

Thermographic Methods of detecting insulation voids in large cryogenic tanks

Four very large (900Kgal) cryogenic liquid hydrogen and oxygen storage tanks at Kennedy Space Center's LC-39 launch pads were constructed in 1965 to support the Apollo/Saturn V Program and continue to support the Space Shuttle Program. These double-walled spherical tanks with powdered insulation in the annular region, have received minimal refurbishment or even inspection over the years. As the Shuttle Program comes to an end we now have the time to perform limited refurbishment.

Thermography has been used to monitor the state of insulation as one of the four tanks was drained of cryogen and warmed to ambient temperatures. An anomalous region of insulation detected previously with thermography was confirmed by visual inspections during this period. Thermal models and a comparison of images from the cold and warm tanks suggests that the anomalous region can be detected even without cryogen in the tank. The ability to detect and correct probable insulation voids prior to filling with cryogenic fluid can provide significant cost savings by reducing commodity boil-off over many years of use.

Presenting Author:

Ellen Arens

NASA, Kennedy Space Center

NE-L5