

# THERMAL EFFECTS MODULE - ADVANCED



For improved accuracy in structural and heat transfer analyses of self-heating and thermal gradient effects.

**Note: FPM-TB is required as a prerequisite**

The advanced thermal module is an add-on to the basic module. It enables greater accuracy and completeness in the representation of temperature and frequency effects in structural and thermal models.

## Experiment Overview

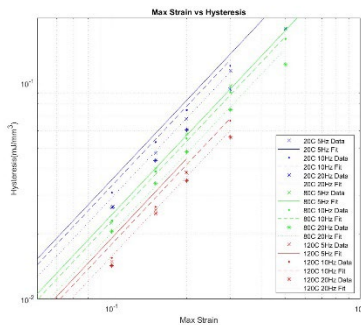
- static tearing raw data at 2 more temperatures (in addition to the 3 temperatures already collected in FPM-C and FPM-TB)
- cyclic stress strain raw data at 3 temperatures and 3 frequencies
- thermal conductivity, specific heat & density measurements
- thermal expansion measurement
- number of slabs needed for test: 3

### Use with

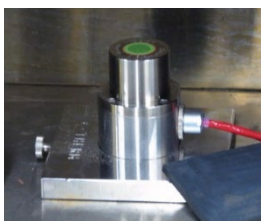
- Powerlaw strain amplitude hysteresis model
- Terziyski-Kennedy temperature and frequency model
- Exponential fatigue crack growth temperature sensitivity
- Table lookup temperature model

## Analysis and Reporting / Deliverables

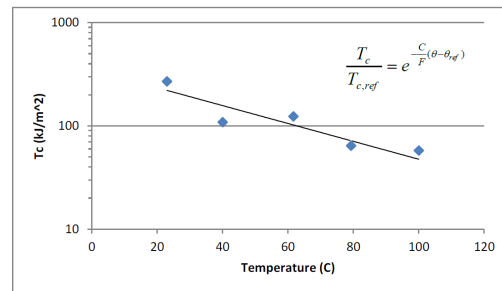
- heat generation law parameters describing dependence of hysteresis on strain, rate, and temperature
- tear strength vs. temperature
- fatigue crack growth rate law temperature look up table
- coefficient of thermal expansion



Dependence of hysteresis  $H$  on max strain, temperature and frequency.



Thermal transport properties are measured using transient plane source method.



Dependence of tearing energy  $T_c$  on specimen temperature.



Thermal expansion is measured using thermomechanical analysis (TMA).