Space structure design for refining minerals in zero gravity

Deepanker Shukla

Independent Researcher

incdsg@yahoo.com

ORCID 0000-0002-3870-0761

Abstract

No techniques to refine minerals in zero gravity currently exists and emphasizing on this, the author of this paper has designed a space structure.

Keywords

Refining Minerals, Zero gravity, Space structure, Asteroid, M-type.

Introduction

Most of the asteroids can be categorized into 3 types namely, C/S/M , mostly water, somewhat metal and mostly metal respectively. Besides theses there are several other asteroids but they constitute less percentage and near extinct comets are mostly water. Refining minerals in zero gravity might not have had been this big of a problem if it wasn't for the vacuum part, as it makes convection and conduction of heat away from structure a big challenge. Even then cooler and big radiating fins could have been added but refining using conventional methods generates a tremendous amount of heat that compounds the innovation needed within those methods. As thermal expansion is the elephant in the room, a novel design from scratch is needed upon which a new set of innovations can be done and as a whole, future space refining industry can rely.

Design

For the design process a set of rules have been kept priority:

i) Least amount of possible heat generation.

ii) Separate stages and no stage contributing towards more than one end goal.

iii) Least amount of electricity required cause power generation can lead to huge amounts of heat generation.

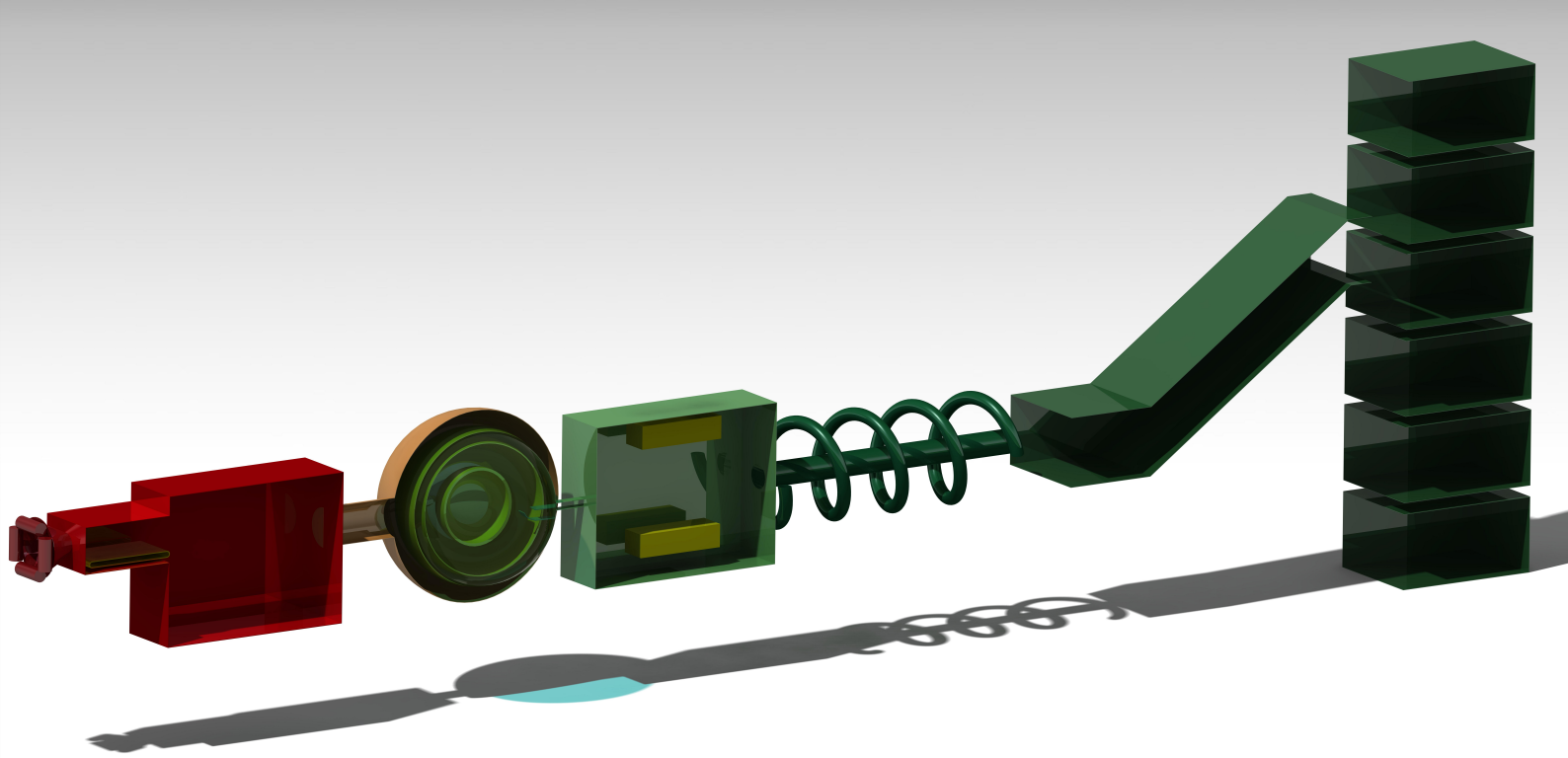

Figure 1

From the left:

Intake of ores by grinders into a storage area with conveyors.

In second container, centrifuge machine separates low density particles from high density, preferably by mixing mercury (or similar liquid) into it which can be filtered out by moving porous plate through or similar fabric through mixture.

In third container, magnets separate particles accordingly and must be moved separately into next processing chamber.

In forth tube, electromagnet can melt metal particles through induction heating. This process can be removed by adding more layers of centrifugal processing to ensure thermal expansion stays at bay, or can be configured into modules for specific types of particles (profitable) as needed but with equivalent cooling.

The fifth and last part has to be sorting system with different parts of structures carrying out their own mechanism so as of whole structure sorts adequately.

Conclusion

The seemingly simple design while itself an innovation upon multiple inefficient processes on themselves, can act as sketch/bridge for further innovations to build upon and can benefit from papers such as given in reference. [1] Further research is needed to manufacture end produce (sorted) into useful in space.

Note

Just as different fields of applied science requires their own morality and expertise, this specific field of manufacturing in space would require its own. As it will be tirelessly expensive to use same manufacturing process, it will also be tirelessly expensive to use same produce such as different metals, alloys and composites that humanity uses on earth to manufacture requirements on space, thus further research is required to make the end product still contaminated from theses processes (as their end goal was to generate least heat to reduce thermal

expansion of the structure), and use those alloys that have generated by the refining processes used in space. The author have kept in mind that to change a system/institution like this step-by-step process is required, and has only added this note with intent of available research to be used within those future innovations in terms of composites generated.

Reference

[1] Seebeck and Peltier : Conceptualizing Passive electrical energy generators for totalitarian space structures of the future (https://doi.org/10.31224/2594)