

# AC vs EC

Information Centre

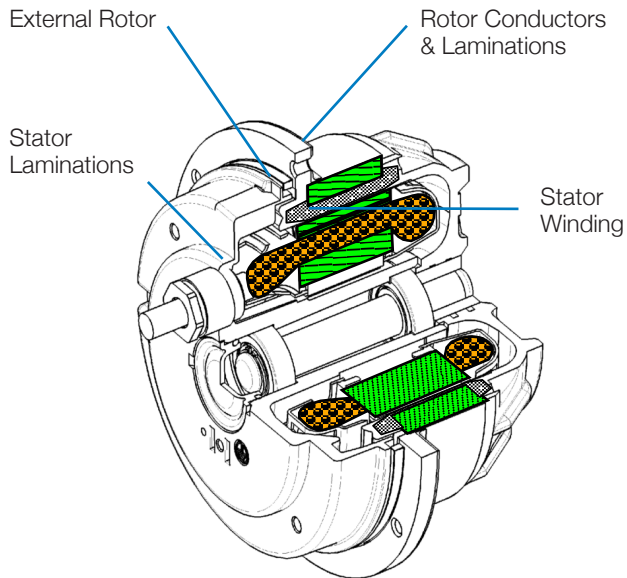
# AC vs EC



## The Facts

### External Rotor AC Motor

AC Motor Mechanical Configuration



### AC Motor Losses

**Stator copper losses** – Current flowing through stator windings creates heat.

**Rotor copper losses** – Current flowing through rotor conductors creates heat

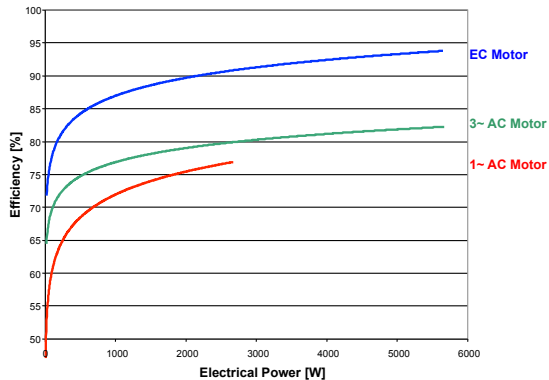
**Rotor slip losses** – Increasing slip increases the current flowing through rotor conductors, creating more heat, especially at reduced speed.

**Iron core losses** – Hysteresis and eddy currents in the stator and rotor laminations, creating heat

**Electronic losses** – N/A

**Other losses** – Bearing friction, windage

### Comparative Motor Efficiencies



### AC or EC driven fans?

- Relatively low capital expenditure
- Some electrical power is required to 'induce' magnetic fields in rotor laminations and induce current flow in rotor conductors- (lowered efficiency)
- Additional items required for speed control-additional cost for speed control
- Relatively high losses (slip, core), compared with EC motors, especially at reduced speed - (lowered efficiency at reduced speed)
- Relatively high running costs and so relatively high 'life-time costs'.

### Main Component Orientation

Motor rotor positioned outside the stator.

### Fan Application

Fan impeller either integral with the rotor, or bolted to the rotor. Very compact design, when compared with internal rotor motor.

### Summary

- Relatively low capital expenditure
- Lower efficiency than equivalent EC fan, especially at reduced speeds
- Additional items required for speed control
- Relatively high running costs compared with equivalent EC fan, and so higher 'life-time costs'

Source: Ziehl-Abegg

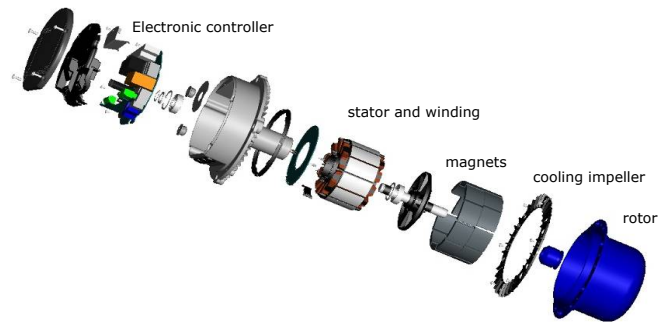
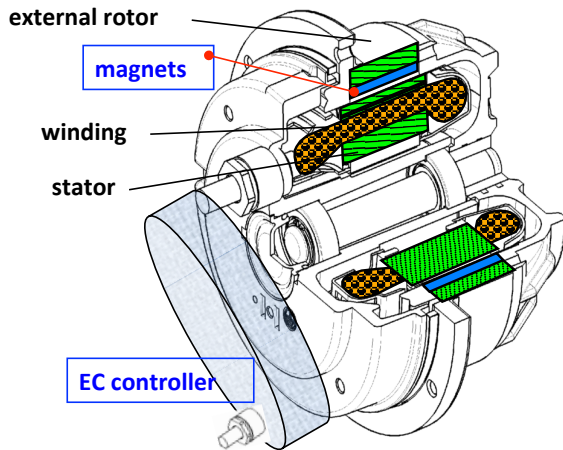
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## The Facts

### External Rotor EC Motor

EC Motor Mechanical Configuration



### EC Motor Losses

**Stator copper losses** – Current flowing through stator windings creates heat

**Rotor copper losses** – None

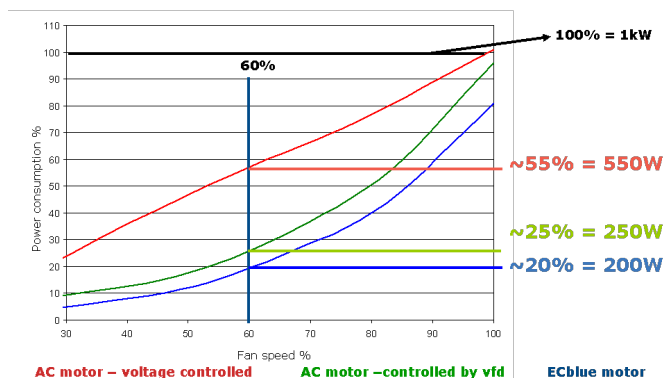
**Rotor slip losses** – None

**Iron core losses** – Hysteresis and eddy currents in the stator and rotor laminations, creating heat

**Electronic losses** – Low level losses from using electricity to drive electronics

**Other losses** – Bearing friction, windage

### EC Fans vs AC Fans



### AC or EC driven fans?

- Relatively high capital expenditure, but reducing
- Using permanent magnets means none of the electricity applied to the stator is required to induce magnetic fields in the rotor- (higher efficiency)
- Speed control built into the electronic commutation electronics
- Relatively low losses compared with equivalent AC motors, especially at reduced speed.
- Higher efficiency than equivalent AC motor, especially at reduced speed, so lower running costs and 'life-time costs'.

### Summary

- Relatively high capital expenditure, but reducing
- Higher efficiency than equivalent AC fan, especially at reduced speeds
- Speed control built into the electronic commutation electronics
- Higher efficiency than equivalent AC fan, especially at reduced speeds, so lower running costs and 'life-time costs'

### Main Component Orientation

Motor rotor positioned outside the stator.

### Fan Application

Fan impeller either integral with the rotor, or bolted to the rotor. Very compact design, when compared with internal rotor motor.

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