GREAT STEP 2023

National Mining Innovation Challenge (NMIC)

TEAM NAME :- AVINYA

TEAM MEMBERS:

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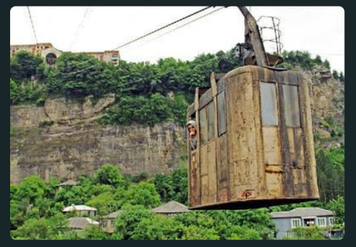
PROBLEM STATEMENT

Approaches that can be employed in Indian Surface Mines to reduce the fuel cost and CAPEX greatly with the help of gravity.

EXISTING SOLUTIONS

HAUL TRUCKS

Leads to large-scale deforestation



PIPELINES

Used for minerals transported in the form of slurry

CONVEYER BELTS

High untapped potential

CABLE CARS

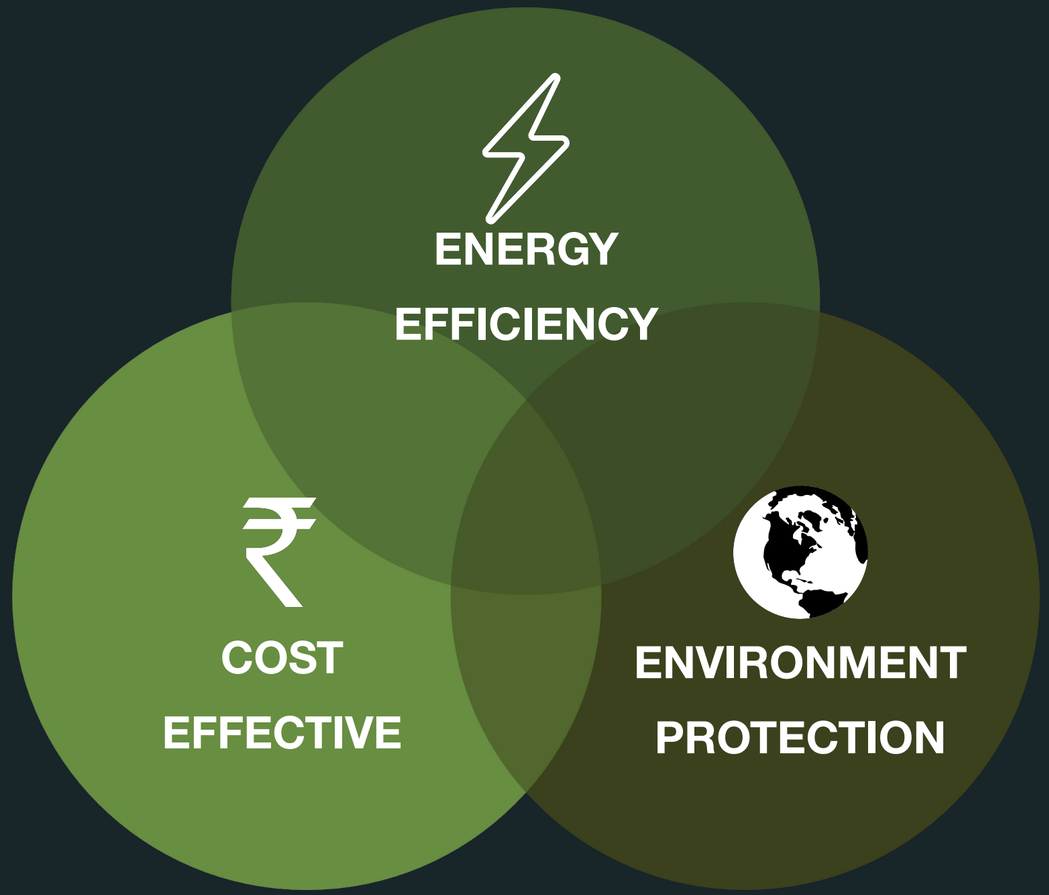
Limited capacity

AERIAL TRAMWAYS

Limited capacity

NEED FOR BETTER METHOD

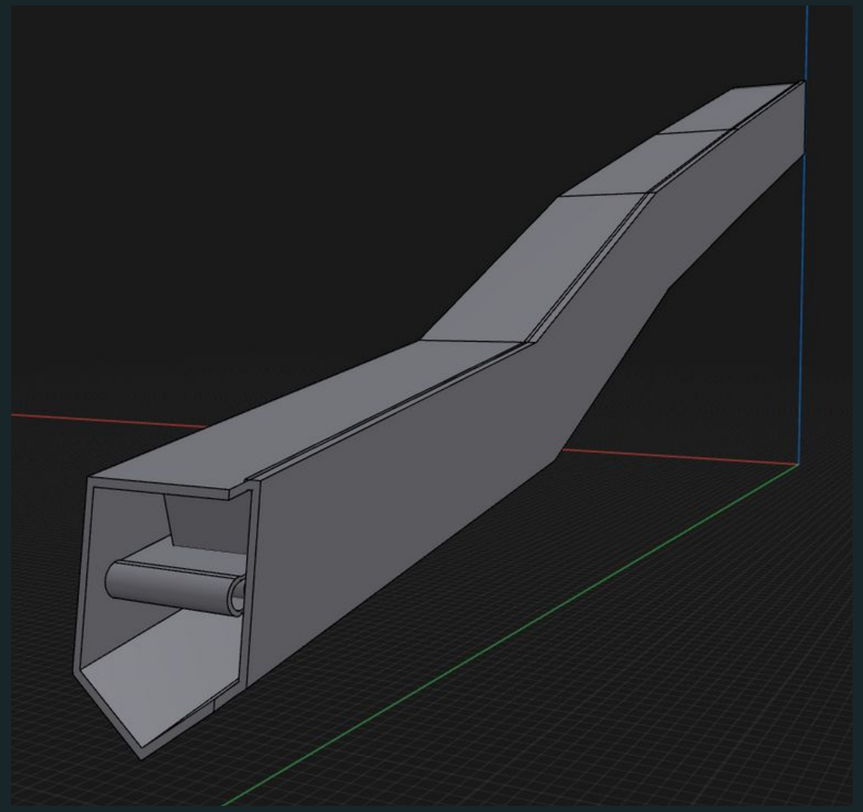
Mining operations involve the usage of machinery with high power consumption

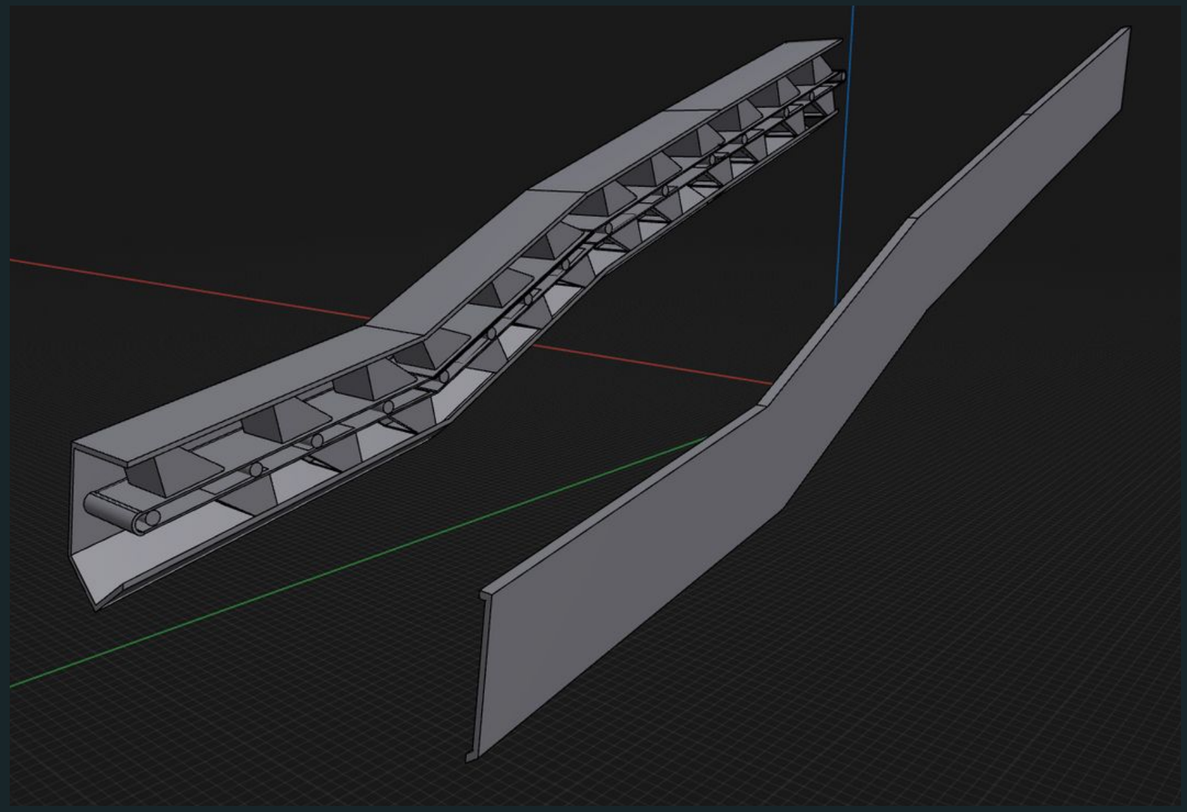


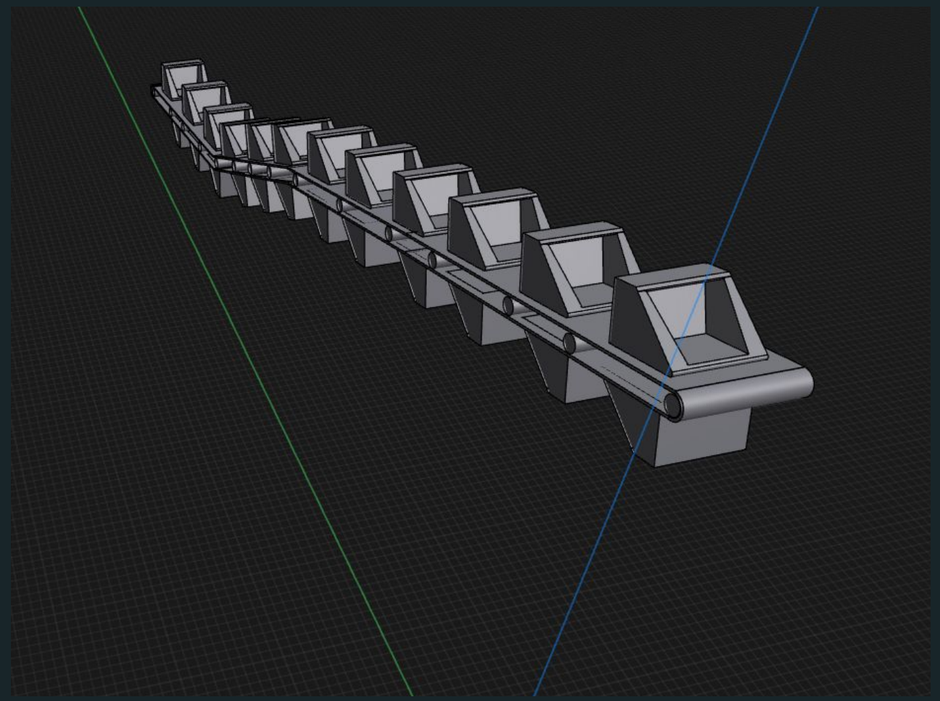
Tend to be highly capital-intensive

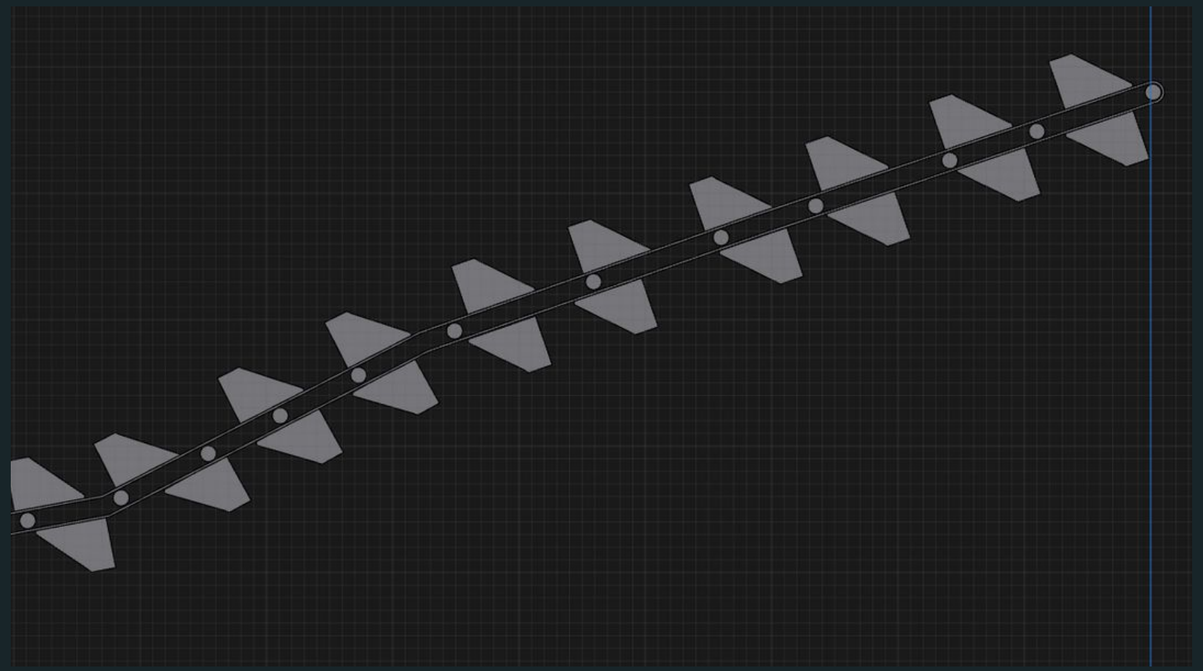
Ideal process will minimize such damage to our environment

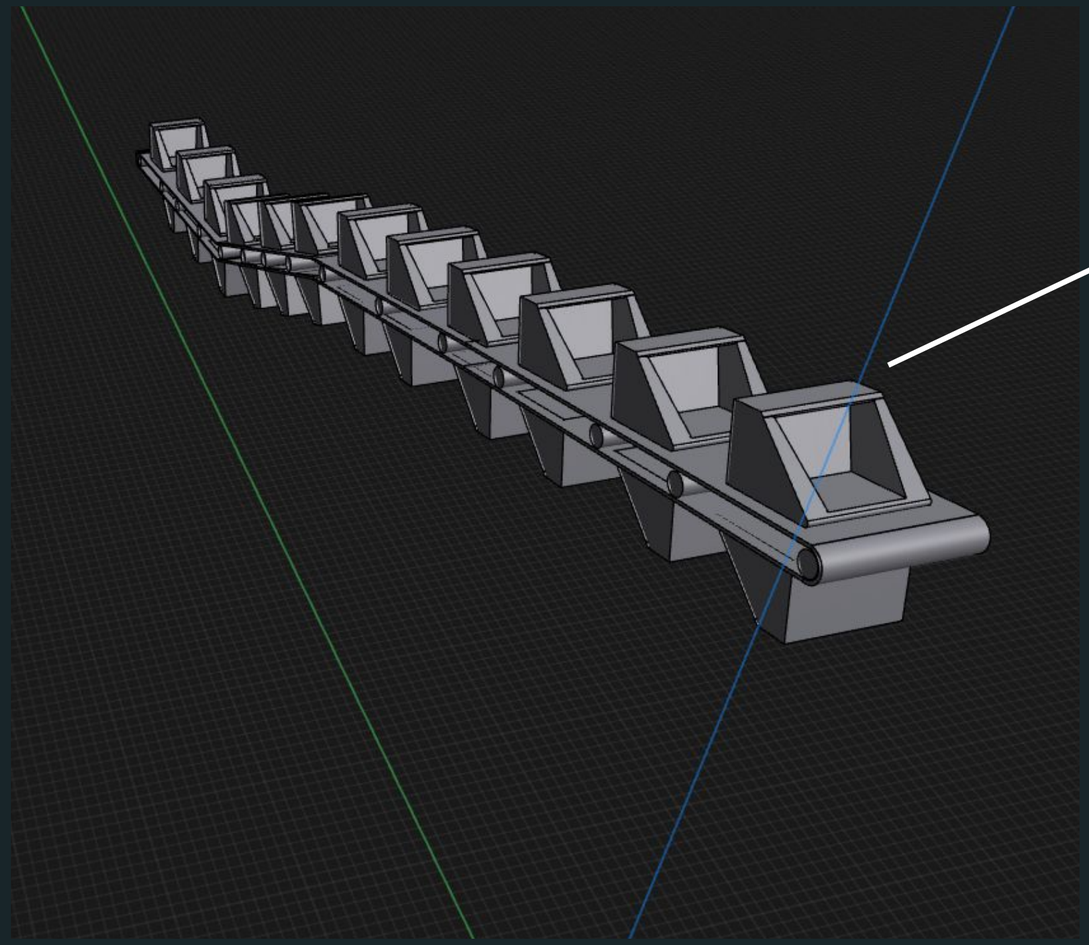
OUR SOLUTION: AXIOPIT

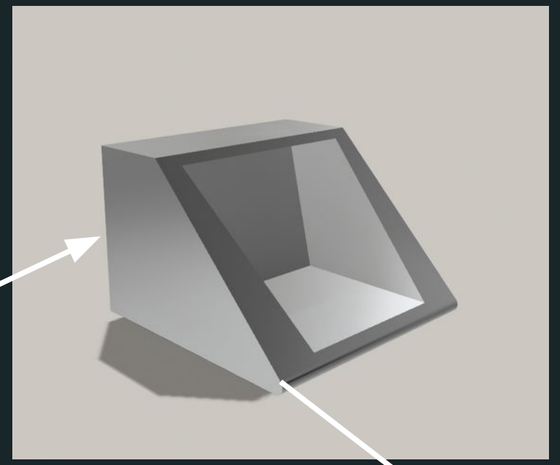


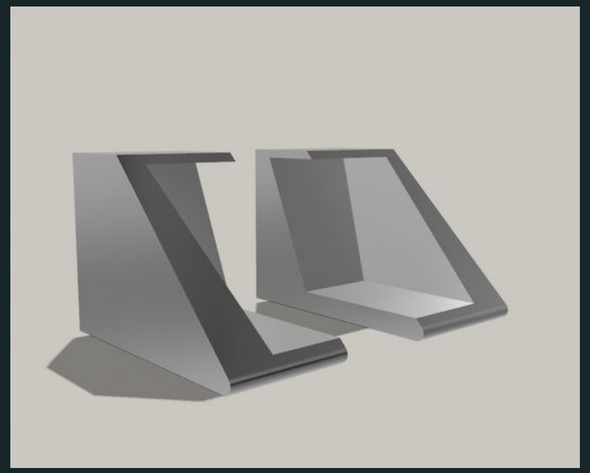






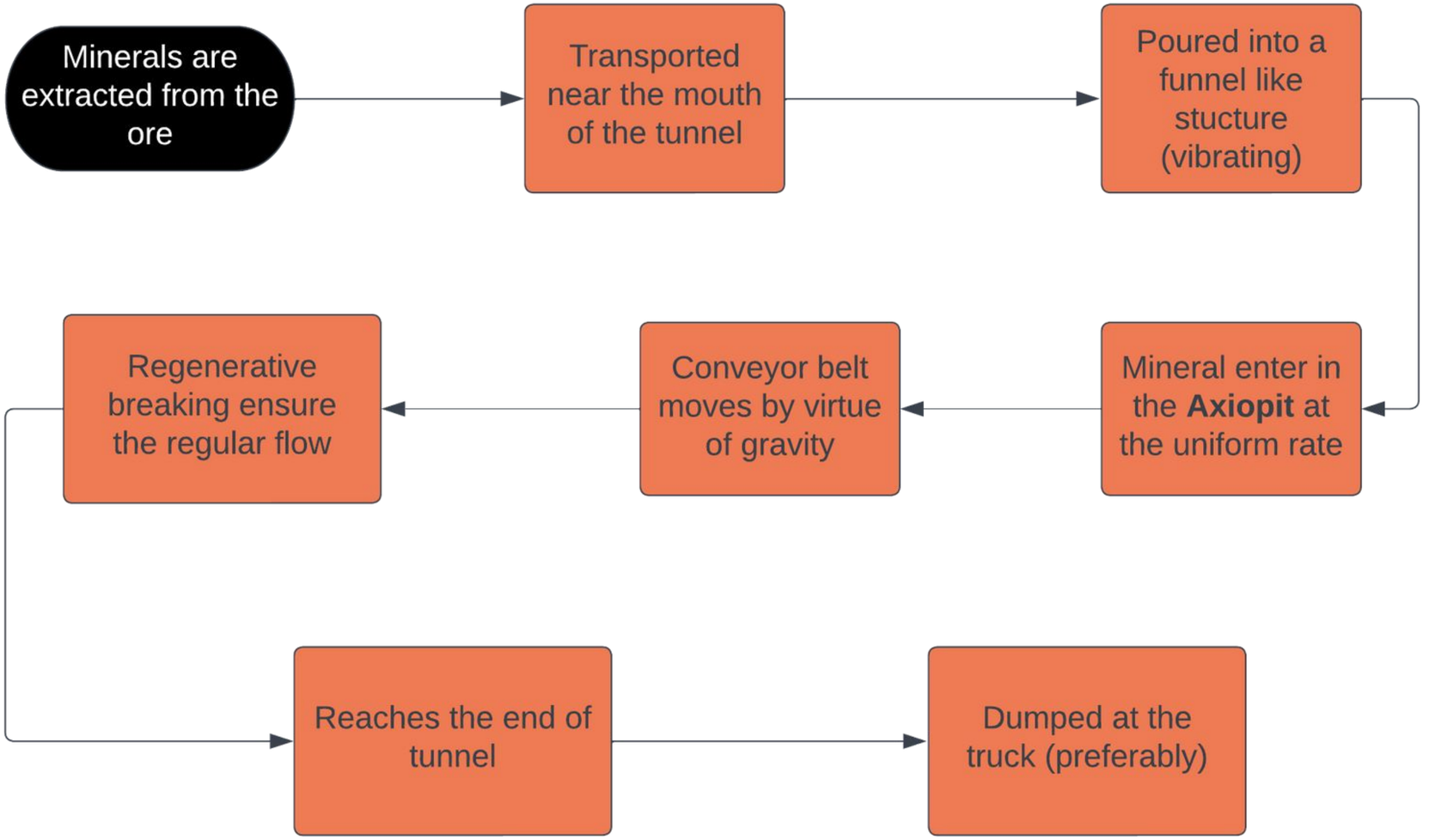






WORKING PRINCIPLES

FLOWCHART


Minerals are extracted from the ore
Transported near the mouth of the tunnel
Poured into a funnel like stucture (vibrating)
Mineral enter in the **Axiopit** at the uniform rate
Conveyor belt moves by virtue of gravity
Regenerative breaking ensure the regular flow
Reaches the end of tunnel
Dumped at the truck (preferably)

CALCULATION

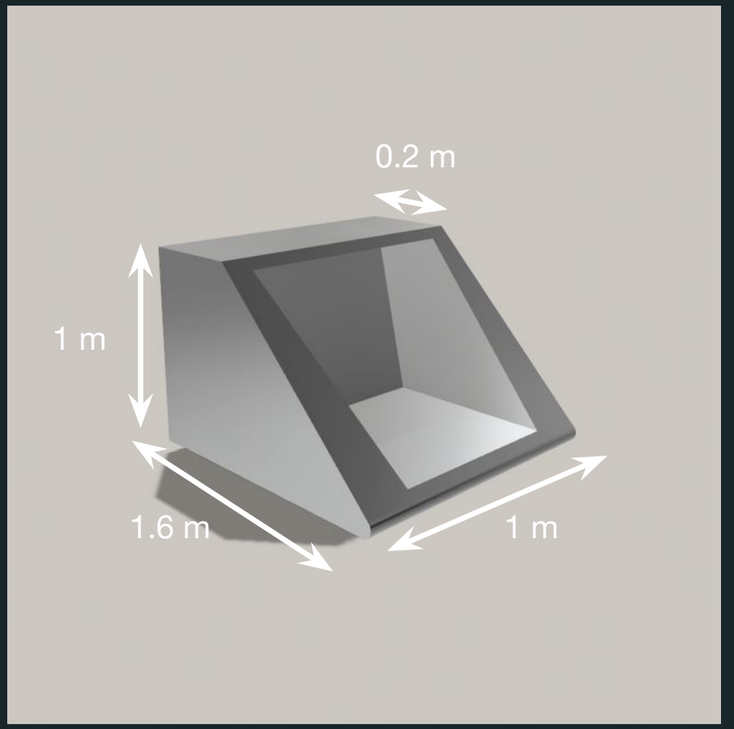
Assumptions:

- Slope range: 20 degrees to 45 degrees
- We have assumed a nominal speed of 1.75 m/s
- The average amount of coal produced in mines is 20865 metric tons
- The average density of coal is 1.3gm/cm^3
- Volume of coal = 15384 m^3
- Total working hours per day = 18h

Hence we have to transport 854.7 m^3 per hour

If each carrying plate can carry 0.75 m^3 of coal then the average distance between such segments can be taken to be around 3m

Thus, each compartment will have close to 1 tone capacity.



DIMENSIONS

FEATURES

ENERGY EFFICIENT

COST EFFICIENT

VERSATILE

SOFTER ON THE ENVIRONMENT

POTENTIAL BACKUP OF THE ENERGY

CONVERTS THE EXISTING POTENTIAL ENERGY OF MINERALS TO ELECTRICAL ENERGY

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THANK YOU

FAQs

- What measures have been taken to ensure that any mined minerals do not accumulate in the tunnel?
- How will the conveyer belt be maintained? Will the entire belt have to be replaced due to localized damages?
- What if one of the pulleys stops working all of a sudden due to some problem?
- How will it be ensured that varying inclinations do not prevent the smooth functioning of the conveyer belt?
- How will we prevent slacking of individual compartments?
- How will we introduce a backup braking system in case of emergencies?