COLEGIO BAYARD

Mission to Mars

Stage 4:

What type of propulsion do you choose?

Solar panels: 2,000 kg (estimated) Hydrogen fuel and liquid oxygen: 2,000-5,000 kg (estimated)
Excavation machinery: 2,000-5,000 kg (estimated)
Shovels for digging: 9 kg
Food and drink: 11,970 kg (estimated)
Samples of microorganisms and/or Martian soil: 5 kg
Adding up these components, we get an approximate total weight range between 15,459 kg and 23,459 kg, as mentioned above.
using as an example the spacex starship that weighs approximately 4700 tons and everything we are going to carry would give us between 4,715,459 kg and 4,723,459 kg

Given the estimated total weight of the spacecraft and the voyage duration of approximately 3.5 years, we would have to consider a high-thrust, high-efficiency chemical engine to provide the necessary power during critical phases of the voyage, such as launch and maneuvering. insertion into the orbit of Mars.

A suitable chemical engine for this mission could be the Liquid Oxygen/Hydrogen Propulsion Engine (LOX/LH2). This engine is known for its high efficiency and high specific impulse (Isp), which means that it provides a large amount of thrust per unit mass of fuel consumed. LOX/LH2 uses liquid oxygen as an oxidant and liquid hydrogen as a fuel, making it a very efficient combination. In addition, this engine has the advantage of generating a clean exhaust, composed mainly of water vapor.

During interplanetary cruising phases, where greater efficiency and lower fuel consumption are sought, the Hall effect ion propulsion engine would be ideal. This type of engine, while providing very low thrust, is extremely efficient in terms of long-term fuel consumption. Ion engines use electricity to accelerate ions and generate a smooth, constant thrust. They are ideal for keeping the ship on a stable trajectory for long periods of time, thus saving fuel.

The combination of a LOX/LH2 chemical engine for the high-thrust stages and a Hall effect ion engine for the interplanetary cruise stages can take advantage of the best of both worlds: the power and efficiency of the chemical engine and the low fuel consumption of the ion engine.

We would use chemical energy and electrical energy both for the takeoff and for coming back. We would use 50% of the fuel for the chemical motors and 100% of the electrical energy motors. When we get to mars we are going to take out the solar panels and we will clean them when they need to and we will charge them for the approximate 18 months there on mars because scientists say that the solar energy there is better than ours. When the time comes to return we will use 100% of the solar energy thanks to the solar panels and the other 50% of the chemical energy.