The Medium-Lift Convertible Payload Transport Aircraft

Design by

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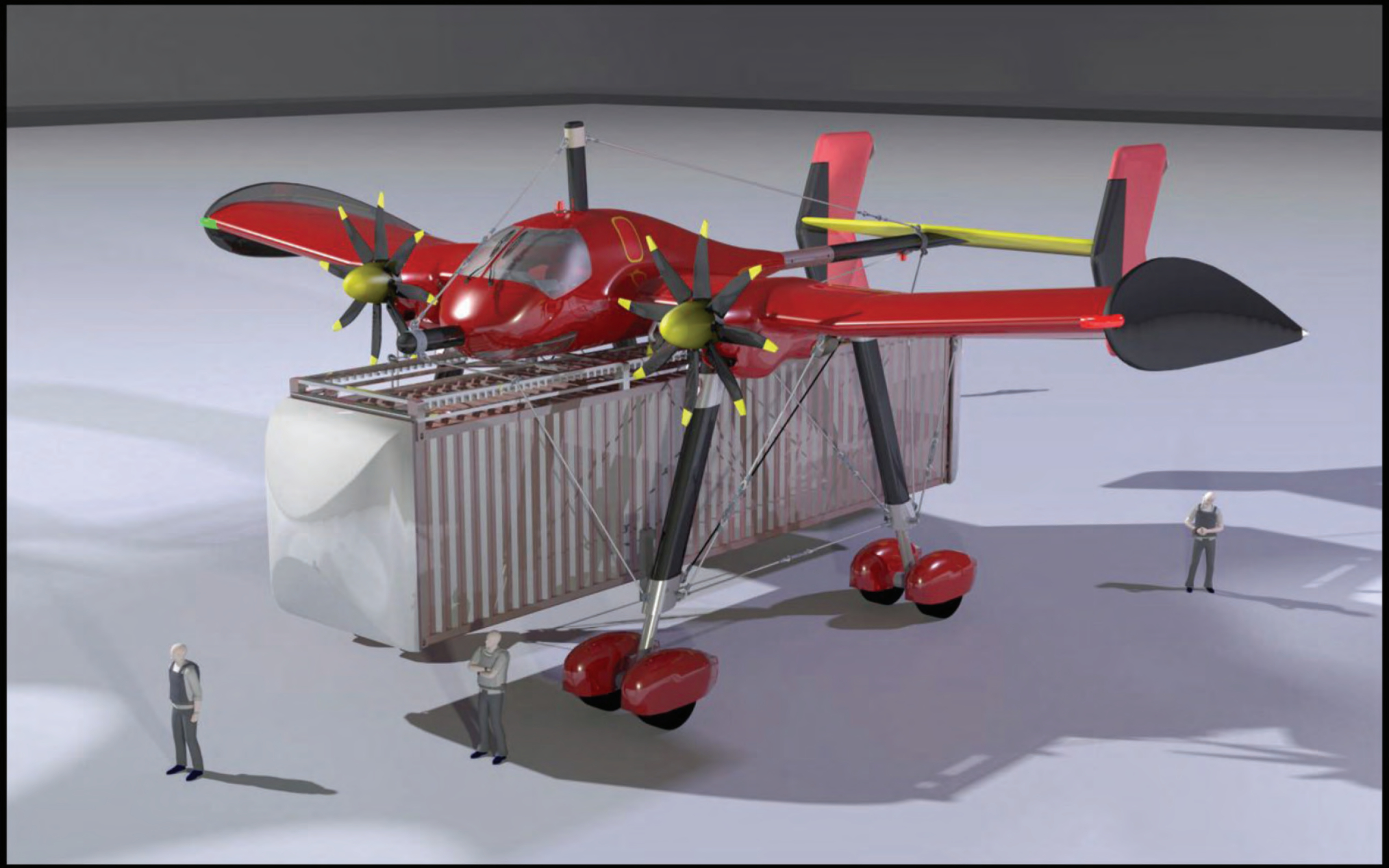


Executive Summary

At 111-years, aviation is a mature industry. Low-speed fixed-wing transport aircraft have long been considered settled technology. Over time, little has changed in the basic platform layout itself. The elementary fixed-wing configuration still consists of a fuselage (the tube), wings, empennage (tail section), and propulsion. Transport aircraft built in the 1930's are still in use today.

Subsequent to 'rotary-wing' aircraft (helicopters), the so-called 'powered para-wing', introduced some 40 years ago, is aviation's most recent arrival in terms of powered platform types. The Medium-Lift Convertible Payload Transport Aircraft (M-L CPTA) is of this category. As the term implies, these type of aircraft employ an overhead 'para-wing' that includes an arrangement of vertical riser lines from which the remainder of the platform is attached and hung in suspension, much in the same manner as are parachutists. This vertical layout engenders what is referred to as a 'suspension-system' type of airframe architecture, whereby the payload itself is hung in suspension, gantry-like, from beneath the aircraft's main 'fixed-wing'. Doing this, even without taking the optional para-wing into consideration, facilitates the complete elimination of the traditional fuselage component as a structural requirement in this disruptive and revolutionary transport aircraft platform design. All of the unwanted fuselage weight is reassigned to the payload, thus significantly increasing the ratio of total useful load to the aircraft's weight when empty. The resultant design makes for a highly efficient and much more effective load-bearing aeronautical structure.

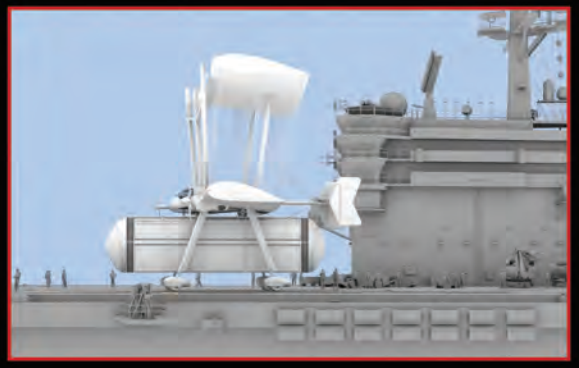
As such, the CPTA platform exhibits the same physical characteristics typical of any suspension-system type of architectural or mechanical structure that incorporates lines, wires or cables; be it a suspension bridge, construction crane, boat hoist, engine hoist, winch, fishing line, or picture frame wire whereby by a relatively lightweight structure (line/wire/cable) bears a load that is many magnitudes heavier. For example, a length fishing line weighs but a few grams, yet is capable of easily hanging tens, even hundreds of pounds. A 5-ton boat hoist can easily lift 50-ton boats. This same structural characteristic is the source and basis of the CPTA's amazing efficiency as a load-bearing aeronautical structure and aerial platform.

Depending on the model, the obsolete, 'state-of-the-art' fuselage-type transport aircraft commonly in use today generally lift from 60% to 105% of their own empty weight. The CPTA lifts more than **500%** of its empty weight. As an aeronautical configuration, the CPTA exhibits slightly higher aerodynamic drag. This translates into a somewhat lower airspeed. Per sortie, in real life all of this means that the CPTA is still more than twice as efficient in terms of overall lifecycle costs. See attached Aircraft Comparison Chart.

An equally important characteristic of the CPTA is that it is the **only aircraft ever** designed specifically to handle ISO intermodal shipping-containers, thus filling the missing 'air-link' capability-gap in the intermodal supply chain of trucks, trains and ships that has existed since the inception of intermodal shipping-containers in the early 1970s.

Aircraft Comparison Chart

Aircraft	Gross Take-Off Weight (GTOW)	Total Useful Load (UL)	Operating Weight Empty (OWE)	Ratio of Total UL to OWE	UL as a Percentage of GTOW	Cruise Speed	Take-Off Distance @ GTOW	Landing Distance @ Max Wt	ISO Inter-Modal Shipping Containers	Outsized Cargo	Cost
CPTA (with para-wing deployed)	**100,000 lb**	**85,000 lb**	**15,000 lb**	**5.67 to 1**	**85.0%**	**226 kt**	**1,595 ft**	**1,090 ft**	**Yes**	**Yes**	**< 22M**
Lockheed C-130H	154,700 lb	78,231 lb	76,469 lb	1.02 to 1	51.0%	292 kt	4,000 ft	2,100 ft	No	No	65M
CPTA (without para-wing deployed)	**55,000 lb**	**41,000 lb**	**14,000 lb**	**2.93 to 1**	**74.5%**	**246 kt**	**1,280 ft**	**830 ft**	**Yes**	**Yes**	**< 21M**
Grumman C-2A	54,353 lb	20,608 lb	33,745 lb	0.61 to 1	38.0%	251 kt	2,000 ft	1,500 ft	No	No	39M



As an air-cargo transport aircraft, the CPTA is intended to also be able to access remote geographic regions where infrastructure is minimal or nonexistent. Designed with a light wing-loading and landing-gear footprint, these aircraft, with their multiple landing-gear options, are purposely intended to be able to access field conditions that would be absolutely impossible for the obsolete aircraft that the CPTA is projected to supplement and or replace.

In comparison to helicopters, except for its lack of a vertical-lift capability, the extreme short take-off and landing (XSTOL) M-L CPTA out performs these type of aircraft in every other operational/ performance category.

It is important to note that, as is typical of any type of vehicle system, configurations both larger and smaller than the M-L CPTA depicted herein, are within the design purview of Trans Air Systems' 'powered para-wing' aeronautical platform concept.

Advantages Vis-à-Vis the State-of-the-Art

50% Lower Life Cycle Cost

- Acquisition
- Operational (fuel consumption per payload ton-mile)
- Maintenance
- Insurance (commercial)

Only Aircraft Ever Designed For ISO Inter-Modal Shipping-Containers

- 'Roll-on/Roll-off' (Ro/Ro) Throughput Loading/Unloading
- Interchangeable Payload/Platform Interface System
- Accommodates Wheeled-Vehicles and Semi-Trailers
- Out-Sized Payload Package Capable

Take-Off and Landing Performance

- Light Wing and Power Loadings
- Extreme Short Take-Off and Landing (XSTOL) Performance
- Light Footprint, 'Soft' Unprepared Field Accessible
- Multiple Option Landing-Gear Wheel Combinations and Track-Tread Types
- Suitable for Maritime Basing
- Adaptable for Water, Snow and Ice Basing

Medium-Lift CPTA vs. Helicopter/Rotorcraft

- Greater Payload Capacity Than World's Largest
- Much Higher Percentage of Total Useful Load
- Greater Payload Package Flexibility
- Higher Service Ceiling
- Greater Range and Speeds Faster Than Helicopter

Implementation

As a private design firm, Trans Air Systems is not in a position to provide for the production of its creations. Consequently, the manufacturing will need to licensed or contracted. While retaining ownership of proprietary rights, we would care to consult during the M-L CPTA's detailed engineering design and the development of the first full-size concept-demonstration prototype.

Previously, the aerodynamic characteristics and performance estimates of the M-L CPTA concept has been quantified through rigorous engineering analysis and test flights of subscale concept demonstration prototypes. Highly respected DARcorp of Lawrence Kansas, our aerospace engineering associate, has independently audited and verified the M-L CPTA's analysis and its extraordinary performance claims.

The U.S. and International Patent application process has been initiated. We are now free to enter the public domain and introduce the concept to industry, kicking-off with an appropriate marketing and sales program. This would include issuing press releases, and placing advertisements and public relationship articles in the air-cargo and military industry trade magazines and websites. Next, we will form a tradeshow team and create a presence, with large graphics and static subscale concept demonstrators, at the important international aerospace and air-cargo industry tradeshows. To name but a few of the more than 200 air-cargo companies that comprise the global industry, 'end-users' such as UPS, FedEx, DHL would directly approached. Finally, there are international government and military markets to also be developed. It will become the manufacturer's responsibility to assume the respective marketing and sales effort.

A very conservative estimate would be the sale of 1,000 units over a 20-year period of time (50 per year). With both larger and smaller units to also be developed, the total unit number of platforms to be produced could easily exceed 2,000 during this same time period. Unit cost will depend on size and load capacity. The M-L CPTA will sell for approximately $20M to $25M each. Upon the acquisition of initial purchase orders, the next order of business would be to license out the manufacturing to the aerospace industry that in turn will pay royalties fess for the licensing of manufacturing and sales rights.

Mission Statement

- Initiate Industry and Investor Awareness
- Generate Industry Demand
- Prepare Supply Chain Providers
- Establish Contact With Aircraft Leasing Companies
- Contract or License CPTA's Manufacturing

Milestone Goals

- File Patent Applications
- Introduce CPTA Directly to Prospective End-Users
- Secure Provisional Purchase Orders
- Develop and Test First Full-Size Prototype Concept Demonstrator
- Secure Manufacturing
- Initiate Production and Sales

A Technology Review

Subsequent to the 'fixed-wing' and 'rotary-wing', aviation's most recent arrival, the 'powered para-wing', is little used, not well studied, and even less well understood in terms of its possible applications. Consequently, its true potential as a lift-producing aerodynamic structure has never been fully exploited.

The CPTA is a 'powered para-wing' type of platform. The main advantages of the para-wing are its light weight, structural convertibility, and compact storability. The function of para-wings (parachutes, Rogallo wings, and parafoils) is to retard descent, or to provide the lift for kites and certain powered configurations. Historically, powered applications have been limited to low-speed ultralight type aircraft. By introducing rigid structural components and attachment points to the otherwise flexible and free flying para-wing, a ram-air inflated parafoil type para-wing can be modified and harnessed, and made to function as a fixed-wing structure, with a fully formed leading-edge, while retaining all of its structural advantages of light weight, rapid convertibility, and compact storability; all the while allowing for significantly higher airspeeds.

In addition, the para-wing, with its arrangement of riser lines that connect to the structure hanging below, engenders aviation's first-ever suspension-system type of airframe architecture. Externally, the payload package is hung in suspension from the high, gantry-like, strut-mounted fixed-wing, and is hard-point connected to the lower extremities of the fixed-wheel strut assembly. Doing so allows for the elimination of the traditional fuselage as a required structural component in a fixed-wing aircraft.

The result is a new type of aerial platform that is a much more effective and efficient aeronautical lifting structure. Additionally, the CPTA platform exhibits enhanced performance capabilities that are not possible with the less efficient and more cumbersome transport aircraft that it is intended to replace. With the CPTA, the ratio of payload weight to the aircraft's operating weight when empty (OWE) is dramatically increased more than five-fold. Disruptive and transformational, this revolutionary new airframe architecture, with its novel structural arrangement, is the source of the CPTA's considerable efficiency as an aerial transport platform and robust, agile aerodynamic structure. Once it is produced and placed into service, the CPTA will be highly effective at doing the work for which it was designed and intended.

Characteristics

1.) Elimination of the fuselage as a structural component.

2.) Weight of former fuselage is reallocated to the useful load.

3.) Main airframe components:
Fixed-wing and control surfaces; cockpit; propulsion; empennage; fixed landing gear and wheel-strut/cable assembly; payload interface system. No fuselage.

4.) Both payload container and bottom-lift flight-deck options are hung in suspension from the fixed-wing and externally attached to wheel-strut assembly via a set of hard-point connections.

5.) Via the hard-point connections and the corresponding network of multiple load-paths, the container, or flight deck, becomes part of airframe when positioned and locked into place for flight deployment.

6.) Optional para-wing is deployed as required for useful loads greater than 20-ton.

7.) Large empty space located within the fixed wheel-strut assembly is readily available for easy placement of bulky, outsized payloads.

8.) Platform concept may be sized up or down as required for expanded mission opportunities.

Exploitation

1.) CPTA is a revolutionary, high-payoff aerial platform and air-cargo transport system that may be quickly developed and placed into service.

2.) Only aircraft ever designed specifically for the aerial transport of semi-trailers, ISO intermodal shipping-containers, and outsized payload packages.

3.) Significantly lower lifecycle costs to produce, operate, maintain, and insure (commercial market) when compared to the traditional aircraft that it is intended to supplement and or replace.

4.) With its thick, broad, low aspect-ratio fixed-wing and extra-large internal fuel tank space, the CPTA is designed for: XSTOL flight characteristics; a medium-speed flight regimen; medium to long range; and high-endurance flight times good for loitering operations.

5.) An additional variant could be designed for higher speeds and greater range; but by doing so and going with a smaller, thinner wing and a higher aspect-ratio with less lift-induced drag, the tradeoffs would include longer takeoff and landing distances, and smaller internal fuel tanks with correspondingly reduced flight time endurance.

6.) Because of the para-wing's convertible nature and compact storability, this lightweight, flexible fabric type of lift-apparatus will prove to be ideally suited as the 'take-along' lift-component for a wide variety of multimodal vehicles systems such as 'flying-bicycles, -motorcycles, -cars, and -boats'. These are hybrid vehicle combinations that have a broad range of utilitarian uses and practical everyday applications.

Summary

The CPTA aeronautical platform is a moderate-risk, high-payoff, new-technological concept that promises innovative mission capabilities that result in significantly enhanced task efficiency and logistical effectiveness, with dramatically reduced overall system's lifecycle costs. Effectively, from an air-cargo transport aircraft's point-of-view, it truly is doing considerably more, with a great deal less. Plus cum minus.