The Galaxy Class

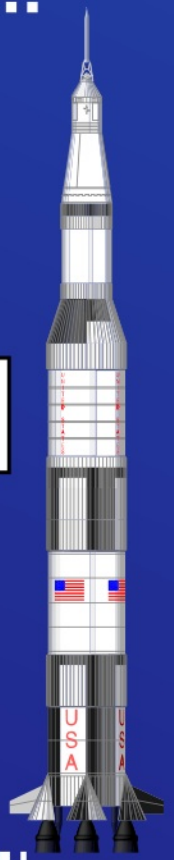
Single-Stage-to-Orbit Ultra Heavy Lift Vehicle
Built in Vancouver, British Columbia, Canada

February 2016 - Freely Distributable Open Source Information

The Galaxy Class Ultra Heavy Lift Vehicle

Saturn-V Rocket Payload to Low Earth orbit: 310,000 lb (140,000 kg)

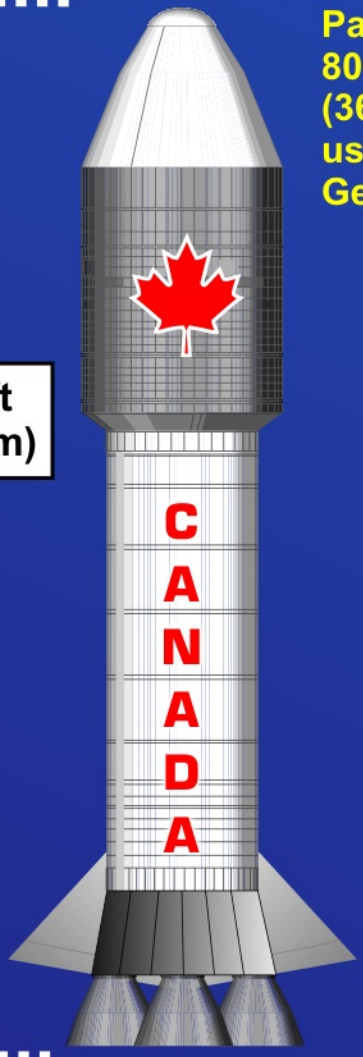
363 ft (110m)



33 ft (10m)

55 ft (17m)

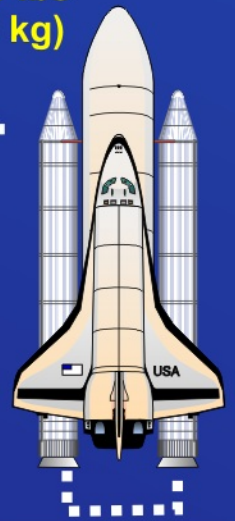
410 ft (125m)



The Galaxy Class UHLV
Payload to Low Earth orbit:
800,000 lbs
(362,873 kg)
using Gen-One Motors
Gen-Two Motors Will Allow Greater Payloads

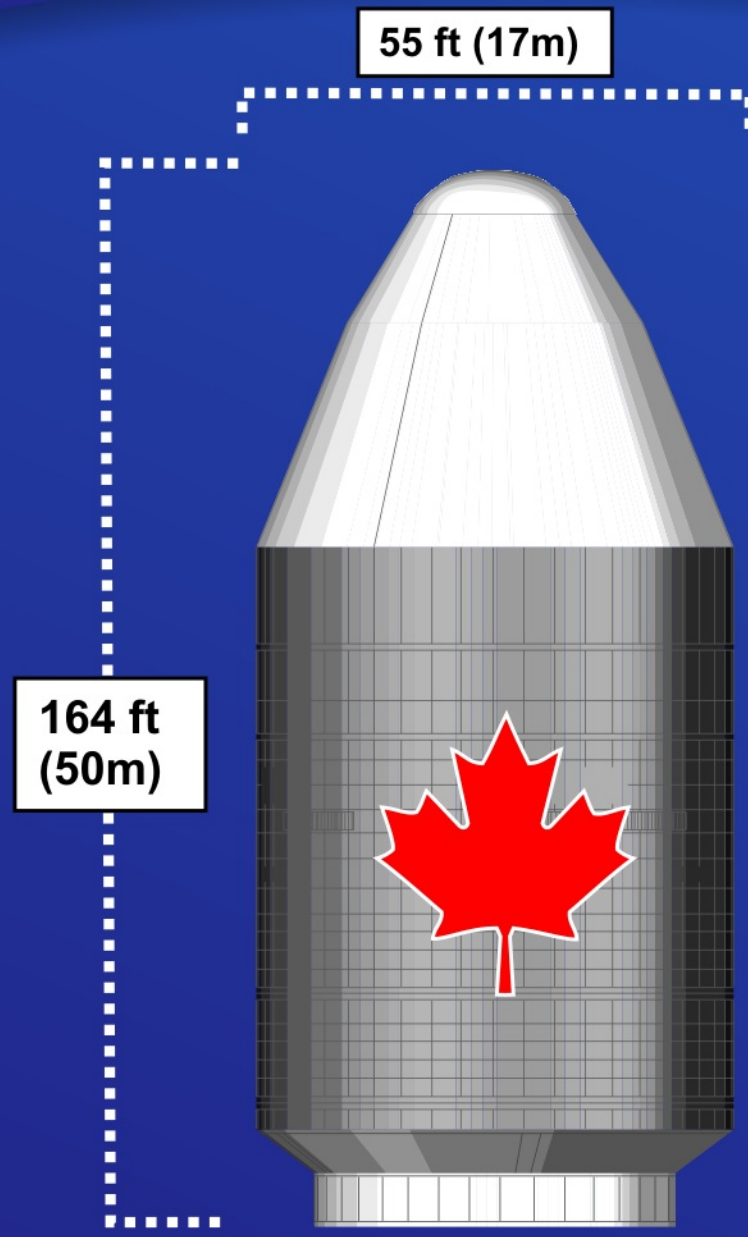
Space Shuttle
Payload to Low Earth orbit:
800,000 lbs
(27,500 kg)

184 ft (56.1m)



28.5 ft (8.7m) width
for orbiter cargo area only

The Galaxy Class
Ultra Heavy Lift Vehicle



Auxiliary Cargo Pod
65 Feet by 55 Feet
(20 Metres x 17 metres)
Outer Dimensions

Available Interior volume:
80,878 Cubic Feet
(2290 Cubic Metres)

Primary Cargo Pod
85 feet x 55 feet
(26 metres x 17 metres)
Outer Dimensions

Available Interior volume:
149,774 Cubic Feet
(4241 Cubic Metres)

The Galaxy Class Ultra Heavy Lift Vehicle

Sheet Hydroforming of Tubular Rocket Sections

Invented by Fred Leuthesser, Jr. and John Fox
in the 1950's of the Schaible Company of
Cincinnati, Ohio, USA

Advantages:

1) Speed of creation (12 hours and less for a
single-peice 50 foot by 200 foot tubular section)

2) Rigidity of final assembled unit structure.

3) Allows forming of unusually-shaped
indented cavity and compound curve structures.

4) Large Scale Dies can be made of Filled Concrete Shell,
CNC-Machined Metal Molds or even Solid Rock!

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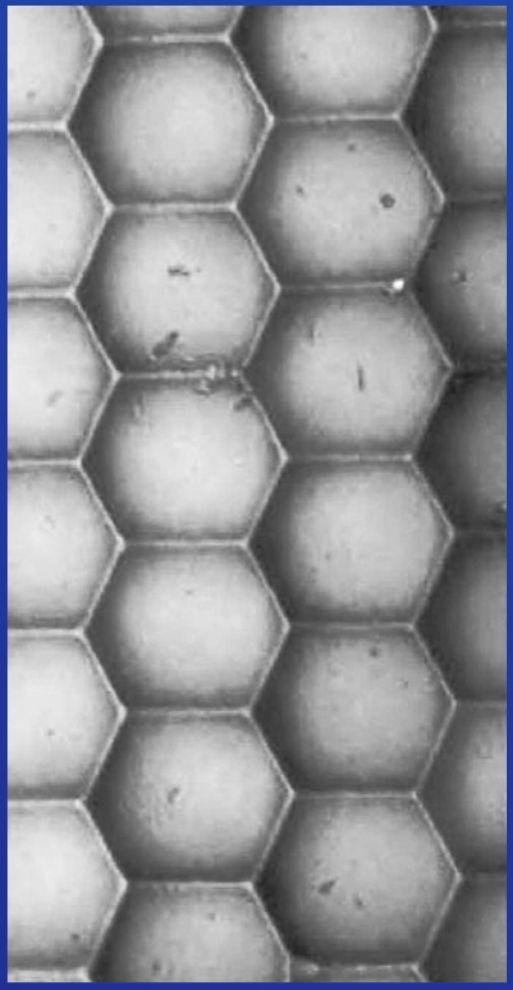
Ultra Heavy Lift Vehicle

Hydroforming: How It's Done:

Steel Reinforced Concrete Hydro-Form Shell filled with inexpensive foamed silica. Inner shell contains Hexagonal ridges to create a rigid grating-like structure for the Rocket body sections.

Each rocket section is Hydroformed as a one-piece tube using pressure-fluid which forces sheet aluminum (1/6th or 3/32th of an inch thickness) into the hex-grating-shapes which are the negative-indent forms created out of high-strength concrete.

The hex-grated tubular structure is strong and lightweight and will have machine-welded outer aluminum sheets applied to the inner and outer surfaces which will be coated with thick-film ceramic for aerodynamic heating/ablation protection.



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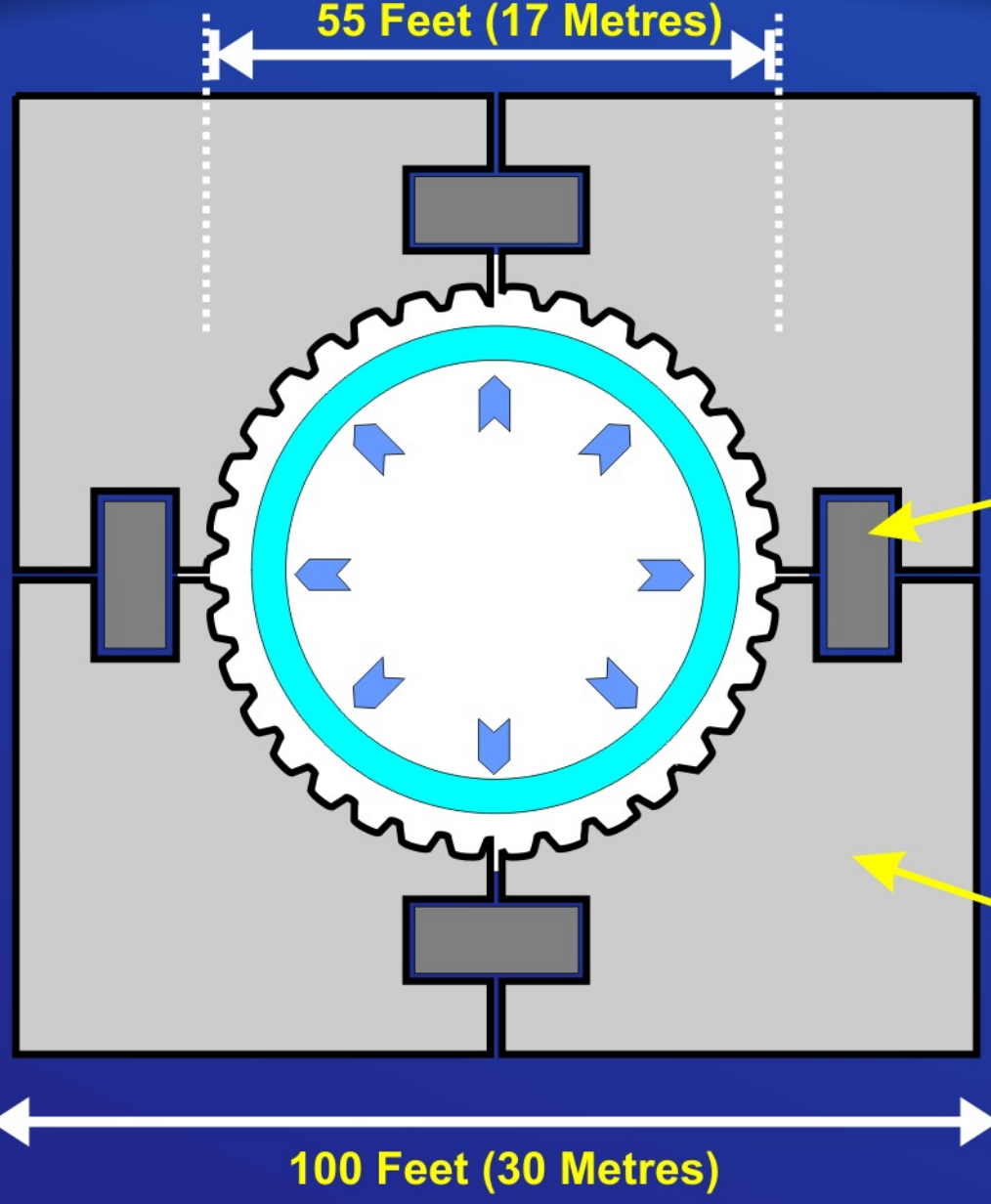
Ultra Heavy Lift Vehicle



Hydraulic Oil is pumped in at 15,000 PSI pressing the 1/16 or 3/32 inch aluminum sheet into any cavities.

The extreme pressure pre-stresses the aluminum forming a high-strength rigid structure ready for skinning on the outer and inner side of the hydro-stamped tubular structure.

Hydraulic pressure seals (15,000 PSI Fluid Pressure)

Negative-indent tool die created from Silica Foamed High Strength Concrete Shell with built-in hexagonal grating used as the strengthening cross-members.

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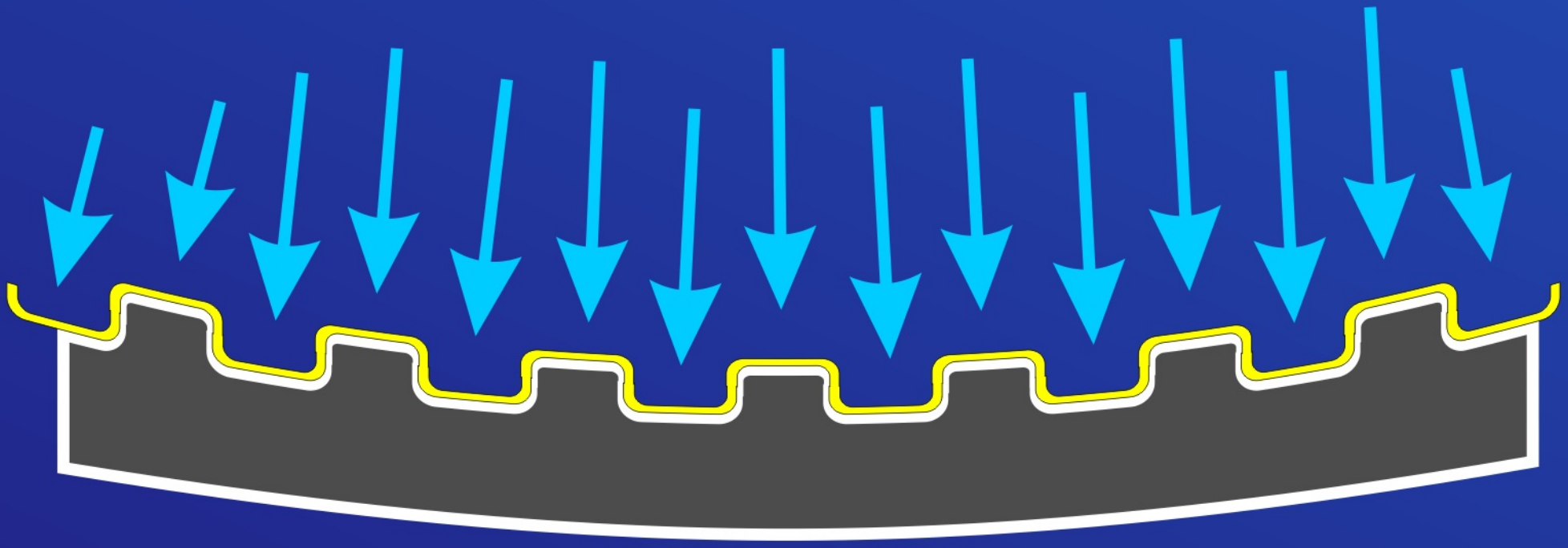
15,000 PSI Hydraulic Fluid Pressure
forces sheet aluminum into cavities



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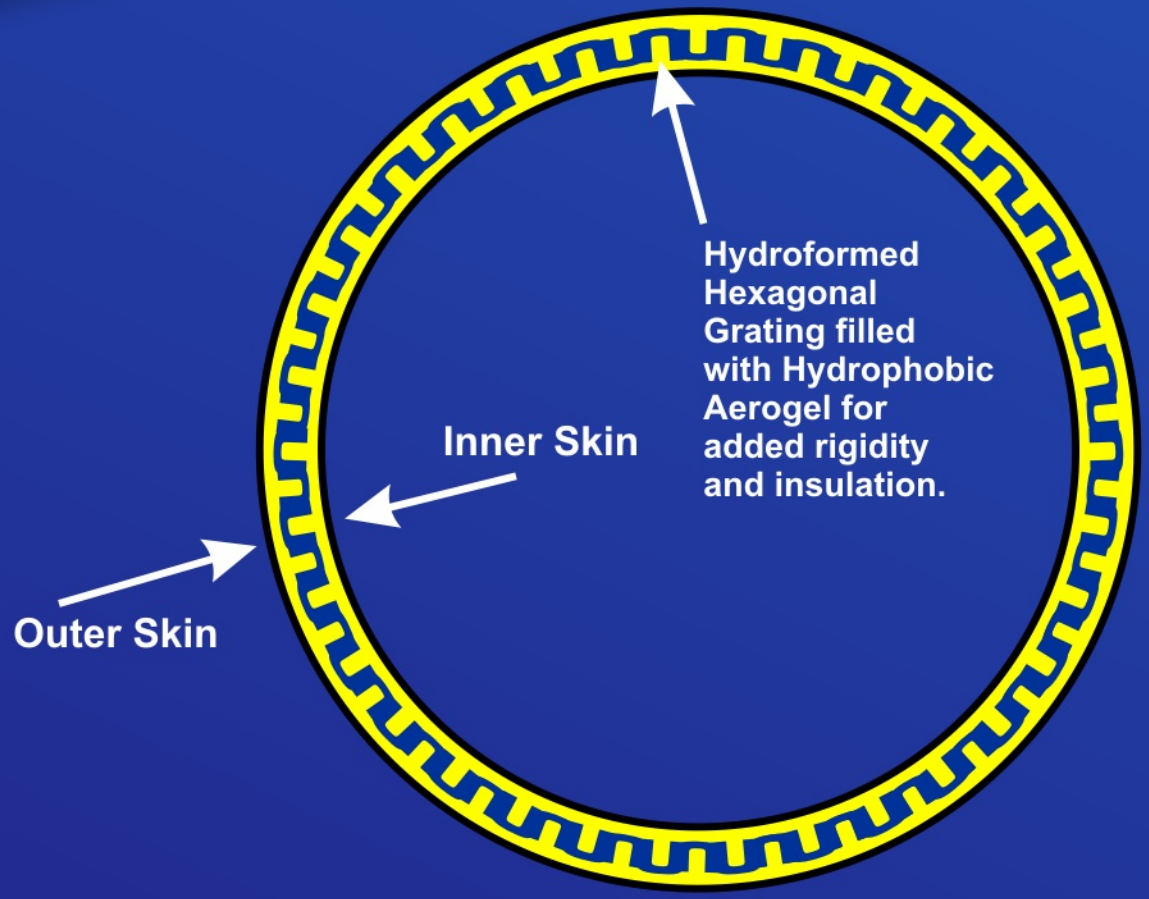

Final Result is rigid inner hexagonal grating structure containing Hydrophobic Carbon or Other Aerogel for extreme light weight and heat/cold insulation rating. Grating is covered with 1/16” or 3/32” Sheet thick film Ceramic-coated Aluminum for further rigidity.

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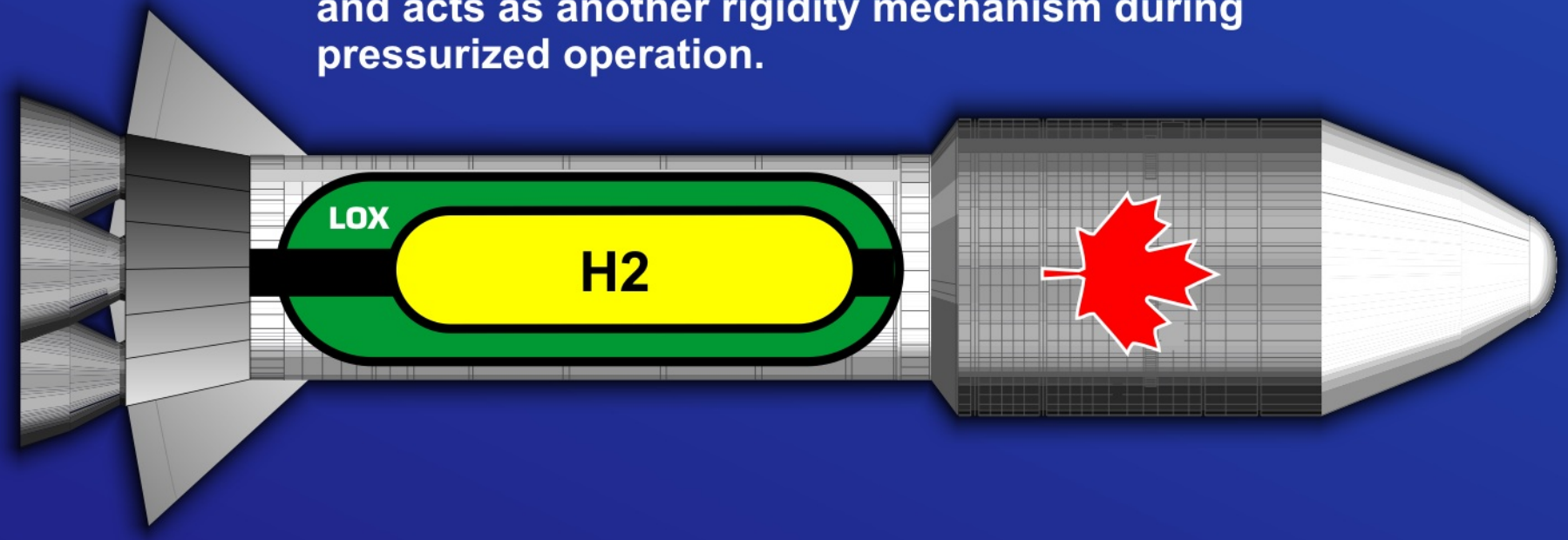
Unique Tank-Within-a-Tank Design for the Hydrogen (H2) and Liquid Oxygen (LOX):

Same Aerogel-filled hexagonal rigid grating sandwiched between ceramic coated sheet aluminum as the outer rocket hull.

Outer LOX tank insulates the hydrogen tank and acts as another rigidity mechanism during pressurized operation.



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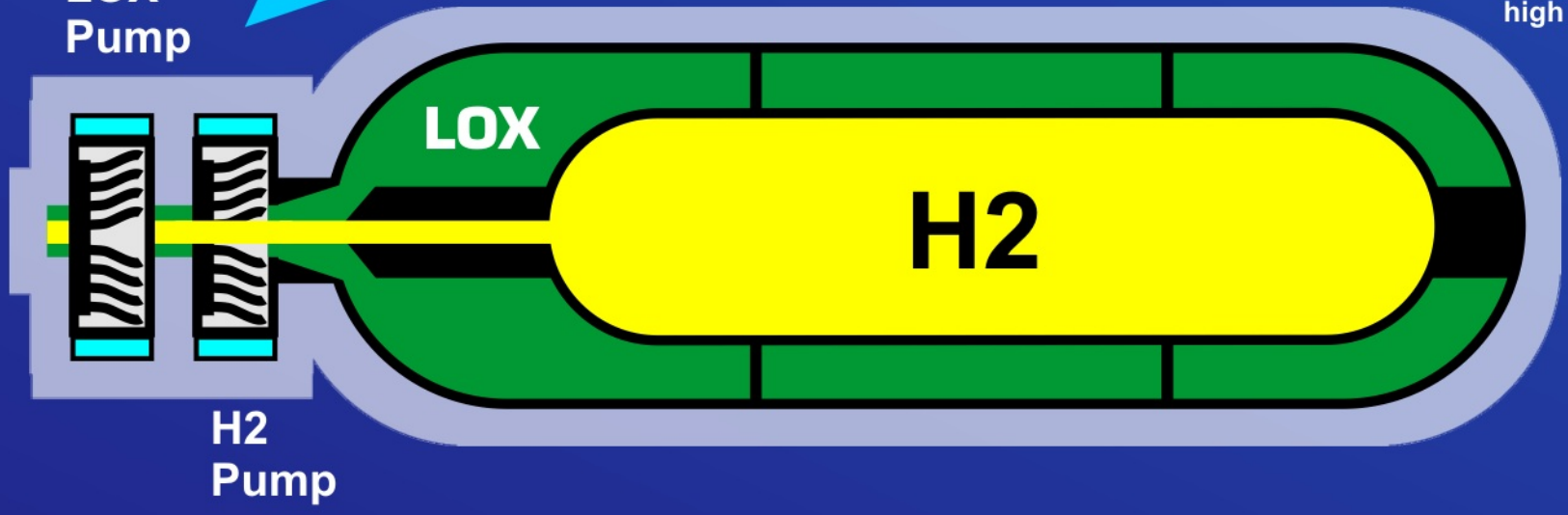
Tank-Within-a-Tank Design
Double-Walled with Ring Feed
into Back-pressure arresting
Turbo Pump assembly for
eventual Ignition and Mixing
of LOX and H2 fuel within
Rocket Motor Assembly.

Aerogel Insulation for
light weight and very
high insulation properties



Twin Spiral Vortex Shaped Impellers have high feed rate and are linear-induction powered for high-speed and space-rated reliability.

Tube within a Tube fuel feed design allows for PRECISE feed of fuels into rocket motors for final vapourization and mixing.

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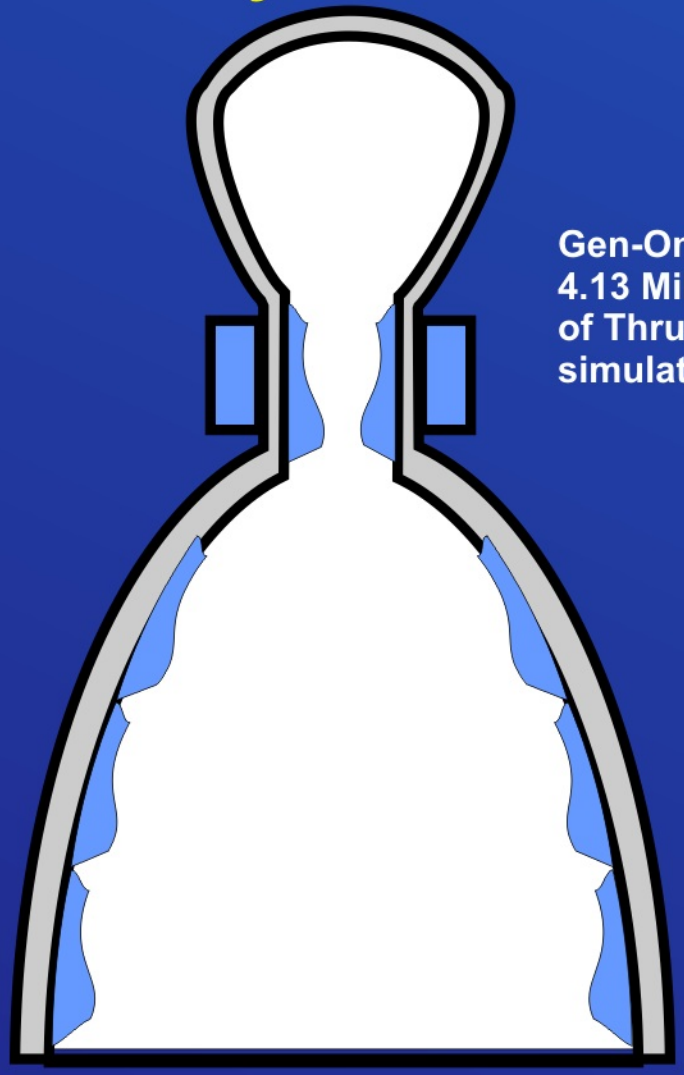
Much Larger Rocket Motor than Saturn-V F1 System

Rocketdyne F-1 Engine
1.52 Million Pounds
of Thrust (Sea Level)



Gen-One UHLV Engine
4.13 Million Pounds
of Thrust (Computer
simulated at Sea Level)

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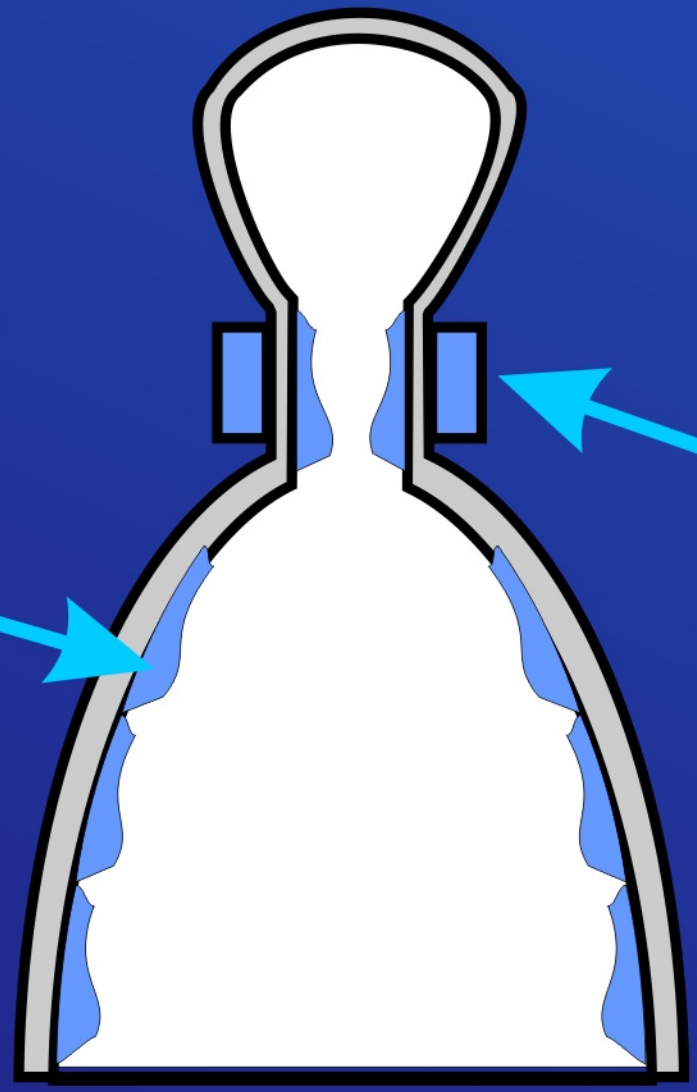
Single-Piece Hydroformed All-Aluminum Combustion Chamber and Rocket Nozzle Assembly with Heat-proof Dimpled Ceramic Coating

The expanding gasses within the large nozzle are further stabilized via built-in high-heat resistant ceramic coated vanes arranged in a spiral vortex pattern which are dimpled much those on golf balls. This dimple pattern ensures a rough boundary layer allowing a smooth laminar gas flow for the rest of the expelled gasses.

The nozzle and combustion chamber assembly is high-strength aluminum alloy surface-coated with thick-film dimpled ceramic for high heat resistant upwards of 2000+ Degrees Celcius.



The expelled gasses have a vortex induced by a high-RPM spinning vanes motor (impeller-like) powered by a linear induction system which spins the expelled gasses through the constricting throat for stabilization purposes.

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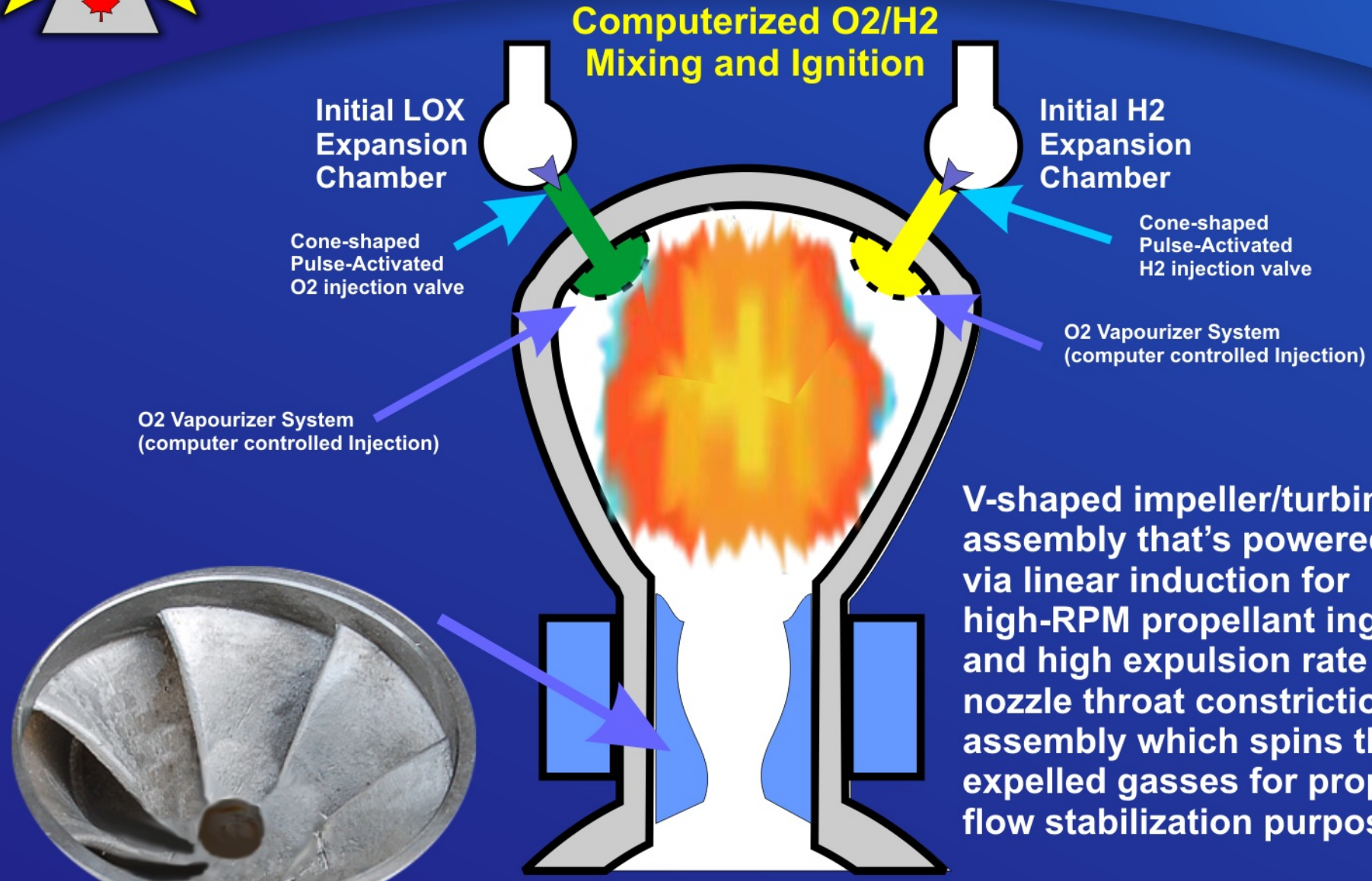

V-shaped impeller/turbine assembly that's powered via linear induction for high-RPM propellant ingestion and high expulsion rate through nozzle throat constriction assembly which spins the expelled gasses for propellant flow stabilization purposes.

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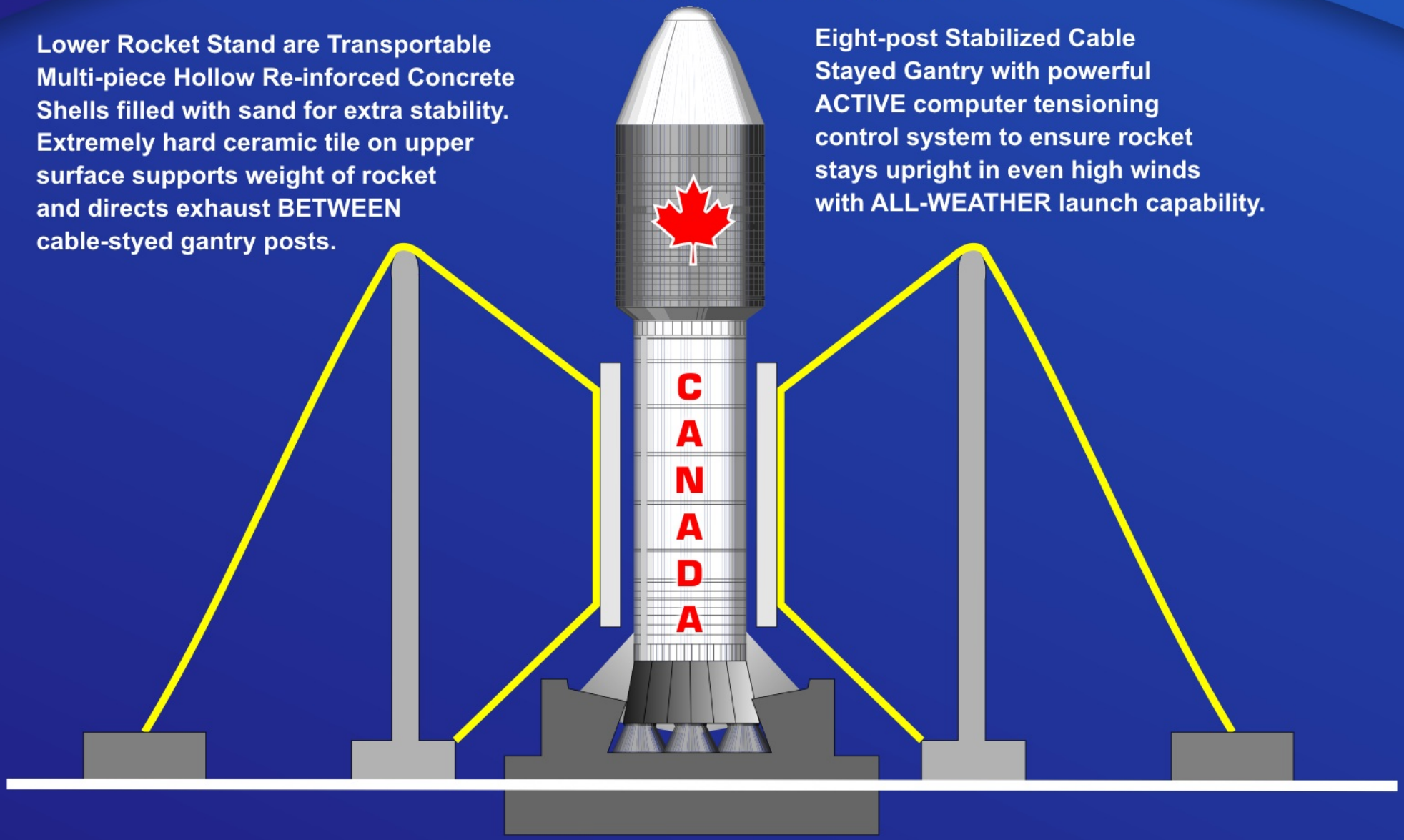
Cable-stayed Gantry-Launch System

Lower Rocket Stand are Transportable Multi-piece Hollow Re-inforced Concrete Shells filled with sand for extra stability. Extremely hard ceramic tile on upper surface supports weight of rocket and directs exhaust BETWEEN cable-styed gantry posts.

Eight-post Stabilized Cable Stayed Gantry with powerful ACTIVE computer tensioning control system to ensure rocket stays upright in even high winds with ALL-WEATHER launch capability.



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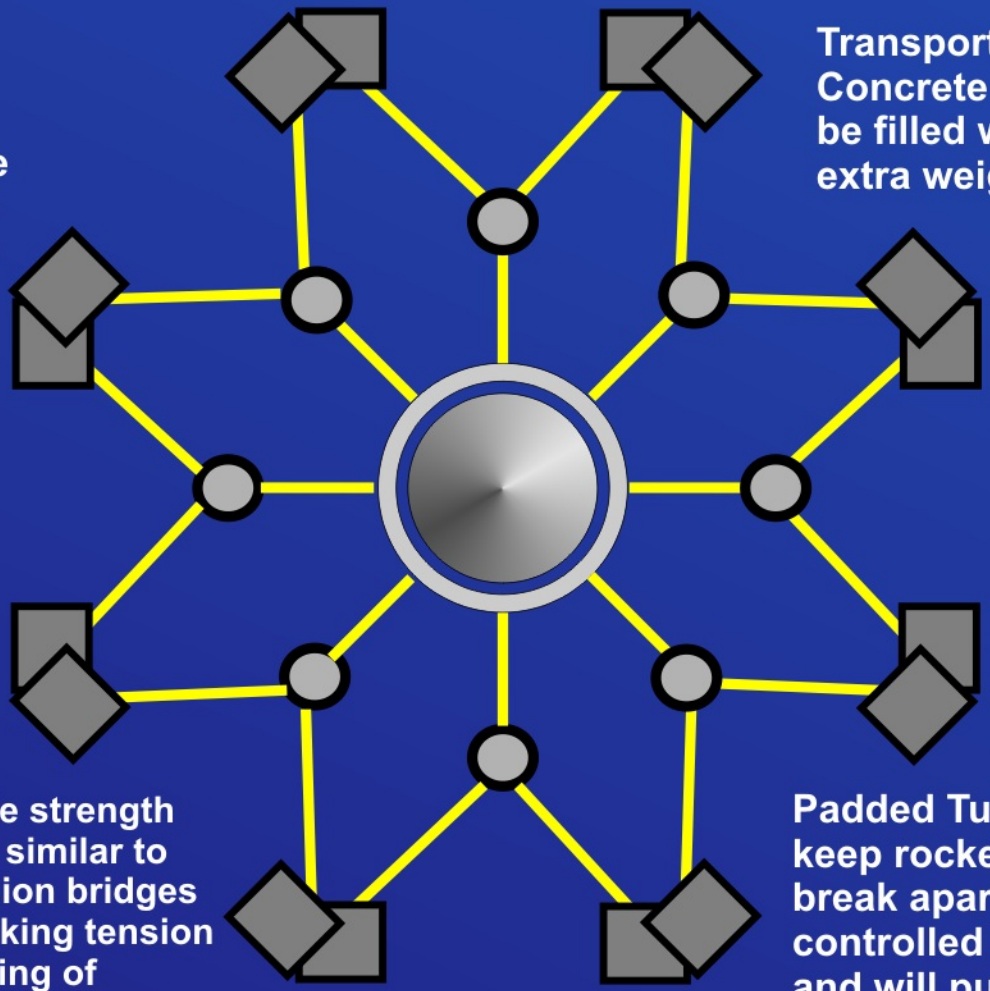
Cable Stayed Gantry System Overhead View with internal Ring-based stabilization (Auto-tensioning)

Eight Transportable high-strength alloy posts are set up on concrete blocks within in-ground hollows for preventing base movement.

Transportable Hollow Concrete Blocks can be filled with sand for extra weight.



Cables are High-Tensile strength multi-strand steel wire similar to those used in suspension bridges attached to ratchet-locking tension motors with auto-sensing of cable tension.

Padded Tubular Support rings keep rocket stable and rings break apart by electronically controlled latch release mechanism and will pull away during launch.

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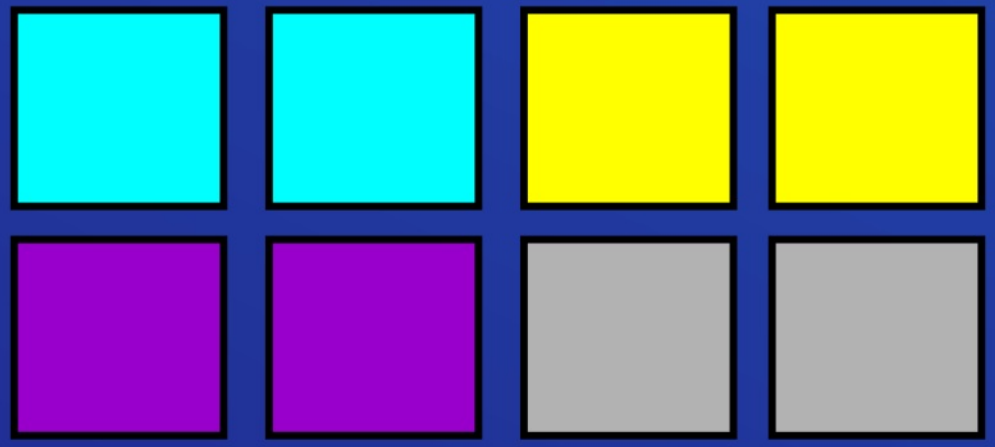
Eight 64-Bit RISC Processors for Autonomous Flight Control
(Cooperative Voting System to Prevent Hardware Failure Points)

Two Roll, Pitch, Yaw and Rocket Heading Controllers

Two Payload Management and Deployment Controllers, and Ground Communications



Two Fuel Mixing and Injection Controllers

Two Flight Path, Gyroscopic and Inertial Guidance Controllers

All Variables for 3D-XYZ Control Roll, Pitch, Yaw, Velocity, Power, Heading and Flight Path are all 64-bit integer and floating-point numbers with Try-Exception Block programing that auto-corrects ALL overflow, underflow and Not-a-number conditions. All Values are clipped to range-limits on out-of-bounds conditions.

Processors are space-rated multi-core (four-core) and are cooperative in their subject area of control. All cores in a function block vote as to whether their inputs and outputs are valid and any core that returns out-of-range or invalid data is discarded and/or quarantined.

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Operating System is Realtime Linux
8 millisecond latency with 32 hardware threads
with pre-emptive multi-tasking

Two 4-core RISC processors are assigned a single mission function using low-latency fixed-packet size message passing for all inter-process communications.

Each mission function has 512 Gigabytes of NON-SHARED space-rated memory storage and is used ONLY for the data inputs and outputs of the assigned mission function.

All arrays, records and files are duplicated and are pre-allocated at a fixed memory allocation size. Extra buffer space is in-between all allocated arrays, records and record fields just in case buffer over-runs are ever encountered.

All function inputs and outputs are clipped to specified range limits with all processing done using PURPOSEFULLY LIMITED numeric processing ranges which have been exhaustively tested with ALL legal input/output values.

Single Cores within function blocks vote as to whether their input/output values are valid and/or legal and any cores that respond with too many invalid results are quarantined and the other cores take over upon failure.

A mission-critical version of Linux has been selected with memory management, serial I/O and communications stack embedded into the kernel to ensure eight millisecond latency.

Each CPU runs a copy of the same kernel and is fully multi-threaded among the four cores using ONLY the assigned memory space within the 512 Gigabytes of storage.

Source Code is all C++ and highly commented with all algorithms checked for consistency and validity and has had extensive bounds-checking for all low-level numeric and high-level math functions.

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