Design of an Orion space transportation system

Vision for Space Exploration (VSE) embodies a watershed chance to enlarge the depth and breadth for human exploration and development for today's and future generations. The launch of space stations has brought negative impacts within the environment and human health. For instance, China's launch of a 900 to (US) station into a 285 mile Low Earth Orbit with the use of Orion propulsion system and launch of a 1000 ton (US) space station into GEO by ESA have some negative implications. Consequently, this has necessitated a need for reorganizing the way of achieving these goals (Griffin, 2007). The situation also comes in the wake of a cut in the National Aeronautical and Space Administration (NASA), making it almost impossible to attain the objectives of VSE with aid of NASA's current strategy. This paper will therefore present a detailed discussion on the alternative technology that to be employed within the existing Space Transport System (STS) to ensure the negative impacts brought about are reduced to the their minimum levels.

Launching of a 100 ton (US) space station into Geosynchronous Earth orbit (GEO) will call for a new technology to allow a smooth transition and less negative effects on the environment and human beings. The best approach to start with is engaging DIRECT derivative of the present Space Transport System. The move will be possible through swiftly fielding the Orion Spacecraft through an access level version of heavy lift vehicles' latest family referred to as "Jupiter" (Griffin, 2007). In minimizing the costs involved, within the VSE's initial phase, the new technology requirements will make use of the existing infrastructure of STS. This proposal will not only promote the safety of the crew but also reduce the gap within the American based entry to space especially after the retirement of the space shuttle. The European Space Agency (ESA) and CSA will also draw the same benefits as their American counterparts because they all share a common goal within the STS.

DIRECT is the best because it is not a totally new idea as it retains the mainstream of similar manufacturing, equipment, and launch processing staff that is currently in use by STS, though leveraging present flying engines on other launch vehicles devoid of the necessity for expensive new progress programs/ and or "upgrades." Additionally, using America's only existing premeditated national heavy lift asset, developed over many years expensively for instance to launch a 1000 to (US) space station into LEO, will go along way in protecting all STS derivative strategies' foundation entailing the Ares-V in the future, whilst warranting exploration goals are realized if with the cancellation Ares-V (Griffin, 2007).

Griffin (2007) adds that through centering all endeavors on STS system's DIRECT derivative long lead, technically challenging and expensive machinery, like high aptitude upper phases and upgraded/new engines can now be moved off the crucial way for NASA and ESA/CSA's mission support. These vital long term aspects can be re-targeted for finishing point the commencement of the VSE's lunar phase. It is not likely that there will be any major enhances in the near term slips or budgets within the space shuttle's date of retirement. Therefore this approach will offer the logical solution to the dilemma faced within the Space Transport System because of the complex interaction of political, economic, environmental and engineering forces.

Dumbacher et al (2009) asserts that there are many benefits of the proposed new approach, DIRECT as it will enhance safety within STS and romance margin as compared to the Ares-I. For instance, the dual main engine configuration and higher performance of the Jupiter Launch vehicle gives Orion's crew the capability to endure an out-of-condition engine for the period of ascent to orbit, that could probably even save the mission. In the case of Ares-I, an out-of-condition main engine would instantly lead to a Loss of Mission (LOM) without choice and would initiate a likely hazardous abort scheme (Ashford, 1984).

Even both the Ares-I and Jupiter-120 launch vehicles encompass a Launch Abort System (LAS), there is the use of the proven systems, within the Jupiter, at lower ostensible operational freight levels to enhance crew safety. In addition, Jupiter-120 has a far much superior general arrangement relative to the Are-I with respect to control authority and structural loading allowing a wider range of satisfactory launch conditions and ascent eventuality planning. This further improves the mission rate of success.

Setting up of a lunar base on nearside is could easily solve some of the dilemmas within the STS because the moon is seen as an idyllic point for space explores to accumulate materials and human labor out the deep gravitational well of the earth (Ashford, 1984). However, there are many challenges involved as according to studies, establishing a lunar base could bring about more problems on the moon. Problems to do with lunar dust are inevitable, a thick layer of fine dust referred to as regolith envelopes the lunar surface and any slight destruction may cause it to build up on receptive power components, hampering their performance. Spacecraft operations will disturb considerable amounts of lunar dust hence any attempt to site it within the moon has consider positioning dust sensitive apparatus at a distance as far as possible from the pedestal centre of operations.

However, there is still good news that STS could still set up a lunar base on nearside but through a careful site selection approach integrating the lunar science's potentially completing interests, operational constraints, resource utilization and other important factors such as lunar landscape's topography, launch and landing trajectories of the transportation vehicles, safety considerations like free abort trajectories, probability of utilizing lunar resource, communications needs to, from and on to the lunar space and scientific objectives (June and Camp, 1983).

All potential hazards brought about by launching and testing spacecrafts have to be dealt with agency. Studies indicate that exposure to recurrent nuclear blasts cause the problem of erosion (ablation) of the pusher plate. According to experiments and calculations, ablation of less than 1 mm happen incase a steel plate is not protected. This is a problem that is easily solved through spraying with oil. Additionally spalling can happen hence destroying the pusher plate; this problem is solved however by using alternative materials such as fiberglass and plywood (June and Camp, 1983).

A serious problem could occur from a launch of the spacecraft from the Earth's surface, the nuclear fallout. Researches indicate that any explosion in the magnetosphere could bring fissionables back to the earth's surface except if the launch happened from a polar area like barge within the higher areas of the Arctic. Additionally, this will be the case when the opening launching explosion isa big mass of usual high explosive only to considerably reduce fallout; succeeding denotations would be in the air hence much cleaner (Griffin, 2007).

It is not viable to perform this in Antarctica as it calls for massive legal changes because the continent is currently an international wildlife preserve. The fallout could lead to fatal cancer. This problem has to be solved by launching the spacecrafts from above the magnetosphere to prevent charged fallout's ions within their exhaust plasma, from being trapped by the magnetic filed of the earth and also avoid being returned to the Earth.

To conclude the whole discussion about developing new technology for Space Transport System to reduce hazards that could be associated with it, it is important to emphasize the safety of the environment, crew members and the health of general public has to carefully put into consideration. This way, there will be goodwill from all the concerned individuals because of safety.

Reference

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