

We Cover More Ground!

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TECHNOLOGICALLY SUPERIOR PERFORMANCE

HEAD-TO-HEAD TESTS PROVE CHINOOK WIND MACHINES MOVE MORE AIR

H. F. Hauff Company was founded in 1965 as a small manufacturing business of specialized agricultural equipment. Driven by a deep commitment and compassion for technologically improved and advanced products, the company has grown, now operating out of a 30,000 square foot facility, serving customers worldwide.



Why the Chinook Fan Prop?

Chinook fans have improved aerodynamics with an 80 degree sector angle!

The aerodynamics of the Chinook blade make it different from other blades. While other fan props move air within a sector angle coverage of 45-60 degrees, the Chinook prop widens the sector angle circle of coverage to 80 degrees, significantly increasing the velocity and movement of air on the ground where coverage is needed.

Chinook fans cover more ground, wider area, longer duration - 14+ acres!

Numerous field comparison tests have been performed comparing the Chinook blade with competitive blades that do not have the trailing edge wedge. In all scenarios, the Chinook blade performed better, covering more ground, over a wider area, and for a longer duration of time during rotational cycle. Chinook fans cover 14+ acres in mature tree fruit, more in lower growing crops.

Chinook fans protect the fruit bud longer and better!

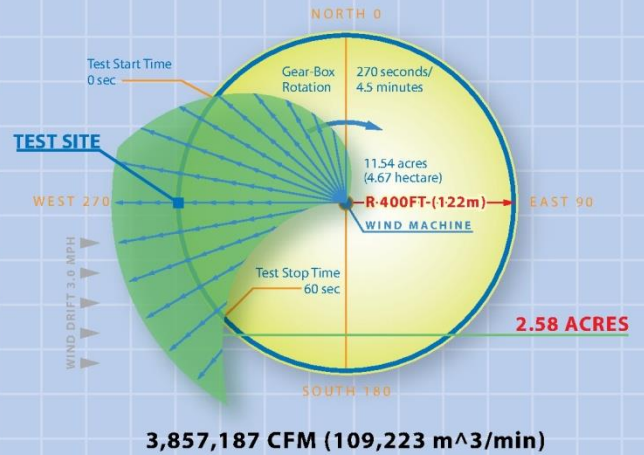
Protection of the fruit bud/plant has increased from 35 seconds to over 60 seconds for each rotational cycle. Chinook's wider sector angle coverage mixes air not only in the horizontal plane, but also in the vertical plane. This advantage gives you a bud with additional protection even on uneven ground.

Chinook fans move larger volumes of air, with more immediate temperature rise!

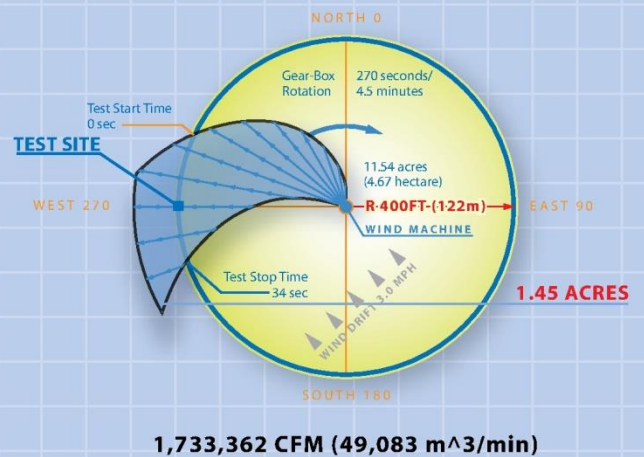
Drawing warmer air from the upper atmosphere with increased sector angle helps to raise the temperature on the orchard floor more quickly than with other prop styles. In one documented test, the Chinook fan blade mixed & moved 3,857,187 CFM of air compared with 1,733,362 CFM of air from another competitive fan blade. This is over 2 times more volume of mixed air with the Chinook fan.



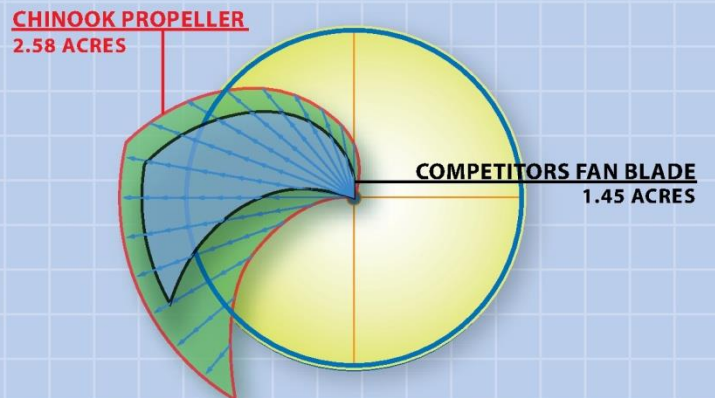
CHINOOK PROPELLER



COMPETITORS FAN BLADE



COVERAGE AREA COMPARISON



CHINOOK PROPELLER

SWEPT TIPS AND TRAILING EDGE WEDGE

LENGTH: 216 INCHES
USEABLE AIRFOIL: 200 INCHES
CENTER: 16 INCHES



Aaron Mathison relies on Chinook wind machines to protect his crop and H. F. Hauff to keep them running.



Growers have proven, over and over, in actual field usage, that the Chinook fan blade will protect an additional 80-150 foot radius up-drift, over and above other competitive fans when placed on the same unit, run at the same RPM and utilizing the same engine vacuum draw.

"I personally started working with H.F. Hauff company for my wind machine service in 1995 and I have relied heavily upon them ever since. The Hauff boys themselves are what has sold me on their wind machines. They are as honest as the day is long. If something is not going to work they will tell you right up front.


I purchased 8 new Chinook wind machines this year. I can tell you they are a lot more efficient than the other machines I have had. The V-10 with the Chinook blade flat moves air!

Our Malaga Ranch is on some pretty hilly ground which creates its own micro climate. We had never got a cherry crop out of there until this year, and thanks to the Chinook V-10 we had an excellent harvest. The autostart option has been a great advantage for us. It's much more advanced than I expected. I can tell you that whenever there is a problem the Hauffs are right there to fix it, even if it's not their problem. They consistently go the extra mile.

In addition, their lease to buy financing option has made it possible for us to double the number of wind machines we would have purchased with conventional financing."

Aaron Mathison
Bob Mathison Orchards, Inc.
Wenatchee, WA





A unique fixed wedge is incorporated into the trailing edge of each Chinook blade. The wedge functions much like the flaps of an airplane when used on take off and landing by increasing its amount of lift. The increased amount of lift increases air movement. The Chinook wedge performs in like manner and offers increased coverage to a minimum 14+ acres in mature tree fruit and even more in grapes.

ONE PIECE, LIGHTWEIGHT PROPELLER DESIGN

A LIGHTER WEIGHT & STIFFER BLADE MOVES AIR EFFICIENTLY WITH LESS VIBRATION

Extensive research and development has been spent on the Chinook fan blade to achieve maximum performance, efficiency, high strength, and lower weight.

The Chinook blade is constructed from composite fiberglass; machine made into one piece. The blade, with steel teeter hub attached, weighs approximately 100 lbs. The low 100 pound fan swing weight and one piece form provides for smooth running, vibration-free operation.

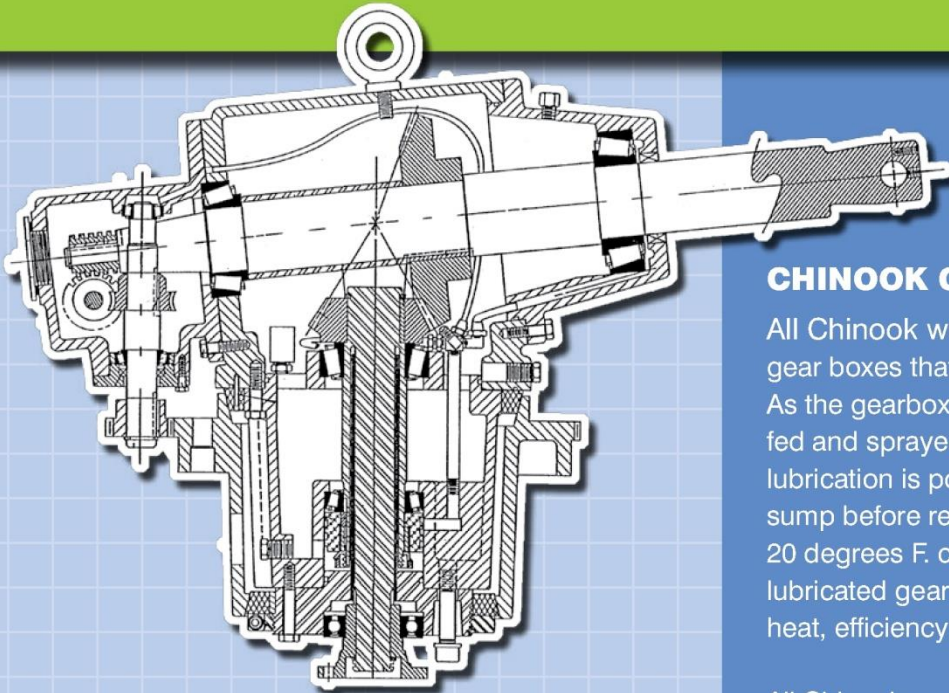
An advanced airfoil design, developed by NASA engineers, is incorporated into each Chinook blade featuring a trailing edge wedge and Dornier swept tips to significantly reduce air resistance and improve fan efficiency. These features work together to produce more air movement, with wider area coverage for a longer duration of time. As a result, the total acres protected is increased for the Chinook fan over other fans that do not have these features.

Given the same amount of horsepower input, the trailing edge wedge will directly increase the amount of air movement over non-wedge blades. The Chinook fan has, at any one time, an estimated 80-degree coverage angle, compared to 45-60 degree coverage on other fans.



THE COOLEST GEAR-BOX IN THE INDUSTRY

RUNNING UP TO 20°F COOLER MEANS MORE HORSEPOWER AT THE FAN



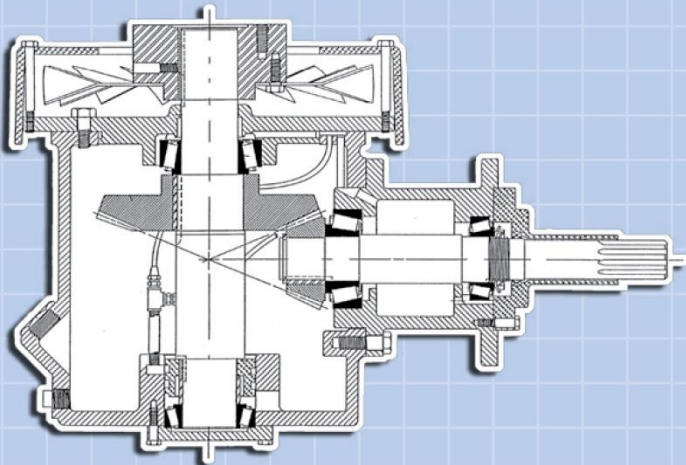
CHINOOK GEAR DRIVES

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 and sprayed onto each gear and bearing. The lubrication is positive and direct. The oil drops into a sump before re-circulation, resulting in temperatures 20 degrees F. cooler when compared to splash-lubricated gear drives. With less gearbox friction and heat, efficiency is increased and life extended.

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. In other words, if the gearbox were to be run continuously for 18,000 hours, 90% of the bearings would remain in service during this timeframe. Chinook gear drives use spiral bevel gear sets mounted on 3" diameter fan shafts and 1.75" diameter input shafts, providing extra stability and longer life.

CHINOOK TOWER AND DRIVETRAIN

Chinook towers are built of .25" x 20" diameter spiral welded steel tubing. Towers measure 35' 2" to the center of the fan hub. There is no need for concrete vibration dampeners in Chinook towers. The 3-section drive train is factory engineered to minimize the number of slip joints to only one. Each drive section is dynamically spin-balanced for vibration free operation and longer bearing life.



“After two years of NO crop due to cold weather and frost damage on low lying areas of our vineyards we sought out Vailmont Vineyards (authorized Chinook dealer) for some professional advice in combating our cold winters and frost.

We ended up installing five diesel Chinooks. In the spring of 2006 we had four monster frosts and the machines protected all areas of our vineyards from any frost damage. We are looking at very healthy vines and a great looking crop.”

Curtis Fielding
Fielding Estate Winery
Beamsville, Ontario



Curtis Fielding standing beside one of the five Chinook wind machines that made a healthy productive vineyard possible for Fielding Estate Winery.

H. F. HAUFF COMPANY COMMITMENT

BUILDING ON TRADITION, TECHNOLOGY AND COMMITMENT TO OUR CUSTOMERS

Chinook wind machines work for the long haul. Reliability, ruggedness, and high performance are key ingredients in all Chinook wind machines. Damage to your crop, due to frost, can occur in as little time as 20-30 minutes. You need protection that can be counted on to do the job, year after year.



More power means greater efficiency, less maintenance and longer engine life.

The standard Chinook ground powered wind machine comes equipped with the Ford Triton V-10 6.8 Liter 10 cylinder Propane powered engine package.

SPECIFICATIONS

FAN PROPELLER BLADE

One piece construction	Built in mold accuracy, precise angle settings, pre-balance accuracy more true.
Sandwich construction	Triax fiberglass wrapped over urethane foam core - high strength, low weight, increased rigidity.
Hub Area	Airfoil and air movement begins 14" from hub center improving fan performance.
Swing Weight	Low fan swing weight (105 lbs.), less friction, less horsepower consumed, less tower vibration, increased gearbox/drive train life.
Advanced airfoil design	NACA 4409 airfoil, trailing edge wedge, swept tips - creates more air movement, reduces air resistance and improves fan efficiency.
Swept tips	Reduce drag, smooth out air turbulence and the size of the vortices (air-drag) - helps to improve air flow pattern and efficiency over the entire blade.
Trailing edge wedge	Increases air velocity, produces wider sector angle coverage from 45° to 80°.
Coverage	14+ acres with a minimum of 800 to 850 ft of coverage.

DRIVE LINE AND TOWER

Dynamic - Balanced drive line	Dynamic spin-balanced at 1400 RPM for smooth, vibration-free operation.
Drive line speed	1000 RPM, slower speed for vibration-free operation and longer bearing life.
Drive line slip joint - one	Drive line manufacturers agree that the least number of slip yokes for the least amount of drive line wear.
Concrete tower weights - none	Heavier props require vibration dampeners due to harmonic resonances created at operating engine speeds.

GEAR BOX DRIVES

Lubrication	Pressure lubrication allows for instant lubrication, pressurized oil sprays each gear and bearing dropping into a sump before recirculation, operating at temperatures 20°F cooler. Less heat generation means more transmitted horsepower reaches the fan; most efficient gear drives available today.
AGMA Rated	American Gear Manufacturers Association - gear boxes built according to specific engineering standards where shaft, gear and bearing sizes are balanced and optimized for the required horsepower - for strength and durability.
Bearing Type	100% tapered roller bearing on drive shafts, 10% greater bearing load capacity.
Bearing design life	AGMA determines 90% of bearings will remain in operation after 18,000 hours of continuous use.
Speed reducer box -	Separate bolt on speed reducer box serviceable without the need of boom truck. Easier to service and maintain, less expensive to repair.
Cast iron housing	Dampen vibration, assure correct bearing and gear position under all load conditions.
Lower box fan cooled	Cooler running box doubles life of lubricating oil. Operates at 180-190°F.
Upper box input shaft	Larger shaft, takes more torque, 1.25x10 spline.
Upper box drag bearing	12" bearing diameter for smoother rotation, better stability, longer life.
Lower box input shaft	Larger shaft, takes more torque. 1.375x10 spline.
Interchange capability	Chinook gear drives interchange with most competitive gear drives. Same gear ratios make gear box exchanges easier and more cost competitive.

ENGINE - More power means greater efficiency, less maintenance and longer engine life.

The Chinook wind machine is available in gasoline, propane, natural gas, diesel, and electric.

The standard Chinook ground powered wind machine comes equipped with the Ford Triton V-10 6.8 Liter 10 cylinder Propane powered engine package.

All Chinook units come equipped with Murphy safety shutdown controls for oil pressure, temperature and over speed. In addition, as an option, all units can be equipped with an auto-start system with a centrifugal clutch.



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