



# Oxidizer Tank and CTN



## N<sub>2</sub>O Tank Manufacture



Tank Liner Lamination



Liner Pressure Test

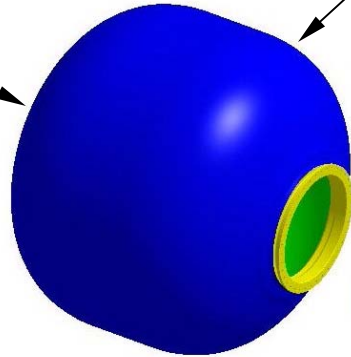


Graphite/Epoxy Overwrap



Tank Proof Test

**Forward Bulkhead:**  
The oxidizer tank is filled and vented through the tank's forward bulkhead. This keeps those functions away from the hot side of the tank, improving safety.



**Oxidizer Tank:** Self-pressurizing liquid Nitrous Oxide (N<sub>2</sub>O) tank with interface flanges. The tank is both an integral part of the spaceship fuselage and the mounting point for the CTN. The tank is bonded to the fuselage skin through an elastomeric compound. The large bond area is lightly loaded, damage tolerant, and isolates vibration.

**Main Valve Bulkhead:** includes slosh baffle/valve/injector/igniter components. The primary joint is at the rear flange where the CTN is bolted onto the oxidizer tank. This flange has O-rings to prevent gas leakage. The valve and injector are mounted on a bulkhead inside of the oxidizer tank, eliminating a possible leak path. Burying the valve and injector inside the tank also eliminates the need for additional plumbing capable of expanding and contracting during the engine run, (a requirement in traditional designs).

**CTN:** motor Case, Throat and Nozzle which contains the solid fuel. The one-piece motor design minimizes the number of possible leak paths. The cantilevered mounting can accommodate various motor lengths and diameters without changing mount or tank designs.

The propulsion system used on SpaceShipOne is a **hybrid rocket motor**. Hybrids are among the safest and simplest rocket motors. They combine the performance advantages of liquids with the simplicity of solids. Neither the fuel nor the oxidizer are hazardous to transport or store.

Two companies, SpaceDev and Environmental Aerospace, are in competition for the propulsion contract. Each is responsible for the main valve bulkhead, valve, injector, fuel grain, motor controller, ignition system, and ground test firings. Both vendors will complete the ground test phase but only one will fly on SpaceShipOne.

## CTN Manufacture



CTN Insulator with AAE Aerospace's Ablative Nozzle



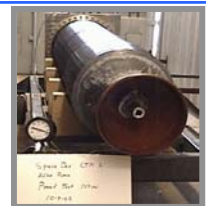
Graphite/Epoxy CTN



Mounting Ring Installation



Graphite/Epoxy Overwrap



CTN Proof Test