Validation of a Fine Water Mist Fire Extinguisher

STATUS QUO

- *ADA Fine Water Mist (FWM) Portable Fire Extinguishers (PFE)*
- *Tested on wide range of representative fires including 34% O_2 / 8 psi environment*
- *Spray fully characterized (droplet size, plume dimensions) in one-g lab*

NEW INSIGHTS

(1) Water atomization in microgravity: quality and droplet size distribution (DSD) compared to one-g lab measurements (above). Goal is to confirm that micro-g does not affect droplet formation.

(2) Transport of droplets in microgravity: discharge inside an obstructed enclosure to simulate an ISS rack.

ACHIEVEMENT

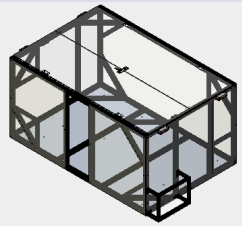
MAIN ACHIEVEMENT: Validate in microgravity a new PFE using FWM and nitrogen for replacement of the current CO_2 PFEs onboard the ISS. CO_2 at fire suppression levels is toxic in occupied spaces. As a result, ISS crew safety will be appreciably improved during fire emergency operations.

HOW IT WORKS: Droplet size distribution (DSD) is determined using a Malvern Spraytec instrument located inside a sealed enclosure in a first experiment. In a second experiment, droplet transport around obstructions is measured via infrared light scattering in a remote region of the same obstructed enclosure. In both cases, the PFE is actuated inside the sealed enclosure.

EXPECTED PERFORMERS: ADA Technologies (Littleton, CO), Colorado School of Mines (Golden, CO) and NASA Glenn Research Center (Cleveland, OH).

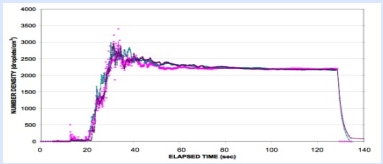
SCHEDULE: July 18-22, 2011.

DELIVERABLES AND DATE: Preliminary flight report (July 29, 2011), Final report (September 23, 2011), Follow up report (July 18, 2012).



ADA sealed enclosure where measurements will be made

QUANTITATIVE IMPACT



Discharge time: 10 s bursts, 6 bursts per PFE

DSD: similar to baseline lab data at 30 cm from instrument beam: D[32]<70 microns, Dv10<20 microns

Spray density at beam: 30-80%

Spray span factor: 1.5 to 3.0

Transport: +10% improvement without gravity (chart above)

END-OF-PHASE GOAL

FWM PFE assures ISS crew safety in firefighting and post fire clean up operations

- ***Eliminates the risk of CO_2 poisoning from current PFE***
- ***Refillable onboard for longer missions***

Validated, non-CO_2 extinguisher with equivalent performance is critical to improved ISS crew safety

ADA Technologies, Inc.