PA-97: Multiple Helicopter Heavy Lift System

The concept of joining several helicopters into one operational unit worked out well in detail designs and led to another important vertical lift concept, the augmentation of the helicopter’s dynamic lift with the static lift of an air buoyancy envelope. Buoyant lift augmentation presented a unique opportunity to achieve much greater lift production in a highly cost effective manner.

To maintain coincidence of the dynamic and static lifts, four helicopters are arranged around the center of buoyancy of the envelope, two on each side. Powerful longitudinal and lateral control moments are thus provided by the differential collective pitch change of the rotors, interconnected to and controlled by one pilot. Yaw moments are produced by the differential cyclic tilting of the rotors. Propulsion and retardation are obtained from the cyclic tilt of the rotors. In forward flight, the rudder-vators, attached to the tail of the blimp, add their pitching and yawing control moments to the combined helicopter control, reducing turn-around time in shuttle transport operations.

The Helistat was built under a 1980 U.S. Navy contract for the Forest Service to demonstrate economic and ecological potential of heavy vertical air lifters in harvesting timber and other natural resources in difficult-to-get-to terrain. The demonstration vehicle utilized a Navy ZPG-2W aerostat (1,000,000 cu. ft.) and four H-34J helicopters. Inflating the aerostat envelope with helium to its length of 343 feet made the helistat the largest aircraft in the world (Hughes flying boat span is 320 ft.)

The Helistat is a small version of what could be accomplished in the future, where payloads from 60 to 200 tons are possible.