Corrosion Control

Corrosion is the deterioration of materials due to reactions with their environment. Corrosion can have catastrophic consequences when it is not prevented, detected, and controlled. New technologies are needed to build/maintain spaceport systems that are cost-efficient, safe, reliable, and easy to inspect. Corrosion can be minimized by proper selection of materials, coatings, detection methods, and maintenance procedures in the design stage. Corrosion detection is important to avoid catastrophic failures. NASA is seeking technologies for prevention, detection, and mitigation of corrosion in spaceport facilities and ground support equipment. Technologies and tools for the evaluation and detection of hidden corrosion, including a system to detect corrosion under paint on either side of the structure without requiring removal of any components or thermal protection system elements covering the structure. Development of new coatings and qualification of existing coatings for corrosion protection.

Non-Destructive Evaluation/Non-Intrusive Inspection Technologies

Non-destructive evaluation (NDE) technologies for cryogenic foam insulating materials. Tools and techniques for defect detection in composite materials. Non-destructive methods to determine structural integrity of bonded assemblies, especially non-metallic composites and thermal protection system (TPS) materials. Non-intrusive inspection of vacuum-jacketed piping to survey long distances of piping without compromising the vacuum. Nondestructive evaluation/inspection techniques for graphite epoxy composite over-wrapped pressure vessels (COPVs) or Kevlar COPVs. Definitive techniques do not currently exist for determining if there are broken fibers, voids, or delaminations which could result in a decreased safety factor for COPVs. Failure to detect a defect could result in a COPV rupture leading to loss of life, loss of mission, and/or damage to flight hardware, facilities, and ground support equipment (GSE).

Propellant Loading/Servicing/Storage

Lightweight and versatile cryogenic storage and distribution technologies. Energy-efficient cryogenic insulation
approaches to achieve operationally effective, integrated refrigeration and storage systems. Increased propellant quantity requirements for Constellation Systems will require larger storage vessels and longer transfer lines. Advanced cryogenic loading technologies, including systems that combine advances in component health management, automated process control, instrumentation, resource conservation, and improved seals. Advanced propellant system umbilicals and quick-disconnect fittings for a variety of fluid interfaces.