HyPerComp Engineering, Inc.

WORLD'S LIGHTEST PRESSURE VESSELS SINCE 1996

Company Snapshot

- World leaders in design, analysis, qualification, and production of light-weight composite pressure vessels (type III, type IV, and type V)
- 35 employees with over 120 combined years of direct engineering experience in composite pressure vessels
- AS9100D Certified
- Founded in 1996

High Performance Pressure Vessels

- Recent high performance designs:
  - 4 geometries qualified and flying launch missions (first ever type IV vessels in manned space-flight)
  - 4 geometries in qualification for new launch vehicles
  - 5 geometries qualified for use on military unmanned vehicles (aerial and underwater)
  - 5 geometries qualified for use on commercial unmanned aerial vehicles
  - 6 geometries qualified for use in CNG vehicles
  - Many other development and qualification programs for H2 fuel cells/ electrolyzers, defense systems, water filtration, lab equipment, etc.
- Hydrogen storage mass fractions achieved:
  - 14% with 1.5X burst safety factor
  - 10.4% with 2.25X burst safety factor
  - Continually improving
- Largest vessel developed:
  - 32.5" OD X 93.5" long
  - 1,000 L water volume
  - 9,200 psig burst pressure
  - Type IV
- Highest burst pressure achieved:
  - 38,000 psig
  - 17.7" OD X 94" long
  - 226 L water volume
  - Type III

Qualification Standards and Agencies

- AIAA S-081
- AIAA G-082
- ISO 11119-2 and 3
- ISO 11515
- US DOT—CFFC
- ECE 79
- ECE R134
- ANSI NGV2 and HGV2

Capabilities

- Pressure vessel design:
  - Solid modeling and engineering drawings
  - Fiber pattern design and programming
  - Proprietary type IV design (3rd generation design, qualified in over 15 aerospace and commercial applications)
  - Proprietary type V design
  - Pressure interface pass-through ports (for internal instrumentation, plumbing, electrical)
- Finite Element Analysis (complex composite structures, including pressure vessel domes)
- Fabrication (in house):
  - Filament winding
    - 4 Axis CNC controlled state-of-the-art machinery
    - Wet or pre-preg
    - Up to 40" OD X 144" long (102 cm x 366 cm)
  - Composite skirt fabrication and installation
  - Plastic liner rotational molding and blow molding
  - Plastic welding (for assembly of internal components in type IV vessels)
- Fabrication (contracted):
  - Spin-formed seamless metal liners
  - Chemical etching for thinning of metal liners
  - Welded metal liners
  - Precision machined metallic components
- Pressure vessel testing (in house):
  - Hydraulic proof and burst testing up to 50,000 psig (345 MPa)
    - Real time expansion measurements
  - High speed automated hydraulic cycle testing up to 8,000 psig (55 MPa), up to 6 cycles per minute
  - Lower speed automated hydraulic cycle testing up to 50,000 psig (345 MPa)
  - Automated gaseous cycle testing up to 9,000 psig (62 MPa)
  - Rapid blowdown testing
  - Thermal conditioning and thermal cycle testing from -50 °F to 250 °F (-46 °C to 121 °C)
  - Cryogenic burst testing as cold as –321 °F (-196 °C)
  - Calibrated permeation testing
  - Calibrated leak check (helium sniff method)
  - Impact testing
  - Gunfire testing
  - Bonfire testing
  - Instrumentation (acoustics, strain, temp, pressure, others)
  - Precision parts cleaning and inspection
- Pressure vessel testing (contracted):
  - Shock and vibration testing (pressurized or empty)

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