MCC



FAA **Microscale Combustion Calorimeter**

• U.S. Patents 6,464,391 & 5,981,290 • ASTM Standard D7309-13



Update on qualification test for adhesives

- Companies participating in similarity program supply samples with minor changes in material along with FAR results
- Microscale Combustion Calorimetry (MCC) testing is performed in FAA lab to determine if MCC testing can *catch the minor differences* in material and more important *to predict the results of certification test (basis).*
- Possible elimination of re-certification of the entire part

Company	Form of samples	Sample Description //// Concerns	FAR results	MCC results	MCC = FAR?
Hutchinson	3 films: Film A Film B Film C 2 adhesives: Adhesive A Adhesive B	Film A is newly developed film containing high amount of FR Film B and C are batches of the same film, separated by a few years	Some failures for Film A (probably due to configuration of blankets)	Different flammability spectrum for Film A, also higher [CO] Adhesives have different flammability spectra, but both contain FR	YES
B/E Aerospace	2 adhesives	Samples are identical, some variation in FAR test results	First set showed variation in total heat release, additional testing showed no variation between two samples	Samples are equivalent	YES
3M	3 adhesives: Sample 20 Sample 32 Sample 37		Sample 20 failed 4 out 4 12 s VBB Sample 32 passed 2 out of 4 Sample 37 passed 4 out of 4	Sample 20 flammability spectrum looked different from samples 32 and 37. Sample 20 has higher probability of failing 12 s VBB if MCC properties used as predictive variable	YES
Flexible Ceramics	2 flims				

Hutchinson samples



- Film 2004 is newly developed film containing high amount of brominated FR
- Films T004 and 0612 are 2 batches of the same film, separated by a few years
- Heat release rate curve is different for film 2004 for standard (900C combustor) conditions
- CO/CO2 ratio is 20 times higher for film 2004
 @ 800C combustor temperature



- Adhesives 261 and 808 are different
- They both contain flame inhibiting compounds

B/E Aerospace samples



HRR, W/g

- Samples H3101 and H3101x are determined to be equivalent
- Two sets of OSU testing were completed. First set showed variation between H3101 and H3101x in HR. Second set showed no variation.

Temp, C

3M samples



- Sample 20 is different from samples 32 and 37 according to MCC test results
- Checked for FR presence @ 750 C combustor temperature, no CO detected
- 12 s results: Sample 20 failed 4 of 4, sample 32 passed 2 of 4, sample 37 passed 4 of 4.