

**Motor Vehicle Fire Research Institute**  
**Awarded Contracts**

**Title:** [Microscale Combustion Calorimeter Testing of Automotive Materials](#)

**Contractor:** [TRACE Technologies, LLC - Dr. Richard Lyon, PI.](#)

**Duration:** June 16, 2005 to October 16, 2005

**Purpose:**

Earlier testing sponsored by NHTSA and GM conducted fire resistance testing of a variety of automotive materials using several test methods. This research project would subject samples of some of the same materials to tests that use a Microscale Combustion Calorimeter. The contractor has data on representative aircraft interior materials that have been subjected to the same test. These tests will provide a comparison between the Microscale Combustion Calorimeter test results and other test methods. It will also provide a comparison between the fire resistance of automotive and aircraft materials.

The Microscale Combustion Calorimeter operates by the process of pyrolysis-combustion flow calorimetry (PCFC). In PCFC physical properties of the material do not influence the heat release results generated in the test. Materials are tested by thermally decomposing a sample and combusting the off-gases. The amount of oxygen consumed is measured and is proportional to the amount of heat released in a fire. Data is presented as one or more heat release rate peaks versus a temperature axis. The values measured are the peak heat release rate, total heat release, and char yield. The peak heat release rate is used to calculate a value called the heat release capacity, which is a material property. The total heat release is the amount of heat that is released throughout the decomposition and is a measure of the total fuel generated. A char yield that is proportional to that which is produced in a real fire is obtained from the residual weight of the sample after the test. The temperature at which these events occur can also be obtained.

Twenty-one samples provided by MVFRI will be tested in the Microscale Combustion Calorimeter. Data provided will show the heat release rate curve and a summary of the values derived from it. A summary sheet listing all the results for the data set will be provided. Additional data on a set of standard materials will be provided.

A summary report authored by Richard Walters and Richard Lyon comparing the results to materials currently in aircraft will be provided. A description of the testing device and test procedures and how they compare with test procedures used in DoT standards will also be included. All test data and test plots will be provided in electronic form using Excel or equivalent software.