

# Regolith as a Service: Enabling End-To-End ISRU Operations

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# Bulk Material Handling Systems



POLIMAK is an engineering company of +45 years specializing in bulk solids handling technologies across multiple industries.

## Locations in

Turkey, USA, Germany, UK, Scotland

## Team

Over 100 highly skilled professionals.

## Delivering Solutions for

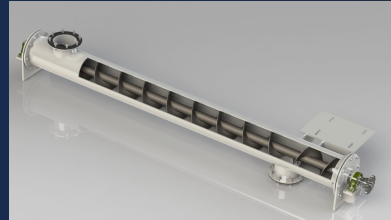
- Mining
- Chemical processes
- Energy
- Materials handling and logistics
- Construction & Infrastructure
- Environmental technologies



Excavation  
&  
Collection



Transport



Conveying  
&  
Feeding



Storage

## Others

- Loading
- Filling
- Discharging
- Crushing
- Grinding
- Dust mitigation
- Drying
- Screening
- Separation
- Mixing & Blending
- Bagging & Packaging
- Weighing & Dosing



Image Credit: NASA

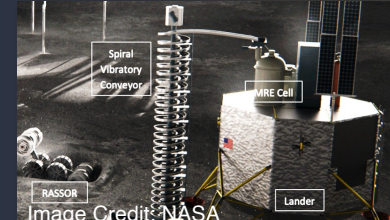


Image Credit: NASA



POLIMAK SPACE is a spin-off established to apply terrestrial expertise toward developing solutions for space resource activities.

## Locations in

The Moon, Mars, Asteroids, and beyond

## Team

Four ambitious professionals with big dreams.

## Developing Solutions for

- Lunar construction
- Water & O<sub>2</sub> extraction
- Helium-3 production
- Metals extraction
- Propellant production
- 3D printing
- Thermal energy storage

## Enabling scalable lunar industry through regolith infrastructure

We enable ISRU operations and bring the whole ecosystem together by delivering essential regolith handling infrastructure. Our patented Modular Drum Conveyor (MDC) system provides a modular solution that supports the entire ISRU chain.

### Delivering regolith:

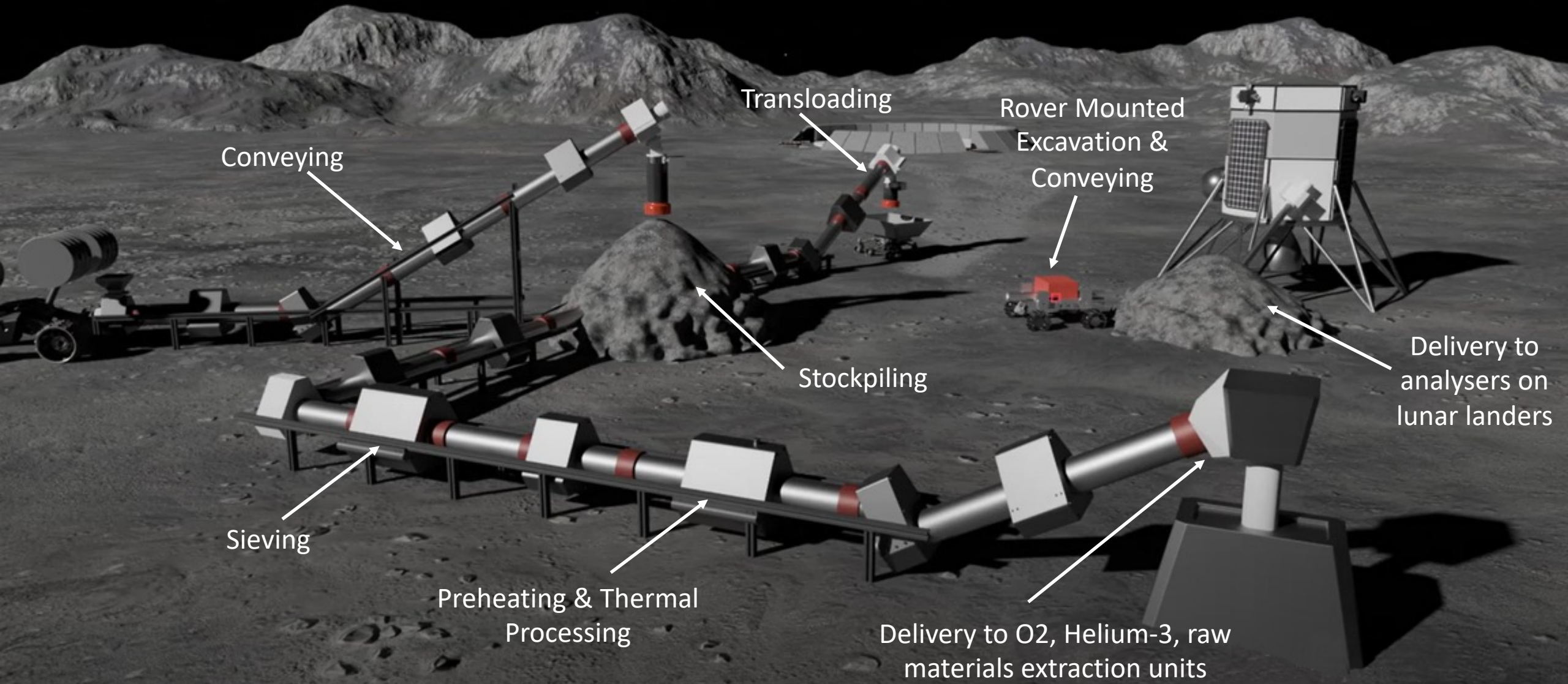
- In the right amount
- At the right time
- With the right size
- At the right temperature
- With the right composition



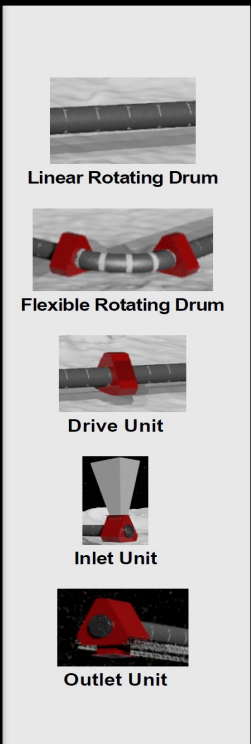
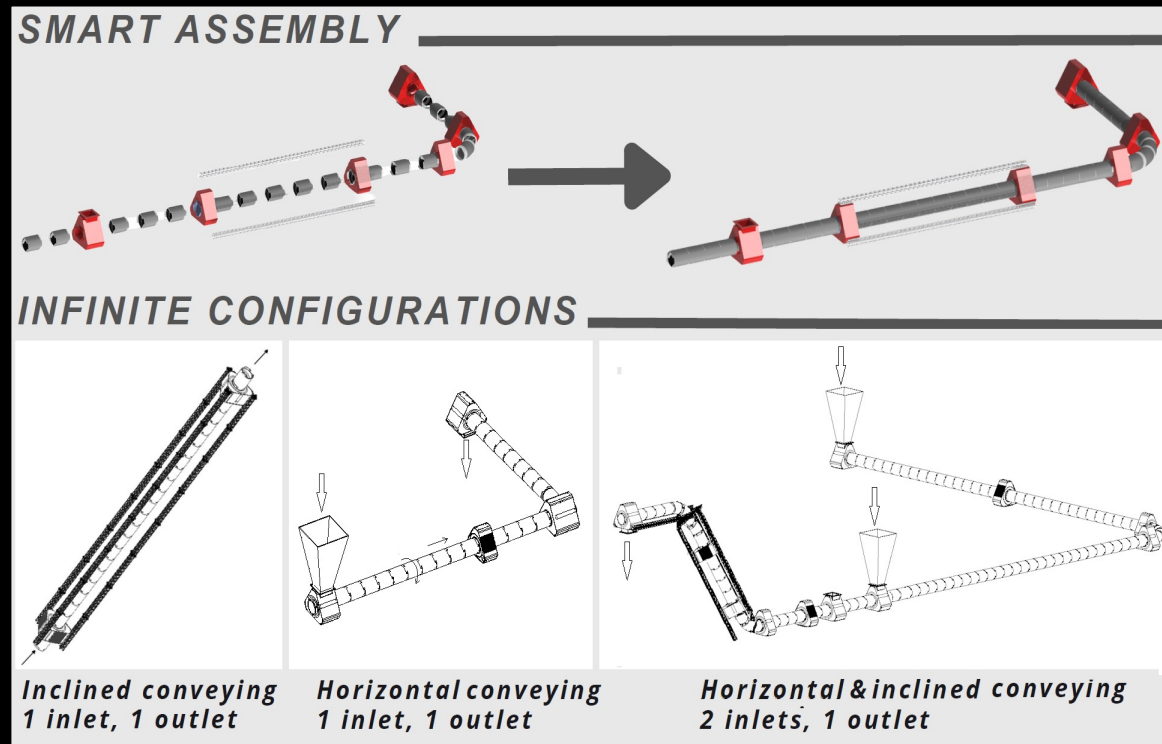
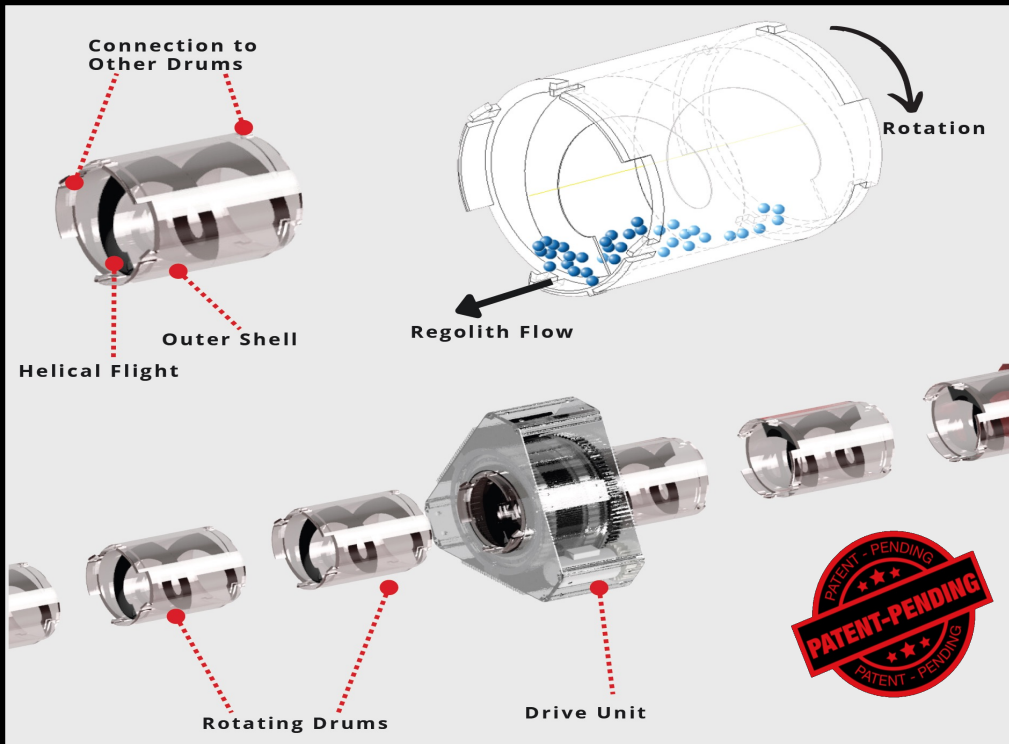
### Delivering regolith for:

- Lunar construction
- Water & O<sub>2</sub> extraction
- Helium-3 production
- Metals extraction
- Propellant production
- 3D printing
- Thermal energy storage

# Regolith Pipeline: Optimized Regolith Delivery and Processing



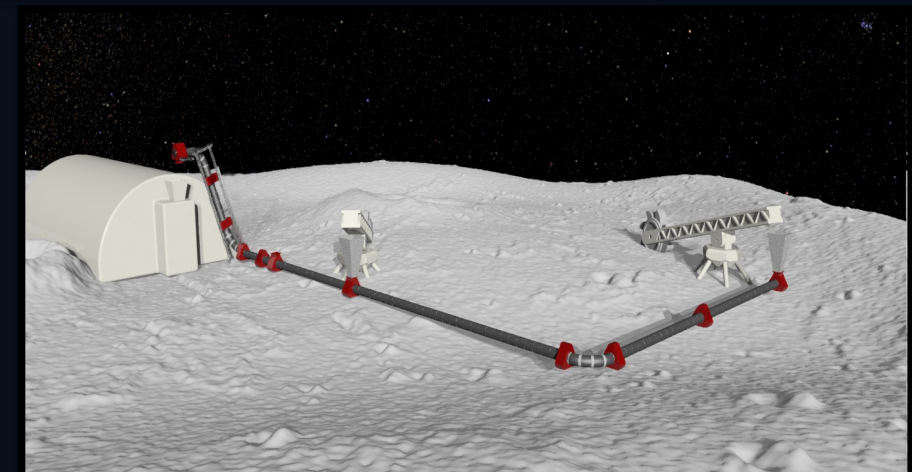
# Modular Drum Conveyor (MDC)



The modular drum conveyor facilitates the effective transport of space resources between excavation areas, construction sites, processing units, and lunar landers.

## Key Features:

- Modular design for endless configurations, conveying routes and distances.
- Suitable to install on rovers for excavation and transportation
- Fully contained conveying minimizes dust emission and damage on mechanical parts.
- Minimized abrasion due to rolling of particles instead of forced sliding
- 50% of the parts can be built and sourced from local raw materials.



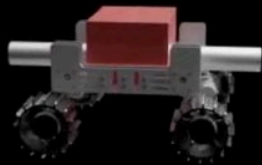
## EXTRACTION

## BENEFICIATION

FEEDSTOCK

HANDLING

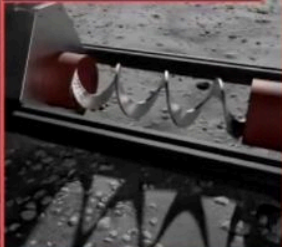
CHARACTERIZATION



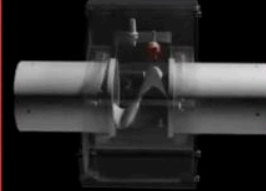
ROVER MOUNTED



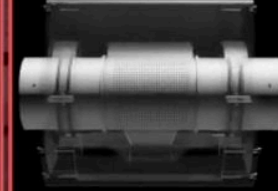
STOCKPILING



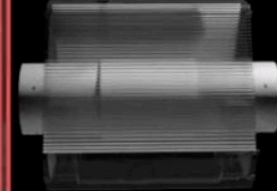
MDC PIPELINE



SENSOR MOD.



SIEVING MOD.



HEATING MOD.

LUNAR  
TESTBED  
INSTALLATION

SCIENTIFIC  
PAYLOADS

REGOLITH  
BASED  
BUILDING  
MATERIALS

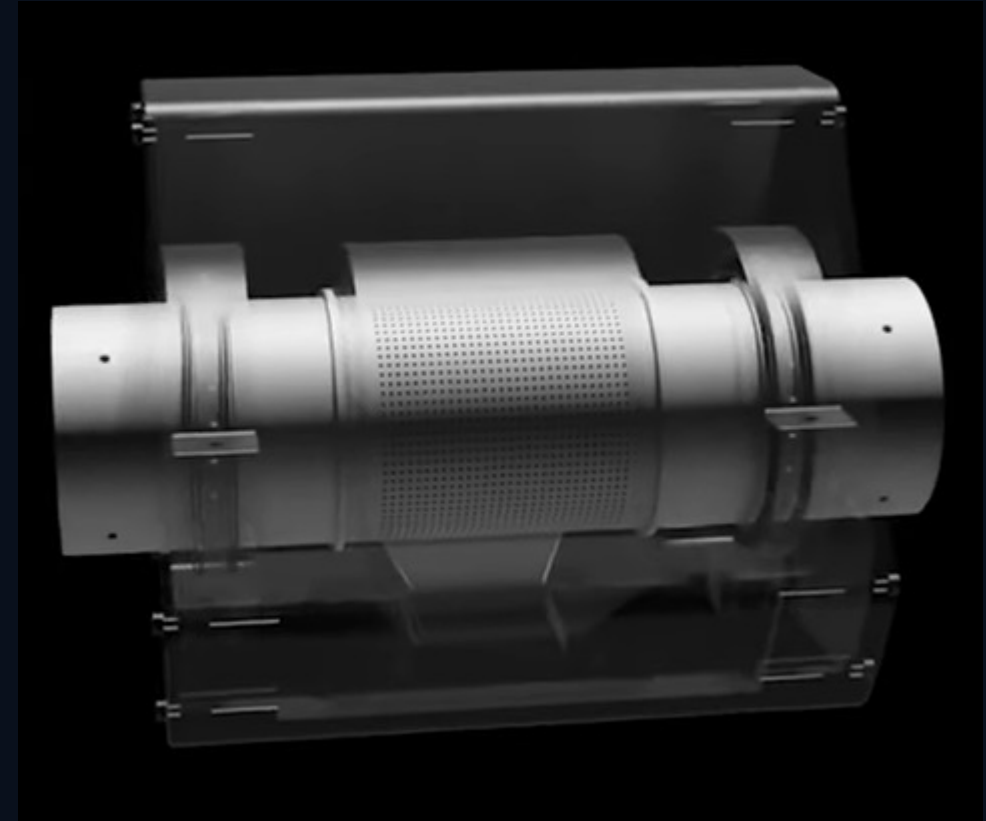
OXYGEN  
PRODUCTION

WATER &  
METALS  
EXTRACTION

THERMAL  
ENERGY  
STORAGE

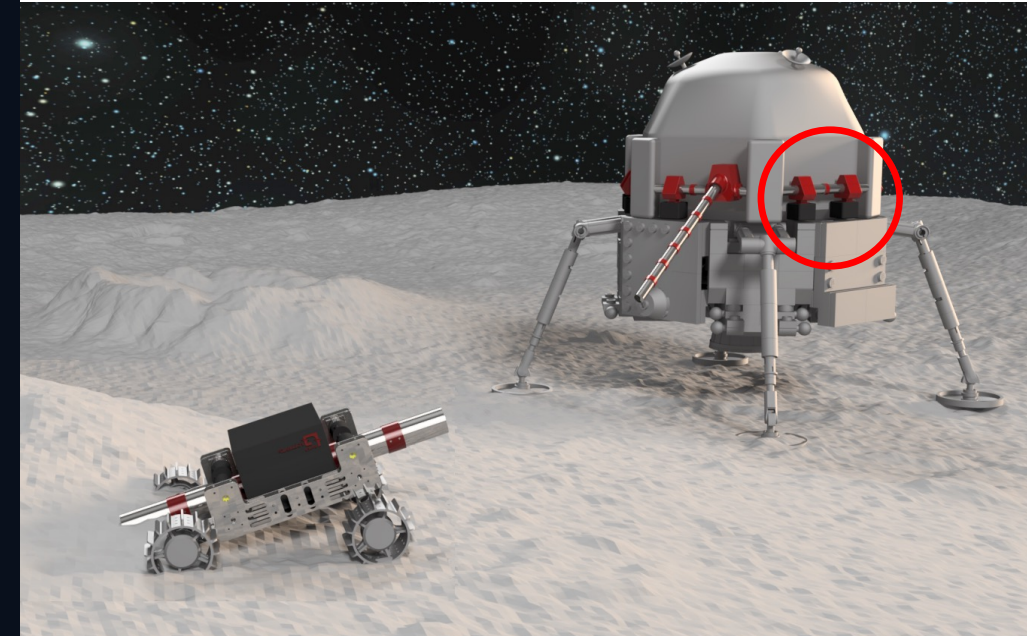
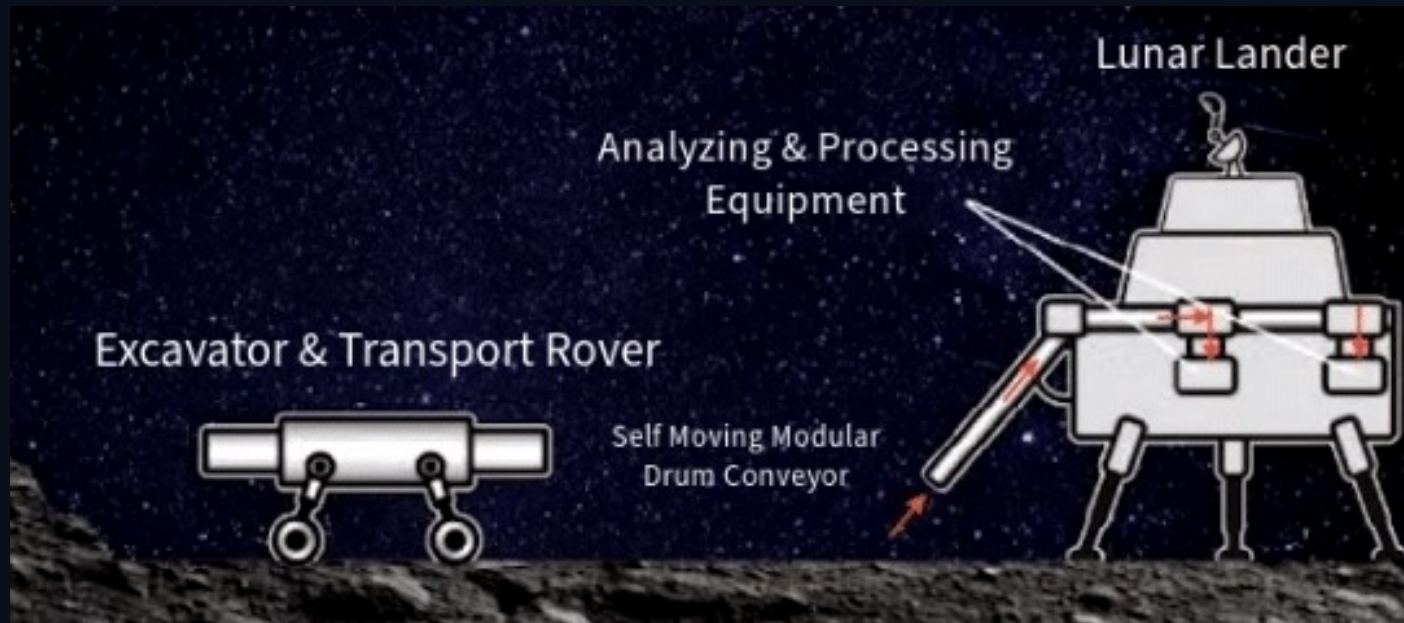
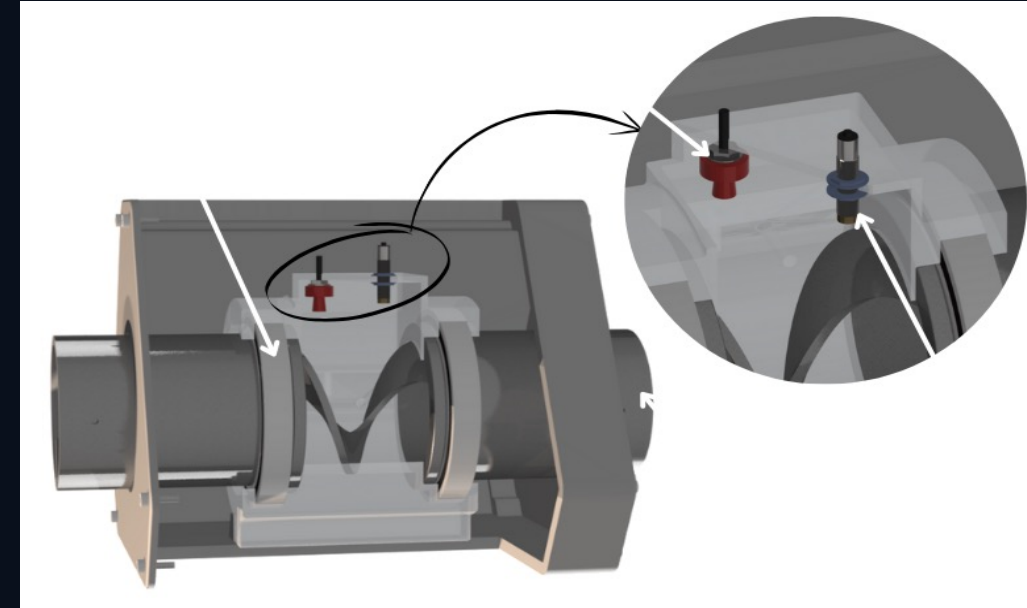
## Sieving Module

- Separates regolith into different particle sizes in a compact design.
- **Self-cleaning mesh** design prevents blockages and minimizes maintenance.
- Finer particles directed to oxygen extraction and 3D printing.
- Coarser particles used for construction and shielding.
- Patent application is ongoing



## Multi-Sensor Regolith Sample Feeder Module

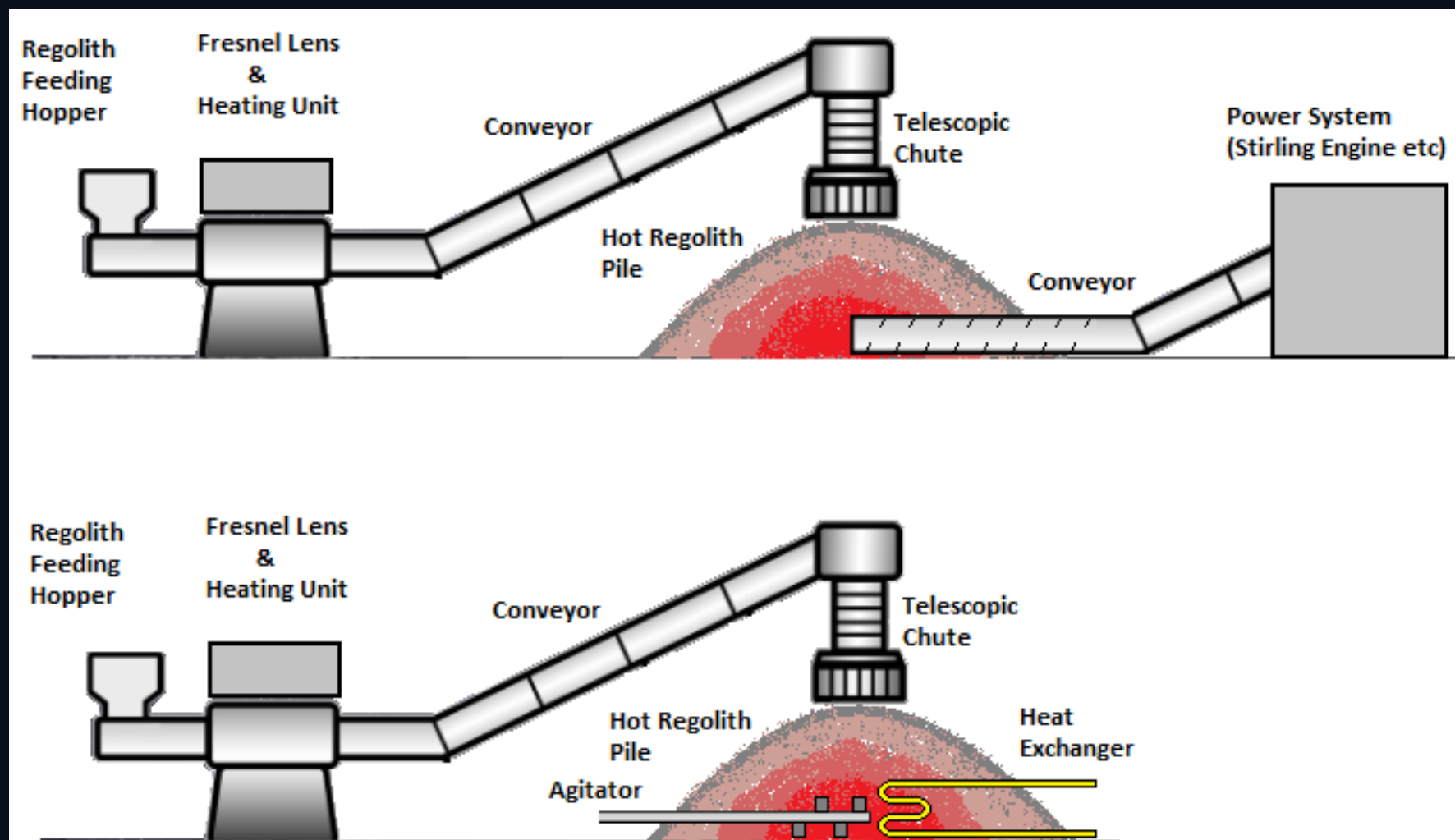
- The Sensor Module features multiple sensor connection ports. Its integrated conveyor unit collects regolith from the surface, distributes it to all connected sensors and discharges it after analysis is complete.
- Enables the delivery of regolith samples to third-party sensors or analyzers for scientific measurements.
- Designed for integration with lunar landers, rovers, and fixed lunar structures.
- Supports multiple measurements from different locations.
- Reduces overall payload weight by minimizing mechanical components through a single interface for connecting multiple sensors.



## Thermal Energy Storage System

Thermal Energy Storage System stores heat from regolith preheated by Fresnel lenses during lunar day, using its natural insulation to retain energy.

Integrated with the MDC and Preheating Module, it enables reliable heat supply during lunar nights for power, heating, and ISRU.





### Astroport (US)

- Astroport was awarded NASA STTR Phase 2 to develop concepts and system architecture for lunar launch and landing pads. Polimak contributes to regolith handling system development as a consortium member.

### Orbit Recycling (DE)

- Research on the use of orbital debris to manufacture MDC parts directly on the Moon.

### Fraunhofer IPK (DE)

- Development and demonstration of MDC drum components and pipeline segments through casting of molten regolith simulants.

### ESRIC (LU)

- Receiving support from the ESRIC Startup Support Programme to advance our ISRU technologies and move closer to commercial readiness in the space industry.



### University of Greenwich (UK)

- Development of a 1/6th density regolith simulant to replicate lunar regolith flow behavior under Earth-based test conditions.

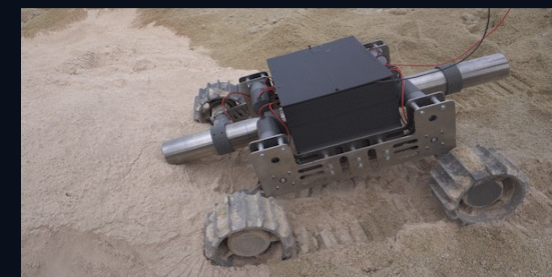
- Design of a compact regolith characterization device intended for use in lunar missions, enabling in-situ assessment of regolith flow properties across diverse surface conditions without the need to return samples to Earth.

### Middle East Technical University (TR)

- Establishment of a lunar testbed facility focused on robotic testing and regolith handling systems.

### #TheMoon Lunar Yard (DE)

- Field testing of MDC systems under simulated lunar conditions to evaluate regolith handling performance.



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