

INDIAN INSTITUTE OF TECHNOLOGY-KANPUR
(Department of Mechanical Engineering)

Enquiry Number: JRK/NSV/ADRDE/2014-2015-05 Closing date: 28.11.2014

Through: Head Mechanical Engineering

Name of Item: Design & Development of Tether which can be used for floating in air balloons.

Sealed Quotations (technical bid and price bid separately sealed) are invited by the undersigned for the supply of following services:

Overview: The aim of this project is to develop a tether which can be used for floating in air balloons. These are tethered balloons are normally filled with Helium gas which keeps it in air. The objective is to design a tether which is connected to these lighter than air balloons. Weight of the tether should be kept minimal and also should have high factor of safety.

A. Qualitative Design Requirements

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| 1. High Strength to Weight Ratio | 5. High BW data communication capability with minimum optical loss |
| 2. Minimum and Uniform Diameter | 6. Lightning Survivability |
| 3. Flexibility to bend around pulleys and winch drum | 7. Environmental Hardening |
| 4. Power transmission capability | |

B. Quantitative Design Requirements

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|----------------------------------|---|--|
| 1. Breaking Strength | : | ≥ 9000 Kgf |
| 2. Weight | : | ≤ 300 gms/m |
| 3. Diameter | : | 20 ± 1 mm |
| 4. Airborne Power Requirement | : | 3 KVA (20 A WG 04 wire) 1 Φ , 240 V |
| 5. Data Rate | : | 01 Gbps/channel using fiber (06 fiber, SM) |
| 6. Lightning Drainage Capability | : | 70 kA (min.) |
| 7. Minimum Bending Radius | : | 20D, D is the dia of tether |

C. Type of Theoretical Analysis/Simulations to be done for the Proposed Design:

- | | |
|---|-----------------------------------|
| 1) Structural Analysis | |
| a) Tension | a) Lightning Drainage Capacity |
| b) Flexure | b) Heat Generated and Dissipation |
| c) Buckling | c) Skin Effect |
| d) Fatigue | 4) Power Transmission |
| 2) Dynamic Analysis | a) Power transmission capacity |
| a) Free Vibration Analysis | b) Heat dissipation |
| b) Force Live Load Dynamics | 5) Helium Flow |
| 3) Thermal Analysis under Lightning Conditions. | a) Pressure on tube walls |

D. FEA Analysis of the Tether for the above design

Terms and Conditions

1. All quotations must reach undersigned by 20th Nov 2014
2. The technical evaluation committee will decide to purchase the services irrespective of cost offered by the service providers and this will depend upon the availability of funds & technical specification and the usage of product in our institute.
3. Payment: As IITK standard terms.
4. Taxes as applicable
5. Delivery: Earliest possible time
6. Validity of Quotation: 60 days
7. Review meeting/teleconference will be held once in two months to review the progress of the project.

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