

Aerial Delivery Overview & Areas of Investigation For Personnel Airdrop

Mr. Brian Bagdonovich
Team Leader
Airdrop Technology Team
US Army Natick Soldier RDEC

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- Airdrop in Afghanistan
- JPADS & Mission Planer
- 2K JPADS JUONS
- Aerial Delivery S&T
 - Precision Airdrop Enhancements
 - Communication
 - Personnel
 - Helicopter Sling Load
- Opportunities

Combat Airdrop Summary

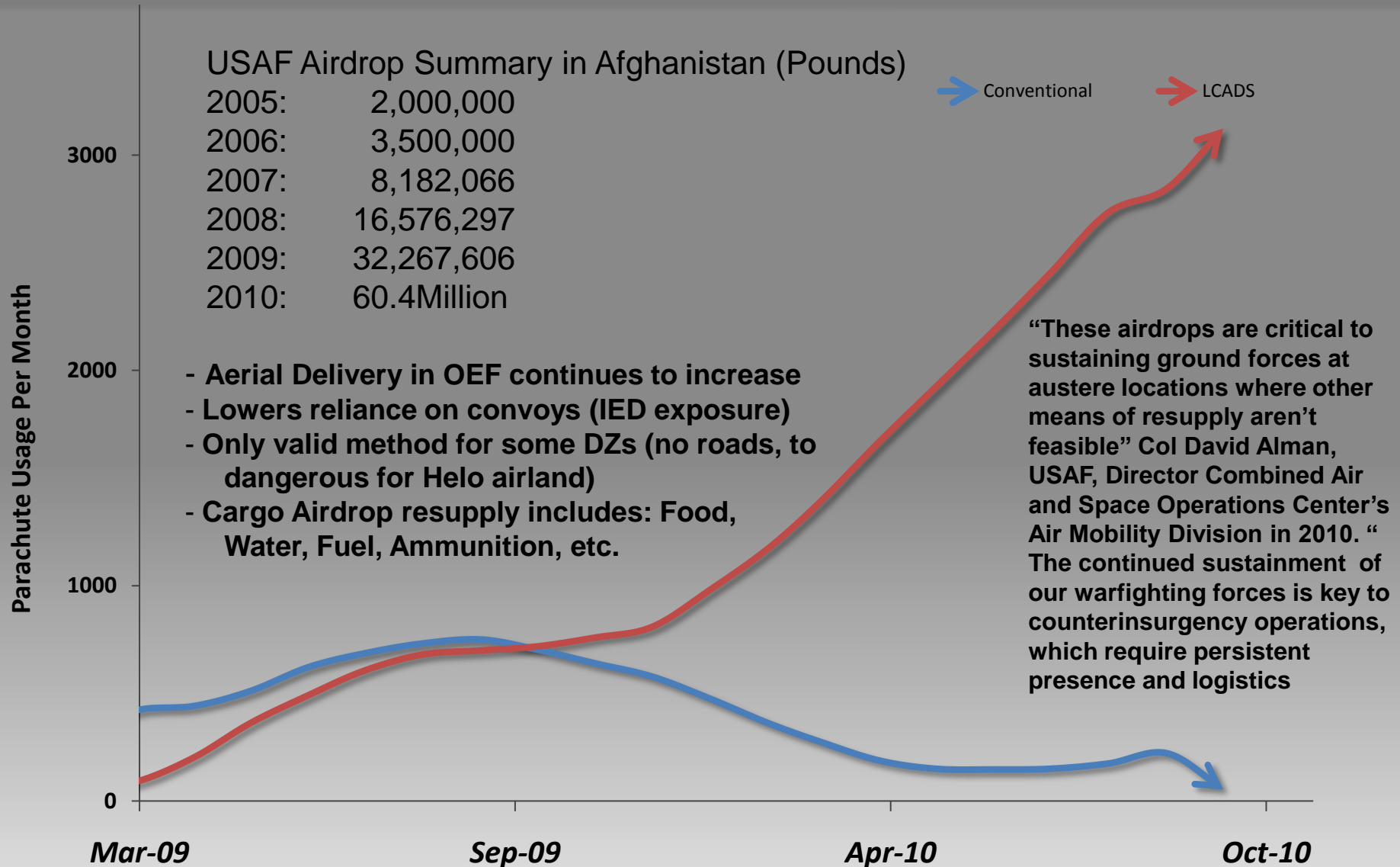
Increased Use of LCADS Vs. Conventional

USAF Airdrop Summary in Afghanistan (Pounds)

2005:	2,000,000
2006:	3,500,000
2007:	8,182,066
2008:	16,576,297
2009:	32,267,606
2010:	60.4Million

- Aerial Delivery in OEF continues to increase
- Lowers reliance on convoys (IED exposure)
- Only valid method for some DZs (no roads, too dangerous for Helo airland)
- Cargo Airdrop resupply includes: Food, Water, Fuel, Ammunition, etc.

→ Conventional → LCADS



- **LOW COST CONTAINER (LCC):**
 - Reduces costs by at least 55% over current CDS
 - 2,200 lb. load capacity
 - Delivers serviceable load in 13-knot ground winds
 - Thousands fielded since FY06
- **LOW VELOCITY & HIGH VELOCITY PARACHUTES**
 - 2200 load capacity – low to high altitude
 - Performance Similar to 26-Ft High Velocity and G-12 Low Velocity Parachutes
 - Pre-packed by the manufacturer
 - Simple design, easy to build, able to meet surge requirements
 - Broad manufacturing base
 - Thousands fielded since FY08
 - LCADS Low V has become system of choice in OEF when threat allows



4 Chute LV-LCADS HALO





DZ looking at Run-in

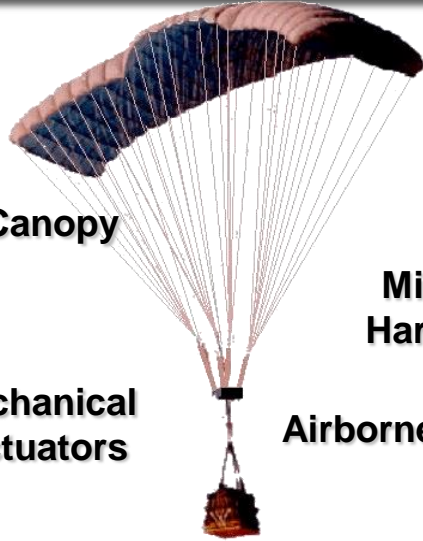


100 x 350 m

30° Slope Either Side Of
Centerline

50° Slope on Trailing Edge

UNCLASSIFIED



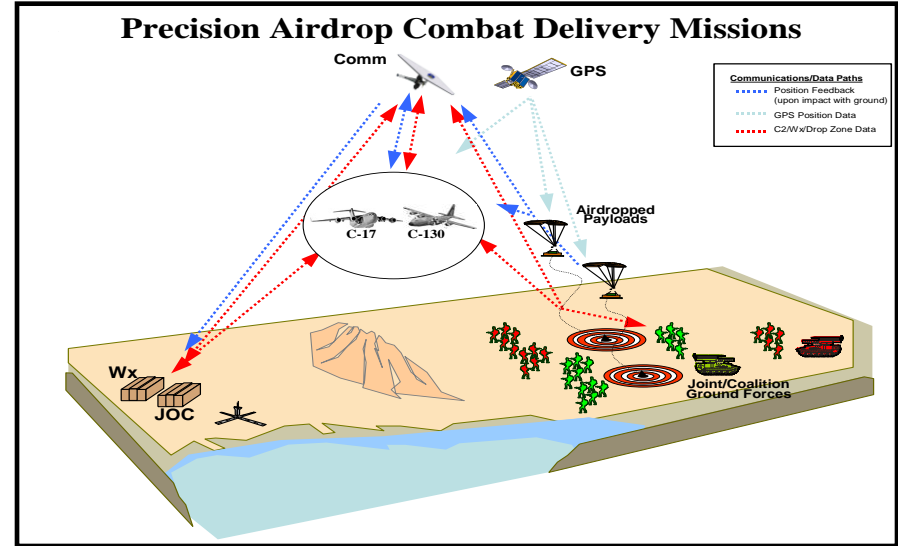
Steerable Canopy



Mission Planning
Hardware/Software

Electro-Mechanical
Steering Actuators

Airborne Guidance Unit



FAMILY OF SYSTEMS FOR

- MICRO LIGHT (JMDSE JCTD): 10-150lbs
- ULTRA LIGHT VERSION~250-700 LBS
- EXTRA LIGHT VERSION~700-2400 LBS
- LIGHT VERSION~5001-10,000 LBS
- MEDIUM VERSION~10,001-30,000 LBS
- HEAVY VERSION~30,001-60,000 LBS



USMC ULW Lead
Contract Award
March 17, 2011

250-700lb

Micro Light
(multiple US investments)
10-150lbs

ICTD

Military Free Fall (head
&/or Chest mounted)

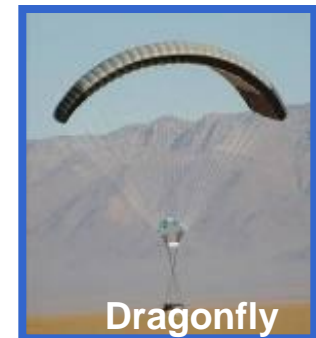


Common Mission Planner:
"All" High altitude systems



Firefly

700-2.4Klb

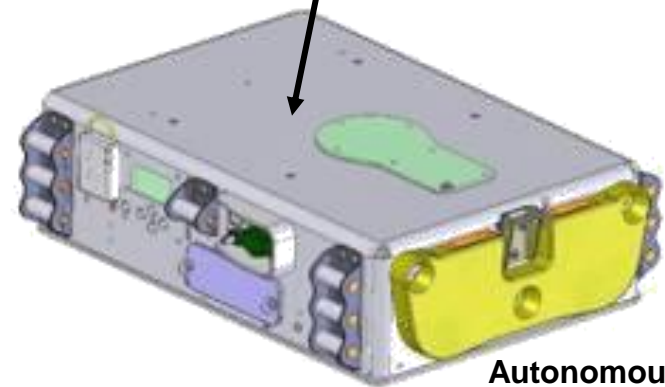
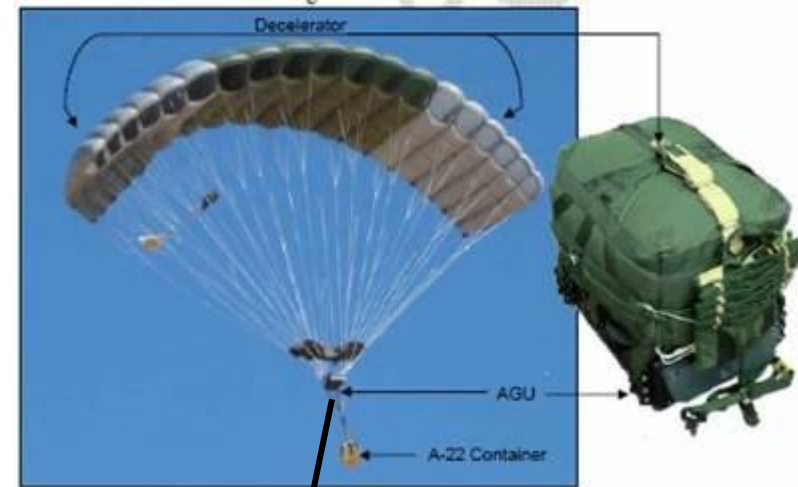


Dragonfly

5-10Klbs

High altitude deployable cargo self guided airdrop systems: 24.5Kft MSL+ deployments, 50M accuracy (objective). All wirelessly linked to a common JPADS-Mission Planner

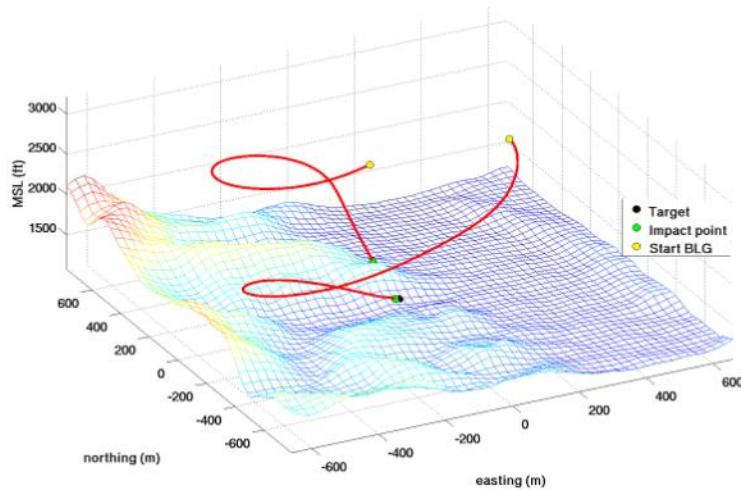
- **DESCRIPTION:**
 - Autonomously navigates along a predetermined glide and flight path to accurately deliver supplies and equipment
 - Utilizes two primary components: a decelerator and an Autonomous Guidance Unit (AGU), which interface with the USAF JPADS mission planner
 - Compatible with A-22 Container
- **STATISTICS:**
 - Weight – 160 lbs.
 - Max Payload – 2,400 lbs
 - Release Altitude – 3,500ftAGL-25,000ftMSL
 - Surface Area – 1025 ft²
 - Offset – >20Km
 - Accuracy ~110 m CEP (80%) (T-150m)
- **STATUS:**
 - Under Contract to Airborne Systems North America (now Hunter Defense Technology)
 - Systems Urgently Fielded to OEF in Sep 08
 - Materiel Release & Full Rate Production Approved May 09
 - 200+Systems Fielded Since Jul 09



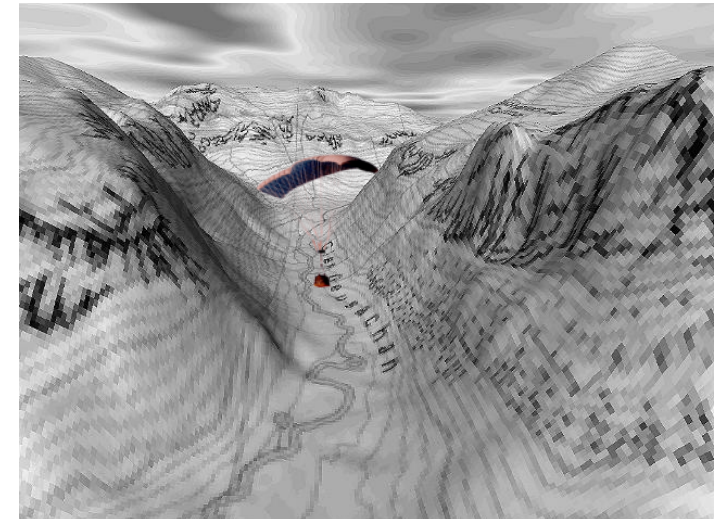
**Autonomous
Guidance Unit (AGU)**



- Three major requests:
- 1) Obstacle/Terrain avoidance
 - 2) One time use HW
 - 3) Improved accuracy



- **Weather sensing**
 - Share wind knowledge up a stick (leader/followers)
 - Forward wind knowledge will improve accuracy
- **Height sensors**
 - Improve AGL data for terminal guidance, flare timing, and obstacle avoidance
 - Increase accuracy and load survivability
- **Digital Terrain Elevation Data (DTED)**
 - Avoid mountains, ravines and adapt to undulating drop zones
 - Improve flight path and increase accuracy/survivability
- **In-flight tracking/Asset Location**
 - Communication among systems (deconfliction), A/C and soldiers
 - Improve ability to locate payloads
- **Adaptive flight software**
 - Maintain planned mission with damaged AGU or parafoil
 - Improve reliability, accuracy, and survivability



• JPADS Accuracy Challenges

- Winds
- High Aspect Ratio/Glide Canopy
 - Unstable Sink—Dynamic Stall
 - Full Brakes—Fast Ground Speed



Average miss = 50+ m
3+ yrs

• AccuGlide: Glide Slope Control, Landing—Like a Round

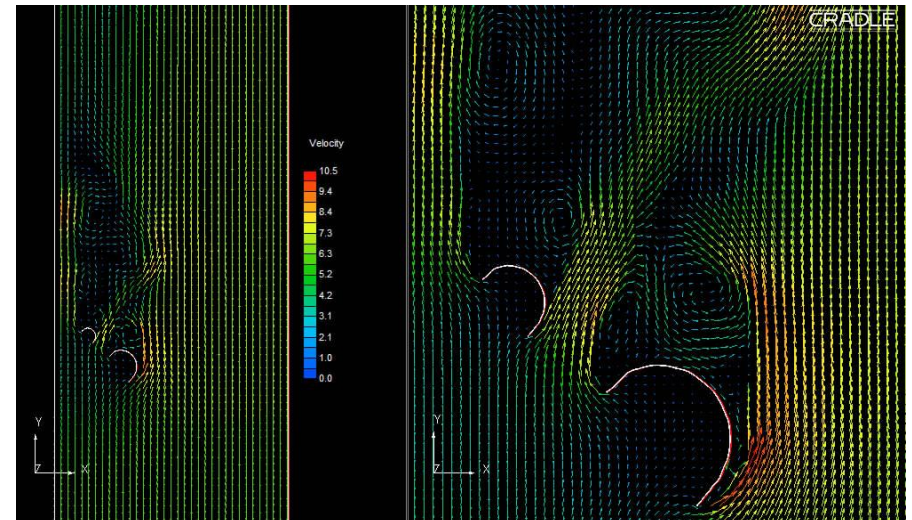
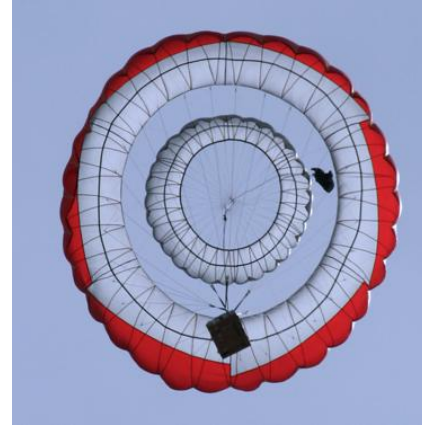
- Design = Personnel Accuracy, Low Aspect Ratio
 - Stable Sink—Stall Recovery
 - Full Brakes—Slow Ground Speed
- FY09/FY10: AG100 = 100 ft² (80 lbs payload)
 - New Guidance and Control System
- FY10/FY11: AG580 = 580 ft² (600 lbs payload)
 - Variable Trim with enhance glide control



Miss = 2 m
3rd week of Testing

High Speed Container Delivery System (HSCDS)

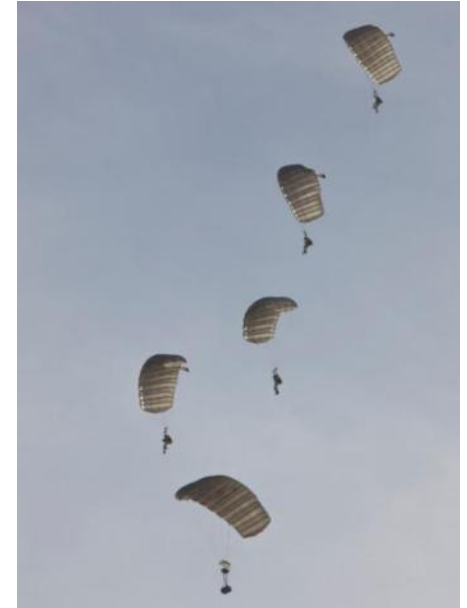
- Novel canopy design concept – Concentric Annular
- Fills capability gaps that current inventory cannot handle
 - Faster drag area generation
 - Reduced oscillation
- Designed to survive opening at 250 KIAS. High geometric porosity reduces damage.
- Design can be applied other existing Army needs – Advanced Low Velocity Air Drop Systems – Heavy (ALVADS-H)
- Light weight (50% the weight of a G-12 with the same drag area)





- Currently JPADS does not know location of other systems.
- Occasional “mid air” collisions.
- Comms between systems allows:
 - Addition of deconfliction SW
 - Follow the leader GN&C
 - Passing of wind estimates (or measurements) from “lower” to higher systems when heading to same DZ
 - Passing of “position” (to include impact) up chain (last system SATCOM connected)
- Testing with unsecure comms (S&T)
- Currently investing in next gen JPADS avionics.

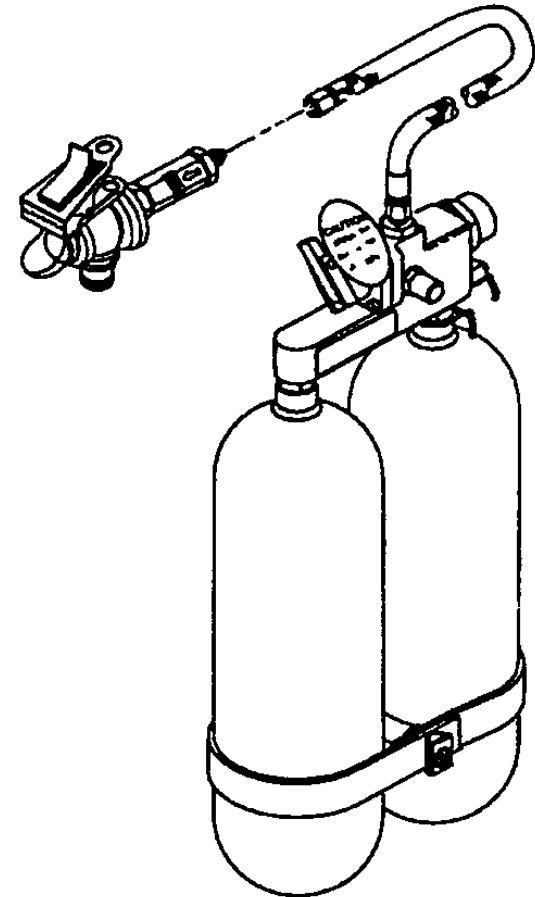
Communication, De-confliction, Combo Drops



- De-confliction: JPADS <-> JPADS
- Combo drops: JPADS & MFF
- Soldier load reduction
- Also desired with HALO option
- Comms extended between jumpers and bundles
- Jumpmaster with “optional” controls
 - Change mission in flt, (alternate IP)
- SATCOM on JPADS (or MFF)
- Limiting overload SA to jumper is key
- Personnel de-confliction at night more difficult
- Pass wind estimates up chain
- Track all systems via LOS comms, pass all via SATCOM
- Exact payload location on ground, flare direction...



- Current bottle rated as 106 cu in at 1800 psi
- Aircraft exit altitude increasing by 10,000 feet up to 35,000 feet AGL, and increasing time under canopy to potentially 45 minutes or longer
- Working with PM-SCIE to provide parachutists with more oxygen with a higher psi bottle



Full-Face Oxygen Mask

- Recently fielded the improved Parachutist Oxygen Mask (POM)
- Current Military Free Fall helmet-worn equipment does not provide adequate thermal protection in extreme cold environments
- Investigating development of full-face oxygen mask for greater thermal protection of face and neck with increased exit altitudes up to 35,000 feet AGL



Parachutist Extreme Cold Weather Thermal Protective Equipment

- Current maximum exit altitude for High Altitude Military Free Fall training/operations is 25,000 feet AGL. This will be increasing to 35,000 feet AGL.
- At 35,000 feet AGL, soldiers could experience temperatures of -60°F, and land at drop zones with temperatures in excess of 100°F.
- There is no equipment available to provide the necessary thermal protection during time aloft and account for the thermal differential between aircraft exit and surface temperatures.
- While there exists some thermal equipment, it is lacking in protecting extremities, such as hands and feet.





•Conduct Air drop from the cargo hook of a helicopter

- No required drop order
- Air Drop/ Air Land capability
- Release system within the aircraft
- Integrate with any parachute system
 - Guided
 - Unguided
 - HALO
- Integrate with any Helicopter (cargo hook required)



Low Cost Helicopter Sling Load Equipment

- **New HSL Equipment**
 - **High Strength**
 - **UV/particulate resistant**
 - **Light Weight**
 - **Low Cost**
- **One Time Use Equipment**
 - **Low Cost Materials**
 - **Low Cost Manufacturing practices**

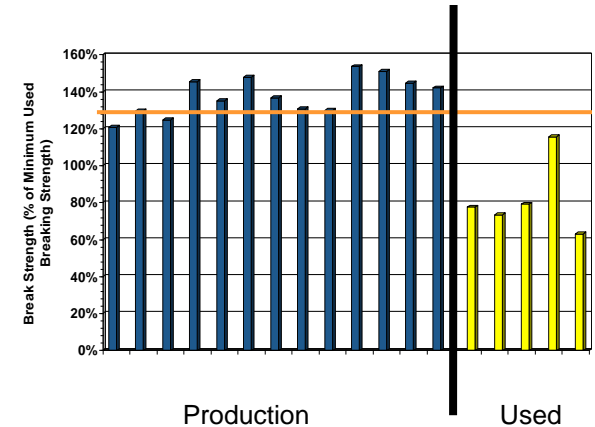


Problem:

- Up to 40% strength loss after 18 months of use in Iraq
- Strong evidence of sand ingestion and degradation
- Currently no service life on the equipment
- Visual inspection prior to use

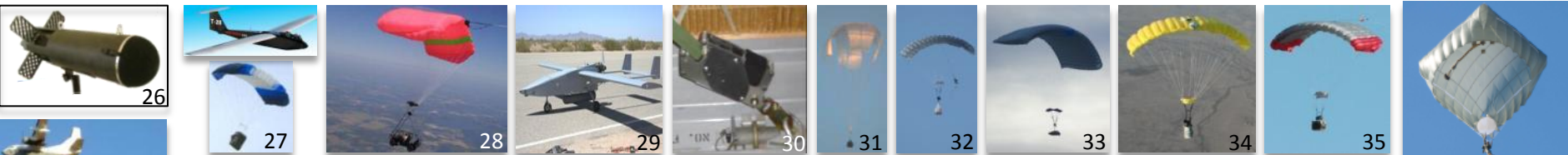
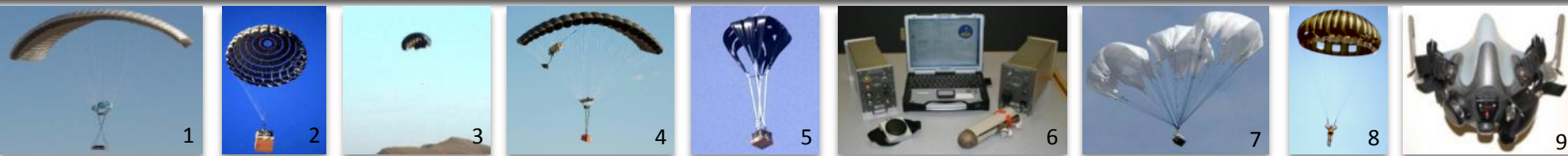
Program:

Identify non-destructive tests methods
it identify damaged ropes and cords



Current RFI Link:

https://www.fbo.gov/index?s=opportunity&mode=form&id=62ee2b4317486aaa81c037bd32346f50&tab=core&_cview=0



Operational &/or POR	S&T	S&T (Cont.)	Foreign
1: 10K JPADS (Dragonfly)	11: 2K ICDS (HALO)	22: Onyx UL, jumpers following	31: CA - Low Cost
2: 26ft RS ICDS	12: 5-10K ICDS HALO (1)	23: Onyx ML	32: CA - Sherpa 2K
3: LV LCADS (ICDS)	13: 10K Screamer (RCFd)	24: Panther 500	33: CA - Sherpa 10K
4: 2K JPADS-Firefly	14: BPADS	25: PCADS	34: NL - Spades 300 (UL)
5: HV LCADS (ICDS)	15: CopterBox	26: QuickMEDS	35: NL - Spades 1000 (2K)
6: JPADS-MP	16: GlideLine Parachutist Navigation	27: Snowflake via Arcturus UAS	NL- MFF Jumpers: not shown
7: LCLA (3 variants)	17: 5-10K ICDS HALO (2)	28: Strong ATV (Prowler)	
8: MC-6	18: Maverick UAS, dropping 3 systems	29: Tigershark UAS with Provider	
9: Parachutist Oxygen Mask	19: Megaflly (18K-30K)	30: Wireless Gate Release System	
10: T-11	20: Microfly		
	21: Mosquito Delivery System 3		

Systems at PATCAD 2009

A broad selection of systems were showcased at PATCAD 2009. Approx. 40 lifts utilizing 400,000 lbs of cargo tested from 3-30,000 lbs. Systems drop from C-130 (H and J), C-17, C-23, V-22, Commercial C-130, and Tigershark, Maverick and Arcturus UASs.



Examples include:

Natick maintains an active Broad Agency Announcement (BAA)

<http://nsrdec.natick.army.mil/business/index.htm>

Open for ideas/responses in ALL areas of Aerial Delivery

For US Small Businesses only:

See the SBIR website...."many" opportunities:

OSD: <http://www.acq.osd.mil/osbp/sbir/>

Army: <http://www.armysbir.army.mil/>

See FebBizOps website:

<http://www.fbo.gov>

Or

www.fedbizopps.gov

QUESTIONS?



Brian Bagdonovich
USA NRDEC

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