TENDER PIAP/KZP/15/09

APPENDIX 2.1.

THE REQUIRED TECHNICAL-FUNCTIONAL PARAMETERS LIST

Subject of the procurement: **Delivery of the UGV navigation system for the Unmanned Terrestrial Vehicle for TALOS demonstrator.**

PRODUCER / COMPANY:. . . . . **DEVICE TYPE:**. . . . . .

STRUCTURAL VERSION OF (YEAR): . . . . . **YEAR OF PRODUCTION:** . . . . . .

item number	parameter / term	complementarity with the term	YES/ NO	Value of the offered parameters /description of complementarity with the term/
	I. General requirements			
1	*2*	*3*	*4*	*5.*
1.	**The system shall be of Differential DGPS aided INS type.**	YES		
	The system, installed on a wheels skid track vehicle, shall be able to provide in real time the following data :			
1.2.	• **Attitude**	YES		
1.3.	• **Azimuth**	YES		
1.4.	• **Velocities in three axes**	YES		
1.5.	• **Acceleration in three axes**	YES		
1.6.	• **Angular rates in three axes**	YES		
1.7.	• **Latitude, Longitude and altitude**	YES		
1.8.	• **Data validity**	YES		
1.9.	• **Status and performance**	YES		
1.10	• **Control data**	YES		
1.11	• **GPS time**	YES		

1.12	• **INS raw data (even when operated in hybrid mode)**
	  ○ **Attitude**
	  ○ **Azimuth**
	  ○ **Velocities in three axes**
	  ○ **Acceleration in three axes**
	  ○ **Angular rates in three axes**
		YES		

1.13	**DGPS raw data (even when operated in hybrid mode)** • **Latitude, Longitude and altitude** **All data shall have a time tag.** **An "off the self" system is required. Software adaptations are permitted.**	YES		
1.14	**The system shall include four main elements:** • **INS** • **Differential GPS (including antenna)** • **Fusion processor** • **Power supply and electronic cards**			

1.15	**ANTENNA:**
	The antenna performances shall be as follows:
	• **3 db band pass for GPS option:**
	  ○ **L1: 1575+/- 20 Mhz**
	  ○ **L2: 1228+/- 20 Mhz**
	  ○ **L-band: 1543+/- 20 Mhz**
	• **Noise figure (typical): <2.5 db**
	• **VSWR (typical):,20:1**
	• **3 db band pass for GLAONASS option:**
	• **L1: 1588.5+/- 23.0 Mhz**
	  ○ **L2: 1236.0+/- 18.3 Mhz**
		YES		

	II. Capabilities			
1.	**Modes of operation**			
1.2	**The system shall implement its own state machine and have at least the following modes of operation:** • **Initialization mode** • **Operational mode** • **Maintenance mode**	YES		
1.3	**The system shall have the following sub modes of operation:** • **Power up** • **Slow Alignment** • **Init/ Fast alignment** • **Operation/ Fast alignment** • **Hybrid navigation** • **Inertial only**	YES		

2.	**<u>Fusion</u>** **Loosely coupling is the minimum requirement (Fusion of DGPS information into the KALMAN filter).**	YES		
2.1	**The system shall provide an RTK and Omnistar HP-capable receiver and/or use odometer aided to the INS**	YES		
2.2	**The desired combined INS/DGPS system shall feature tightly or deeply combined architecture. (vide technical draving 1 and 2 p. 9 Appendix 2)**	YES		
	III. System performance			
1.	**System Accuracies:**			
1.2.	**Position and height (m)**	**Omnistar HP and RTK-2 (1Cm+1ppm)**		
1.3.	**Velocity (m/s)**	**0,015**		
1.4.	**Roll / pitch (Deg):**	**0,03**		
1.5.	**Azimuth (Deg)**	**0,2**		
1.6.	**60s, free inertial/unaided 3D position Error (m)**	**0.12 without odometers correction**		
1.7	**60s, free inertial/unaided, Velocity Error (m/s)**	**0,07**		
1.8.	**60s free inertial/unaided yaw Error (deg)**	**0,2**		
2.	**System dynamic range**			
2.1	**Velocity (m/sec)**	**30**		
2.2.	**Altitude (m)**	**-450-5000**		
2.3.	**Angular rate (deg/sec)**	**± 400**		
2.4	**Angular Acceleration (deg/sec^2)**	**± 10000**		
2.5	**Pitch & Rol (deg)**	**± 90**		
2.6	**Azimuth (deg)**	**± 180**		
3.	**System Refresh Rate**	**Min 50Hz**		

4.	**The INS performances are driven from the system accuracies as defined in para 3.2.3.1 Appendix 2**			
	• **Min Refresh rate:**	**50 Hz**		
	• **Max data latency :**	**5 m**		
5.	**<u>Differential GPS performance</u>** **The system shall be based on the Omnistar HP and RTK-2 (1Cm+1ppm) technology. The performances shall be equal or better than:**	**YES**		
5.1.	• **Data rate:**	**20 Hz**		
5.2.	• **Typical time to first fix:**			
	○ **Cold start:**	**60 sec**		
	○ **Hot start:**	**35 sec**		
5.3.	• **Typical Reacquisition time:**			
	○ **L1:**	**0.5 sec**		
	○ **L2:**	**1.0 sec**		
5.4.	• **Time accuracy:**	**20 ns RMS**		
5.5.	• **For Omnistar HP mode the initialization time ver. position accuracy shall be better than:**			
	○ **After 2 min**	**= 0,8 m RMS**		
	○ **After 3 min**	**= 0,5 m RMS**		
	○ **After 30 min**	**= 0,2 m RMS**		
	○ **After 40 min**	**= 0,1 m RMS**		

	V. Interfaces			
1.	**The navigation system will contain the following interface:** (Interface diagram para. 3.3 Appendix 2)	YES		
1.2	**<u>Power supply</u>** **The INS shall accept 18V to 34V DC steady state according to MIL-STD-1275B,** **The DGPS shall accept 9.5v to 18 v steady state regulated power supply** **.Desired power supply range: 18V to 34V DC steady state according to MIL-STD-1275B for "one box" system.**	YES		
1.3.	**<u>RS422/RS485 or Ethernet Data Bus</u>** **The system shall communicate with the other vehicle's systems through RS422/485.or Ethernet data bus.** **it is desired that the data bus shall include all the data described in para 3.1 Appendix 2, and the RTK data correction, otherwise part of the data shall be transferred thought RS422//RS232 RTK correction communication data bus and the RS422//RS232 DGPS communication data bus.**	YES		

1.4.	**RS422//RS232 RTK correction communication data bus** **The differential GPS may receive RTK corrections through this data bus. It is desired that the RTK corrections will be transmitted through the RS422/RS485 or Ethernet Data Bus (para 3.3.2.2 Appendix 2)**	YES		
1.5.	**RS422//RS232 Differential GPS communication data bus** **This communication data bus shall be used for DGPS raw data transfer.**	YES		
1.6	**1 PPS (strobe signal out)** **This output shall be received even when the deferential GPS is not working or while outage .**	YES		
1.7.	**Odometer output** **The system shall have at least one odometer input. Data received from this input shall be used in localization algorithm.** **The contractor shall specify the exact interface.**	YES		
	VI System environment requirements			
1.	**Temperature** **Temperature conditions, which the system shall be capable of enduring (operated and non-operated), shall be as follows:**			
	• **Operation:**	**-30℃ to +60℃**		
	• **Storage:**	**-40℃ to +71℃**		

2.	**<u>Altitude (pressure)</u>** **Altitude conditions, which the system shall be capable of enduring (operated and non-operated), shall be defined as follows:**			
	• **Operation:**	**from -450 m till 16 404,20 ft**		
	• **Storage:**	**from -450 m till 12000 m**		
3	**<u>Rain</u>** **Rain (including hail) conditions, which the system shall be capable of enduring (operated and non-operated), shall be as defined in method 506.4 procedure I, and the following parameters:**			
	• **Rain rate:**	**100 mm/h**		
	• **Wind velocity:**	**65 km/h**		
	• **Drops dimensions:**	**D=4.5 mm**		
4	**<u>Humidity</u>** **Humidity conditions, which the system shall be capable of enduring (operated and non-operated), shall be as defined in method 507.4 (while exposed to 10 test cycles).**			
5	**<u>Fog and Salt Atmosphere</u>** **The system and the system performances shall not be harmed after 2 cycles, 24 h each, of continuous exposure to fog and salt conditions (5% salt)**	YES		

6.	**Blowing Sand** **Sand blowing conditions, which the system shall be, capable of enduring (operated and non-operated) shall be as defined in method 510.4 procedure II and the following parameters:**			
	• **Wind velocity:**	**20m/sec-30m/sec**		
	• **Temp:**	**50 deg c**		
	• **Relative humidity:**	**25 – 30%**		
	• **Sand concentration :**	**0.5 g/m3**		
	• **Exposure duration for each axis :**	**2 hours**		
7.	**Blowing Dust** **Dust blowing conditions, which the system shall be capable of enduring (operated and non-operated), shall be as defined in method 510.4 procedure I and the following parameters:**			
	• **Wind velocity:**	**5m/sec-10m/sec**		
	• **Temp:**	**50 deg c**		
	• **Relative humidity:**	**25-30%**		
	• **Exposure duration for each axis :**	**6 hours at 23 deg c and another 6 hours at 50 deg c**		
VII. Other requirements described in Appendix 2 "Technical Specifications" - acc. to the Contractor's description				
1.	**System quality factors:**			
1.2	**Reliability** **MTBF** **System Field MTBF shall be not less than 5000 hours at 55 deg C , with confidence level of 90%.**			
1.3.	**Operational Service Life** **This para shall be updated by the contractor.**			

1.4.	**Useful Life** **This para shall be updated by the contractor**	
1.5.	**Quantitative Maintainability Requirements** **Maintenance concept** **This para shall be updated by the contractor.**	
1.6.	**Adjustments** **Adjustment alignment or calibration shall not be permitted for the system. Any adjustments, alignment or calibration that may be required shall be carried out only at the system manufacture**	
1.7.	**BIT Modes** **The system shall have three BIT modes:** • **Power-up bit** • **Periodic/Continuous BIT** • **Initiated BIT**	
1.8.	**Dimensions and weight** **As an "off the self" item this requirement is not relevant.** **It is desired to be as small as possible.** **The system manufacturer shall submit the proposed system outline drawing(s)**	
1.9	**System package** **The navigation system may be "one box" type (the systems elements are cards that installed in one box) or "multi box" type (the system elements are installed in separated boxes).**	

1.10	**<u>Dimensions and weight</u>** **Cooling** **No specialized cooling system should be required for the navigation systems.** **Connectors** **The system connectors shall be circular sealed types.** **Desired connectors: MIL-C-38999-III type.** **DGPS antenna** **The proposed antenna shall be suitable for outdoor use.**	
1.11	**Electrical Power Requirements** **Power Input** **Power consumption** **Overload protection** **Input Circuits**	
1.12	**Transportability**	
1.13	**Mechanical installation requirements**	

If at least one of the above parameters/conditions is not met, the offer shall be rejected.

Note: Lack of description in column 5 "Offered parameters value / 'Condition met' description" shall be treated as a lack of the given parameter in the proposed configuration

We declare, that the above-specified offered device is complete and shall be ready for operation without any additional purchases and investments necessary (not including consumables).

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(podpis osoby upoważnionej
do reprezentowania Firmy na zewnątrz)