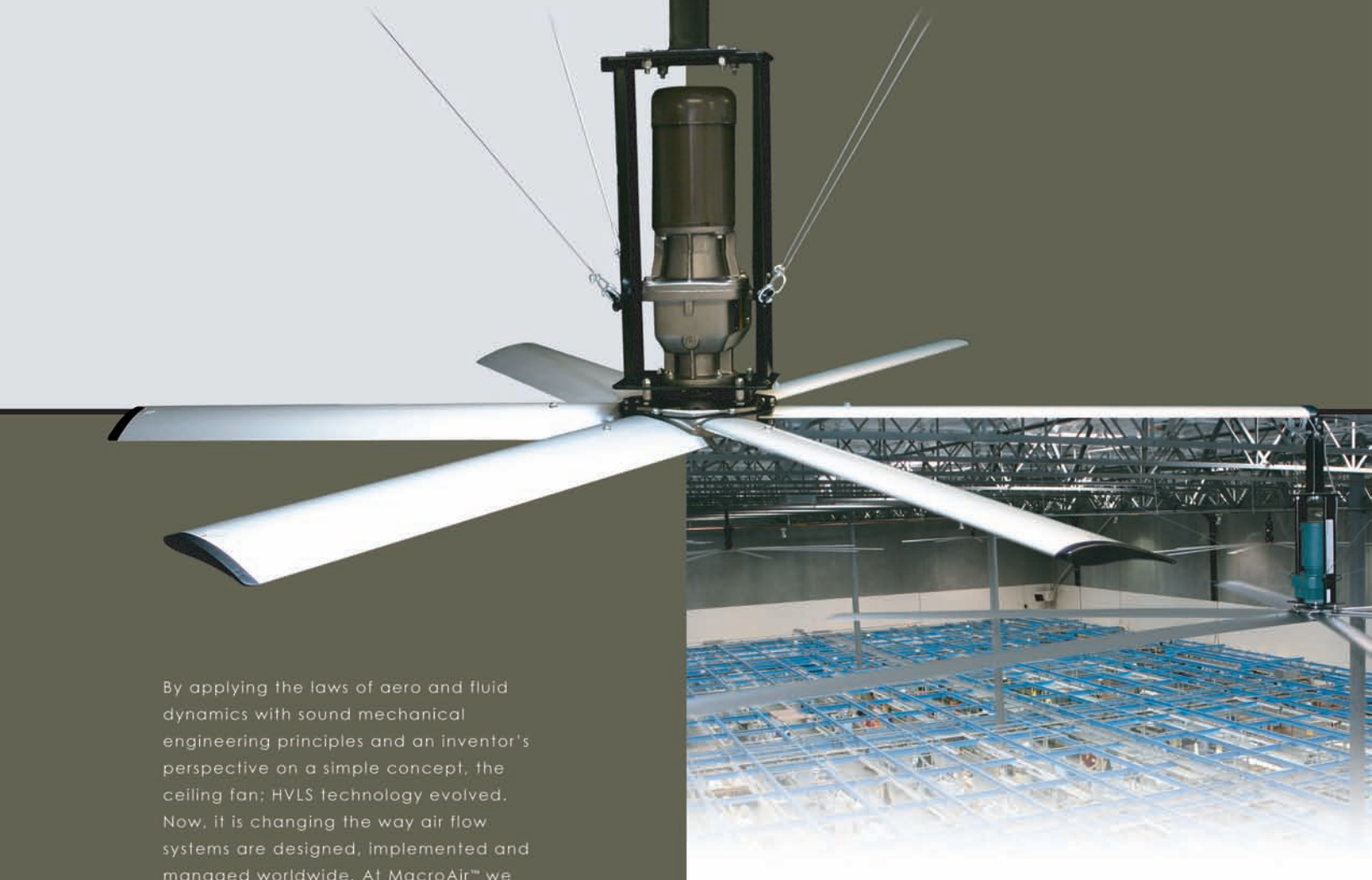
Fan Brochure



By applying the laws of aero and fluid dynamics with sound mechanical engineering principles and an inventor's perspective on a simple concept, the ceiling fan; HVLS technology evolved. Now, it is changing the way air flow systems are designed, implemented and managed worldwide. At MacroAir™ we work to build high quality, energy efficient products to enhance the comfort and productivity of people and improve the production and processes of business.

MacroAir's priorities are simple; people and their environment, integrity, quality in workmanship and passion for work and living.

Walter R. Boyd

INVENTOR, FOUNDER

MacroAir TECHNOLOGIES

We Move Air™

THE ORIGINAL BIG FANS Since 1995™

INTRODUCING
The WhisperFoil XL™ Six Blade

Not since we first introduced HVLS technology in the mid 90s have we been more pleased to offer our customers another industry first. Our new SIX blade design offers unmatched mechanical efficiencies, exceptional air flow for summer cooling, reversibility for winter heat de-stratification and our patent pending Two Part Interlocking Safety System for worry free optimal performance. Models with VFDs feature EMI/RFI (electromagnetic and radio interference) suppression technology. Plus our in-house manufacturing team pays close attention to every detail to assure you of the highest quality in the industry.

"The associates are very pleased with the fans in terms of comfort. From an energy stand point, all I can use is theoretical. We were able to shut down a 5HP fan for each 1HP MacroAir™ fan installed. There are some sensible savings there."

Ed Caswell
Goodyear Tire and Rubber Company

HVLS Fan Technology

With diameters up to 24 feet, HVLS fans solve air quality problems by circulating large air masses seamlessly. The design, mechanics, and size of HVLS fans yield unique advantages that no other technology can match.

- Highly Energy Efficient
- Full, Encompassing Air Circulation
- Effects Air to Cool, Warm, and Comfort People
- De-stratifies Heat Layers for Winter Comfort
- Promotes Healthier Air Quality
- Outstanding Coverage without Drafts
- Keeps Wet, Moist Areas Dryer
- Decreases Bacteria, Mold, Mildew and Spoilage
- Improves Livestock Comfort and Performance
- Deters Birds, Bugs and Flying Insects
- Reduces Complaints and Liability Issues
- Reduces Heat Stress
- Long Life Mechanical Efficiencies
- Ergonomically Located for Safety

The relationship between speed (rpm), diameter, airfoil shape, and the resultant size and momentum of a fan's air column yields exponential efficiencies. First, an air column with a large area can sustain movement longer by leveraging its own momentum allowing air to entrain, circulate and reach corner to corner. Second, all encompassing circulation diminishes areas of stale, stuffy, noxious, unhealthy air. By operating at very low rpm, torque and wear are minimized and fan mechanical efficiencies are increased for a longer life cycle. Third, low rpm equates to a highly efficient fan using very little power to operate. They run for pennies an hour! Numerous studies by universities and mechanical efficiency experts agree HVLS fans are the most energy efficient fans available.

Leverage Existing HVAC Systems

HVLS fans are an energy saving asset when incorporated with HVAC systems. They run for pennies an hour and move large air masses without creating turbulence. They reduce thermal loads, electricity use, and mechanical cooling and heating times. Employ fans to run during peak-load times, economizer cycles, or when setback times are scheduled. Incorporate fans into zone program designs to reduce tonnage and in some cases, completely eliminate it. Right size HVAC systems by using MacroAir fans to ensure comfort levels are maintained and energy savings goals are achieved. When designing HVAC systems less duct work and fewer ventilation fans may be required. Thermostat settings can be adjusted higher in summer and lower in winter to yield significant cost savings. Less run time means less system maintenance requirements and extended system life expectancies.

Design Green with MacroAir

Energy efficient cost saving equipment is vital to your business, our economy and our planet. In acknowledgement of HVLS fan efficiencies many state and local energy saving programs offer rebates, grants and loans for HVLS fan procurement and installation. Be sure to check for these kinds of programs in your area.

A Simple Example of Energy Savings

36 inch High Speed	24' MaxAir Fan
10,000 to 12,000 CFM	376,804 CFM
Fans to Match CFM: 31	**... to 1**
Power: 14.53 kW:	1.65kW
Cost at .09 kWh: 1.31	0.148
Cost for 20,000 hrs: $26,200	$2,960
Energy Savings:	**$23,240**
Life: 3-5 Years	To 10 +
Rebuildable: NO	YES
Maintenance: YES	LOW

"Changing the way experts design and implement air flow systems worldwide..."

Enhance Ventilation Systems

By continuously mixing incoming fresh air with stale processed air the total amount of ventilation required is reduced. No other fan system, or ventilation technology does this better. In many cases, the number of high-speed exhaust fans can be reduced or eliminated all together, which can cut fan power consumption up to 90%!

Airvolution™ Line

Optimizes Comfort for People

Airvolution fans are specifically designed to enhance the comfort of people. A fan's large column of air pushing downward builds a comfortable deep floor jet of air that entrains outward. The depth of the floor jet (wall of moving air) is related to the diameter of the fan. There is no need for speed. Air velocities from 3 to 5 miles an hour optimize the cooling effect of air sweeping across moist skin. Too much air is turbulent and drying; it creates unwanted drafts and higher air velocities can heat the skin instead of cooling it.

MaxAir™ Line

Excels for Agriculture and Special Applications

The MacroAir research and development team determined there is a need for higher air velocities when cooling livestock, or where extreme moisture, bacteria, mold, mildew, and wet conditions such as wet floors exist. In these circumstances higher air velocities equate to higher performance factors and a healthier environment. MaxAir fans are engineered to deliver the optimal air flow for these special conditions.

Quality, Service and Warranty

Product development and continuous improvement are the hallmarks of MacroAir. Walter Boyd, founder and inventor of HVLS technology and his son, Eddie Boyd, president and CEO, continue to lead the industry with the highest in-house manufacturing and quality control standards.

MacroAir fans are individually matched with engineered control panels to ensure optimal acceleration, speed, longevity and overall efficiency and effectiveness. Fan hubs are lost foam cast and tolerances must be within + or - 10/1,000th of an inch. Our chief engineer works with our manufacturing team and is on the floor daily leading and improving our processes.

Our customer service staff is always available to answer your questions - our goal is to exceed your expectations. To that end, we provide a lifetime limited warranty on blades and hubs, three years on their components, and one year on labor. Our products are built to last and perform year after year.

What is Your Main Objective?

Better air circulation can improve employee comfort, heighten moods and improve performance. Consistent air movement helps protect against product spoilage and extends product life. HVLS fans promote cooling, de-stratifies heat layers, and enhances the ventilation of fumes and gases. Plus HVLS fans are extremely energy efficient and will cut energy costs when cycled with HVAC systems.

HVLS Fan Basics for Installation

Here are just a few basic considerations: What is the size of the facility? Ceiling heights should be a minimum of 15 feet. Allow at least 3 feet for clearance, 5 feet is optimal. Allow at least 18 inches for blade clearance; 2 feet or more is preferred. Electrical is 115, 240, 480 volt; single or three phase.

Create a healthier, more comfortable, and productive environment. Select models with six or ten blades and diameters from 8 - 20 and 24 feet. Fans are ergonomically located for a safer, clutter-free work area.

HVLS Fan Sizes and Ratings

We Custom Build

Standard sizes are in 2' increments from 8' to 20'. Our largest fan is 24' in diameter. All ceiling fans include mounting hardware that can be clamped to support beams. Underwriter Laboratories (UL) listed fans are available. Contact us for your special application requirements.

HVLS Fan Finishes and Colors

Blades Anodized Protected

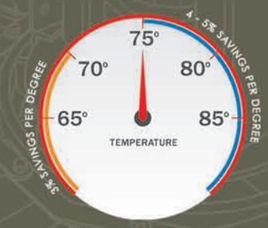
MacroAir standard blades are anodized, extruded aluminum. Anodizing protects blade surfaces for durability, higher performance, easier cleaning, and a longer life. We also offer beautiful custom colors and faux wood finishes.

100,000 Sq Ft., Facility?

For a typical layout 5 to 10 fans will provide optimal air flow and coverage: however, each facility is different. So, please, ask us! We have an exceptional, experienced technical sales staff trained to assess your needs and discuss your requirements.

"Being in a hot-humid climate in Augusta, we looked at multiple options for cooling down our fans during hot summer afternoons at the ballpark. Misting fans created potential fog problems and fountains did not serve the majority of the fan-base. The installation of MacroAir fans solved our dilemma 100%; not only do they cool our grandstands considerably; they have also added a unique element to our stadium which everyone loves."

Jim Arnold, Project Manager
Ripken Management & Design



Adjust Thermostat For **Savings**
Save 3 - 5% per Degree

Diameters and Specifications

MacroAir HVLS Fan Specifications @ 60 Hz (Additional sizes are available) Note, the 24' and 20' WFXL fans are available with ten blades.

Fans Feature MacroAir's 6 Blade Design and Our High Performance WhisperFoil XL™ Blade	24' MaxAir™	24' Airvolution™	20' Airvolution™	20' MaxAir™ (70Hz)	18' Airvolution™	16' Airvolution™	14' Airvolution™	12' Airvolution™	10' Airvolution™	8' Airvolution™
Displacement CFM (Forward Blowing Down)	376,804	275,694	201,805	237,231	179,015	158,911	128,010	97,695	83,025	53,623
Displacement CFM (Reverse Blowing Up)	263,763	192,986	141,264	166,062	125,311	111,238	89,607	68,387	58,118	37,585
Maximum Effective Area	20,000	18,000	15,000	18,000	15,000	15,000	8,000	7,000	5,000	4,000
Typ. Industrial Spacing Ft * *	110	100	95	100	90	90	70	65	60	55
Maximum RPM	54	50	60	70	71	88	104	121	144	206
Power Consumption KW* * *	1.62kW	0.694kW	.592kW	1.032kW	.648kW	.693kW	.734kW	.605kW	.559kW	0.684kW
Motor Horsepower	2	1	1	1.5	1	1	1	1	1	1

* Maximum Effective Area determined within a circular area on an unobstructed floor under the fan. The perimeter of the circle is where the average air velocity measured at 40" above the floor, drops below 40 ft/min.

** Typical Industrial Spacing is measured from center to center of range for most industrial applications; the more floor congestion the closer the spacing.

*** Power Consumption (kW): This is the average power consumption of the fan at 59°F and 29.92 in/Hg atmospheric pressure, in dry air. Lower air density due to high altitude, high temperature, or high humidity will reduce the power consumption for greater energy savings. Convection currents and entrainment in closed areas will typically reduce power consumption. However, fans in open-sided free-stall barns or around large open doors or loading docks may consume more power if left on in windy conditions.

As part of our ongoing product improvement practices, MacroAir reserves the right to change specifications and design without notice.

"MacroAir fans provide much needed air flow and cooling to help keep our employees cool during the hot weather.

I recommend them highly!"

Mike Fenex
Biscomerica

c UL us UL LISTED FANS ARE AVAILABLE

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NEW

eco6 Guard Fan

UP TO 29,551 CFM

- Single or Variable Speed
- Easy Mount & Tilt Positioning
- Ideal to Keep Staff & Customers Comfortable
- eco-friendly and Operates for Pennies a Day
- Only 3/8 hp, for Lowest kW Draw (.265kW)

MacroAir TECHNOLOGIES

We Move Air™

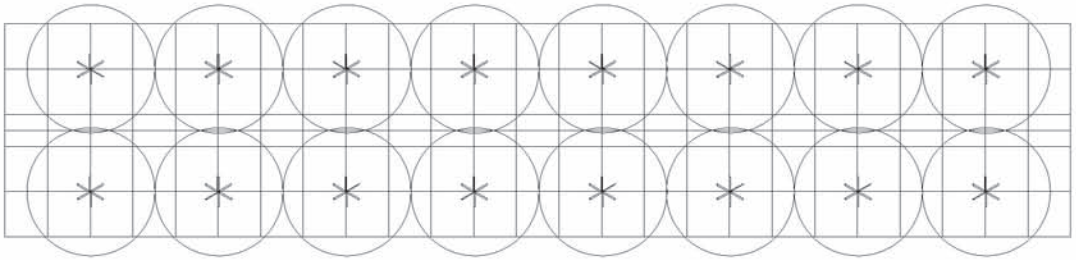
THE ORIGINAL BIG FANS Since 1995

For additional information contact our Technical Sales Staff today.

(866) MoveAir (1-866-668-3247)
info@macro-air.com · www.macro-air.com

High Volume vs High Speed **Cost Advantages**

COMPARE THE COST

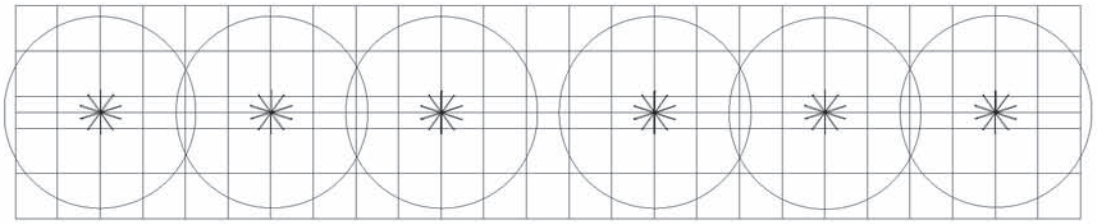


Sixteen 14' **AG-GreenStar** Fans Placed Over Feed Alleys

.678 kW per fan
128,010 cfm per fan

A

520 Cows (Barn: 100 x 520 FT)
Sixteen 14' AG-GreenStar Fans
16 Horsepower at 10.848 kW
10.848kW (9 cents an hour) equals .976 an hour
Cost to run at 20,000 hrs., equals $19,526.40
Energy Savings Comparison: $77,274
Equipment Life: To 10+ years
Rebuild: YES
Maintenance: LOW to NONE
CFM per Cow: 3,939
Energy and Utility Rebates Available in Many States

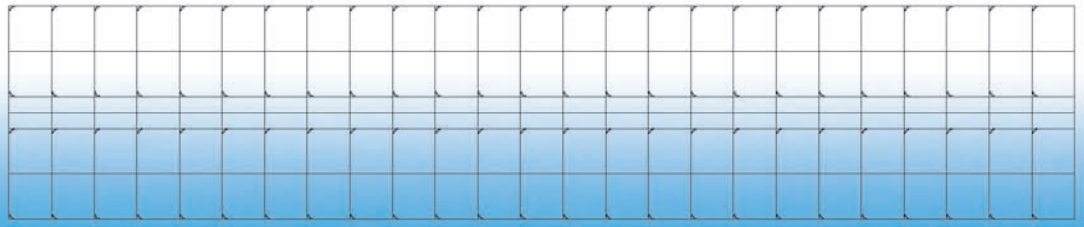


Six **24' MaxAir** Fans Placed Down Center Alley

1.65 kW per fan
376,804 cfm per fan

B

520 Cows (Barn: 100 x 520 FT)
Six 24' MaxAir Fans
12 Horsepower at 9.9 kW
9.9kW (9 cents an hour) equals .891 an hour
Cost to run at 20,000 hrs., equals $17,820.00
Energy Savings Comparison: $78,980
Equipment Life: To 10+ years
Rebuild: YES
Maintenance: LOW to NONE
CFM per Cow: 4,348
Energy and Utility Rebates Available in Many States



One Hundred 36" **High Speed Fans** Placed every 20'

.538 kW per fan
10,000 cfm per fan

520 Cows (Barn: 100 x 520 FT)
One Hundred 36 inch High Speed Fans
50 Horsepower at 53.80 kW
53.80 kW (9 cents an hour) equals 4.84 an hour
Cost to run at 20,000 hrs., equals $96,800.00
Energy Cost Comparison is this
much more to **A)** $77,274 or **B)** $78,980
Equipment Life: To 5 years
Rebuild: NO
CFM per Cow: 1,923
*Maintenance is HIGH (fans will loose 40%
effectiveness when dirty)

HIGH SPEED FANS - *"Dirt on fan blades has little or no effect on fan performance, but dirt on louvers and guards can reduce airflow by as much as 40%. Fan louvers and guards should be cleaned regularly and lubricated ..."

Ref., Fan Performance and Efficiency for Animal Ventilation Systems
Dept., Ag., Eng., University of Minnesota

Did you know? ... the root of high volume low speed, HVLS technology began with a University of Riverside agricultural engineer, W.C Fairbank and his class theorizing about how to eliminate heat stress for dairy cows for increased milk production? It's a fact! The professor took the idea to Walter Boyd, our founder, and over time HVLS technology evolved. As a result of many university studies and expert evaluations plus tried and true applications by dairymen everywhere people agree; HVLS fans are the most energy efficient, cost effective, air flow delivery system available to deliver all-around air flow and ventilation for dairy cows. We are happy to report we are helping to improve milk production worldwide!

HVLS fans are so effective; many energy efficiency programs offer grants, rebates, and incentives for HVLS fan procurement and installation.

By replacing inefficient, high speed fans with energy saving HVLS fans businesses are cutting their energy bills month-to-month and year-to-year. And a faster return on investment is realized through these cost saving rebate programs.

As an example of a program available today; **efficiency Maine** offers customers who purchase HVLS fans a

$1,000.00 rebate
(per fan!)

"I have three reasons
for purchasing MacroAir HVLS Fans for cow cooling. The first is, the amount of electricity saved by using the fans. The second reason is, the big fans are very quiet, so they don't disturb the cows. And third, production is continually going up since I installed the big fan system. That's why I am ordering more fans for my next barn. The first barn, proved to be a big success, now I am building a new barn and I want the same system with the same results."

Mike Rasmussen of **Hill Haven Farms**

go Dairy

MacroAir TECHNOLOGIES
We Move Air™

THE ORIGINAL BIG FANS Since 1985

(866) MoveAir (1-866-668-3247)
info@macro-air.com · www.macro-air.com

"HVLS fans use much less
electricity than typical ventilation fans, last longer and require less maintenance. Recent studies show another very important benefit: even on hot summer days, HVLS fans keep cows cool and comfortable."

Ref., Wisconsin, focus on energy
focusonenergy.com

- Quick ROI, Fans Pay for Themselves
- Highly Energy Efficient
- Air Migrates All Around Cows
- Uniform Barn Coverage, Corner to Corner
- Reduces Heat Stress for Comfort and Increased Production
- Reduces Flies, Moisture, and Ammonia
- Very Quiet, Safely Located
- Deters Birds, Bugs, Insects
- Easy to Install, Motors are Lubed for Life
- Long Life, Highly Durable and Rebuildable
- Provides Outstanding Air Flow for Cooling
- Reversible in Winter to Push Warm Air Down
- Very High CFM per Cow
- Many States Offer Rebates

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In-House Manufacturing

Means Quality, Value, and Flexibility

MacroAir pays close attention to every production detail in the manufacture of our fans. Our in-house manufacturing operation allows for complete control of our processes, scheduling, and delivery. The close proximity between design, engineering, shop, procurement, and quality control yields manufacturing economies that result in savings advantages that we pass along to our customers. We take pride in our position as the creator of HVLS technology and we continue to lead the industry with innovative designs, quality engineering, manufacturing and outstanding customer support.

Power Units

Specifically tailored 1 HP to 2 HP motors with Class F insulation are inverter ready. Helical gear reducers provide reliable operation, are quiet, vibration-free, and ensure long life. MacroAir's design and engineering expertise carefully matches motors, VFD drives, control units, and blade lengths to ensure optimum balance, performance and efficiency.

Controllers

Proprietary control panel designs feature Variable Frequency Drives (VFDs). Variable speed control allows a gentle ramp-up and ability to adjust speed for different conditions. Built-in overload protectors and line reactors protect motors from voltage spikes.

Hubs

Unique – made of aluminum alloy using "lost-foam" casting process to ensure tolerance control within + or – 10/1,000th of an inch, for precision engineering, ease of assembly, and balance.

Blades

MacroAir offers two airfoil blade designs; the Wickerbill airfoil and the Whisperfoil XL both made from anodized extruded aluminum for long life and easy maintenance.

Safety Engineering

MacroAir raises the bar and sets the industry standard for product safety engineering. Our new six blade airfoil fans feature our latest patent pending Two Part Interlocking Safety System. MacroAir's ten blade airfoils feature our patented L-shaped Safety Clips and Links.

Each of these systems are designed and engineered to prevent the hub and blades from falling from the fan unit in the unlikely event of the shaft breaking. Plus the safety system prevents the blades from falling separately or together. Additionally, collent-type friction bushings allow controlled slippage in the event of failure.

WhisperFoil XL™ Blade

Our research, development and testing for the best performing and efficient airfoil shape led us to the decision to make the Whisperfoil XL our premiere blade. The performance is exactly what we wanted in an airfoil. By incorporating this blade with our six blade design, we offer the best fan in the industry at an exceptional value.

Mounting System

MacroAir's innovative Universal Mounting System completely isolates the rest of the fan unit and all its components from the facility structure. The system prevents any vibration or movement from being transferred back into the structure. The system is easy to install and adaptable to most mounting situations.

Guying System

MacroAir incorporates guying into our mounting system for one important reason; guying reduces the isolated load on the center mount and ceiling truss reducing the chance of damaging the building structure. If guying can preclude roof or structural damage sometime in the future, then it is worth it.

The Container Store

Keeps Employees Comfortable! Their major Distribution Center was recognized as "Warehouse of the Month" in a 2004 issue of Modern Material Handling magazine ... This DC boasts many amenities, including 60 MacroAir HVLS fans to keep employees cool... This DC is unlike any other – a testament to the reason why they've secured a spot on FORTUNE magazine's annual list of "100 Best Companies to Work For In America."

Ref., **werc.org**/AboutWERCCalendar

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THE ORIGINAL BIG FANS Since 1995

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CITY	ANNUAL ENERGY per 20,000sq/ft	Savings @ 20%	Simple Payback Years	ANNUAL ROI	5 Year ROI	Fan Only 5 Year ROI	Fan & Install 5 Year NPV
Minneapolis, MN	$19,849	$3,970	1.39	72%	304%	$11,530	$10,586
Milwaukee, WI	17,977	3,595	1.53	65%	275%	10,043	9,099
Chicago, IL	15,902	3,180	1.73	58%	244%	8,393	7,449
Albany, NY	15,878	3,176	1.73	58%	243%	8,374	7,430
Detriot, MI	15,497	3,099	1.77	56%	237%	8,072	7,128
Omaha, NE	15,141	3,028	1.82	55%	232%	7,788	6,845
Cleveland, OH	15,021	3,004	1.83	55%	230%	7,693	6,749
Denver, CO	14,594	2,919	1.88	53%	224%	7,354	6,410
Pittsburgh, PA	14,439	2,888	1.90	53%	221%	7,231	6,287
Boise, ID	14,144	2,829	1.94	51%	217%	6,996	6,052
Columbus, OH	13,737	2,747	2.00	50%	210%	6,673	5,729
Carson City, NV	13,708	2,742	2.01	50%	210%	6,649	5,705
Boston, MA	13,415	2,683	2.05	49%	205%	6,416	5,472
Philadelphia, PA	12,671	2,534	2.17	46%	194%	5,825	4,881
NYC	12,579	2,516	2.19	46%	193%	5,753	4,809
Seattle, WA	12,538	2,508	2.19	46%	192%	5,719	4,776
St. Louis, MO	12,073	2,415	2.28	44%	185%	5,350	4,406
Cincinnati, OH	11,900	2,380	2.31	43%	182%	5,213	4,269
Kansas City, MO	11,703	2,341	2.35	43%	179%	5,056	4,112
Newark, NJ	11,621	2,324	2.37	42%	178%	4,991	4,047
Baltimore, MD	11,228	2,246	2.45	41%	172%	4,678	3,734
Portland, OR	11,190	2,238	2.46	41%	171%	4,649	3,705
Oklahoma City, OK	8,877	1,775	3.10	32%	136%	2,810	1,866
Reno, NV	8,586	1,717	3.20	31%	132%	2,579	6,735
Norfolk, VA	7,919	1,584	3.47	29%	121%	2,049	1,105
Little Rock, AR	7,649	1,530	3.60	28%	117%	1,834	891
Greensboro, NC	7,330	1,466	3.75	27%	112%	1,580	636
Memphis, TN	7,224	1,445	3.81	26%	111%	1,496	552
Oakland, CA	7,121	1,424	3.86	26%	109%	1,414	470

Using readily available ASHRAE data on city-specific heating degree days (HDD) and based on current natural gas cost estimates per BTU ($11.30 per MCF), and conservative facility design criteria; we calculated annual savings, annual and 5 year return on investment (ROI) and 5 year net present value (NPV) of the investment assuming an installed cost per fan of $5,500 and an annual interest rate of 6%. We assumed no increase in energy costs over the 5 year period (so you know your actual results could be much better). Actual installed fan costs per 20,000 square feet of facility space may vary depending on quantity purchased, regional and site-specific installation costs, and air movement challenges and objectives. A ceiling height of 20 Ft was used in these calculations. Best results for indoor applications will be achieved with our energy efficient 20Ft and 24Ft MacroAir HVLS fans having Whisperfoil XL™ blades, 1 hp motors, variable fan speed, and reverse capability.

"The fans are awesome. They really do the trick for us. In the summer, we use the fans along with the swamp coolers to keep the conditioned cool air circulating for improved employee comfort. **In the winter, as heat rises the fans redistribute the warm air back down to the floor.** The fans work great and keep the warehouse comfortable in all seasons."

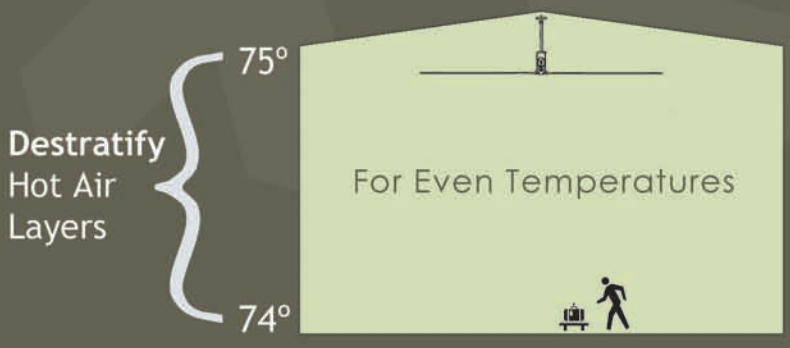
Keith Almryde
Ashworth Inc.

Applications

For MacroAir HVLS Fan Systems

A few examples where fans help businesses succeed.

- Manufacturing, Production & Assembly Facilities
- Warehouse & Distribution Centers
- Automotive & Truck Repair Garages
- "Big Box" Retail Stores
- Aircraft Hangers
- Produce Packing Sheds
- Livestock Pens
- Freestall & other Barns
- Shopping Malls
- Auditoriums
- Sports Arenas
- Gymnasiums
- Tents



REVERSE FANS IN Winter

for Improved Comfort and Productivity.
Reduce Fan Speed to Yield Even Greater

Energy Savings

with MacroAir™ HVLS Fans

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