

17th IAA SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FUTURE (D4)  
Innovative Concepts and Technologies (1)

Author: Ms. Kirti Vishwakarma

University of Petroleum and Energy Studies, India, kirti.vkarma@gmail.com

Mr. Anand Kumar Singh

Department of Space Engineering, Lulea University of Technology, Sweden, anandsingh.and45@gmail.com

Dr. Ugur Guven

UN CSSTEAP, United States, drguven@live.com

Ms. Mahima Gupta

University of Petroleum and Energy Studies, India, gmahima021@gmail.com

Mr. Hitesh Kumar Tetarwal

University of Petroleum and Energy Studies, India, imhitesh147@gmail.com

SPACE EXPLORATION MISSION FOR COLONIZATION: SPACECRAFT REQUIREMENTS FOR  
JOURNEY AND IN-SITU EXPEDITION ON SATURN'S MOON-TITAN**Abstract**

Since the 'Naissance de l'univers' or birth of Universe, colonization of different planets has always amused the minds of those whose curiosity knew no bounds. The expeditious vandalization of Earth in the realms of environment, population and ecosystem have made it imperative to search for a competitive candidate. Planets and moons have been a prominent area of study for exploration and viable wealth of resources amongst scientists. But before colonizing any region, it is indispensable to examine the area for harboring life. As the Saturn's moon Titan possesses a mammoth resemblance to Earth, an attempt to explore Titan by humans for a short-haul mission prior to settlement of a complete civilization is framed to prospect systematically. The biggest cloud on the horizon lies in sending the first astronauts to Titan for a short duration to explore and investigate. Titan has to be studied deeply in the regimes of environment features, surface aids and characteristics to accomplish the mission of landing on it. The paper encompasses the hold of such a spacecraft with humans encapsulating the compelling needs to drive and sustain within it. A didactic approach of space propulsion, space dynamics and biological outreach has been embarked for the survival of the crew. The spacecraft is propelled using Variable Specific Impulse Magnetoplasma Rocket (VASIMR) which generates a thrust of around 5.4 N at 200 kW total RF power to reach Titan sooner than by any other means. With the aid of Magnetic Shielding, the crew is protected from the harmful effects of the Solar, Cosmic and other radiations. Cryo-hibernation pods can further be employed to reduce muscle atrophy of the crew members. Additionally, the assistance of resources, spacesuit and surface characteristics of Titan have been manifested for the humans to accumulate data during the in-situ exploration and scientific experimentation to be conducted on Titan, later returning back to spacecraft in orbit, and then, Earth. It will also serve as a dual impetus of creating an ideal spacecraft for the journey along with the potential to reverse engineer it for other missions and aids to counter the adverse effects on the human body. Thus, while the cynosure of this paper lies in the journey of humans from Earth to Titan in a spacecraft, it also delves into the technical assistance on Titan, while remaining in the Saturn's orbit.