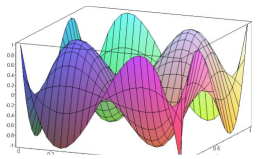

Rulebook 2008

Space Elevator & Space Engineering & Mathematics (Ing-Math Forum PINGUIM).

1.) Introduction

The challenge is to design a space elevator. For such a unique engineering project it is necessary to carefully and objectively examine the open questions, define the issues and find practical solutions where possible. In this project one of the critical studies centers on the influence of vibrations in the system, the numerical analysis of this issue and understanding the behavior of various elevator constructions under different influences.

The vehicle should be able to drive along 50 m vertical test ribbon. The vehicle must be able to transport a defined payload. The fastest elevator will be the winner. If no elevator reaches the top, the highest will win.

2.) The Concept

The elevator includes the following parts:
- A mechanical construction (light) to carry a payload of 5kg.
- Transportation unit (motor and gearing, rolls… to drive vertical on a ribbon)
- Control unit
- Energy unit (generally solar cells)

the organization team will spend:
- The testing ribbon 50 m length
- Light source (18 kW beamer from Arri)

Every kind of energy which is used for moving has to come from the official light source. Just minimal energy for the sensor and control units is allowed.

3.) Security

- You must use helmets inside the starting area.
- The starting area must left by any person during 5 seconds after the take off.
- The elevator must be able to fall about a height of 30cm hold by the contest ribbon without any damage.
- The complete elevator will be sprayed with 5l of water. Afterwards it has to stay 100% functional.
- Every elevator has to make a test drive before the official contest.

4.) Detailed Contitions

- 4.1. ***Light Source***
  The only energy source is a 18 kW- beamer from Arri. The organization team will spend the beam (see data sheet). The center of the light source will be in 1,5m from the ribbon.
- 4.2. ***Ribbon***
  For the race a Ribbon from Siegling (see data sheet) is used. It is an transmission ribbon 100mm x 3mm with a rubber surface. The driving length will be 50m.

The ribbon is stretched with a static power of 2500 N in a distance of 1m from the ribbon there will be an anti rotation wire.

- 4.3. ***Target Marker***
  At the end of the ribbon there will be a target plate with a weight of 1,0 kg.
  The plate is fixed on a 2m line which causes the maximum brake distance.

5.) Elevator

As working energy is only the official light beam allowed.
Only the energy for the control unit could be stored with batteries (one way ore rechargeable.
For the payload (5,0 kg)there has to be a box of 15 x 15 x 20 cm. The damage falling test has to be inclusive the payload. Two independent brake systems are necessary.

6.) Control Unit

The elevator must be run with a remote or automatic control system. It has to stop at the top. Afterwards it has to run downside with brake controlled speed. The maximum downside speed is 2m/s. During the way down the elevator has to stop one time.

7.) Timetable of the contest

3 days before the contest every team gets the opportunity to work on their elevators.
At least 48 h before contest start all teams has to be qualified by making a test drive of 10m. At the contest every team gets 15 min to fix the elevator on the ribbon. The maximum driving time will be 10 min. If the elevator does not reach the top the maximum height will count. Every team gets 3 starts the best start will count.

8.) **Registration fee (Space Elevator Games 2008)**

To make sure to have only serious team there will be a registration fee. The earlier you make the registration the better your fee will be:

registration before	April 30, 2007	450 €
registration before	August 1, 2007	750 €
registration before	December 1, 2007	1.500 €
registration two weeks before		3.500 €

Registration is open, and teams are encouraged to register at:

Space-Elevator2008@ing-math.net

9.) **Organizer (Space Elevator Games 2008)**

Jörn Lutat (Recklinghausen, Germany) & Prof. Dr. habil. Detlef H. Mache (Bochum, Germany)

If you are thinking of attending and have not yet done so, please preregister by sending an eMail to:

PINGUIM2008@ing-math.net