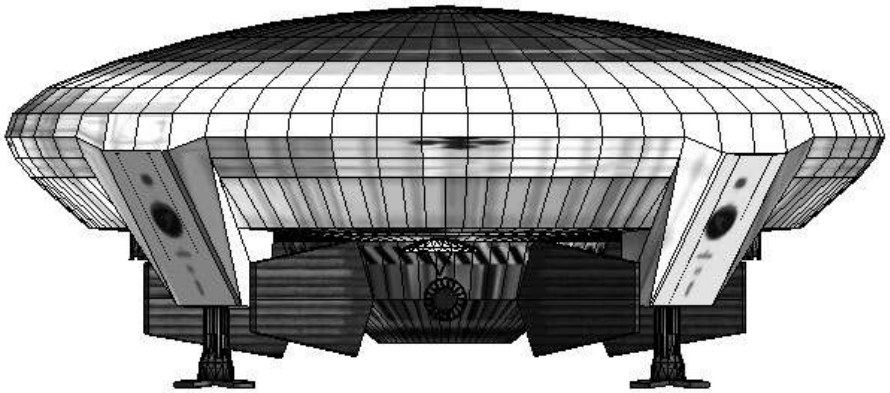
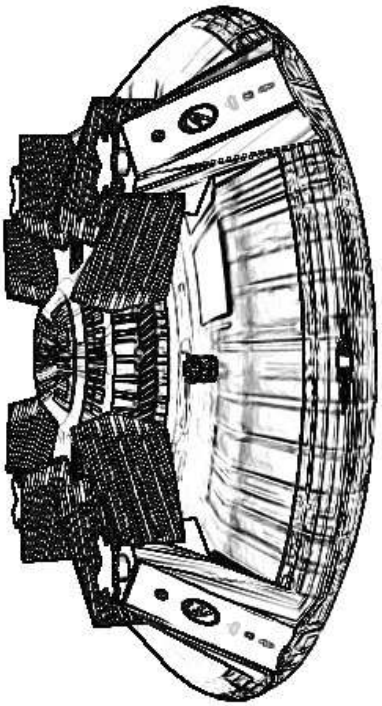
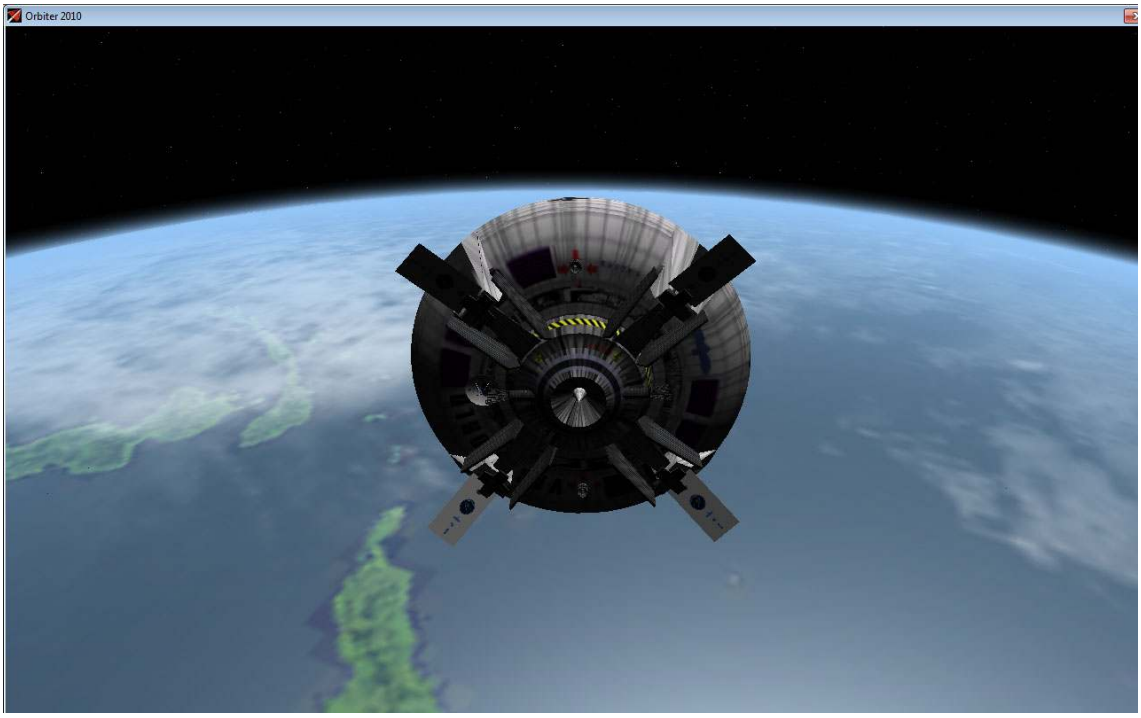
VAGAWORLD FUSION



Contents



Introduction



VAGAWORLD Version 2.1 for Orbiter Space Flight Simulator.

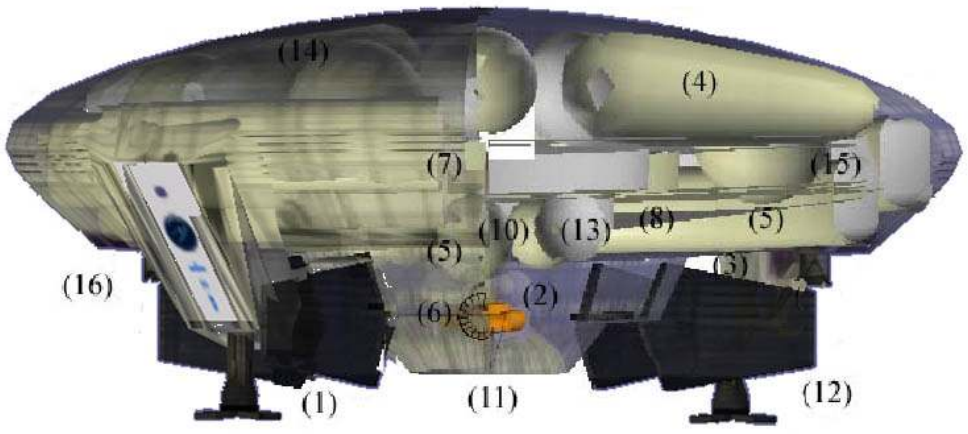
Deep Space Ship for journeys to planets and beyond uses technology of nuclear fusion, magnetic spike engine for optimize thrush and Aero-Brake for the orbital insert.

Vagaworld: vagabond of worlds, is one new step, presents characteristics in size, thrust and weight to optimize the maneuverability. Its design goals are the navigation and commerce.
Incorporate folding ramps to facilitate the loading and unloading of materials between the payload bay and surface, facilitating exploration of the planets and logistic.

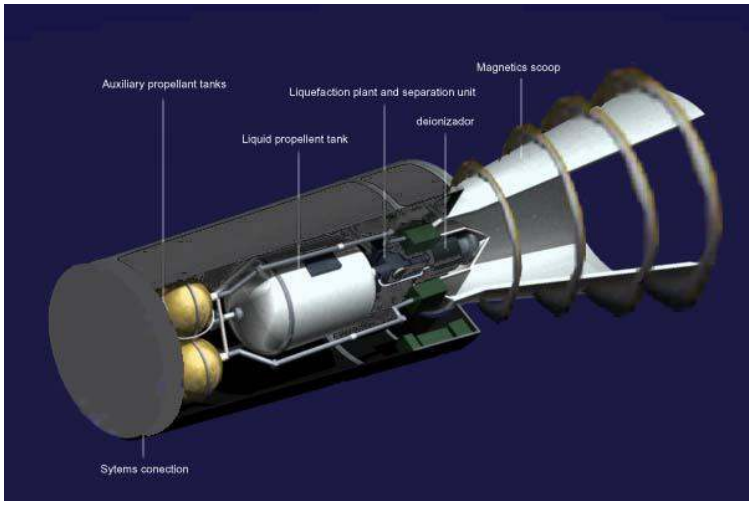
Characteristics Techniques

Type	**Deep Space Ship manned explorer**
Longitude	**22 m**
Span	**55m**
Cross section	**xy: 2180 m^2 yz: 795 m^2 zx: 795 m^2**
Volume	**22000 m^3**
Empty mass	**1.7e5 Kg**
Fuel mass	**10.5e5 Kg**
Total mass	**1,120,000 Kg**
Power Brayton cycle	**30 Mw.**
Power Electric Useful	**10.2 Mw.**
Main thrust	**252500 Nw. - 5050000 Nw.**
ISP nuclear fusion	**176000 m/s - 8800 m/s**
Crew	**5**
Dock's	**3**
Autonomic	**5 ages**
W angular	**0.42 rad/s (4,5 rpm)- Gravity 0,5g**
Speed mission	**400800 m/s - 20040 m/s**

(1)- Radiators High temperature
(2)- Nuclear reactor fusion
(3)-Radiator low temperature
(4)-Tanks propeller
(5)-antenna high gain
(6)-Magnetic Bells (Accumulation propellant and radiation protection)
(7)-Control attitude
(8)- Life support section
(9)- Dock´s
(10)-Auxiliary Tanks
(11)-Spike engine
(12)-Legs
(13)-H_20, 0_2, Food
(14)-Shield Thermal
(15)-Life system support
(16)- Payload Bay



Refuelling: Propulsive Fluid Accumulator



Orbiting in the outer fringes of Earth's atmosphere, at an altitude of perhaps 74.5 miles (120km), the unit scoops up the residual air, compresses and cools it by both ramjet compression and more conventional compressors, outside of the vehicle is a radiator area, both for waste heat from the power plant and heat from the compressors and liquefier

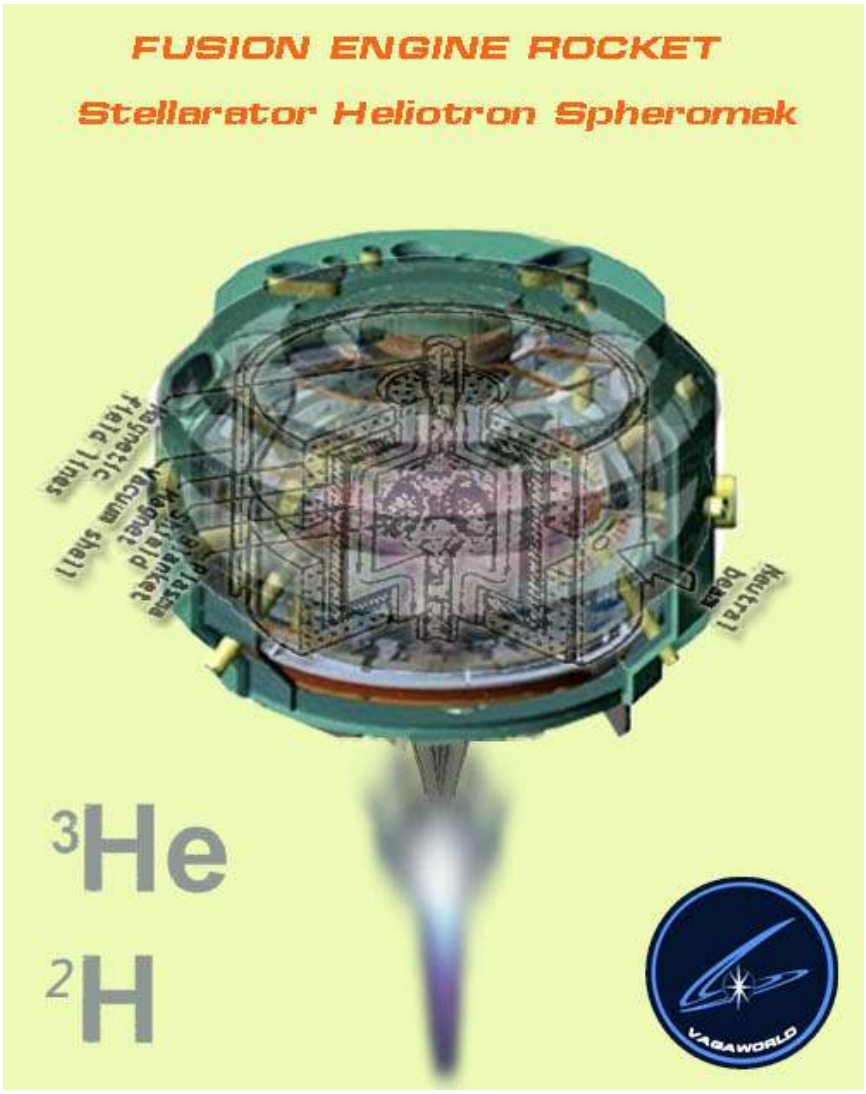
Power Fusion

FUSION ENGINE ROCKET

Advantages of D-3He magnetic fusion for space applications:

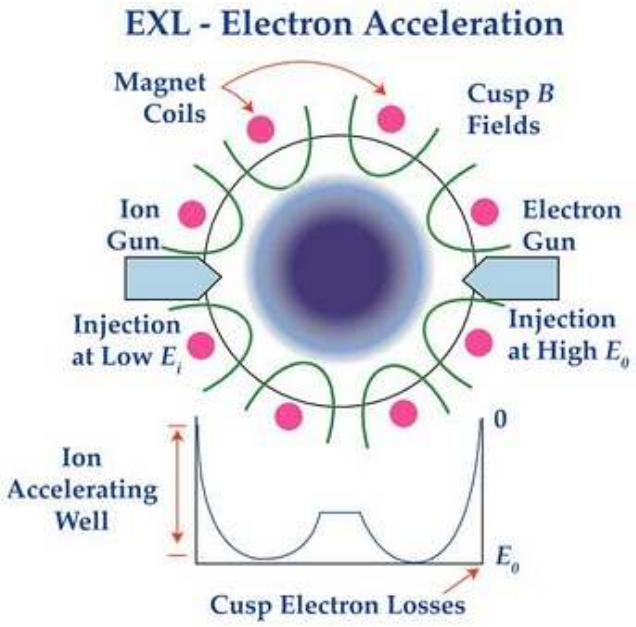
- No radioactive materials are present at launch, and only low-level radioactivity remains after operation.
- Fusion gives high, flexible specific impulses (exhaust velocities), enabling efficient long-range transportation.
- D-3He produces net energy and is available throughout the Solar System.
- D-3He fuel provides an extremely high energy density.
- neutron flux helps greatly
- Reduced shield thickness and mass
- Reduced magnet size and mass
- Increased magnetic field in the plasma.
- Not others secondary propulsion systems

CHARACTERISTICS OF THE FUSION ENGINE



Type: Stellarator Heliotron Spheromak The stellarator core consists of the modular coil set that provides the primary magnetic field configuration, auxiliary coils including vertical field, toroidal field and an ohmic heating solenoid, machine structure, divertor targets, and an external vacuum vessel. The coils provide the magnetic field required. Magnetic Spike engine optimize thrust in atmospheres and space.

To get the merger with lower activation energy. Use magnetic fields to confine the plasma, but not to confine ions but electrons, which are much lighter and therefore easier to confine them. The magnets that hold the electrons in a central area, the cathode virtual obtaining a hybridization with the Polywell reactor would increase its power to the seventh power B^4R^3, and because of the losses that grow to R2, the final fusion energy gain would be the fifth power, B^4R, which means that a twice as large reactor would have a power 128 major, and a generation of 32 times more energy. Therefore he experimented with small reactors achieving improvements in the energy obtained, and meet with an optimal design.



Type: Stellarator Heliotron Spheromak

Power: 1Gw.

Combusts: D-3He

Ignition 50 Kev

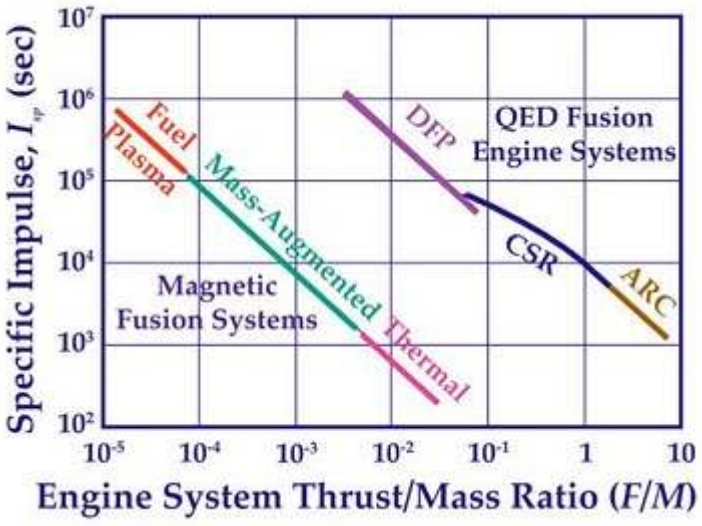
D + ^{3}He → ^{4}He + p 18.3 MeV 3.505 E14 Joule **/ kg**

Tthrust: 252500 N - 5050000 N

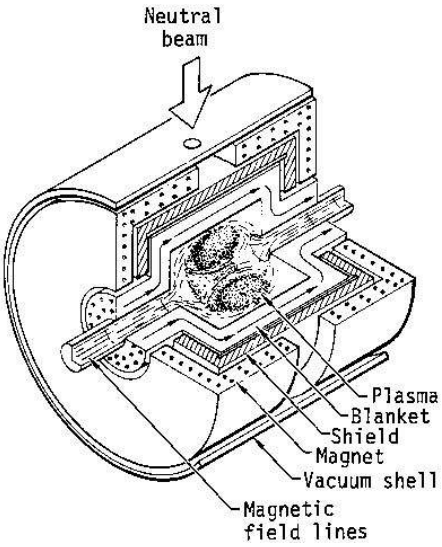
ISP: 176000 m/s - 8800 m/s (add extra gas in double flux fluid bypass)

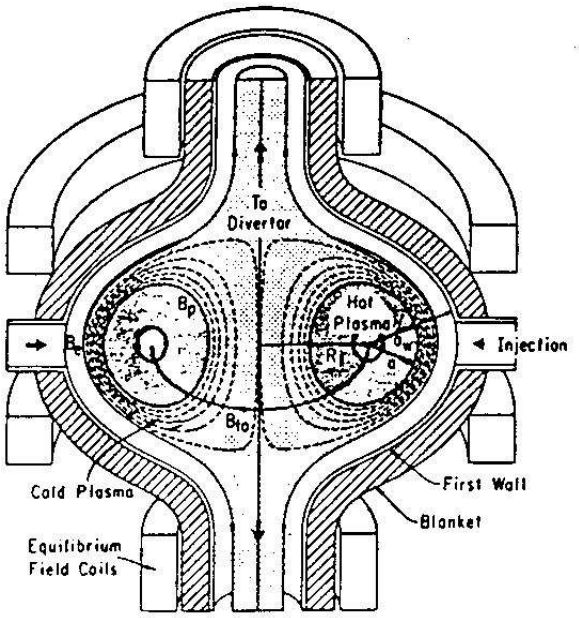
Speed mission 400800 m/s - 20040 m/s

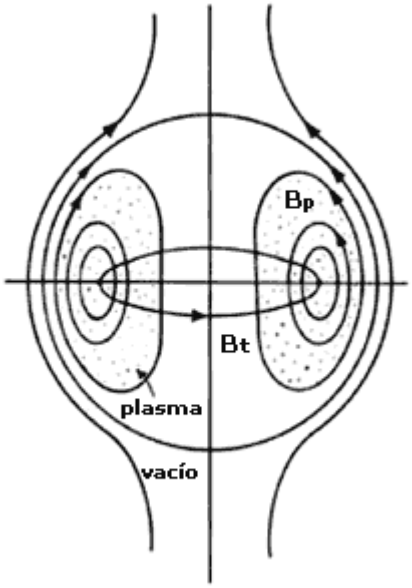
$$\Delta v = n\left[V \times Ln(R)\right]$$

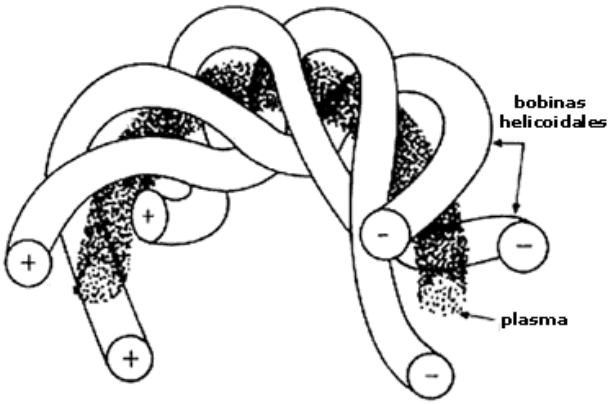


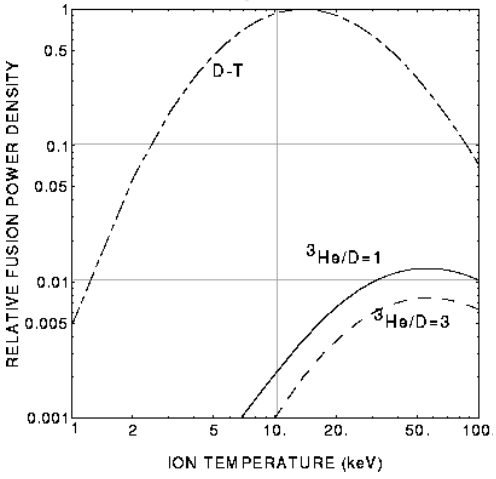
The DFP system diverts the fusion products have much engría mix with a propellant and generate thrust. Controlling the degree of dilution is controlled the momentum. The ideal would be between a factor of 1 and 200.

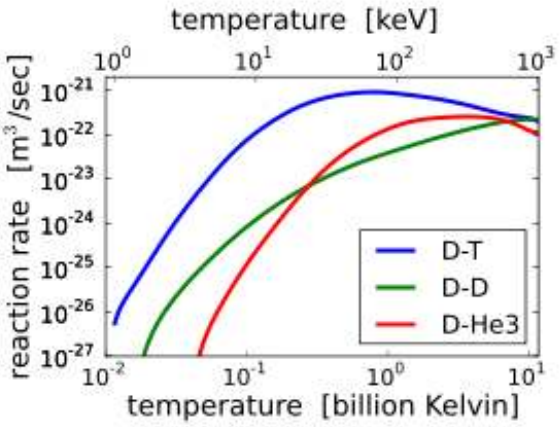

Neutral
beam
Plasma
Blanket
Shield
Magnet
Vacuum shell
Magnetic
field lines


To
Divertor
Bp
Hot
Plasma
Injection
Cold Plasma
First Wall
Blanket
Equilibrium
Field Coils

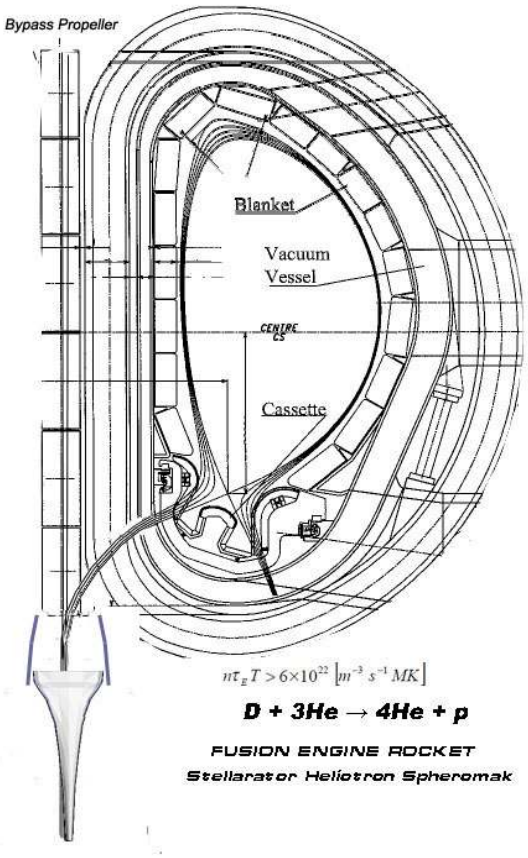

Bp
Bt
plasma
vacío

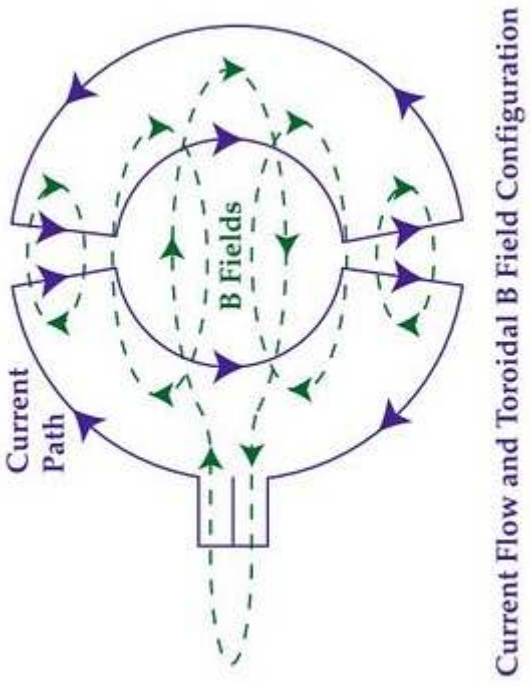

bobinas
helicoidales
plasma


RELATIVE FUSION POWER DENSITY
D-T
3He/D=1
3He/D=3
ION TEMPERATURE (keV)


temperature [keV]
reaction rate [m3/sec]
D-T
D-D
D-He3
temperature [billion Kelvin]

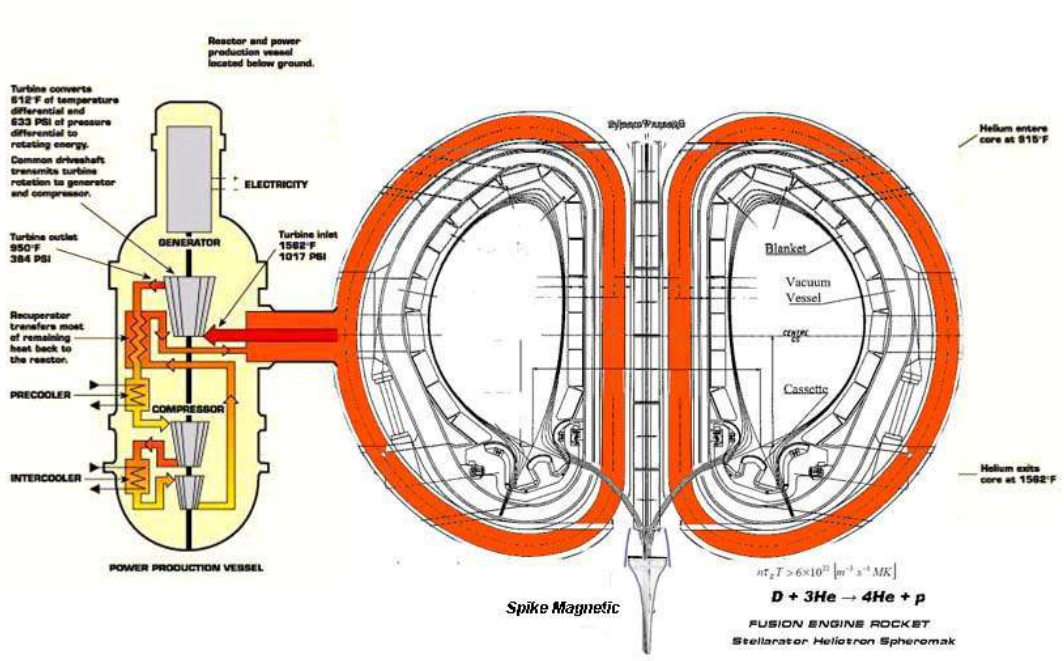
FUSION ROCKET ENGINE MODE

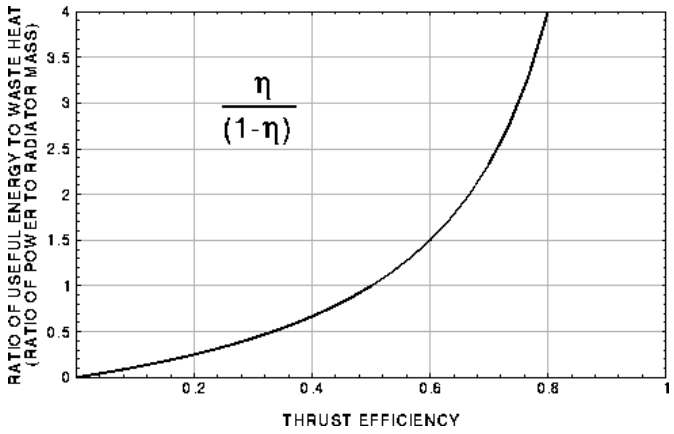


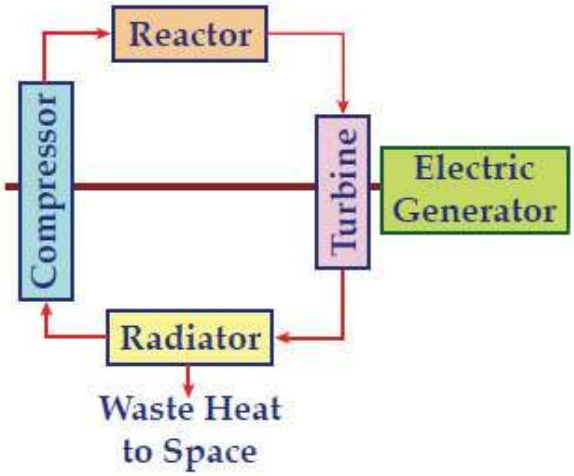


DFP (Diluted-Fusion-Product)
The DFP system diverts the fusion products have much engría mix with a propellant and generate thrust. Controlling the degree of dilution is controlled the momentum. The ideal would be between a factor of 1 and 200. only stays a small DCS system to generate the minimum electrical energy needed to keep running the reactor.Before arriving in the mixing of the products of the reaction chamber drawn components that would still be without merge to a greater use of fuel.A configuration of toroidal magnetic fields drawn products of the reaction of the reactor and extracted them by a nozzle.

ELECTRIC GENERATOR MODE







Engine Mode

D + ^{3}He → ^{4}He + p 18.3 MeV 3.505 E14 Joule / kg

	PW 2.22E+010 w	**spend**	**6.34E-05 kg/s**	**Fusion**
THRUST		**ISP**		
5050000.00 N	**8.80E+03**	**m/s**	**573.8636 kg/s**	
252500.00 N	**1.76E+05**	**m/s**	**1.434659 kg/s**	

Generator Mode

Reactor core	1835 F°	1017.00 psi	1001.67 C°
Turbina in	1582 F°	874.29 psi	861.11 C°
Turbina out	950 F°	378.00 psi	510.00 C°
Enter core	815 F°	322.41 psi	435.00 C°

Figure

El calor inútil, H, es Q - F — ***H = Q (1 - η + ηT1/T2)***

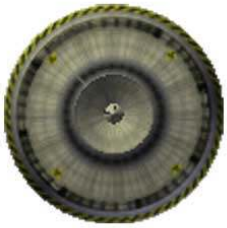
σ=5.67E-8 — ***H = σAT4*** — ***H = F*T / (1 -T)***

RADIADORES

Rendimiento	***Tc***	***Tf***	***Tf/Tc***	**Radiadores**
1/3	1000	659.39 K°	0.66	1
Potencia irradiada		659.76 K°	SURFACE	λ
1.98E+007 w		386.76 C°	1841.38	4.39E-006 m
Rend. Maquina termica		34.06%		***converge***
Pw. Util	1.02E+007 w	**Pw. Total**	3.00E+007 w	1.00

A3=((11.8*2.75)*2)*4= 259.6m2

A2=12.7*20=254 m2



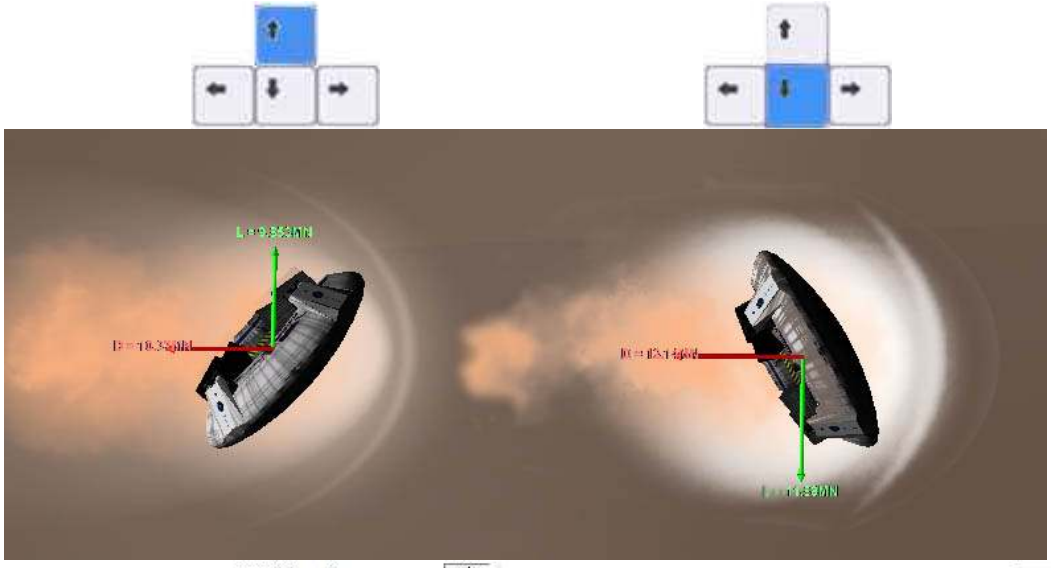
A1= 3.14*(9.5)^2=290 m2

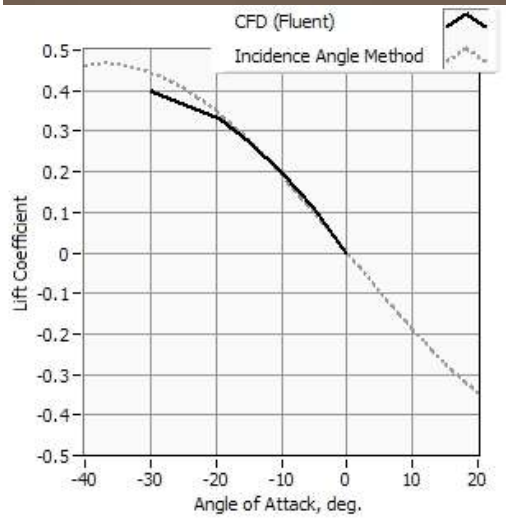
A4=((11.8*5.5.0)*2)*8= 1038.4m2

Total =1841.38 m2

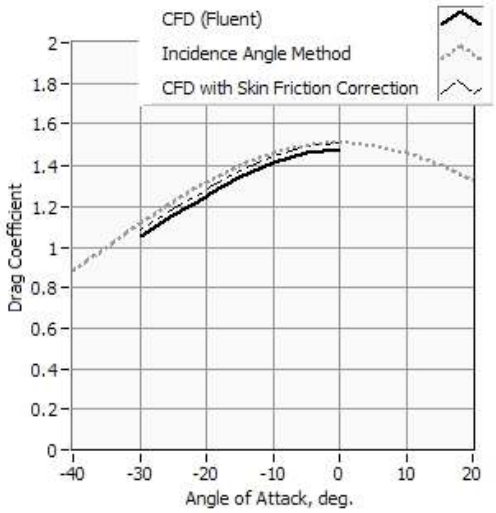
Lift, Drag and Pitching Moment Coefficient

The results of the CFD calculations were compared against the incidence angle calculations.
CFD solution modified using the same Karman-Schoenherr skin friction correction used by the incidence angle.
Model Lift and Drag coefficient comparisons are presented for *Mach 17, 50 km* altitude.
Comparisons of calculated capsule lift and drag coefficients, M=17, 50 km Altitude
Lift-to-drag ratio comparisons are presented. The analytical *L/D* data are also compared against flight data reconstructed from the Apollo AS-202 and the flight data lift-to-drag ratios are.



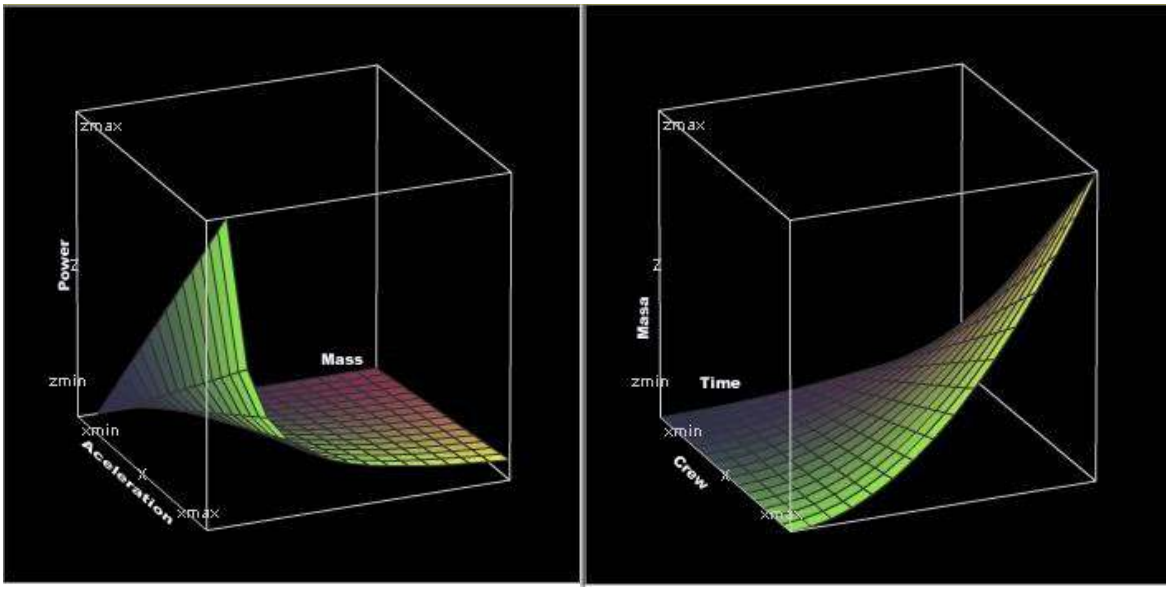


a) Lift Coefficient



b) Drag Coefficient

Power dynamics and efficiency



Vagaworld and UCGO cargo

Vagaworld allow to load the ship with lots of UCGO cargos, thanks to the **XR2 UCGO Cargo Platforms** and the **Universal Cargo** Require Universal Cars and Cargos 2.0"(UCGO)

<table>
<tr><td></td><td>ADD CARGO TO VAGAWORLD</td></tr>
<tr><td>1</td><td>Press (F4) Custom Open scenery editor (F4)</td></tr>
<tr><td>2</td><td>Select New - Vessel name “CargoDeck” - Vessel Type: UcargoDeck - Done.</td></tr>
<tr><td>3</td><td>Select New - Vessel name “Platform1”-Vessel Type: XR2_UCGOPlatform- Done.</td></tr>
<tr><td>4</td><td>Repeat for Platform2, Platform3 and Platform4</td></tr>
<tr><td>5</td><td>Select CargoDeck - Open scenery editor - select CargoDeck- Edit</td></tr>
<tr><td>6</td><td>Select Universal Cargo Deck - Core Ship: Vagaworld - Apply - Done.</td></tr>
<tr><td>7</td><td>Select Payload Manager “Platform 1”. (Dates in table) Attaché Platform 1, platform2...
<table>
<tr><td></td><td>x</td><td>y</td><td>z</td><td>Around x</td><td>Around y</td><td>Around z</td></tr>
<tr><td>Platform1</td><td>16</td><td>16</td><td>-1</td><td>24</td><td>-24</td><td>45º</td></tr>
<tr><td>Platform2</td><td>-16</td><td>16</td><td>-1</td><td>24</td><td>24</td><td>-35º</td></tr>
<tr><td>Platform3</td><td>-16</td><td>-16</td><td>-1</td><td>-24</td><td>24</td><td>-145º</td></tr>
<tr><td>Platform4</td><td>16</td><td>-16</td><td>-1</td><td>-24</td><td>-24</td><td>135º</td></tr>
</table>
</td></tr>
</table>

Select Platform N

Usage Keys:
"C" = grapple cargo.
"Shift+C" = release cargo.
"9" = select cargo to add.
"Shift+9" = add selected cargo.
"8" = Vessel information, e.g. amount of cargos onboard and their mass.
"Numpad Plus "(+) = Increase payload release velocity.
"Numpad Minus"(-) = Decrease payload release velocity.
"Numpad 5" = Reset release velocity to the configuration file default.
"F" = Consume onboard Fuel cargo.
"O" = Consume onboard Oxygen cargo.

ISP change operation fusion engine

SIMULATION OF THE VARIATION OF ISP

> **Need IEAT** MFD. activating "I.E.A.T.MFD" ENGINE CONVERSION: you can change the thrust and ISP of any spacecraft's Main Engine while the simulation is running. Thrust value for an fusion engine **252500 N** typical Vs is. **176000 m/s** these values will be saved if the simulation is closed while "I.E.A.T.MFD" is displayed, otherwise the vessel will revert to its original default values the next time the simulation is started.

Installation

Unzip this file into your main Orbiter directory overwriting the existing files. If you are unzipping using WinZip then make sure 'Use folder names' is selected.

Legal: You may use these files in any way you want except for making money. You are free to distribute this package provided you give proper credit.

Advisable to use AerobrakeMFD LolaMFD to land automatic FuelMFD to transfer propellant between docked vessels and IEAT. Change thrust and ISP setting MFD UMMUFA if you want to add crew. XR2 UCGO Cargo Platforms Created by Woo482. Universal Cargo Deck created by Yuri Kulchitsky. Universal Cars and Cargos 2.0 "(UCGO) created by DanSteph.

Vessel-specific keyboard functions

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[K] Operate folding ramps of payload bay

[G] Deploys the landing gear

Standard disclaimer

Not responsible for anything and you use and install at your own risk.
I wish to thank Martin Schweiger for Orbiter.

Thanks to all the Orbiter community for their addons and contributions.

Have fun.