PROJECT Hydrogen Super Sonic Transport

For Microsoft Flight Simulator FS2004

Features

- GMAX Model
- Extractable Gear
- Genuine Gear Bays
- Movable Flaps
- Movable Ailerons
- Movable Canards
- Movable Rudder
- Thrust Reverser
- Steerable Nose Wheel
- Running Engines
- Taxi & Landing Lights
- Various Antennas
- Genuine Pitots & Static Dischargers
- Contrails
- Wing Views
- Texture Detailed & Easy Repaintable
- Night Texture
- Radius 45m
- ATC-Identification "Super Cruiser"
- Kneeboard Reference File
- Proper FDE's
- MS FS2004 Gauges Panel

General Information

Important Characteristics Of Fictional HSST 500 :

- Length:254ft / Span:214ft / Height:55ft / Wing Area:10000sqft / Fuselage Diameter:26ft / Fuselage Height:21ft
- MTOW:804700lbs (365t) / MLW:716500lbs (325t) / OWE:573200lbs (260t) / MPLD:110250lbs (50t) / Fuel:126146lbs (808500ltr)
- Crew:2+10 / Passengers:32 First + 342 Coach or 500max / LD3 Cargo Containers:16
- Engines:2×165000lbs (2×734kn) - Range:9070nm (16800km) - Runway Length:7000ft (ISA)
- Cruise: Speed M2.25 - Altitudes FL600 to FL700

You would like to ask me possibly **Why I Designed This Fictional Model** and started the Project HSST? Well, there were some different reasons, which all came together in the end. I always wanted to fly a model that is faster than usual planes for flying longer distances without increasing the sim speed rate. Of course, there is the old Concorde, but for ideological reasons regarding its devastating effect on the environment and because of it's age, recent retirement and the bunch of speed and performance limitations in flying, it was no option. On the other hand, I'm a scenery and AFCAD designer, I can edit FDE's and make repaints, but I had no experience with aircraft modeling, and I was very curious how it would be. Since I'm very interested in environment issues and in the environmentally friendly hydro solar technology, I thought to myself, why not bringing all those things together and trying to create a new fictional model for flying?! I had to learn GMAX designing, in the beginning it was very frustrating, but at the end I found it very easy to finish my first model.

But **How Fictional Is This Model** at all? Well, the hydro solar technology is no fiction. Just make a Google search with "hydrogen aircraft" or "cryoplane" or "cryogenic plane", and you will get hundreds of pages about hydrogen aircraft listed. The hydrogen technology for cars is even much more progressed, by the way, and solar modules are almost available at superstores. In my design plan I considered shape and layout of different modern military fighters and the need for a bulky fuselage to store the huge amounts of hydrogen in large tanks. One very special feature is the availability of fully extractable high lift flaps. V-shaped wings made for supersonic speeds usually don't have high lift flaps, making supersonic aircraft flying very uneconomically at low speeds and altitudes, and requiring higher take off and approach speeds. I think, supersonic wings with fully extractable flaps is something that can be realized if some few engeneers would make a small effort. Mankind is able to fly to Moon, is planning trips to Mars, but how about the most close things on earth? We still fly with hot housing kerosene and need 10 hours for transoceanic flights. Anything is going wrong on planet earth!

Since oil resources are limited and oil prices will rise to painful levels in the next 20 years, a replacement for kerosene is needed. **Hydrogen As Fuel** is the perfect alternative. It can be produced with solar energy by electrolysis. It is the most environmentally friendly available fuel. Used for jet engines, only water and - because it is burned with air - a small amount of nitric oxide will be emitted. The hot house effect is very small contrary to kerosene. Since water and solar energy is available in theroretically unlimited amounts, hydrogen may be a very cheap fuel in the future. Also, hydrogen is a safe fuel. In case of explosion it burns quickly into the air, unlike kerosene which can burn for hours. Hydrogen will be used as fuel in liquid form. This requires well isolated tanks, since liquid hydrogen is stored at -260°C. Compared with kerosene, one liter of hydrogen contains only one quarter of the energy, but it is about 12 times lighter. So, one liter of kerosene must be replaced by about 3 to 3.5 liters of hydrogen. This in return requires much more fuel volume capacity and new airplane geometries to keep the normal ranges.

The **Ozone** problem still remains. Like cars on earth, every subsonic speed aircraft flying in the troposphere produces ozone. If an airplane rises to the stratosphere, it will deplete ozone, an undesireable effect. Supersonic aircraft ususally fly in the tropopause. This is the transition layer between the troposphere - where the weather is, the clouds, wind and storms - and the stratosphere. That is why supersonic traffic may harm the ozone layer. Ozone is depleted by nitic oxide for example, but the amount of emitted nitric oxide at burned hydrogen is about 10 times lower than that of kerosene and can be reduced by better engine technologies in the future. The atmospheric layers vary with the seasons and latitudes. In polar regions the tropopause may be at FL400, at the equator it may be at FL700 or higher. Supersonic aircraft therefore should try to protect the ozone layer by flying as low as possible.

Even with improved airplane geometries the **Sonic Boom** effect at supersonic speeds can only be reduced, but very likely not completely avoided. The sonic boom on earth, you probably have experienced it once in your life, also affects animals in the sea and it decreases by increasing flight altitude, but increases with rising speed. Flying with supersonic speed above land is usually forbidden or requires special permit therefore. However, you are advised to fly with supersonic speed only above 45000ft to avoid collision danger with the subsonic traffic. By the way, the sonic boom on earth is audible 50nm ahead and behind supersonic aircraft.

The HSST is equipped with all usual control surfaces, except slats due to the heat on wing leading edges at supersonic cruise speeds of course. **You Can Fly This Plane Like Every Other Jet** in subsonic areas below 45000ft. If you need to implement a subsonic speed flight sector above land to avoid the supersonic boom until reaching the sea, you can fly with M.95 cruise speed at an altitude of up to 45000ft. Choose a vertical speed of +1000fpm or less for a following supersonic sector.

From the below **Flight Profile - San Francisco To Honolulu** you can learn that the HSST must be a very powerful aircraft. It is able to climb with a vertical speed of about 6000fpm, very well for airport neighbours and to fulfill noise abatement rules. The engines of the HSST are a little bit overrated and enable the aircraft to fly with up to Mach 2.30 at an altitude of 70000ft. Also, acceleration from subsonic to supersonic cruise speed is very good. Supersonic sectors can be initiated outgoing from FL410 with at least M.95 at VSI +1500fpm with MTOW, from FL500 vertical speed should be reduced to +1000fpm. Climb to FL650 takes 30 minutes and 440nm will be flown. From FL650 with M2.25, the HSST needs at least 260nm and 35 minutes for the descent.

To **Calculate The Necessary Amount Of Fuel** for a flight, always use "display fuel quantity as weight" and refer to the kneeboard reference file to learn about the fuel consumption of the HSST. Please ignore the gallons fuel options, this is no kerosene aircraft, always calculate fuel with weight in lbs.

Now **Enjoy Flying Supersonic** and see the sunrise in the west !

Overview

				
Side View	Front View	Top View	Gear View	Wing View

Panel

The HSST 500 panel comes with default MS FS2004 **Gauges**. I added to the panel.cfg file a line that enables altitude callouts at landing. Please download and install file "fpda_boeing_callout.zip" from AVSIM to activate them.

Flight Profile - San Francisco To Honolulu

Time	Altitude	IAS	Mach	Fuel *)	NM *)	Waypoints	Alt s *)	Mach s *)	IAS s *)	VSI s *)	Controls & NAV & Remarks
12:00:00				41400		Gate KSFO					Taxi N1 = 35
12:05:00				41000	2100	Rwy 28R					Toff N1 = 95
12:05:30		180		40770							Rotate
12:05:45	00200	200		40650			65000		250	6000	Gear / AP on
12:06:15	04500	240		40320	2095	SQUIG					Flaps 0 / GPS on
12:06:45	08000	250		40040	2092	WESLA				4500	
12:08:30	15250	250	0.50	39500	2085	FUJCE		0.60			
12:10:00	22000		0.60	38990	2077	DRANK		|		3500	
12:12:00	30000		0.75	38390				|			
12:13:45	36000		0.80	37970				0.95			
12:16:30	45000		0.95	37410	2025	SUPER		2.25		1200	Supersonic
12:22:00	52250		1.40	36240	1966	BEBOP				1000	
11:28:15	58500		2.00	34650	1867	BAART					
11:34:45	65000		2.25	32730	1728	BLUFF					TOC
10:48:15				29400	1430	BAKON					
11:03:45				25590	1086	BILLO					
11:15:30				22750	830	BEATS					
10:29:00				19440	530	BANDY					
10:39:00	65000		2.25	17030	311	BRADR	3000		250	-3000	TOD
10:45:30	49000		1.30	16640	203	BITTA					
10:55:00	20000		0.60	16270	121	TOADS				-800	
10:57:45	17500		0.50	16060	107	FREDI					
11:06:00	11000		0.45	15290	64	MAGGI					
11:09:15	08500	235	0.45	14960	48	JOELE			180		
11:16:00	03000	180		14420	24	BAMBO					Flaps 8 / Flaps 20
11:18:45	03000	180		14020	16	GRITL					LVL on / NAV & GPS off
11:19:15	03000	180		13920	14						APR / ILS 26L IEPC 109.10
11:21:00	03000	180		13610	9.0				150		ILS GP catch / Gear
11:22:00	02000	155		13470	6.5						Flaps 40
11:22:45	01500	150		13330	4.5						Autobrake 1 / Spoiler arm
11:23:30	01000			13230	3.0						AP off
11:24:35				13010	0.0	Rwy 26L					Touch Down / Reverser / Spoiler
11:25:00				12800							Taxi N1 = 35
11:35:00				12050		Gate PHNL					

Reserves	:	Diversion 200nm: 5000 to 5500lbs / Holding 30 mins: 4000 to 4500lbs / Contingency 5%: ~5000lbs
Fuel *)	=	Fuel In lbs
NM *)	=	Distance In Nautic Miles
s *)	=	Autopilot Selection

Updates

NEW 6th April 2011 **Version 4.0 Available**

Download: (0.15mb)

- more realistic fuel consumption calculation and weights
- improved FDE set

1st September 2009 **Version 3.0 Available**

Download: (1.20mb)

- updated FDE set
- improved Wing Views

25th August 2006 **Version 2.1 Available**

Download: AVSIM · FlightSim

- Model Smoothened
- More Detailed & Corrected Textures
- New Smaller Objects Added
- Corrected Canards
- Corrected FDE's
- Corrected Panel
- Less Fuel Consumption
- Two Different Genuine Wing Views