

Controlled Landing of Space Capsule

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Abstract:-Space capsules are used in space missions during re-entry, perilous situations and when there is a necessity to abandon the mother ship. In the prevailing desertion techniques there is a lack of disciplined guidance of space capsules. Due to this inviolability of men and materials are at risk. In this paper we deal about manipulated landing of space capsule. We are putting forward a manipulative ship inside the space capsule. This ship consists of retractile horizontal and variable sweeping wings for reliable. In every manned capsule there is a space craft instrument panel is available, with that balance landing may achieved for our requirements. With this approach controlled landing of space capsule is achieved and avoiding the needs of landings on any water bodies and rescue missions of astronauts. This tactics can also be implemented in inter planetary missions. This method can be also implemented in military and commercial aircrafts during emergency situation.

Key words: *Space capsule, control landing, Pyrotechnic bolt*

I. INTRODUCTION

Escape pods are aircrafts that are used during mayday situations to escape a vehicle. Routinely escape pods are fabricated for single occupant but periodically it is used for more occupants. The occupants should be protected from the varying temperature outside and the radiation. The inner temperature should be under control supporting the stability of life inside. To avoid the drifting of the astronauts due to the absence of weight inside of the capsule, seating arrangements are done with seats and straps. It also contains the communication system to communicate with ground system.

Generally the space capsule is frustum shaped with one end totally blunt to shield from high temperature. This blunt configuration system is basically needs for a large angle of attack and also to avoid overheating to the system. The body of the capsule is made up of titanium coated with fiberglass covered with nickel-steel alloy. The base is made of fiberglass and phenolic resin. The material which is used for mini ship should be highly strengthened to avoid damages occurred due to the space capsule travelling at very high speed, mean while it should be light weighted as well as corrosion free material. These properties are suited to aluminum alloy especially duralumin. So we can use duralumin to fabricate mini ship.

It is enforced to secure the crew from threatening situations during the re-entry and also for the protected landing of the crew. But the guidance and the landing of the escape pods are undetermined due to the use of uncontrolled parachutes. Due to lack of navigation the co-ordinates of the landing cannot be predetermined. The objective of the research is to construct an mini ship within the escape pod with a smaller cryogenic chamber, batteries, food, oxygen tanks and control system. This ship has a retractable wing with the fixed horizontal and vertical stabilizers.

After the deployment of parachute inside the atmosphere the escape pod reaches the lower altitude and also the descending velocity of the pod is drastically reduced. Then the highly heated base shield of the space capsule is ejected through explosive detonation then the top layer is carried above by means of the parachute thus deploying the mini ship inside the capsule which is later

PROPERTIES	CAPACITY
Input stimulus	3.5 amp (when electrically initiated) 4.5 amp/4.1 millisecond
Tensile strength	Upto 123645.5 N
Operating temperature	-65 °F and up to +270 °F
Separation time	<10 milliseconds after application of all fire input stimulus <5 milliseconds at greater currents

controlled and manipulated to achieve a safe landing.

II. METHODS AND THEORY

A **pyrotechnic fastener** is a nut contains explosive charges which can be activated from remote distance with the help of electricity, and the charge breaks the bolt into two or more pieces.

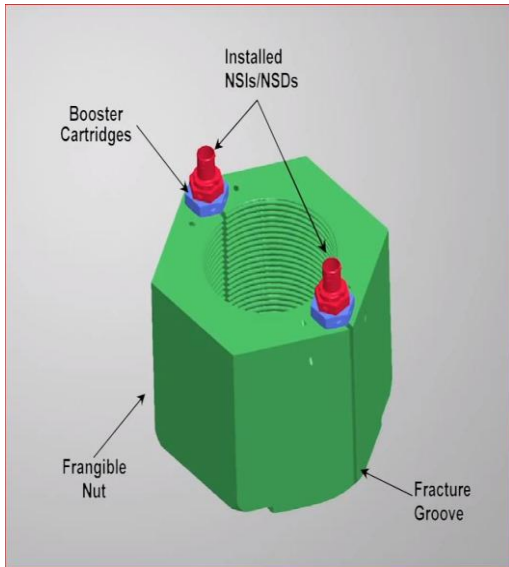


Fig.1 Pyrotechnic bolt

Here we are using exploding bridge wire detonators which are capable of using wire exploding method at higher speed using electricity or we can also use laser diode to detonate with the help of fiber optic cables.

In the mini ship variable swept wings are used to accommodate the lesser space. These swept wings are capable of sweeping the wing to the rear and return to its authentic position during flight. Thus allowing the mini ship to be more aerodynamic by using variable geometric positioning of the wing. While stored in the space capsule the wings of the mini ship is in swept position.

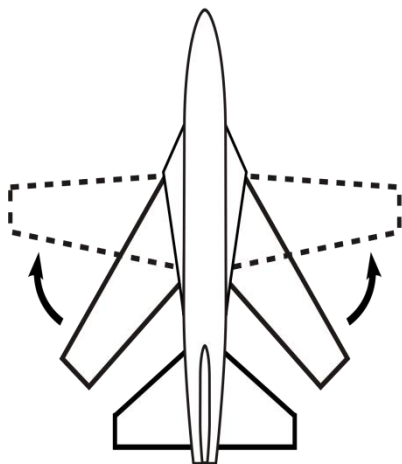


Fig.2 example of aircraft design

The base heat shield of the capsule is attached to it by means of pyrotechnic fasteners and connected by exploding bridge wire detonators. Once the capsule reached a required altitude the parachutes are deployed and the detonators are actuated thus creating a chain reaction of explosion exploding the bolts around the base shield thus detaching the base shield from the main frame of the capsule. Then due to the buoyancy of the parachute the

main frame of the capsule is lifted up thus deploying the mini ship into the atmosphere. The ejected mini ship is controlled by the occupant and the swept wings are retracted back to its original position. Because of this, the higher velocity of the mini ship created by the swept wings is reduced to a safe cruising. Using the cryogenic fuel the mini ship is propelled and with the help of primary and secondary control surfaces. With the help of retractable landing gears safe landing can be achieved.

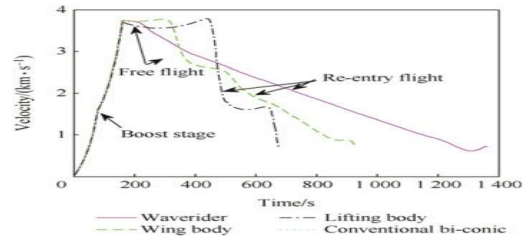


Fig.3 Body analysis for re-entry capsule

DISCUSSION AND CONCLUSION

We are proposing this ideology for the welfare of human lives involved in space missions which are at stakes during re-entry. With this ideology we can accurately select the landing base and also navigate the re-entry capsule. Thus contributing to the developing manned space missions.