

Mist Mining and compression filter design in zero gravity

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Abstract

The author presents a novel design of mining asteroids in zero gravity that is more efficient than present concepts as it leaves unwanted materials and unlocks potential to come back with refined minerals.

Keywords

Mist mining, Zero Gravity, Abrasive, Refining.

Introduction

Present machine design for mining asteroids include methods such as scraping, drilling, heating, cooling, bending and many more and it must be noted that in all the methods mentioned mist formation must be avoided. This particular design presented uses mist formation method to mine the asteroid in one go and uses design presented in paper titled, "Space structure design for refining minerals in zero gravity" [1] for refinement. A step by step innovation can be seen in the failed attempt depicted below. Dimensional liberties have been taken.

Failed Concept

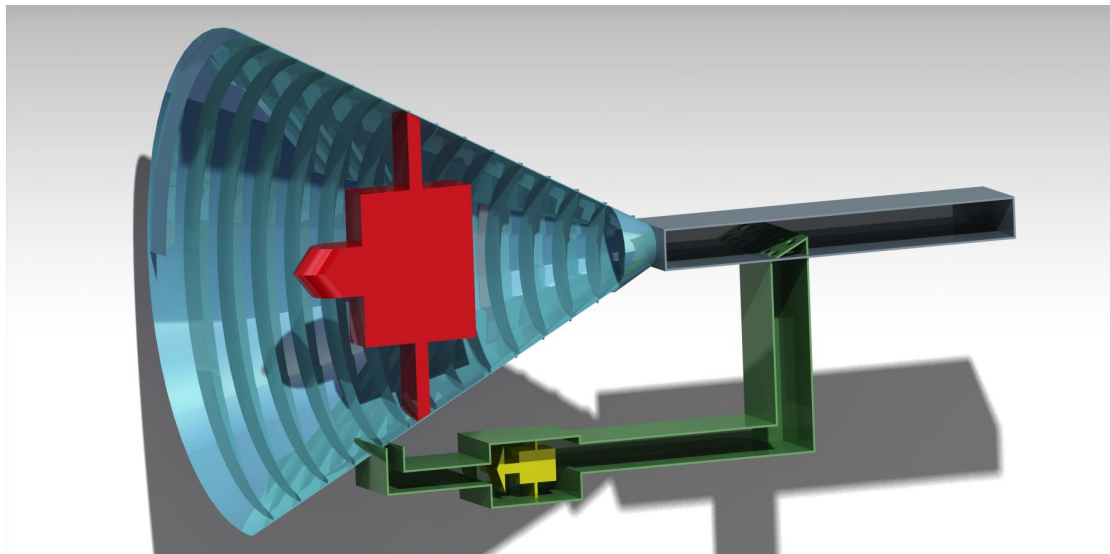


Figure 1

In figure 1, the design utilizes 4 structures: Funnel integrated with helical protrudings (blue) , abrasive mining mechanism (red), collection and translation tube (grey), gas passage with integrated compressor/suction-er and filter. The design failed due to the fact that gas will push funnel away from asteroid.

Innovated Design

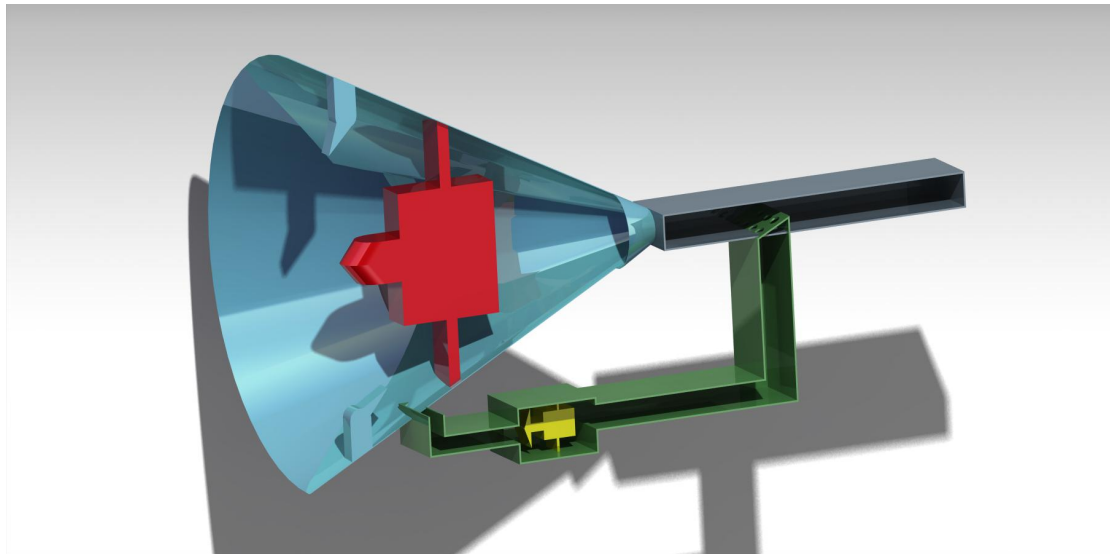


Figure 2

In figure 2, the helical protrudings have been replaced with flaps to push the mist inside the cone.

Conclusion/Remarks

The collection efficiency has been greatly improved not upon the failed attempt, upon existing methods and when combined with zero gravity refiner, the vessel can return with much success than other available methods as author's knowledge. Topology optimization is needed and on the outer rim of cone, sorbothane is suggested for keeping a firm grip on asteroid surface with much needed force, the micro-modules of these design and the one referenced should also be conceptualized to further innovate for efficiency. It must be noted that the flaps motion must be in accordance to density and not constant as can be seen in atmosphere on earth as a generalized observatory fact that the motion of most birds gliding and honeybee flapping is mostly due to the effect of surrounding air molecules and their respective concentration around the surface of wings and less because of weight of birds themselves. The bird's wings feel fluid (air) less dense than the insects, that's why the rowing action is more prominent in insect's wing motion.

References

[1] Shukla, Deepanker. "Space structure design for refining minerals in zero gravity."