

Motors | Automation | Energy | Coatings



# Advantages of Variable Speed Drives

Zest WEG Group Presentation at the 20th Annual Conference for the International Plant Propagators' Society



# Advantages of Variable Speed Drives



## Agenda

- Zest WEG Group Overview
  - WEG International
  - SA Operations
- VSD Technology
- Advantages – Affinity Law
- Case Study
- Summary

# Advantages of Variable Speed Drives

## Zest WEG Group Overview – WEG International

- 34 Factories in 11 countries
- Distributers in over 85 Countries
- Subsidiaries in 29 Countries
- Sales to over a 135 Countries
- Over 30 000 Employees



# Advantages of Variable Speed Drives

## Zest WEG Group Overview – WEG International

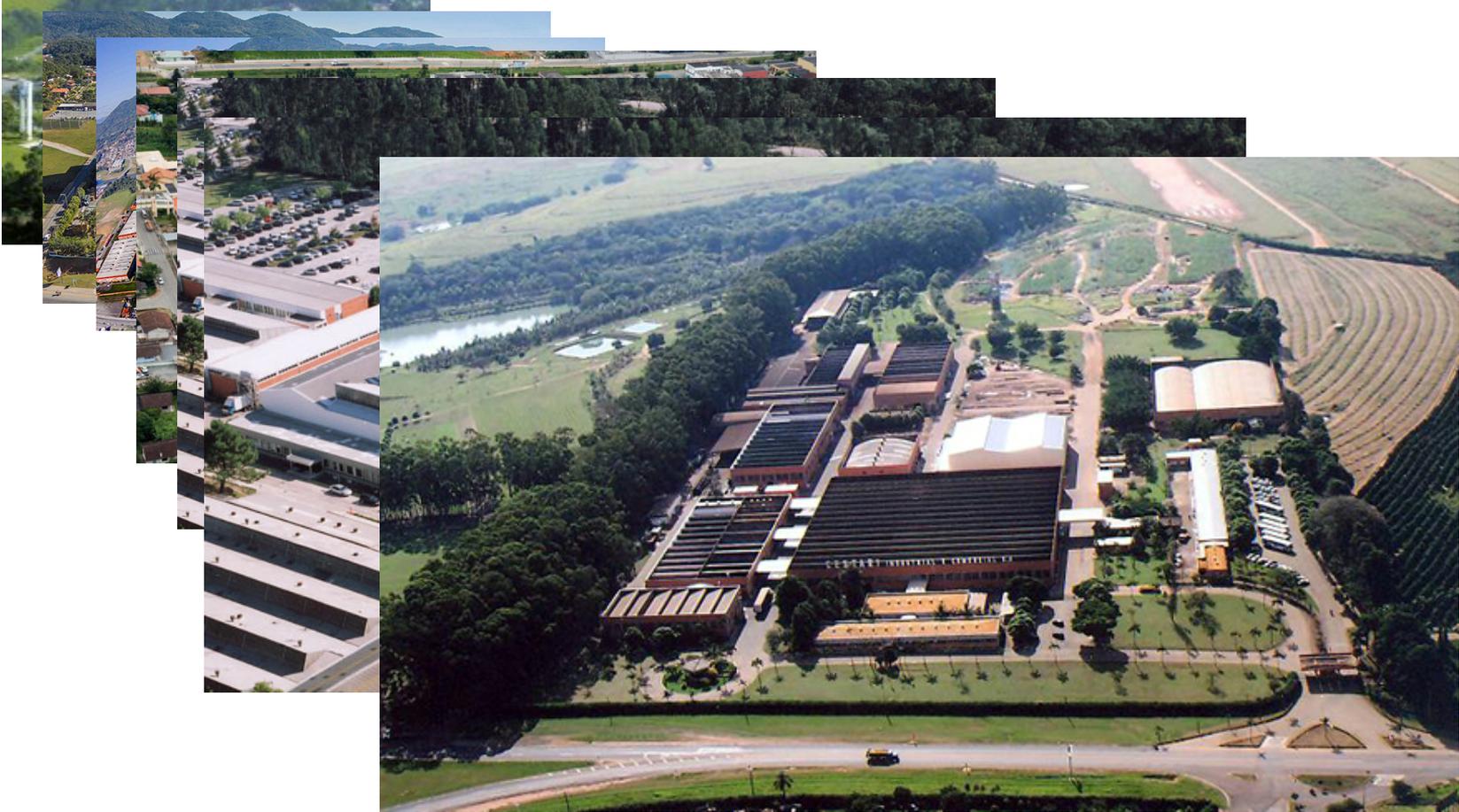
### **WEG Headquarters** *(Jaraguá do Sul - SC - Brazil)*



**1.000.000 m<sup>2</sup>**

# Advantages of Variable Speed Drives

## Zest WEG Group Overview – WEG International



# Advantages of Variable Speed Drives

## Zest WEG Group Overview – SA Operations



**Johannesburg**  
47 Galaxy Avenue



**Johannesburg**  
105 Saturn Crescent



**Johannesburg**  
39 Galaxy Avenue



**Cape Town**



**Port Elizabeth**



**Durban**



**Richards Bay**



**Trichardt**



**Middelburg**



**Rustenburg**

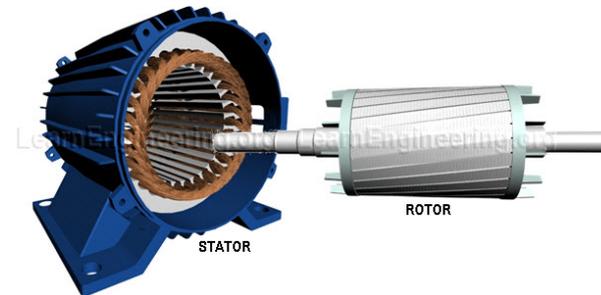
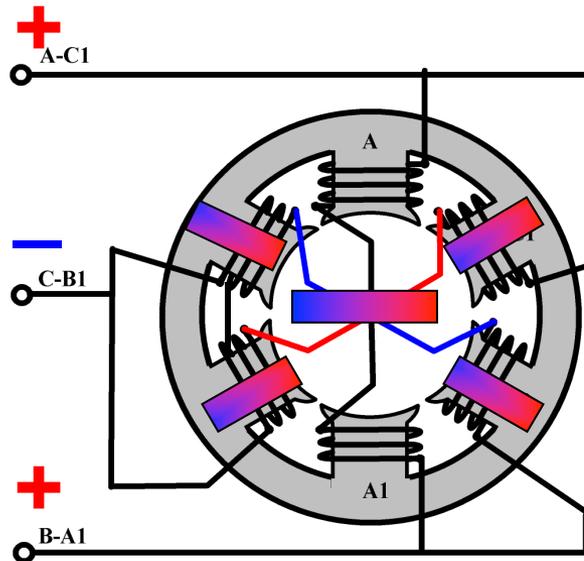
Scope of Supply with-in the Zest WEG Electric division:

**Electrical Motors, Variable Speed Drives, Soft Starters, Switchgear.**

# Advantages of Variable Speed Drives

## VSD Technology

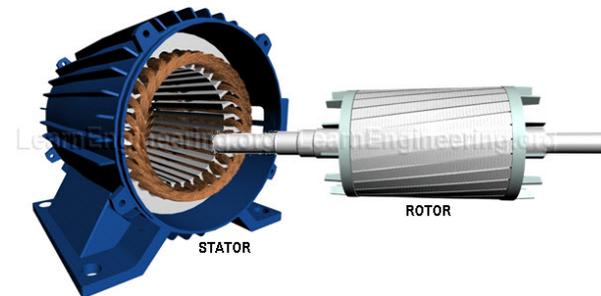
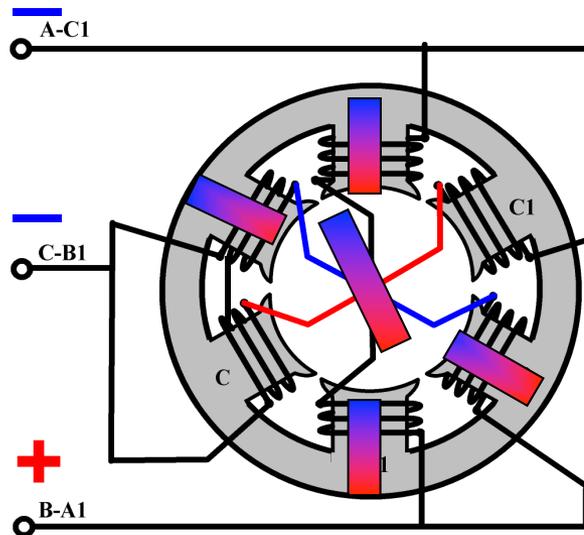
- How does an AC Induction Motor work?



# Advantages of Variable Speed Drives

## VSD Technology

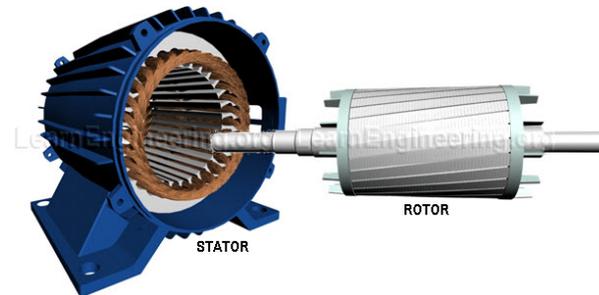
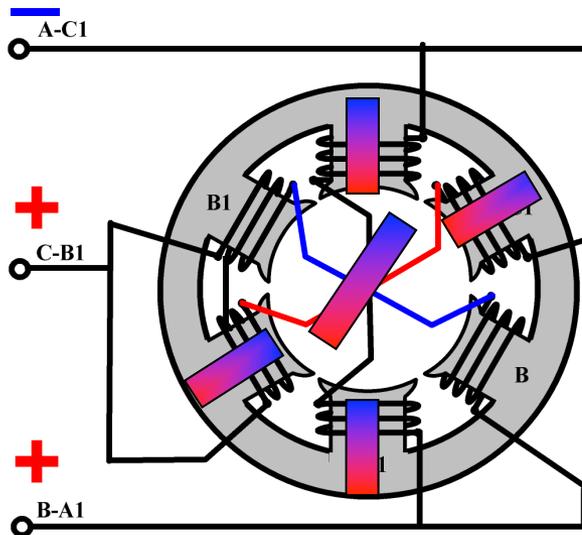
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# Advantages of Variable Speed Drives

## VSD Technology

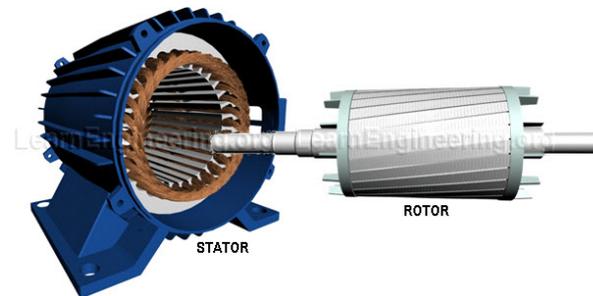
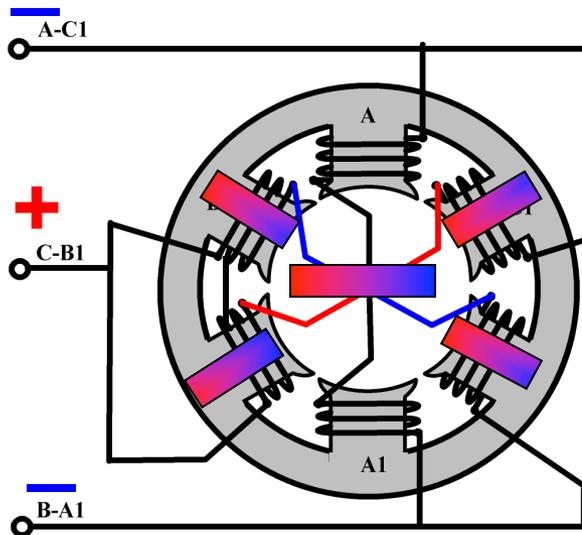
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# Advantages of Variable Speed Drives

## VSD Technology

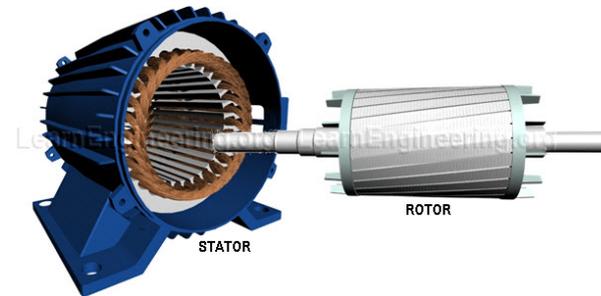
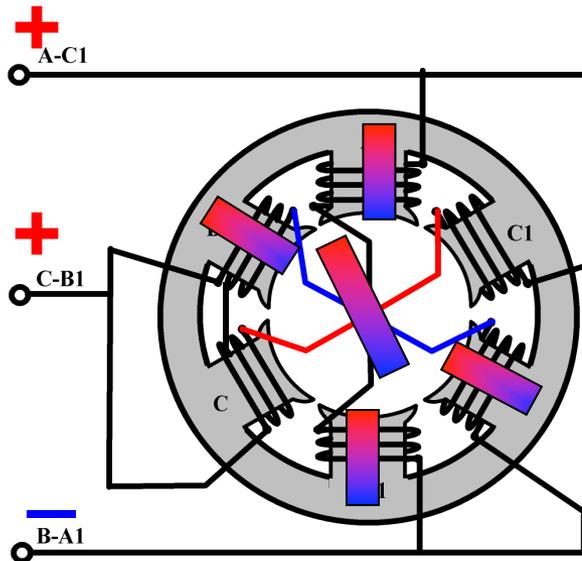
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# Advantages of Variable Speed Drives

## VSD Technology

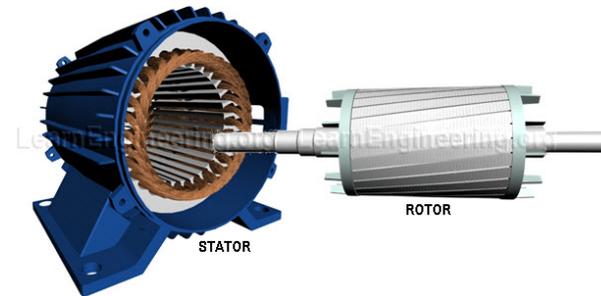
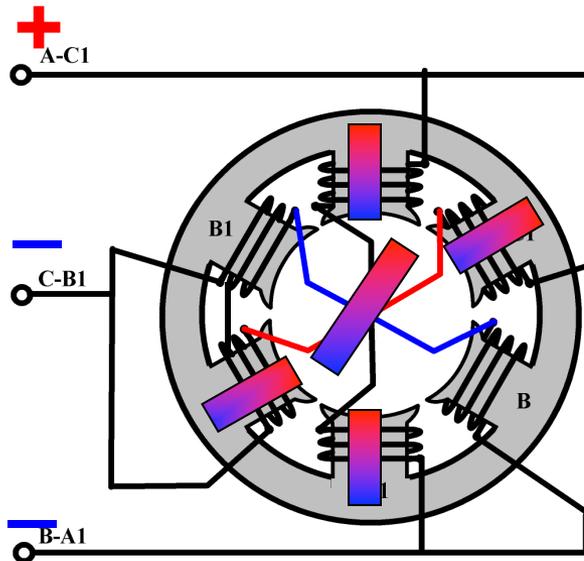
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# Advantages of Variable Speed Drives

## VSD Technology

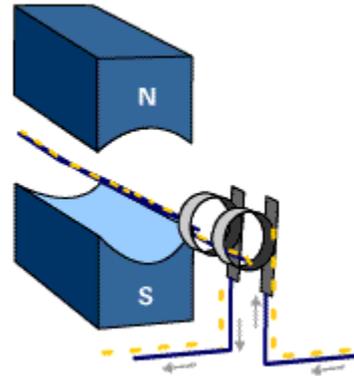
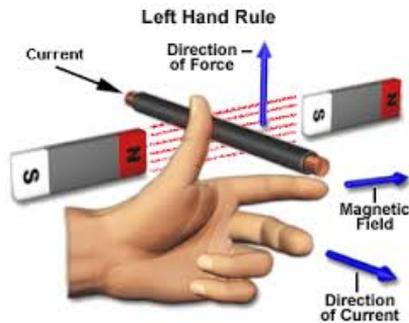
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# Advantages of Variable Speed Drives

## VSD Technology

- How does an AC Induction Motor work?



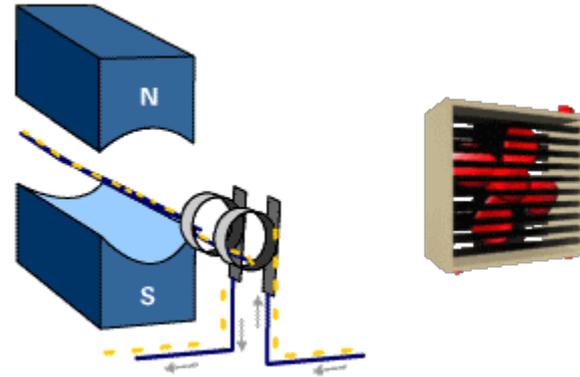
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# Advantages of Variable Speed Drives

## VSD Technology

- What determines the speed of a AC Induction Motor?

$$N = \frac{60 \times f}{P}$$

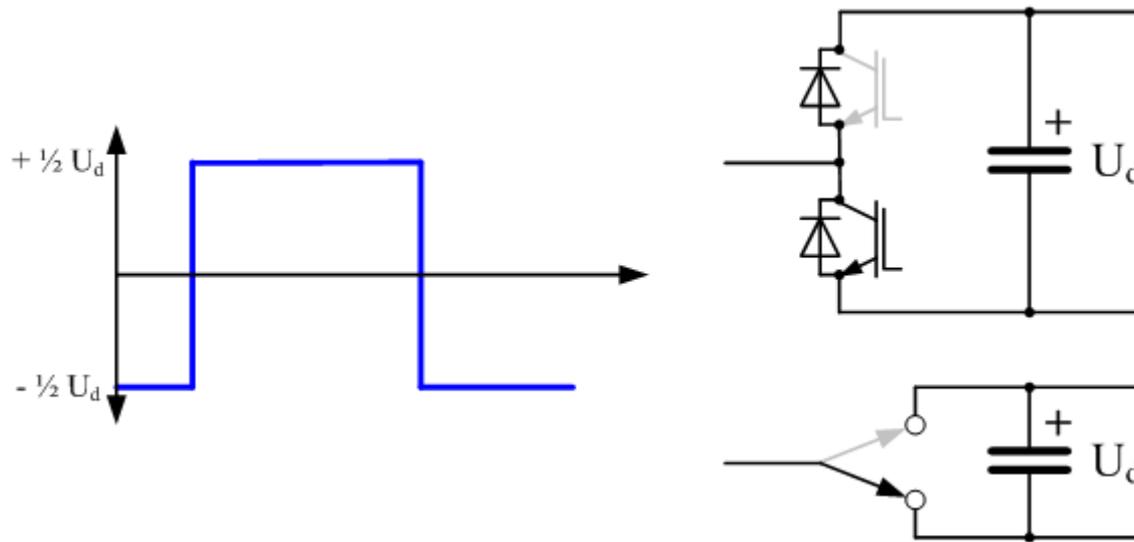


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# Advantages of Variable Speed Drives

## VSD Technology

- How can the speed of an AC Induction Motor be changed?



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# Advantages of Variable Speed Drives

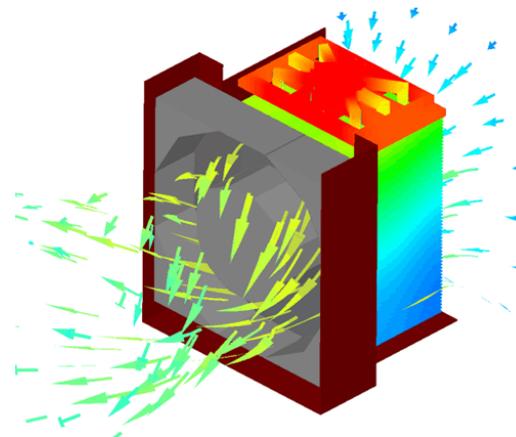
## Advantages – Affinity Law

$$P = Q^3$$

100% Speed (476Hz)

$$P = 0.95^3 (0.95 \times 0.95 \times 0.95) (0.95)$$

$$= 0.86 (21\% saving)$$



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# Advantages of Variable Speed Drives

## Case Study @ Pico-Gro



- Pico-Gro is a producer of micro greens and speciality leaves for the restaurant sector in South Africa. They also supply Woolworths with Micro greens and edible flowers.
- About 50% of their production is now exported to restaurant markets across the globe.



# Advantages of Variable Speed Drives

## Case Study @ Pico-Gro

- Consistent year round production is of great importance to Pico-Gro in servicing all of these markets.
- Our Variable Speed Drives has been installed in their most recently built Green House, with the aim of supplying more consistent climate control
- This is a first for agricultural climate control in SA.



# Advantages of Variable Speed Drives

## Case Study @ Pico-Gro



### M Buys Electrical – Specializes in:

- Greenhouses – Design & installation of electrical system and distribution boards.
- Boilers and under soil heating.
- Artificial lighting.
- Pump stations and booster pumps.
- Pivot repairs and maintenance.
- VSD and soft starter control for pumps, fans, conveyors.



# Advantages of Variable Speed Drives

## Case Study at Pico-Gro



# Advantages of Variable Speed Drives

## Case Study @ Pico-Gro

- Site installation

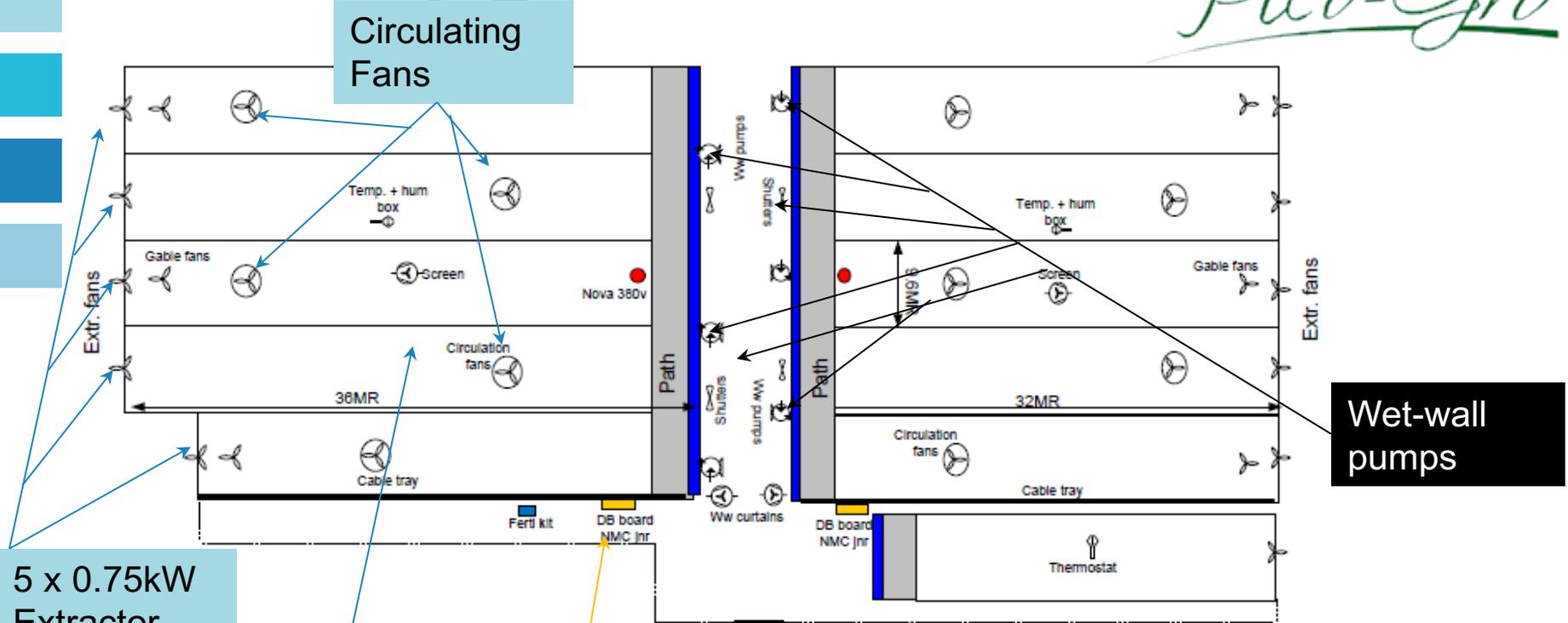


**M Buys  
Electrical**

# Advantages of Variable Speed Drives



## Case Study @ Pico-Gro



- Position of the new DB Box
- WEG 16A Circuit Breaker
  - WEG CFW500 14A VSD
  - NMC Junior Crop Management System





- Stage 1 – Old “On/Off Control” +24°C
- Stage 2 – Old “On/Off Control” +27°C
- Stage 3 – Old “On/Off Control” +30°C

Stage 1 - Un-productive airflow over crop lines

New VSD Speed Control = More productive airflow over crop lines

# Advantages of Variable Speed Drives

## Case Study @ Pico-Gro



- More constant temperature and humidity conditions obtained due to more exact airflow control.
  - "On/Off" control in the past - temperature curves were between 17 and 34 Degrees Celsius
  - "VSD" control - temperature curves proved to remain between 17 and 27 Degrees Celsius.
- Due to the improved conditions an immediate increase in quality and production could be observed.

# Advantages of Variable Speed Drives

## Case Study – Energy Savings

“Snap Shot” Measurements Taken on 15 February 2017

Speed Reference	VSD Output Speed (Hz)	% of Full Speed	Demand (P) in kW	Expected Average Annual Running Hours	Possible % Saving	Average Possible % Savings pending the running hours between the 3 stages
Compared to "DOL"	50	100%	3.49	3285	0%	
Stage 3	48	96%	3.27	3285	6.4%	23.8%
Stage 2	43	86%	2.67	3285	23.4%	
Stage 1	38	76%	2.04	3285	41.5%	

# Advantages of Variable Speed Drives

## Summary

### Advantages – Engineering

- Lower electrical consumption
- Better motor protection
- Lower inrush currents
- Lower mechanical stresses

### Advantages – Agronomy

- More productive airflow over crop lines
- Accurate and faster reacting temperature control
- Happy plants

A high-angle, low-key photograph of a diverse group of business professionals in a huddle. They are gathered around a globe, with their hands resting on it. The lighting is dramatic, with strong highlights and deep shadows, creating a sense of focus and collaboration. The globe is the central point of interest, with various colors representing continents and oceans.

Questions?

**ZEST**

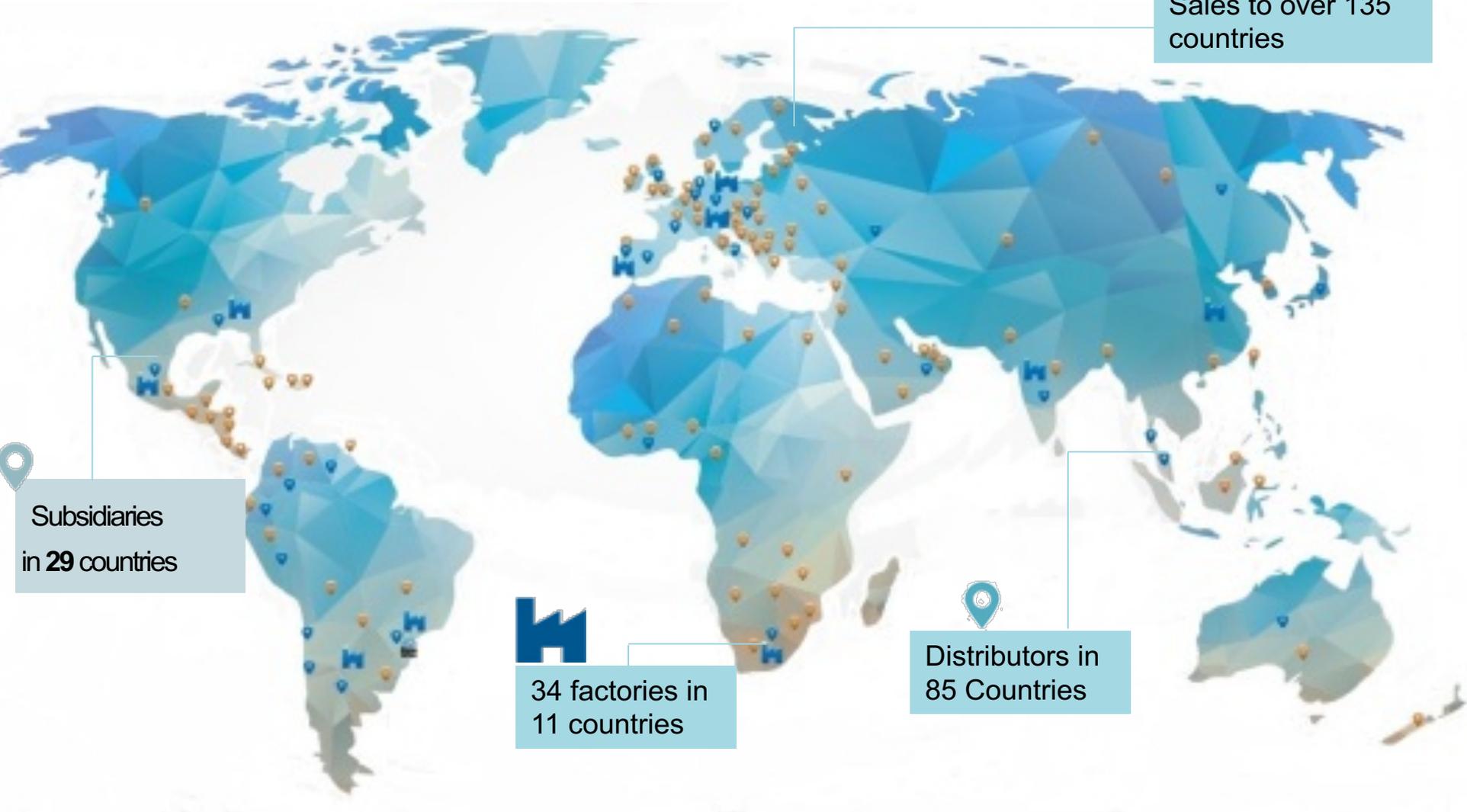
WEG Group



# Manufacturing Plants And Branches



Sales to over 135 countries



Subsidiaries in **29** countries

34 factories in 11 countries

Distributors in 85 Countries

# Advantages of Variable Speed Drives

## Zest WEG Group Overview – Our History



- 16th September 1961
  - 1961, **W**erner Ricardo Voigt, **E**ggon João da Silva and **G**eraldo Werninghaus decided to join efforts to create a company.
- 13th October 1980
  - In 1980 James Blakemore Founded Zest Electrical Motors.
- 30th June 2010
  - The WEG Group of Brazil acquired majority equity stake in South Africa's Zest Electric Group

# Advantages of Variable Speed Drives

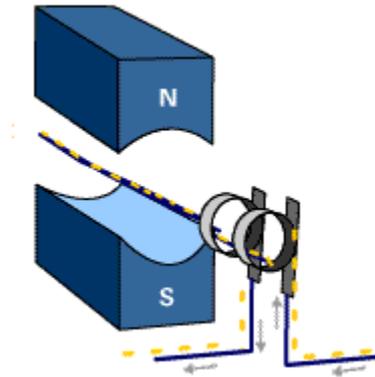
## VSD Technology

- What determines the speed of a AC Induction Motor

$$N = \frac{60 \times f}{P}$$

$$\begin{array}{l} 3000 \\ \text{2 Pole Motor} \end{array} = \frac{60 \times 50}{1}$$

$$\begin{array}{l} 1500 \\ \text{4 Pole Motor} \end{array} = \frac{60 \times 50}{2}$$



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# Advantages of Variable Speed Drives

## VSD Technology



