



2921 Sutherland Drive
 Union Gap, WA 98903
 www.hfhauff.com

Thank you for your interest in the Chinook wind machine. Please find more information for your review in this email and others.



At the heart of any wind machine is its fan blade. Extensive research and development has been spent with the Chinook fan blade, to achieve maximum performance, better efficiency, higher strength, and lower weight.

The Chinook blade is one piece, machine made, constructed from composite fiberglass. The blade, with steel teeter hub attached, weighs approximately 100 lbs. The Chinook blade is constructed with low weight - high strength composite materials. The airfoil begins a close 14" from the hub center; improving air flow over the entire blade with very little dead air space.



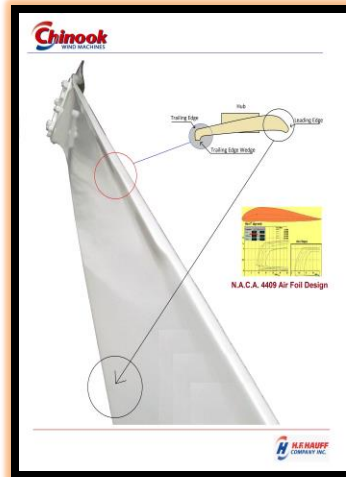
Incorporated into each Chinook blade is an advanced airfoil design, trailing edge wedge, and Donier swept tips. These distinct features work together to produce more air movement, with wider area coverage and more

protection time of the fruit crop. As a result, the total number of acres protected by a Chinook fan prop surpasses other fans that do not have these features.

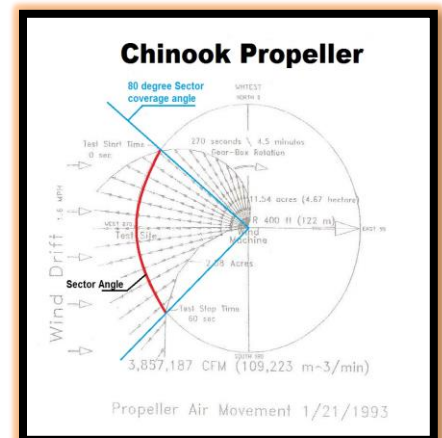
Its advanced airfoil design was developed by NASA engineers to reduce air resistance and improve fan

efficiency. **This improvement has increased total coverage of the Chinook fan blade to 15+ acres (6.07+ hectares) in mature tree fruit and even more for lower growing crops such as grapes, blueberries, kiwis, strawberries – 18+ acres (7.28 hectares).**

Growers **have proven**, in actual field usage, that the **Chinook fan blade will protect an additional 80-150 ft. (24.39 - 45.73 meters) radius up-drift, beyond the reach of other competitive fans** when placed on the same unit, run at the same RPM and utilizing the same engine vacuum draw.



An exclusive and unique fixed wedge is molded into the trailing edge of each Chinook fan prop. The wedge functions much like the wing flaps of an airplane when used on takeoff and landing. At slower speeds, the airplane wing flaps come down creating a wedge along the trailing edge of the wing, increasing the air velocity movement under the wing and thus increasing its lift; helping to keep the plane up in the air or to get off the ground quicker. With more lift comes increased velocity. With increased velocity, air movement





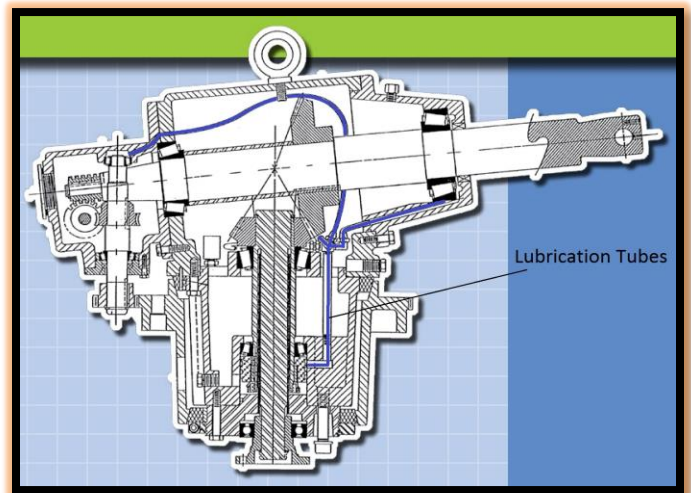
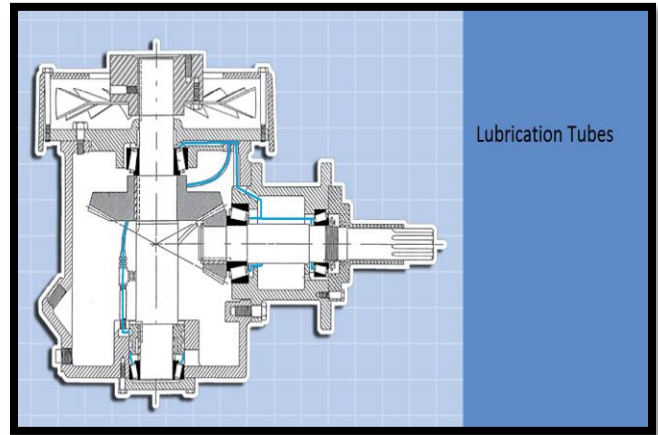
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distance is increased.

The Chinook fixed wedge performs in like manner. As you move from the tip of the fan blade to the center hub, the rotational speed of the fan is turning progressively slower, generating less and less air movement. The incorporation of a fixed wedge along these slower portions of the blade increases the amount of lift, which increases air movement both velocity wise and distance wise over the entire blade. The width of the sector angle (width of piece of pie) is increased. Even the air movement directly under the wind machine tower is affected and increased. The trailing edge fixed wedge will directly increase the amount of air movement over non-wedge blades of the same horsepower input.

The Chinook fan fixed wedge widens the sector angle coverage. At any one time, the Chinook fan prop has an estimated 80° sector angle coverage, compared to 45-47° coverage of other fans. The 80° sector angle works not only on the horizontal plane, but also, on the vertical plane by reaching higher up in the atmosphere pulling down much more warmer air; helping to raise orchard floor temperatures quicker. Whereas, other units have 30-35 seconds of fan coverage on each 4 ½ minute rotational cycle, the Chinook prop has 60 seconds of fan coverage on each rotational cycle. Ice nucleation (frost damage) begins to form after 4 minutes of below critical temperatures. The Chinook fan prop returns to the fruit bud in 3 ½ minutes.

Donier swept tips are used on the ends of the Chinook fan to reduce drag and smooth out the air turbulence and vortices that builds up at the ends of the fan blade tips. Reducing this turbulence and the size of the vortices (air drag) improves the air flow efficiency.



All Chinook wind machines come equipped with gear boxes that are pressure fed, oil lubricated. As the gearbox pinion shaft turns, oil is pressure fed, via tubes, and sprayed on to each gear and bearing. The lubrication is positive and direct. The oil drops into a sump before re-circulation, resulting in **temperatures 20° F. cooler when compared to splash-lubricated gear drives.** Gearbox life is extended and efficiency increased.





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All Chinook gear drives use tapered roller bearings with an **AGMA** (Associated Gear Manufacturers Association) **rated bearing B-10 design life of 18,000 hours**. If a Chinook gear drive were to be run continuously for 18,000 hours, it is expected that 90% of its bearings would be still operational at the end of this time frame. The Chinook top gear box uses spiral bevel gear sets mounted on 3" diameter fan shafts and 1 3/4" diameter input shafts.

Each unit comes complete with the following:

FAN BLADE - Composite fiberglass, trailing edge wedge, swept tips, 18'-pitched for V-10 performance, optional blades pitched for lesser HP
TOWER - 35'2" tall with 25' ladder, .250" x 20" spiral welded steel tube

GEARBOXES - Pressure lubricated, fan cooled, top and bottom

ROTATION GEAR DRIVE - Constant speed, 360 degree, NESW rotation (NWSE optional)

DRIVELINE - 3-section, dynamic spin-balanced
ENGINE POWER OPTIONS - Iveco Diesel NEF 6.7 Diesel, Iveco NEF 4.5 Diesel, Ford Triton V-10 Propane, Toshiba 75-125 HP Slow-Start Electric Motors

CONTROLS - Lighted Murphy Power View mounted on panel w/safety shut down gauges equipped, hour meter, ammeter

OPTIONAL AUTOSTART CAPABILITY
Proprietary Auto Start Controls built into Ford Triton engine control module – no add-on, less wiring, cleaner set-up

OPTIONAL TELEMETRY CAPABILITY
Start and stop, set parameters of wind machine from smart phone or computer. Message you temperature and alarms and show if the machine is running or not, graph results

OPTIONAL PTO MODELS AVAILABLE
Fan horse powers from 86 – 145 HP – PTO 1000 rpm
FOUNDATION MATERIAL - Bolts, rebar

The standard warranty for the Chinook wind machine (fan, gearboxes, drivelines, and tower) is

two years. The manufacturer of the engine warrants the engine.

The Chinook propane Ford Triton V10 units will burn approximately **13 gallons of propane per hour of operation** and the Chinook Iveco NEF6.7 diesel units will burn approximately **5 gallons of diesel per hour of operation**. There are other manufacturers, that utilize the same engine package size but have a higher fuel consumption do to the increased amount of tip drag on their prop and differences in gear box ratios; which increase the engine operating speed, with resultant increase in fuel consumption and more wear and tear on the engine itself. Reports have been made of fuel consumptions for propane units reaching as high as 19+ gallons per hour ,yet, total acreage coverage is still less than that of the Chinook.

We will help lay out the proper placement for the wind machine(s). If you provide us with a road intersection, address, or GPS coordinates, we will use Google Earth Pro to spot and map out the area of coverage that you can expect to get with the Chinook wind machine.

This year marks our 54th year in an agricultural manufacturing business. My brother and I have been personally involved in the wind machine business installing, servicing and selling machines since 1970. We have been manufacturing the Chinook wind machine for 34 years. The Chinook wind machine is a quality built machine, that is reliable, easily maintained, competitively priced, and offers significantly more coverage than other machines.

Please give us a call with any additional questions that you may have.



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