FLAMMABILITY ASSESSMENT OF LITHIUM-ION BATTERY CELLS DESIGNED FOR AIRCRAFT POWER USAGE

An Abstract for the 6th Triennial International Aircraft Fire and Cabin Safety Research Conference Steven M. Summer

Tests were performed at the Federal Aviation Administration William J. Hughes Technical Center by the Fire Safety Team of the Airport and Aircraft Research and Development Division to examine the fire safety hazards that cylindrical- and polymer-type lithium-ion batteries may pose onboard aircraft. Tests were conducted on individual, manufacturer-supplied battery cells to determine how the cells would react in a fire situation, as well as what potential fire hazard the battery cells themselves may pose and the effectiveness of a typical hand held extinguisher on a fire involving the battery cells. The battery cells that were tested were all commercial off-the-shelf products that are being considered by manufacturers for aircraft power-related usage.

The results of the tests showed that the lithium-ion and lithium-ion polymer battery cells can react violently when exposed to an external fire. Under test conditions, when the battery cells failed, flammable electrolyte was released and ignited, which further fueled the existing fire. This release and ignition of the electrolyte resulted in significant temperature and pressure increases within the test fixtures.

Tests conducted with a hand-held Halon 1211 fire extinguisher showed that the halon was able to extinguish all three battery-type fires. However, even after several attempts, the halon extinguishing agent was not able to prevent the lithium-ion polymer battery cells, which are of a different chemistry, as well as a much higher energy density and power capacity, from reigniting.