Load Spectrum Development for Unmanned Aerial Systems Airworthiness

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WSU 2009 – 2010 UAS Research Objectives:

- Identify and document technical differences between comparable groups of UAS and manned aircraft.
- Compare specifics of the UAS vehicle to current types of design standards for manned aircraft.
- Identify top level requirements for a UAS vehicle by performing analysis on the regulatory design standards for manned aircraft systems specific to airframes.
- Identify the potential load frame spectrum impact and the continued airworthiness issues, if any.

Research Methodology

Extensive product review update from the 2007 research.

- Because of the rate of UAS product introductions, a product review should be completed biennually to capture the changes within the UAS community.
- The 2007 review included 65 UAS products. The 2009 review includes 556 products.

Review the high level airframe-related regulations that are used in the manned aircraft community. – COMPLETED

Identify "unique" UAS vehicles that stand out from manned aircraft guidelines in the following areas: speed, weight, altitude, exposure (endurance), environment (mission), airframe configuration, . – ECD July 2010

2009 UAS Worldwide Review

- Currently the UAS list is up to 556 UAS vehicles.
  - Worldwide UAS vehicles increased by 755%
  - US UAS vehicles increased by 118%

The following is a sample of the worldwide review UAS list representing the 2009-2010 Research:

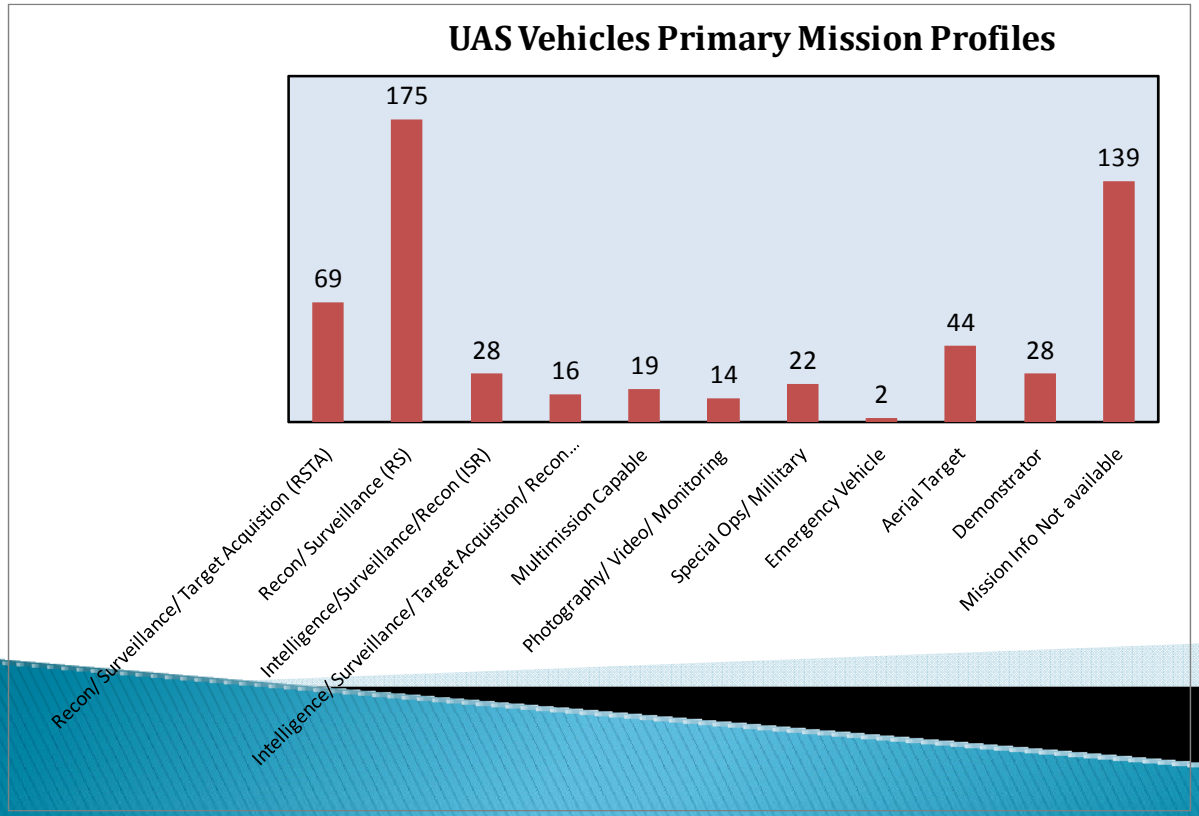
Country	Prime	Designation	Development	Production	Operation	Propulsion	Gross Wt (lb)	Gross Wt (kg)
AUSTRIA	Schiebel Elektronische Geraete	Camcopter S-100	Complete	Limited	Limited	Rotary	440.92	200.00
BELGIUM	Flying - Cam	Flying-Cam	Complete	.	Deployed	.	33.07	15.00
	SONACA/IAI/Thales	B-Hunter	Complete	Underway	Deployed	Piston	1,953.28	886.00
BRAZIL	Flight Solutions	FS-01 Watchdog	Underway	-	-	Pusher prop	143.30	65.00
	Flight Solutions	FS-02 AvantVision	Underway	-	-	Electric	6.61	3.00
	Flight Solutions	FS-03 Starcopter	Underway	-	-	-	529.10	240.00
	Aviotechnica	Hawk 2MV	Complete	Underway	-	-	136.69	62.00
BULGARIA	Aviotechnica	Hawk 2MX	Underway	-	-	-		-
	Armstechno	NITI	Underway	Limited	.	Piston	132.28	60.00
BYLORUSSIA	Kvand Ventures	Husky	Underway	.	.	Twin turbojet rotor	198.41	90.00
	MMIST	SnowGoose CQ-10A	Complete	Underway	Deployed	Turbo pusher prop	1,342.60	609.00
CANADA	MMIST	SnowGoose CQ-10B	Underway	Limited	Limited	Turbo pusher prop/rotor		-
	MicroPilot	CropCam	Underway	-	Limited	-		-
	MicroPilot	MP-Trainer	Complete	-	-	-		-
	MicroPilot	MP-Vision	Complete	-	-	-	5.95	2.70
CHILE	IDETEC	Sirol	.	.	.	Electric prop		.
	Chilean AF Polytechnic	Vantapa X-02	Underway	.	.	.	330.69	150.00
	RMS SA	Mantarraya	Complete	.	.	.	132.28	60.00

December – May 2010 Updates

- Six month research extension was granted with a new due date of August 2010.
- Two additional proposals were written and submitted for review to the FAA for follow-on UAS work:
  - One proposal is a continuation of the Load Spectrum research with an expansion on the unique issues identified this past year.
  - The second proposal is on Materials and Processing relative to the UAS community.

December – May 2010 Updates

- The mission profiles are a key element to this research. This profiling outlines the unique flight environments experienced by the UAS community and identify where and why the UAS community present such variety in load spectrums than normally found with manned aircraft.



December – May 2010 Updates

- The August 2010 Load Spectrum summary will cover the following areas:
  - Comprehensive 2009 worldwide UAS vehicles product list.
  - How UAS vehicles relate to current manned aircraft standards and guidance material.
  - Unique issues for UAS vehicles (relative to current manned aircraft design regulation standards).
  - Grouping of load spectrums for existing GA aircraft similar to applicable UAS vehicles to identify unique UAS vehicles.
  - High level airframe related issues for UAS vehicles.

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