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**Falco eMotors Pvt Ltd**  
*Learning Center of HVLS fans*  
*Gear vs Gearless*

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## 96-97% people are selling Geared HVLS fan – an old technology

All the other fans in the market do not run the blade shaft directly rather they have a gearbox in between which translates the motion in the main shaft (connected to the electric motor) to fan shaft. The losses in the electro-mechanical conversion due to mechanical friction between the gears, reduces the end efficiency of the system, which causes the fan to deliver lesser power than what is absorbed, in other words the user gets lesser effective air flow.



Fig: HVLS Fan with Geared Motor.

## Gear Arrangement

The geared system also reduces the life time of the fan as because of heat due to friction and undue stress causes the gears and other part to damage moreover the failure of parts can jeopardize the safety when not tended on time, which can be really dangerous for the safety of the premises and the personnel working in premises



Fig: Rotation in a simple gear arrangement.



## Epoch HVLS fan – Gear less

Here is where Epoch fans gives the optimal performance with best in class output, Epoch fan gives 55 RPM with 90 Nm Torque with 1.1 kW electrical input.

In Epoch HVLS Fans gearbox is absent, the motor is directly connected to the fan rotor. Therefore, the heating and wearing of gearbox is not present at all in our Epoch system hence the efficiency of the system increases.

Refer following table where we are comparing our Epoch HVLS fan with other competitors in terms of Input Power and Rotor Speed. We are providing with a minimal input power of 1.1 kW (Which is lesser than other competitors), with 55-57 RPM, whereas others are providing Input Power above 1.4 kW with lesser speed. It means we are providing less input power for high speed as compared to the other HVLS fans.



Fig: Epoch HVLS fan (Gearless).

# Lesser power consumption means lesser electricity bills

The result is the lesser power consumption means lesser electricity bills and greater savings.

Company	Falco E-motors	Eco-Air	Rite Hite	Golden Engineering	Kelley Fans	NuTech (Envira North)	Shanghai IPU fans
Power Input	<b>1.1 kW</b>	1.5 kW	1.56 kW	1.5 kW	1.5 kW	1.4 kW	1.5 kW
Speed	<b>55-57 RPM</b>	40-60 RPM	64 RPM	53 RPM	58 RPM	57 RPM	48 RPM

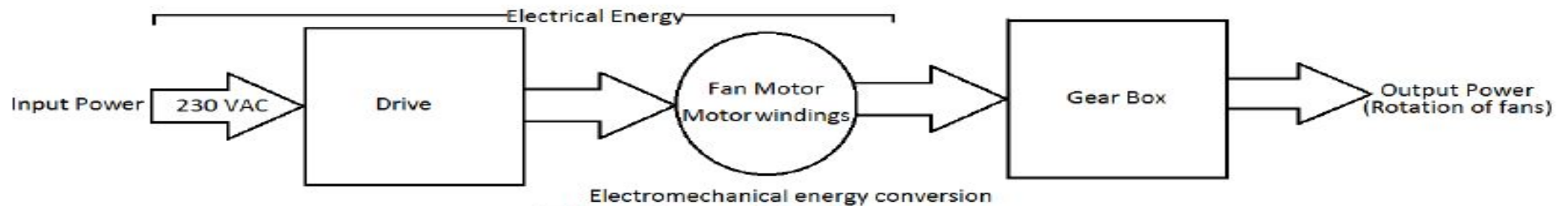
\*Note- All are 24 ft Variant.

As we can see we have higher speed with the same input as any other fan in the market.

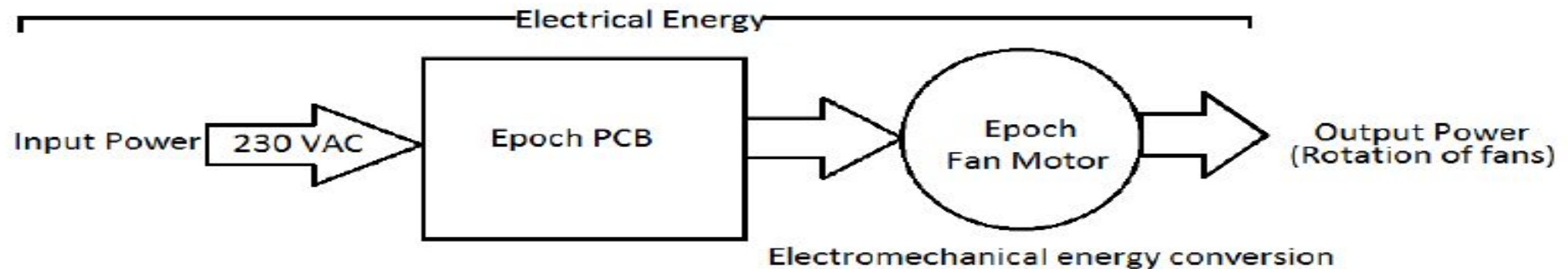
The main reason of this difference is that the energy required to reach a particular speed is being used up to overcome the friction in the gears.

# Energy conversion

The electrical systems like motor generally do not provide same output as input given, that is in our case 1.1 Kw. This absence of power in the output is aptly named as losses. The losses cause reduction in the efficiency, in another word the efficiency is dependent upon losses of the system.



**Fig: Geared Drive motor.**



**Fig: Gearless drive motor**

# Output power

$$\eta = \frac{\text{Output Power}}{\text{Input Power}} = \frac{\text{Input power} - \text{Losses}}{\text{Input power}}$$

The Output Power is measured in the Epoch motor by measuring Torque and speed, and multiplying them. The Input Power is measured by a Wattmeter in the input.

The Output power as mentioned for 22mm, 24 ft is  $55 \text{ RPM} \times 90 \text{ Nm} \times \frac{2\pi}{60} = 519 \text{ Watts}$

The Input power measured by wattmeter is 1100 Watts or 1.1 kW, so the efficiency can be calculated as

$$\eta = \frac{519}{1100} = 47 \%$$

Which is much more than any of the HVLS fan motor in the market.



# HVLS Fan and Air Flow

In HVLS fan, generally volume of air supplied is given more weightage than the air flow speed. The ANSI/AMCA-230-07 suggests otherwise. According to the paper effectiveness (cooling/destratification) of a HVLS fan is decided from the fan speed not CFM (volume of air displaced). The air velocity of main jet flow is of more significance than the volume of air moved, which is proved by using ASHRAE thermal comfort tool.

For air-flow of speed 29.5 to 590.6 fpm is needed to decrease the temperature of the skin of the workers working in the closed complex and reduces the temperature of the surrounding from 36 Celsius to 29 Celsius, Epoch system produces 55 RPM with a 24 ft blade which translates to more than 4000 fpm, which is more than enough to regulate the temperature in limit with comfort level of the workers.



# Why we need temperature reduction by HVLS?



Air Movement in hot and warm surrounding is beneficial as body needs to lose heat in conditions above 23 degree Celsius.

During colder temperature, the air speed needs to be less than 40 fpm for proper destratification of air, during summer days the fan speed for cooling needs to be typically in between 250 to 460 fpm. In humid tropical regions the fan speed needs to be more than 600 fpm for removing the moisture and the heat from the human skin.

In 1.5 HP range Epoch fan gives highest speed with 5 blade for with optimal amount of energy which in turn will reduce the electricity bills than other HVLS fans in the market. This makes Epoch HVLS fans one of the best product with optimal power consumption and unique technology.