Flammability limits differ from cotton by weight (18.05 cm of cotton / fiberglass). The samples in Saffire I and II will be 40.6 cm by 94.0 cm. The samples in Saffire I and II correspond to the curvature seen on the flame spread as a function of ambient pressure in a quiescent environment. The decreasing nature raises an important issue in reduced ambient pressure environments. For a constant oxygen partial pressure, the flammability boundary follows a nearly linear relationship with respect to ambient pressure. The non-zero intercept corresponds to the curvature seen on the LOC values. The strong dependence on pressure suggests other kinetic effects or flow effects.

### Sample Layout Flights I and III

The samples in Saffire I and III will be 40.6 cm by 94.0 cm of cotton / fiberglass blend (Silab cloth). 75% cotton by weight (18.05 cm of cotton / fiberglass). Embedded thermocouples at 0.3 and 0.8 cm above the surface in 2 locations to estimate the flame position and the standoff distance in order to compare with the video footage.

### Nomex Ignition Testing

Tests have been conducted with Nomex H1700-40 to find the limiting oxygen concentration (LOC) for flame spread as a function of ambient pressure in a quiescent environment. The igniter was a hot wire: 18 V at 5 mA. The results with Nomex H1700-40 revealed that having a forced flow, or mixed flow over the fabric surface versus a quiescent environment resulted in different LOC values.

### The Road Ahead

The large-scale material flammability demonstration will facilitate the understanding of the long-term consequences of a potential spacecraft fire and provide data not only for the verification of detailed numerical models of such an event, but also for the development of predictive models that can assist and optimise fire prevention, response and mitigation. The first step to provide a predictive tool that will integrate fire safety into design and management of space vehicles. Such tools will integrate a wide range of design issues including, but not limited to, material selection, emergency response, crew training, post-fire cleaning-up, fire detection, fire suppression, environmental control and life support (ECLS) system design, and even atmosphere selection to provide a globally optimized solution.

### Digital Content

**Video Footage:**
- [Cygnus approaching the ISS](https://ntrs.nasa.gov/search.jsp?R=20150000894)
- [Cutaway view of the fire duct and avionics enclosure](https://ntrs.nasa.gov/search.jsp?R=20150000894)
- [Sample Layout for Saffire II](https://ntrs.nasa.gov/search.jsp?R=20150000894)
- [Sample Layout Flight II](https://ntrs.nasa.gov/search.jsp?R=20150000894)
- [Sample Layout Flight I](https://ntrs.nasa.gov/search.jsp?R=20150000894)
- [Igniter](https://ntrs.nasa.gov/search.jsp?R=20150000894)
- [Normalized Flame Propagation Velocity vs. Groove Width](https://ntrs.nasa.gov/search.jsp?R=20150000894)

**Numerical Modeling:**
- [Numerical Modeling](https://ntrs.nasa.gov/search.jsp?R=20150000894)
- [Sample Layout Flight I](https://ntrs.nasa.gov/search.jsp?R=20150000894)
- [Sample Layout Flight II](https://ntrs.nasa.gov/search.jsp?R=20150000894)

**Contact:**
- David L. Urban (david.urban@nasa.gov)
- Grunde Jomaas (grujo@byg.dtu.dk)

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**A detailed three-dimensional transient concurrent flame spread model, featuring an adaptive mesh refinement method that will resolve in detail the spreading flame base and pyrolysis front, will be utilized to predict recent ISS experiments and future Saffire tests.**