Skycranes

The civilian version of the Sikorsky CH-54 Tarhe is the S-64 Skycrane. Later versions were built by Erickson Air Crane Company.

Helicopters have many commercial uses. One of the most unusual is serving as an aerial crane. In this capacity, helicopters carry loads slung beneath their fuselages on cables. The first helicopters were used in this capacity in the 1950s, although it was not until the 1960s that they were heavily used for this purpose in the construction industry. There have also been numerous proposals for very large, hybrid helicopter-blimps to carry massive loads, but these have not been successful.

Helicopter skycranes offer several advantages over conventional cranes. First, they can reach areas that may be hundreds of miles from the nearest roads or on inhospitable terrain. For instance, they are often used to erect communications towers on top of mountains or electrical transmission towers far from cities and towns. Large skycranes are often used in the lumber business to lift large trees out of terrain that is too rugged for a ground-based vehicle.

The Sikorsky S-64 Skycrane could lift more than 20,000 pounds (9,072 kilograms).

They can also reach locations that a conventional crane cannot easily reach. For instance, skycranes are often used to replace equipment such as transmission towers and large air conditioning units atop tall buildings. While they are not practical for the construction of the buildings themselves, skycranes are highly useful when a single piece of equipment, such a large pump, needs to be brought in or removed. In addition, some large factories have equipment mounted on their roofs far from the edge. A conventional crane could not reach over the building far enough to place or remove this equipment, but a skycrane has no problem doing it.

The Erickson aerial skycrane was used to lift and replace the Statue of Freedom from the dome of the U.S. Capitol.

Many different types of helicopters are used as aerial cranes. The first aerial cranes were lightweight Bell Model 47s used in the early 1950s. The Model 47 could never carry more than a few hundred pounds. In the 1960s, the Sikorsky S-58, known as the H-34 in military service was used in this capacity, and many S-58s are still in use today carrying medium-size loads.

The Bell UH-1 Huey and Jet Ranger are both commonly used to carry light and medium loads to inaccessible areas—for instance, to carry telephone poles along the side of a mountain. The Model 211 HueyTug was a commercial flying crane version of the military UH-1C equipped with a new transmission, longer main rotor, larger tailboom, strengthened fuselage, stability augmentation system, and a 2,650-shaft-horsepower (1,976-kilowatt) T55-L-7 turboshaft engine. It entered service in the 1960s.

Larger helicopters were used for more demanding tasks beginning in the 1970s. Commercial versions of the Boeing-Vertol CH-46 and CH-47 helicopters have been used to carry heavier payloads, such as logs for the lumber industry.

But the heaviest loads require the Sikorsky S-64 Skycrane, which in

military service was known as the CH-54 Tarhe. The Tarhe, which had its first flight in 1962, was used during the Vietnam War to recover downed aircraft, transport artillery pieces, and even drop large “blockbuster” bombs. The S-64 has two Pratt & Whitney T73-P-1 turboshaft engines providing 4,500 shaft horsepower (3,356 kilowatts). The Tarhe could lift up to 20,000 pounds (9,072 kilograms) and has six large rotor blades. No military Tarhe's are currently in service; the U.S. Army uses the CH-47 Chinook for its heavy-lifting needs. Other armies also use the Chinook for this purpose.

A later version of the S-64 was equipped with two 4,800-shaft-horsepower (3,579-kilowatt) T73-P-700 engines. Civilian versions were built, and a number of ex-military versions were remanufactured for civil use for the Erickson Air Crane Company, which first began operations in 1971. Evergreen Helicopters, Inc. also flies the S-64. Civilian skycranes can lift up to 25,000 pounds (11,340 kilograms).

The skycrane is exactly as its name implies—an aerial crane, nothing more. It has a cockpit pod at the front of a long boom equipped with landing gear mounted on outriggers. This provides a large open area under which the carried load is connected to the fuselage.

Skycranes were used in 1972 when the Chesapeake Bay Bridge connecting Maryland and the Eastern Shore was being built to bring concrete and other supplies to the construction site. In 1993, an Erickson aerial Skycrane, normally used for hauling lumber in Oregon, was used to remove the “Statue of Freedom” from the top of the Capitol dome in Washington, D.C. The statue was placed on the ground while it was being cleaned and restored before being gently returned to the top of the dome, once again with a Skycrane.

During many lifting operations, pilots often move their helicopters very little. They usually lift off, hover while the load is attached, and immediately—but slowly—move over to where they will lower the load. If anything goes wrong, such as an engine warning light coming on, they are under orders to immediately drop their load so as not to risk the aircraft. For this reason, the area underneath the flight path has to be empty. If the Skycrane is lifting an air conditioning unit to the middle of the roof of a large factory, for instance, the area inside the factory under the flight path has to be empty. A piece of machinery dropped from the helicopter would likely crash straight through the roof and kill anyone underneath. Many of these operations are also conducted at such low altitude that a total engine failure would be fatal.

Several companies have proposed merging blimps with helicopters, usually by attaching rotors to outriggers mounted below and to either side of a blimp. In this way, an extremely large load could theoretically be carried, with the rotors providing additional lift to the blimp. The purpose of these aircraft is usually to lift large loads of logs for the lumber industry, although other transport missions have also been proposed. An aircraft called the Heli-Stat was built in the 1980s to attempt this mission.

It used the fuselage and rotors of four old Sikorsky H-34 helicopters. But the Heli-Stat crashed. Other proposals for such aircraft have been proposed but never progressed very far.