CIRRUS VISION UPDATE

October 2010

Cirrus Vision Update: October 2010

- Update includes:
  - Supplier Selection
  - Takeoff and Landing Performance
  - Pitch – Thrust Coupling
  - Pressure Vessel Testing
  - Parachute Testing
  - Upcoming Events

Thousands of design details are completed for every component and system making up the Vision.

SUPPLIER SELECTION

91% of Major Systems Supplier Selections Complete

Williams International

GARMIN

LORD AskUsHow

SEAMECH

On The Wings Of GOODYEAR AVIATION

AMETEK

Triumph Aerospace Systems Group

freeflight ENTERPRISES

ZODIAC AVOX Systems

Electromech Technologies

A member of the McKechnie Aerospace Group

Pacific Scientific

AEROSPACE CONTROLS CORPORATION

ALLEN AIRCRAFT PRODUCTS, INC.

MEGGITT

TAT Technologies

Kidde

RAM COMPANY RAM COMPANY

enviro SYSTEMS INCORPORATED

GOODRICH

Parker

Dukes INC aerospace

TAKE OFF AND LANDING PERFORMANCE

Takeoff and Landing Performance

Takeoff Performance

Press Alt FT	Distance FT	TEMPERATURE - °C 0	10	20	30	40	ISA
SL	Gnd Roll	1539	1590	1726	2255	2638	1615
	Total	2029	2095	2281	3019	3558	2128
2000	Gnd Roll	1610	1695	2057	2538	3153	1728
	Total	2119	2233	2733	3408	4281	2278
4000	Gnd Roll	1743	2017	2453	3031	3785	1906
	Total	2294	2672	3279	4095	5174	2518
6000	Gnd Roll	2076	2378	2912	3604	4489	2135
	Total	2749	3166	3915	4899	6172	2830
8000	Gnd Roll	2479	2821	3484	4310	5193	2460
	Total	3301	3777	4713	5895	7172	3275
10000	Gnd Roll	2969	3435	4246	5263	5833	2838
	Total	3977	4631	5786	7254	8077	3796

PRELIMINARY

Landing Performance

Press Alt FT	Distance FT	TEMPERATURE - °C 0	10	20	30	40	ISA
SL	Gnd Roll	1181	1224	1267	1310	1354	1245
	Total	2236	2304	2373	2441	2509	2339
2000	Gnd Roll	1270	1316	1363	1409	1456	1321
	Total	2377	2450	2523	2596	2670	2458
4000	Gnd Roll	1367	1417	1467	1517	1567	1402
	Total	2530	2609	2688	2766	2845	2586
6000	Gnd Roll	1473	1527	1581	1635	1689	1490
	Total	2697	2782	2867	2952	3037	2724
8000	Gnd Roll	1589	1648	1706	1764	1822	1585
	Total	2880	2972	3064	3155	3247	2873
10000	Gnd Roll	1717	1780	1842	1905	1968	1687
	Total	3081	3180	3279	3378	3477	3033

PRELIMINARY

The takeoff and landing performance was generated with our V1 prototype using certification test methods for data reduction.

All information is preliminary and subject to change.

PITCH-THRUST COUPLING

Pitch-Thrust Coupling

12.5 degree nozzle

17.5 degree nozzle

EXACT™ nozzle

Cirrus flight tested several different nozzle configurations to optimize handling characteristics.

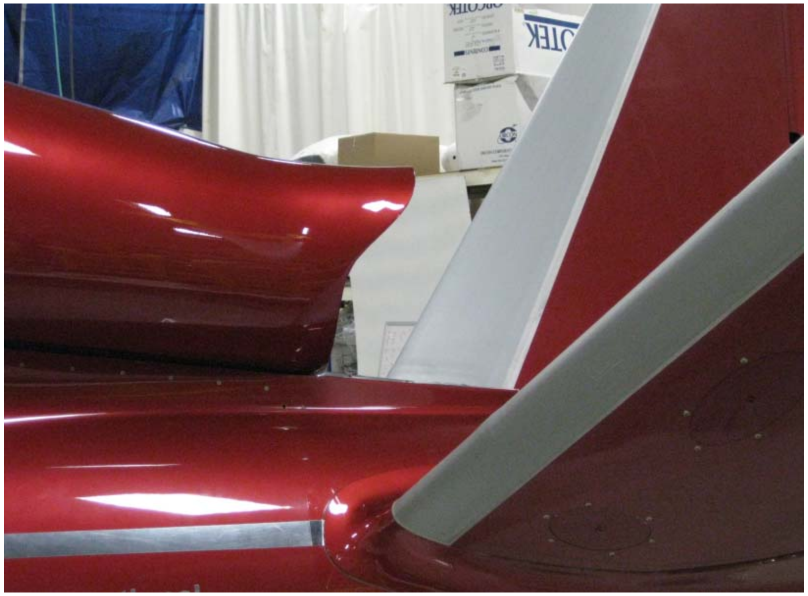
The EXACT™ nozzle is a proprietary and innovative design by Williams that uses the Coanda effect to result in a varying thrust with no moving parts.

The thrust is more vectored at low altitudes to provide improved low speed handling and is straighter at high altitude to provide better cruise performance.

Williams EXACT™ Nozzle – Coanda Effect

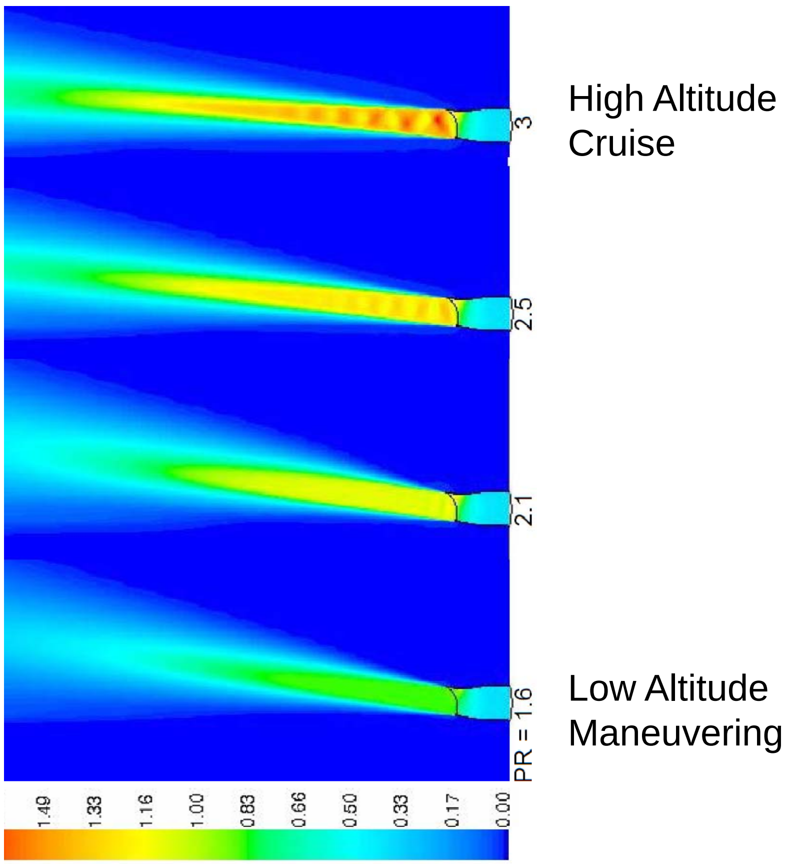
V1 Goals

1. Increase cruise speed
2. Improve pitch-thrust coupling effect



V1 is modified with a Williams EXACT™ nozzle designed and tailored specifically for the unique engine installation configuration of the Cirrus Vision jet. A benefit of the top mounted engine is maximized engine efficiency with a short and straight inlet. However, a small amount of pitch-thrust coupling results. The Williams EXACT™ nozzle mitigates this effect by pressure ratio vectoring.

Williams EXACT™ Nozzle – Coanda Effect



Greater nozzle vectoring results in better flying qualities but reduces cruise speed. Using non-moving geometry the Williams EXACT™ nozzle has a thrust vectoring effect that essentially changes with altitude.

At lower altitudes where cruise efficiency is not as important, the thrust vectoring is at its greatest. As the aircraft climbs into cruise altitudes the thrust exits more straight, or in line with the aircraft direction.

PRESSURE VESSEL TESTING

Full Scale Pressure Vessel Testing Apparatus

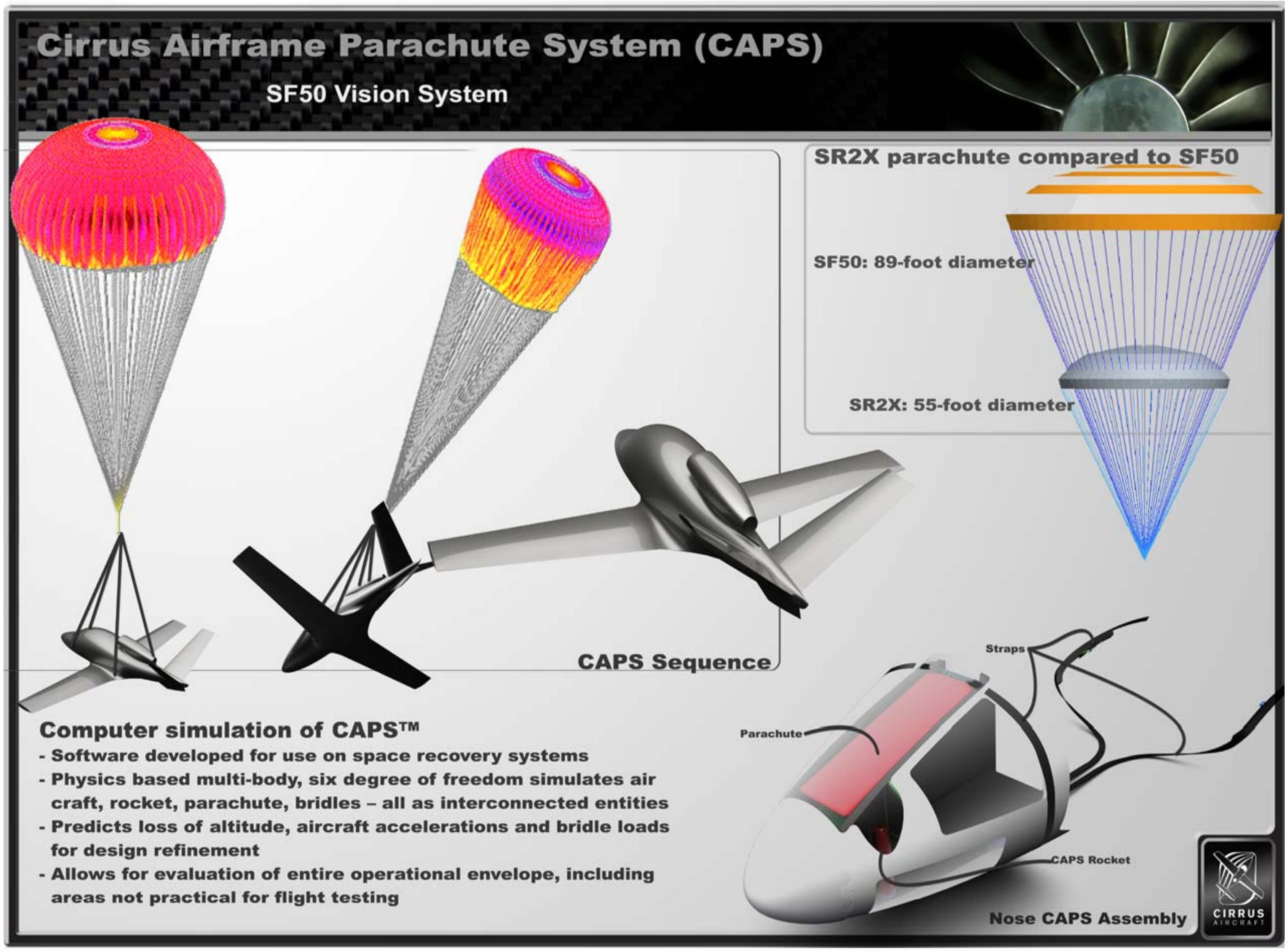


The full scale fuselage pressure vessel article was pressurized to 6.6 psi (8000’ cabin at FL280). The fiberglass test article with composite laminate was tailored to be of equivalent stiffness as the final carbon fiber materials. Testing of this article allows us to get stress and deflection data to recalibrate our computer models, resulting in a more optimized design for the actual pressure vessel.

An area of specific interest to our design team is the optimization of load sharing between the fuselage and structural door. While somewhat predictable, actual 3D deflections of the door and fuselage structure under pressure is a very complex engineering challenge. Additional information generated with these tests validates the flow rates needed to maintain cabin pressure with the bleed air flow rate from the engine.

PARACHUTE TESTING

Parachute Development Goals



Scaled Parachute Testing

Test Articles

- 50% scale parachutes using conventional timed pyrotechnic cutters
  - Pyrotechnic timed cutters allow the parachute to disreef in a controlled manner, providing the ability to optimize the system for loads versus airspeed and altitude envelope.
  - Testing is performed with program parachutes designed to reach various steady state airspeeds prior to the main chute deployment.

Test Objectives

- Obtain drag area vs. reefing line length relationship
- Derive inflation model for reefed and unreefed designs
- Validate reefing approach

Parachute Testing

- To date eight drops completed successfully
  - Scale canopies with SF50 two stage reefing technology

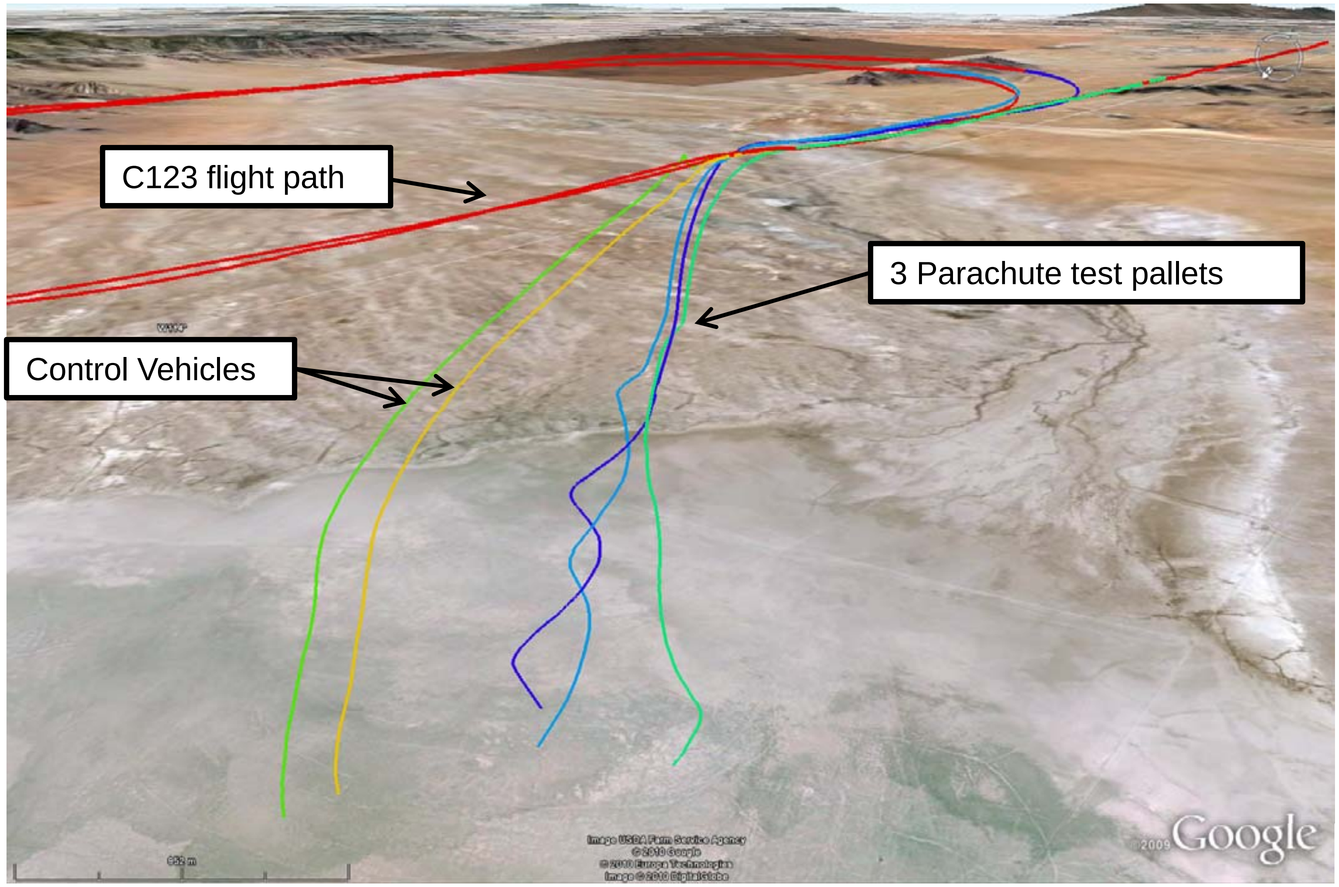
- Used to establish baseline characteristics of different reefing ratios
  - Reefing is a restriction on parachute opening and is done to control inflation rate resulting in lower opening loads on the aircraft and on the parachute structure.

- Results used to define and refine reefing ratios, reefing timing, and canopy geometry details

Parachute Testing

- Conducted August 9-15, 2010 Kingman, AZ
- Parachute test weights deployed from the back of a Fairchild C-123 Provider
- Three test loads and two control loads were dropped on each flight for a total of nine tests
  - Control loads are utilized to provide wind data
- Instrumentation attached to the parachute loads:
  - Horizontal and vertical velocity via GPS
  - Three axes accelerometers (redundant gauges)
  - Three axes rotation
  - Pressure and temperature
  - Ground and onboard video

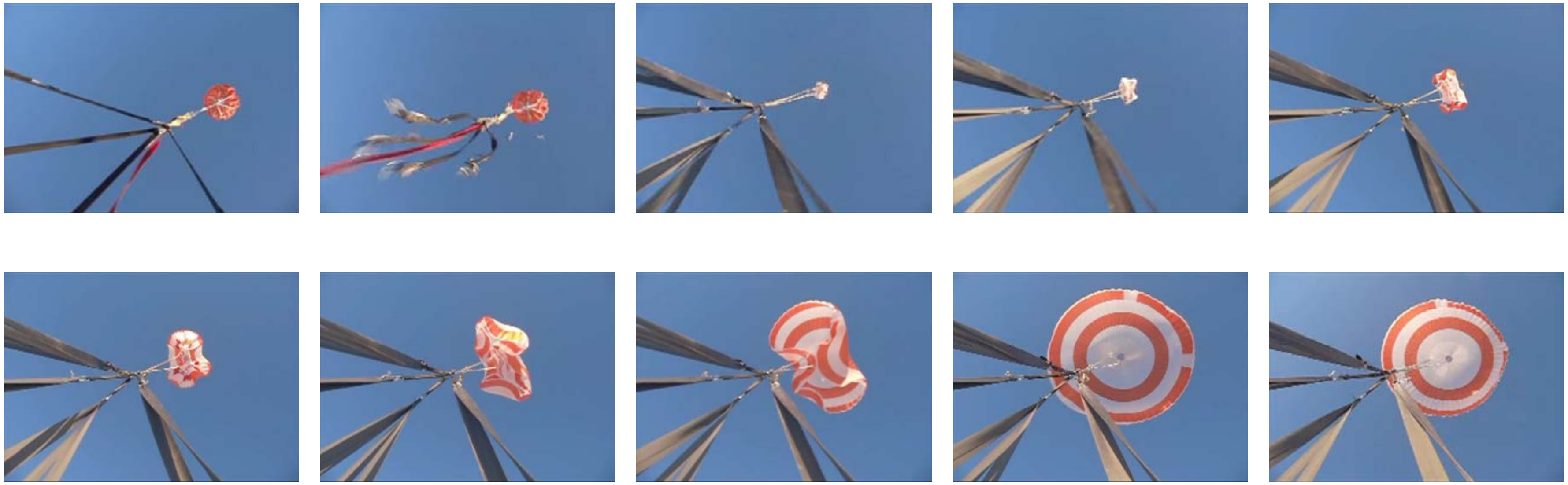
GPS Traces from Tests 1-3



In addition to three parachute test pallets, two control vehicles are dropped at the beginning and end of the test to measure atmospheric conditions like temperature, wind speed, etc.

The test loads can be seen exiting the C123, following a timed stabilization profile and then deploying the test parachute. Once deployed, the decelerated load will follow a gliding spiral descent path (similar to the parachutes on our SR2x.)

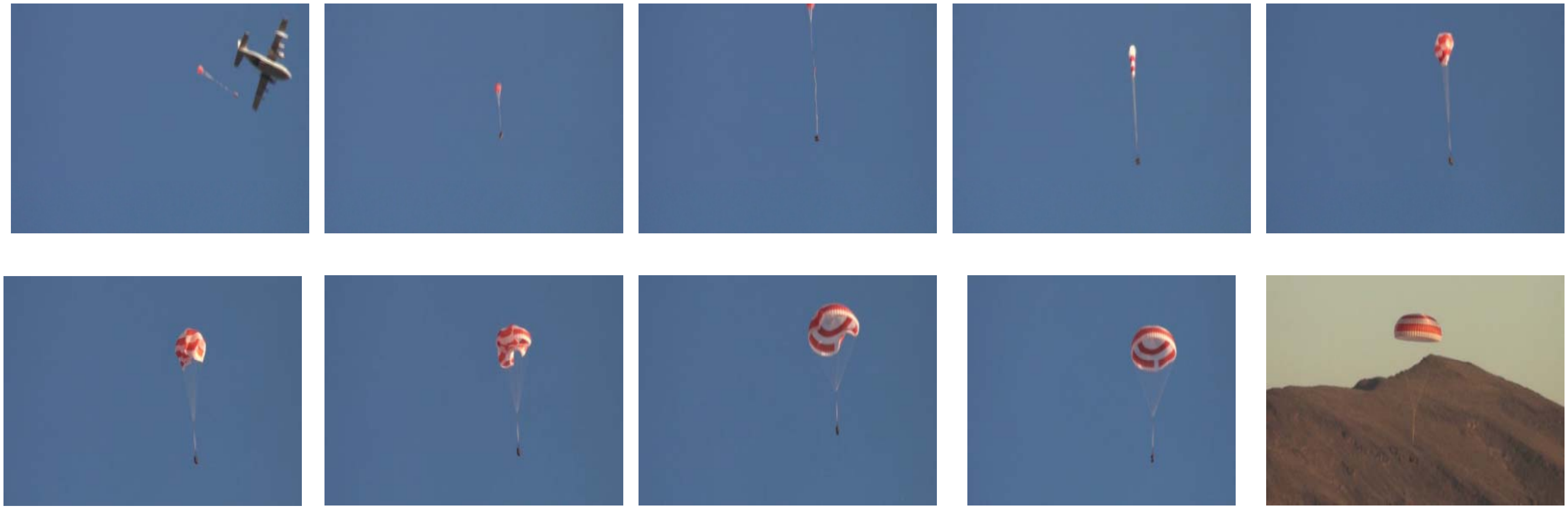
Onboard View Dual Reefed Parachute, Test #8



The load and acceleration characteristics are quantified and used to design the final parachute. This optimization is critical to keep parachute weight to a minimum and ensure that the parachute can operate safely within the wide deployment speed range intended for the aircraft.

*Note the program parachute at steady state in the first picture, extracting the main canopy in the second picture. The remaining pictures show the progression of parachute inflation.

Ground View Dual Reefed Parachute, Test #8



The parachute test load exists the drop aircraft around 100 knots and is allowed to reach test speed under a program parachute (first, second pictures). Once the test load reaches a predetermined airspeed, the main parachute is deployed (third picture) – initially reefed in the first and smallest stage.

A second and slightly larger reef stage occurs for a short period of time followed by full inflation. The purpose of these tests is to vary the two reefing sizes and the time the parachute spends reefed in each configuration.

Parachute Development - Next Steps

- Correlate GPS and acceleration data, including rotations
- Complete inflation force profile analysis
  - Results will be used to perfect parachute trajectory model determined initially by computer simulation
- Conduct additional development testing with updated design configuration
  - Repeat low reefing ratio tests to complete data
  - Validate strength and opening force profiles
  - Verify rate of descent
  - Validate type-design reefing approach

UPCOMING EVENTS

Inside Cirrus 2011 Event Schedule

See the Cirrus Vision at these upcoming 2010 events:

10.19	Atlanta, GA
10.28	Fort Lauderdale, FL
11.2	Naples, FL
11.3	Orlando, FL
11.4	Tallahassee, FL
11.10	Lexington, KY
11.11	Nashville, TN
11.16	Memphis, TN
11.17	Little Rock, AR
12.1	Houston, TX
12.2	San Antonio, TX
12.7	Austin, TX
12.8	Addison, TX
12.15	Oklahoma City, OK
12.16	Kansas City, MO

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IF YOU HAVE ANY QUESTIONS

PLEASE CONTACT

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