



Credits: USAF

## Sensors

# Ultra-High Temperature Displacements and Strain Measurement

An optical method for detecting displacements and strains at ultra-high temperatures during thermo-mechanical testing

NASA Langley Research Center has developed an optical method for detecting displacements and strains at ultra-high temperatures during thermo-mechanical testing. This innovation will provide displacement and strain measurements in high temperature applications where conventional measurements technologies cannot physically survive. The measurement system has operated in laboratory environments in excess of 2,800 degrees Fahrenheit.

## BENEFITS

- ➔ Can obtain displacement and strain measurements at temperatures in excess of 2,800 degrees Fahrenheit
- ➔ Minimal optical aberrations during measurements
- ➔ Can be applied to any optical pattern recognition system

## APPLICATIONS

- ➔ Atmospheric re-entry vehicles
- ➔ Hypersonic flight vehicles
- ➔ High temperature engine turbines
- ➔ High performance engines
- ➔ Any other application for high temperature testing

technology solution

# NASA Technology Transfer Program

Bringing NASA Technology Down to Earth

## THE TECHNOLOGY

A need exists to measure displacements and strains for materials subjected to high temperatures at or above 1,500 degrees Fahrenheit to verify a material's structural performance at those temperatures. For example, such measurements are needed for spacecraft re-entry vehicles, hypersonic flight vehicles, high temperature engine turbines, and high performance engines.

The technology is an ultra-high temperature measurement technique that enables the use of conventional optical methods for sensing of displacements and strains at temperatures well above those where these conventional measurement techniques have previously been applicable. High temperature materials are used which can endure an experimental high temperature environment while simultaneously having a minimum optical aberration, such that emissivity differences in these materials can be used to produce a visible pattern that can be used by conventional optical methods.



Hyper-X Research Vehicle Concept Drawing

## PUBLICATIONS

Patent Pending

National Aeronautics and Space Administration

### The Technology Gateway

### Langley Research Center

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