

1.1 Woven Thermal Protection System

Statement: A new technology for producing woven thermal protection materials that uses precisely engineered 3D weaving techniques. The woven approach utilizes commercially available weaving technology, consisting of equipment, modelling and design tools, to optimize the weave.

Problem addressed: Existing thermal insulation materials are not efficient over various heating rates, and they don't permit reconfiguration of material composition to match a change in design.

Solution: Using woven thermal protection materials, sustainable, scalable, design-optimized solutions can be achieved with relatively low life-cycle costs.

Technology description: Woven thermal protection materials leverage the mature state-of-the-art weaving technology that has evolved from the textile industry to design materials with tailorable performance by varying material composition and properties via the controlled placement of fibers within a woven structure. The resulting material can be designed to perform optimally for a wide range of thermal conditions to address various design requirements.

Benefits of the product: Woven thermal protection materials provide multiple benefits that includes:

- Novel approach to producing thermal insulation material.
- Thermal insulation material optimized for a specific design.
- Reproducible and predictable material performance.
- Lower costs.

Areas of application: The woven thermal protection materials could be efficiently used as a thermal insulator serving cryogenic industry, including LNG, LPG, ethylene, and hydrogen production and transportation facility. It combines high thermal insulation and excellent structural properties.