SECTION - C

TECHNICAL SPECIFICATIONS OF STORES AND DRAWINGS.

Supply of Force Feedback Haptic master arm for Virtual Reality System

OBJECTIVE:

The Force Feedback Haptic Device will be used to interact with the Virtual Models during the design reviews and modeling, and will be used as a Master Arm for control of Remote Handling Equipment during the operation phase and online control. Following are the technical specifications:

HARDWARE:

Sr. No	Parameter	Specifications	Offered Specifications (To be filled by Vendor)
1	Force-feedback	All 6 degrees-of-freedom (3 translations and 3 rotations)	
2	Operational workspace	It should be corresponding to the movements of an average human arm: **Translation:** Length: 1200 mm or better Width: 600mm or better Height: 1000 mm or better **Rotation:** Yaw: 300° or better Pitch: 120° or better Roll: 270° or better	
3	Maximum force	~65 N or higher	
4	Continuous force	~30N or higher	
5	Maximum rotation torque	~5 Nm or higher	
6	Continuous torque	~1 Nm or higher	
7	Stiffness	~8000N/m or higher	
8	Static Compensation	Should have static compensation of the device's own weight	
9	End-effector	Modular end-effector equipped with programmable switches	
10	Handle Interface	It should have a Programmable handle at the tip to virtualize the gripper action	

| 11 | Network Interface | Ethernet RJ45 Gigabit or EtherCAT RJ45 connection | |
| 12 | Accessories | All necessary cables and connectors | |

SOFTWARE:

S.No	Parameter	Specifications	Offered Specifications (To be filled by Vendor)
1	Software Features	• 6-dof Force-feedback output	
		• Direct integration of the Haptic arm with the design software (CATIA & SolidWorks) without use of any other intermediate software	
		• Simulation of the kinematic chains for a serial 6DOF robotic arm	
		• Should have inherent modules for collision detection	
		• It should support integration with Visual C++	
		• Should include API for Force simulations based programming	
2.	Compatibility with design software	CATIA V5 and SolidWorks along with API for programming	
4.	Operating System Compatibility	Latest version of Microsoft Windows	
5.	Compatibility with Tracking System	Optical tracking systems like ART, Vicon, Motion Analysis, trackd	
6.	License Validity	Perpetual	
7.	Documentation	All the user manuals and handbooks related to hardware and software should be provided in either hard or soft copy.	

Warranty: Minimum 3 years comprehensive warranty for all the hardware and software components:

General Terms and Conditions:

1. The software version to be supplied must be the latest version.
2. The software should be upgraded within the warranty period soon after the release of any version/ up gradation of the software at free cost by the vendor at IPR premises. There should not be any delay time due to any reasons in upgrading the software after the official release of up gradation from the company.
3. All the features (and newly added on features) should be included with the supply of software.
4. A technical training of minimum 4 days shall be provided by the Vendor at IPR premises.
5. Within the warranty and support period, in case of software not functioning as per the specifications, the vendor should bring out solutions within a week time.
6. The Quotation should include Minimum 3 years' comprehensive warranty for all hardware and software components.
7. The warranty starts from the date of successful installation of the software to full satisfaction of IPR authorities

Site Acceptance Tests

- All the components on their delivery to IPR will be checked as per the specification sheet and terms and conditions as specified in the tender.

- The Force Feedback Haptic Device will be tested for the interaction with the Virtual Models (available at IPR) in CATIA and SolidWorks. The maximum forces and torque will be measured for compliance with the required values as mentioned in the specifications

- The workspace as mentioned in the specifications will be measured by rotation and translation of the physical arm.

- Accuracy testing (For accuracy testing, all virtual models by IPR)

    o Rotational : permitted errors <= 1 %

    o Translation : permitted errors <= 1 %

    o Performance range : All parameters should be perfectly working in the specified range