question 1:** For PT-2, the statement of work (SoW) asks to achieve a TRL of 5 (“component and/or breadboard validation in relevant environment”, as defined in the SoW). However, among the detailed requirements and requested activity descriptions, there is no mention of any of the relevant environment tests, such as thermal-vacuum cycling, vibration tests, radiation tests, etc., that would be required to reach TRL 5. The work description appears to be more in line with a target TRL of 4 (component and/or breadboard validation in laboratory environment). Moreover, the SoW clearly states that:

“More specifically the scope of this contract is to design, build and test in laboratory conditions a portable breadboard Dyson (or modified Dyson) spectrometer imaging system...” (Page A-47, Section 5 – Scope of Work) which is coherent with TRL 4.

**Can you confirm that TRL 4 is the intended TRL target within the contract period for PT-2 or make the necessary changes to the work description?**

**Answer 1:** As stated in the 3rd paragraph, Section 5, Scope of Work, of the SOW:

*“The developed water color imaging spectrometer breadboard should be ready to be tested in the field on-board an aircraft typically used for aerial photography to examine the performance and all the functionalities. It will be installed on the floor of the aircraft on a shock absorbing mount and look through an opening at the bottom of the aircraft (nadir looking position). Another option is to install it in a gyro-stabilized mount. The mount and airborne test of the water color imaging spectrometer is not the scope of the current STDP contract and may be covered by a separate contract.”*

TRL 4 (Component and/or breadboard validation in laboratory environment) is inadequate to meet the requirement for airborne flying test campaigns. The airborne test of the developed water color imaging spectrometer is not in the scope of the current STDP contract.

In order for the developed water color imaging spectrometer to sustain the airborne flying test, the SOW has included some TRL 5 level requirements, such as [SY-018], [SY-019]:

*[SY-018] Structure and mechanics*

*The breadboard imaging spectrometer system shall have necessary opto-mechanics, thermals and structures to support the required mechanical, thermal and structural functions of the system that is portable for airborne tests.*

*[SY-019] Ruggedization for airborne test*

*The breadboard imaging spectrometer system shall be ruggedized such that the system should meet the vibration and shock environment specifications for small aircrafts*

*(including turbo\_propellers), as specified in MIL-STD-810 F (SE-RD5) (Methods 514.5 and 516.5) or RTCA DO-160E (SE-RD6) (Section 7, Table 7-1 and Section 8, Table 8-1).*

CSA's expectation regarding verification methods are communicated in table 1 of the SOW. Specific test case definitions are to be established by the bidder and must respect the target TRL of 5.

## 2. For Priority Technology 3 (PT-3) - Composite Enclosure for Use at Cryogenic Temperature

**Question 1:** Are there more details available regarding the cover insert interface requirements? Are the inserts required to accept threaded fasteners, or are any other type of specialized inserts to be used?

**Answer 1:** Inserts should be designed for cryogenic temperatures and yes, should be able to accept threaded fasteners. CTE mismatch should be minimized.

**Question 2:** It is assumed that the lap shear coupons are intended to be solid laminate traveller coupons to verify the adhesive cure process, and not to characterize the facesheet adhesion. Is this correct? The lap shear test is not appropriate to test adhesion to the core, but is suitable for quality assurance of the adhesive cure process. If characterization of facesheet adhesion is desired, can alternate tests be proposed in lieu of, or in addition to the lap shear tests?

**Answer 2:** Please find below the correct norm, and number and size of coupons:  
At least five (5) 1 inch by 1 inch coupons shall be processed identically and simultaneously to test for the adhesion between facesheets and core.

Item	Description	Specification	Nbr of coupons	Requirement/Goal
Adhesion, facesheet to core	Through-tensile strength	ASTM C 297-04	5	>2500 psi (Req)

## 3. For Priority Technology 9 (PT-9) - Space Qualifiable Bonded Joints between Carbon Fiber Reinforced Polymer (CFRP) and Aluminum

**Question 1:** What is the intent behind obtaining B-allowables in Phase 1? Is the intent to characterize the adhesive properties? If so, can alternate tests be proposed to characterize the adhesive? The joints will work as a system, so the information from the shear test suggested cannot be directly used in performing joint design activities.

**Answer 1:** The intent of the B-allowable in Phase 1 is to characterize the adhesive properties and identify the failure mode (in the adhesive, between the adhesive and CFRP or in the CFRP). Alternate test can be proposed.

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**Question 2:** Are the B-allowables tests in Phase 1 intended to address material variability? This would require testing from multiple material batches. B-allowables can statistically be determined from a small number of samples, but the allowable will have a much higher knockdown applied to it. If failure occurs in the substrate the measured values will depend on the composite panel design and manufacture, and will not reflect joint strength.

**Answer 2:** The intent of the B-allowable is not to address the material variability. The number of sample can be increased to reduce the knockdown factor of the B-allowable. Concerning the failure in the substrate, yes it might happen since we are looking for an adhesive stronger than the substrate.

**Question 3:** Is 'measurement and characterization of the bond strength and stiffness over the specified temperature range' in Phase 1 intended to be flatwise tension and lap shear performed at the temperature extremes?

**Answer 3:** Yes.

**Question 4:** Are the coupons in Phase 1 only intended to be used for lap shear and flatwise tension or are they intended to be more representative of joint designs to be used in Phase 2?

**Answer 4:** Only intent to be used for the lap shear and flatwise tension.

**Question 5:** In Phase 2, is there any specific geometry required for the 'aluminum part bonded to a flat CFRP panel' or is this intended to be a flat piece of aluminum?

**Answer 5:** There is no specific geometry for the aluminum bonded on a CFRP plate.

**Question 6:** Are there any specific requirements on the carbon components to be used in Phase 2 (thickness, ply orientation, minimum strength, etc)?

**Answer 6:** There are no other requirements than those described in the Statement of Work.

**Question 7:** In Phase 2 are random vibration and T-Vac the only tests required on the prototypes?

**Answer 7:** Yes, the bonded strength will be verified by vibration.

**Question 8:** The requirement "The variation of the bonding strength and stiffness should not exceed 10% over the temperature range -170 to 160" is interpreted as "there should not be more than a 10% change to the strength/stiffness as a result of the temperature cycling", i.e. the pre-cycled and post-cycled properties shall be within 10% for strength and stiffness. Is this a correct interpretation?

**Answer 8:** Yes, it is a correct interpretation, except that in your statement "the pre-cycled and post-cycled properties shall be within 10% for strength and stiffness", *shall* has to be replaced by *should*.

**ALL OTHER TERMS AND CONDITIONS OF THE RFP REMAIN UNCHANGED.**