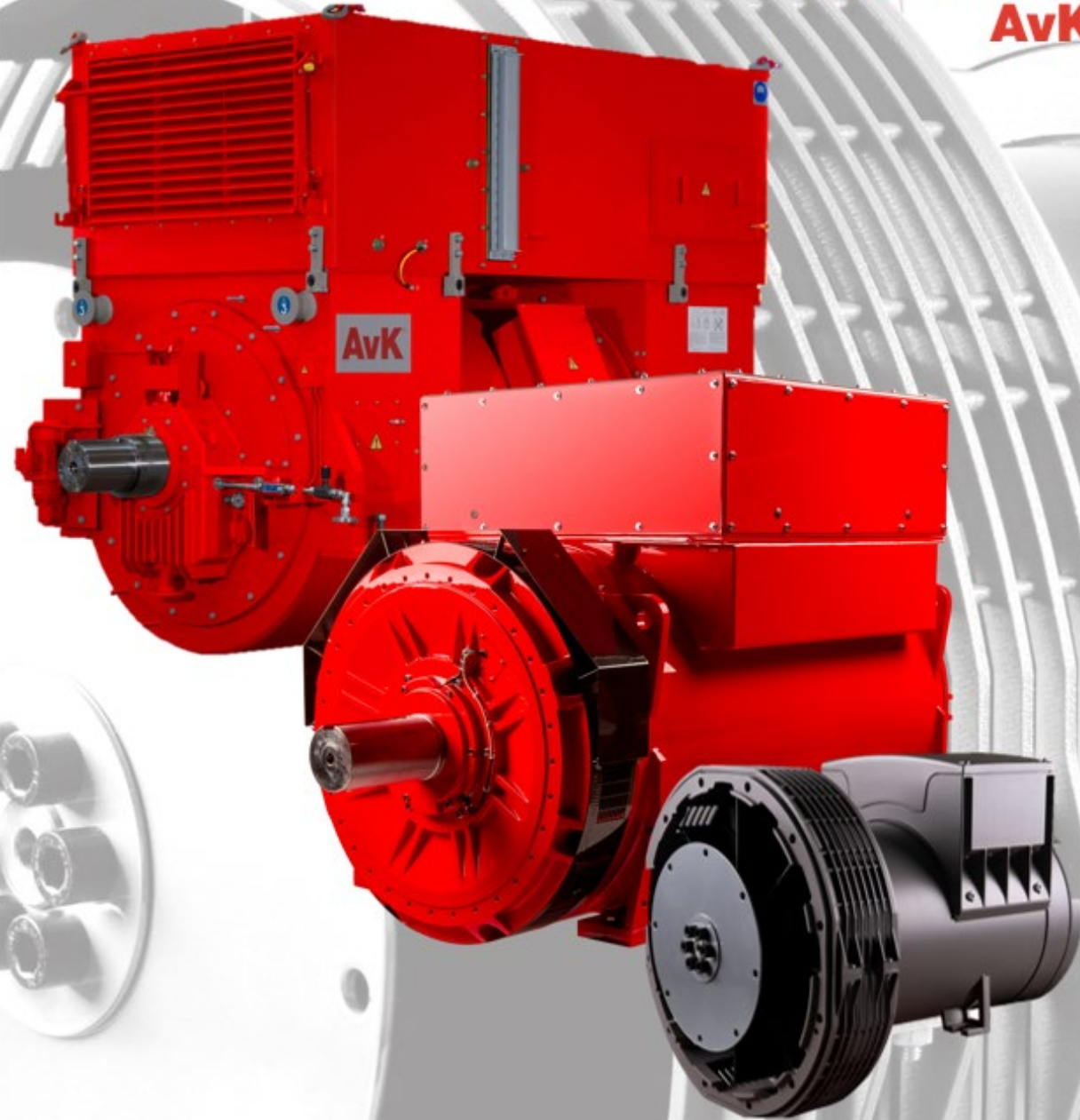


**NEWAGE  
STAMFORD  
AvK**



**Generator  
Technologies**



# **EGSA General Session**

Ryan Loso

Business Director/General Manager

March 8, 2022

Public

## Intro

# Why we need to hear from leading component manufacturers?

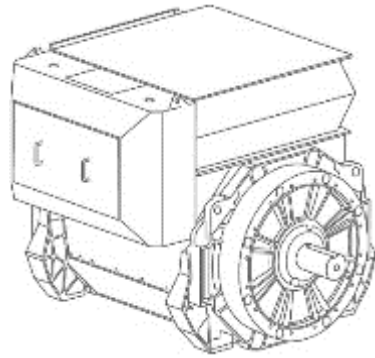
- Unique perspective
- Validate our products
- Education



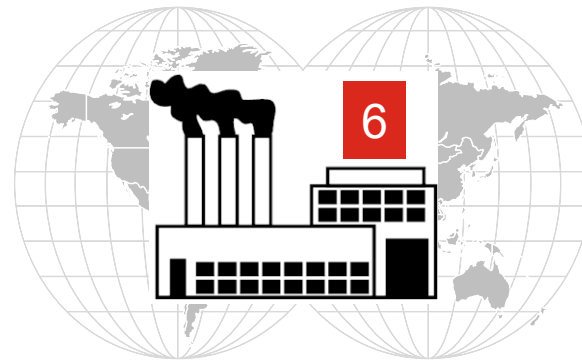
# Who are we

**NEWAGE<sup>®</sup>**  
**STAMFORD<sup>®</sup>**  
**AvK<sup>®</sup>**

EST.  
**1904**



4 – 9,000 kW



# Global locations



## HERITAGE

# 100 Years of Innovation



The Cutting Brothers establish an electrical engineering business in Stamford, UK

AvK announces world's first self-regulated alternator

First self-regulating alternator tested and produced in Stamford



Introduction of "C" range, first volume produced brushless alternators



Cummins Acquires Onan/Newage

1904

1919

Arthur van Kaick founded AvK electrical machines in Frankfurt



1938

1945

Cutting Brothers sell to Stamford Electrical

1950

1958

First rotating field alternator produced "L" range LB26

1966

1973

World's first alternator produced to utilise a PMG for AVR excitation

1986

1992

Development of AvK DSG Range



# HERITAGE

# 100 Years of Innovation

Merger of AvK



Opening of 2<sup>nd</sup> factory at Ranjangaon, India



Anti-counterfeit programme launched



Introduction of the new STAMFORD S-Range with CoreCooling™ Technology



Launch of the STAMFORD S7 and S9

2001

2006

2007

2010

2011

2013

2016

2018

2020



Company renamed Cummins Generator Technologies Ltd.

Opening of 2<sup>nd</sup> China manufacturing plant



\$12m investment in capacity expansion at Craiova, Romania



Opening of new manufacturing facility in Stamford, UK

Public

## PRODUCTS

# STAMFORD<sup>®</sup> S-Range

Fitted with CoreCooling<sup>™</sup> Technology

- Enhanced thermal management
- Optimised power density core
- New core lengths
- High efficiency airflow



3 YEAR  
WARRANTY



4 – 4,000kW

## PRODUCTS

# STAMFORD®

- Wire-wound (random-wound)\*
- 4-pole alternators: 4-4,000kW
- 2-pole alternators: 10-40kW
- 6-pole alternators: 200-1,300kW
- Voltages up to 13.8kV
- Brushless excitation with AVR
- IP21, IP22, IP23, IP44 protection

\*S9 and P80 MV & HV range are manufactured to bar-wound design



4 – 4000kW



## PRODUCTS

# AvK<sup>®</sup>

- Bar-wound (form-wound)
- 4, 6, 8 and 10 pole alternators
- DSG LV range up to 690V
- DIG MV/HV range up to 13.8kV
- Brushless excitation with AVR
- IP23, IP44, IP54, IP55 (CACA, CACW) protection
- Suitable for numerous prime movers: diesel, gas and steam turbines



600 – 9,000kW

# Product Compliance

- UL and CSA certification across the complete **STAMFORD**<sup>®</sup> and **AvK**<sup>®</sup> ranges
- Our range of alternators are compatible with all Industrial Standards and Marine Classifications
- Our manufacturing plants operate to One Global Standard supported by the 10 practices of the Cummins Operating System
- All alternators are manufactured in ISO 9001 and ISO 14001 environments



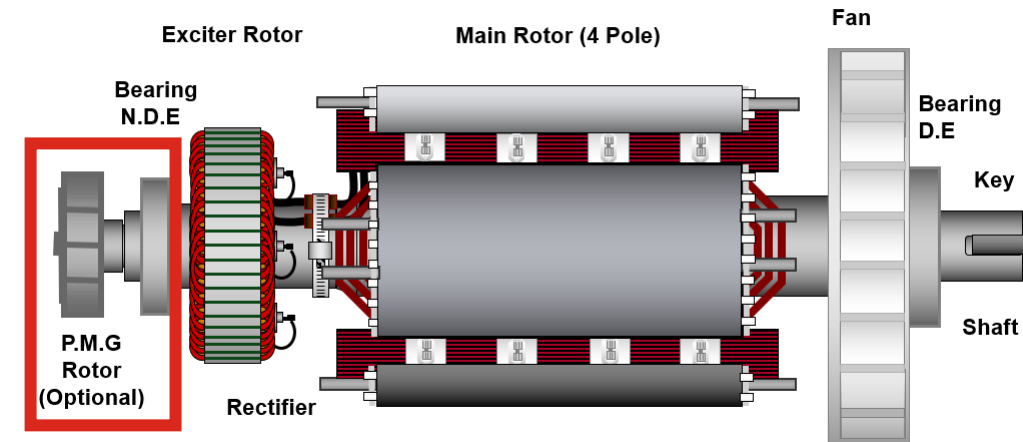
**Thank you**



# Appendix

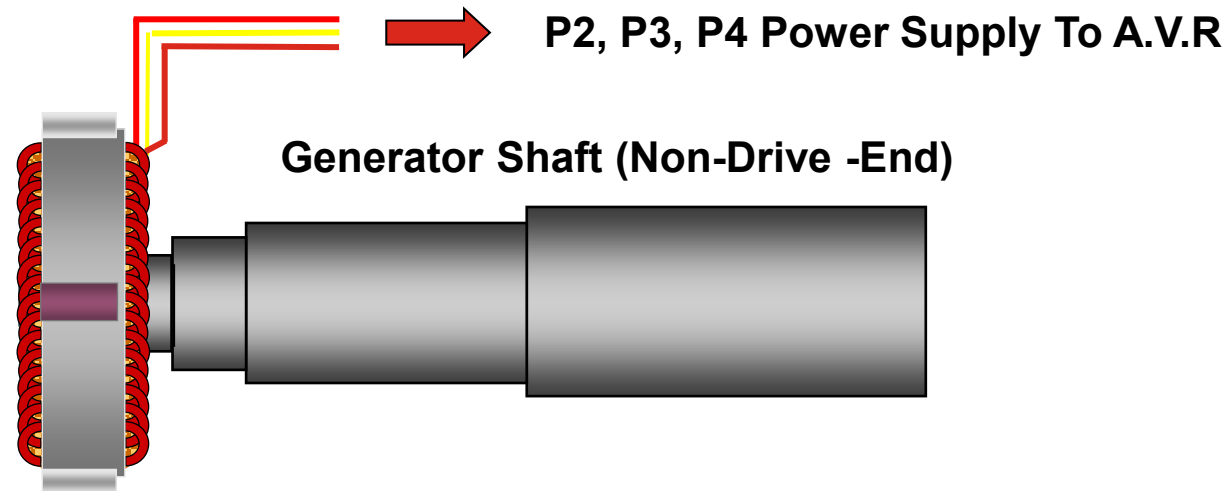
## Permanent Magnet Generator

- ISOLATED POWER SUPPLY FOR THE AVR,
  - PROTECTS AVR FROM HIGH TRANSIENT FAULT CONDITIONS IN THE DISTRIBUTION SYSTEM
  - UNAFFECTED BY WAVEFORM DISTORTION CAUSED BY NON LINEAR LOADS
- SUSTAINED SHORT CIRCUIT CURRENT UNDER FAULT CONDITIONS
- POWERFUL VOLTAGE BUILD UP SYSTEM ON INITIAL RUN-UP, DOES NOT RELY UPON RESIDUAL MAGNETISM.
- CAPABLE OF VOLTAGE BUILD UP AGAINST LOAD, (FREQUENCY STARTING OF LARGE MOTORS).



## Permanent Magnet Generator

### The Permanent Magnet Generator (PMG)



- Dowel Pin for PMG Rotor Location
- Rare Earth Magnet Rotor, highly magnetic saturated field. 8 Pole Rotor, 100HZ (at 1500 RPM ) or 120 HZ (at 1800 RPM )
- Through Bolt fixture to Shaft non drive end
- Stator: 3 Phase A.C 170 (50Hz) to 220 Volts (60Hz)

## Winding Protection

### How Stamford alternators are typically protected from environmental conditions

- 1) We offer a variety of resin options, impregnation methods, and wound component coatings depending on machine size.
- 2) In cases of Severe Environment Impregnation (SEI), we offer double impregnation and/or different treatment (Epoxy VPI for example) on select wound components.
- 3) For what we deem Level 3, additional treatment may include painting of otherwise exposed surfaces inside the alternator.

Component	SEI Level 1	SEI Level 2	SEI Level 3
Main Stator	Sub 250kW – Polyester resin, dip or Hot Roll Dip Above 250kW 1x Vacuum pressure impregnation Epoxy	2 x Vacuum pressure impregnation	2 x Vacuum pressure impregnation
Main Rotor	Sub 250kW – Polyester resin Polyester Standard Hot Roll Dip	Sub 250kW – Polyester resin Polyester Standard Hot Roll Dip	Sub 250kW – Polyester resin Polyester Standard Hot Roll Dip
Exciter Stator	Dip and bake – Polyester resin Epoxy black resin overcoat	VPI Epoxy	VPI Epoxy
Exciter Rotor	Dip and bake – Polyester resin	Epoxy black resin	Epoxy black resin

## Winding Protection



Hot Rotate Dipping



## Winding Protection





Creating a better tomorrow™...

## Regal Rexnord Corp. – Marathon Generators

March 8, 2022

Why it's important to hear from our major component suppliers

Marcelo Oliveira  
VP of Global Sales  
Marathon Generators



# HISTORY

1913

Marathon Electric was founded



1955

Beloit Tool Corporation was founded

Beloit Tool Corp.

**DURST**  
1967

**GROVE GEAR**  
1981

1997

Acquisition of Marathon Electric - motors & generators



1997



1999

**HWADA**

2008



2008



2010

UNICO

2010

ELCO

2010



2010

AIR-CON TECHNOLOGY

2010

CMG

2010



2011

RAMU INC

2011

AC Smith

2011

JAURE

2015

KOP-FLEX

2015

1910

1920

1930

1940

1950

1960

1970

1980

1990

2000

2010

2020



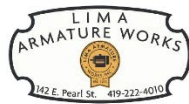
1930s

Lima Armature Works acquires motor manufacturing capability

**REGAL**

1969

Beloit Tool Corporation changed its name to Regal Beloit



1986

1986

Acquisition of Lima Armature Works adds Lima Mac generator line



1987

OHIO GEAR

1987

ILLINOIS GEAR

1987

ELECTRA-GEAR

1989

FOOTE-JONES

1989



2000

THOMSON

POWER SYSTEMS

2000



GE Capacitors

By Regal-Beloit

2004



2005

**ALSTOM**

2007



2007



2007



2007



ARROWHEAD SYSTEMS LLC

2021



CENTA

2021

REXNORD

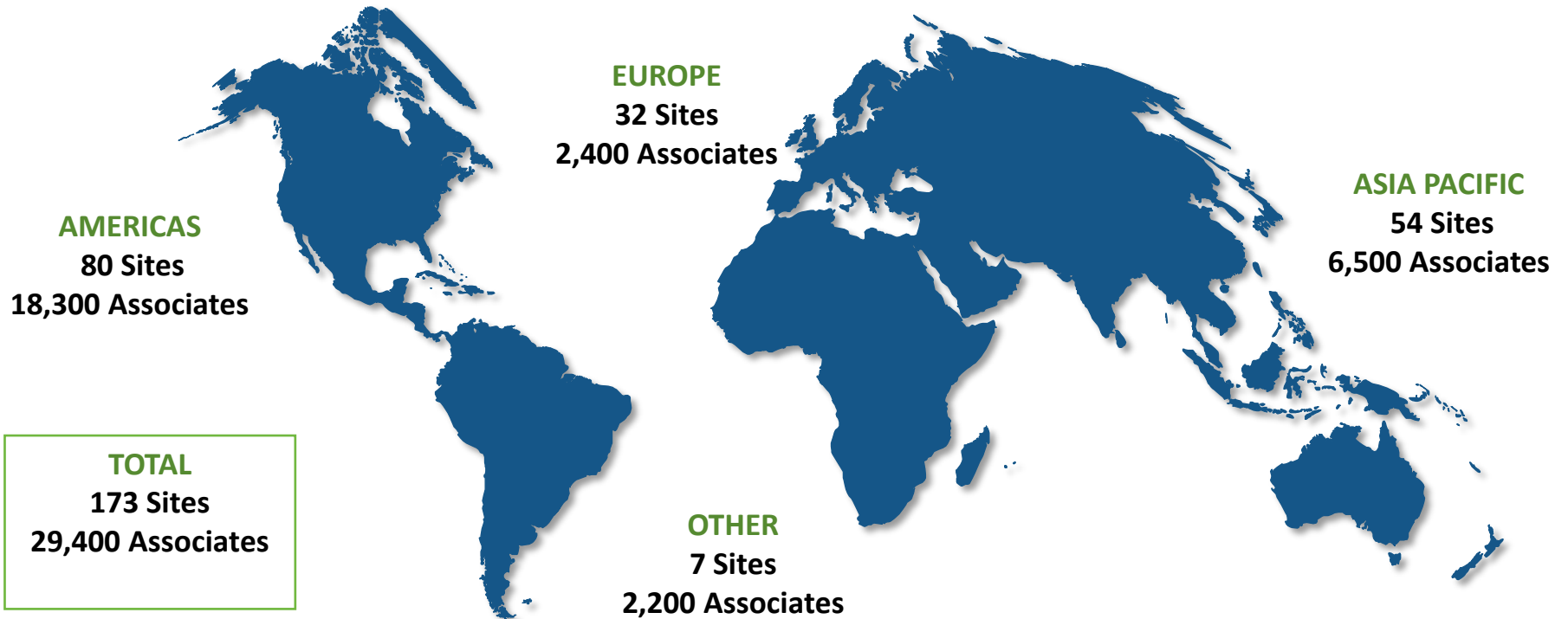
2021

**RegalRexnord**™ 2021 Sales = ~\$5 Billion

Regal Rexnord Performance<sup>1</sup>

	2020	2021E	2022E
Sales	~\$4.1B	~\$4.8B	~\$5.0B
Adj. EBITDA <sup>2</sup>	~\$0.74B	~\$0.9B	>\$1.0B
EBITDA Margin	~18%	~19%	~21%

## Regal Rexnord Presence



## Marathon Generators Presence



**AMERICAS**  
**USA, MEX, BRA**



**TOTAL**  
**1000+ Service**  
**Centers Globally**

**EMEA**  
**UK, NET, ITA, SA**  
**Dubai**

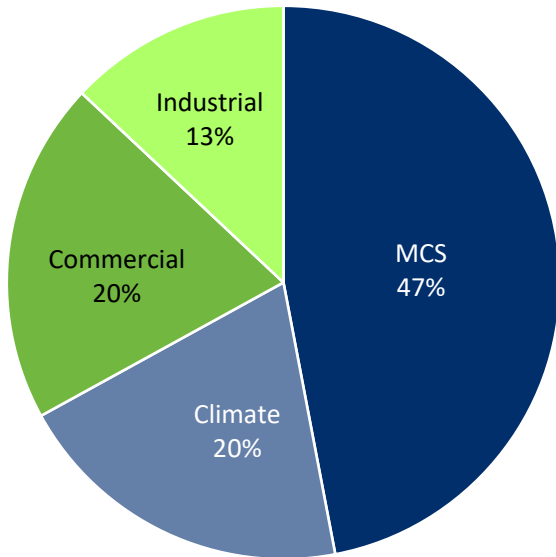


**ASIA PACIFIC**  
**China, SIN, AUS**

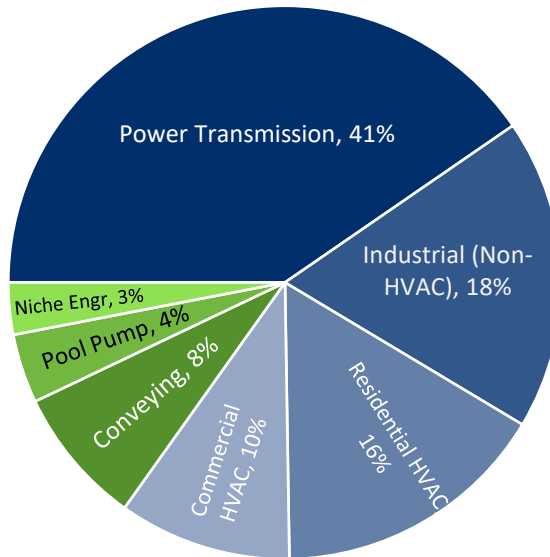
## KEY INDUSTRY EXAMPLES



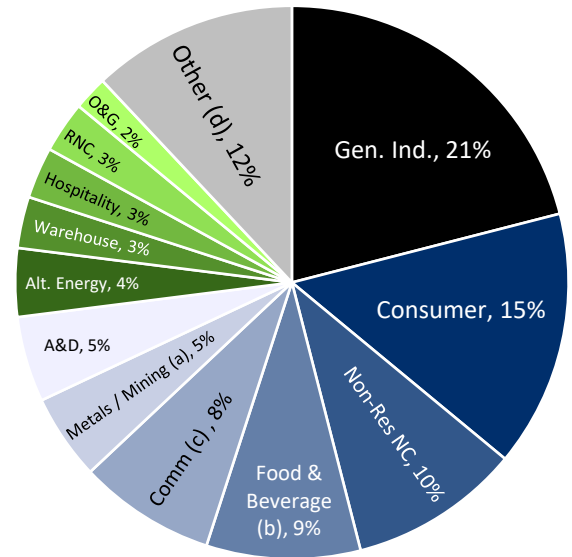
### Sales By Segment



### Sales By Application



### Sales By End Market

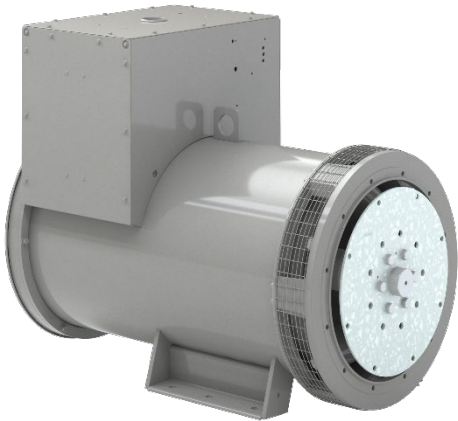


- (a) Includes Aggregates Processing
- (b) Includes "Cold Chain" Related Sales
- (c) End Markets in Non-Manufacturing ISM Not Categorized Elsewhere
- (d) Includes Forestry / Wood, Agriculture, Grocery, Data Center, Marin, Telecom, Automation, Pharmaceutical



## MagnaPlus

- LV (to 600V), 60 & 50Hz
- Outputs up to 430kW/420kVA
- 1 & 3 Phase, 12 leads or dedicated
- 1 & 2 Bearings, ODP
- Options & Accessories
- Built in Mexico & China (stock)



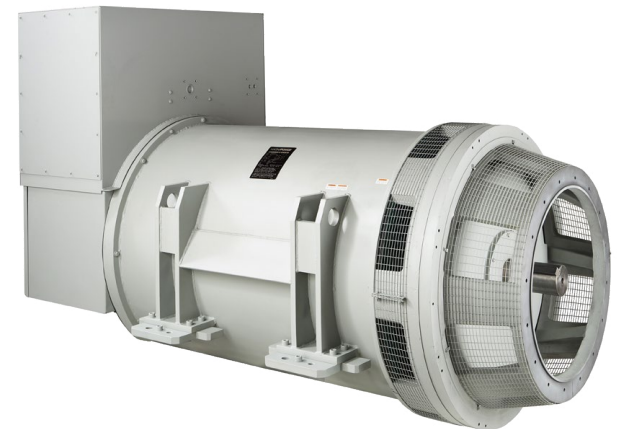
## MagnaMax

- LV & MV (to 6.9kV), 60 & 50Hz
- Outputs up to 2650kW/2650kVA
- 1 & 3 Phase, 12 leads or Busbars
- 1 & 2 Bearings, ODP, IP44, IP54
- Many Options & Accessories
- Custom designs
- Built in Mexico, USA & China (stock)



## MagnaPower

- LV, MV & HV (to 13.8kV), 50 & 60Hz
- Outputs up to 4000kW/4000kVA
- 3 Phase, 6 leads (Busbars)
- 1 & 2 Bearings, ODP, IP44
- Many Options & Accessories
- Custom designs
- Built in USA & China (build up)



# Dedicated products for critical applications



**marathon** Generators

THE IDEAL GENERAL PURPOSE GENERATORS FOR POWER AND STABILITY

**MAGNAPLUS**

REGAL REXNORD



**marathon** Generators

DELIVERING EXCEPTIONAL TRANSIENT PERFORMANCE AND HANDLING OF HIGH LINEAR LOADS

**MAGNAMAX**

REGAL REXNORD



**marathon** Generators

THE OPTIMUM CHOICE FOR THE MOST DEMANDING REFINERY POWER APPLICATIONS

**MAGNAPOWER**

REGAL REXNORD



**marathon** Generators

**LIMA MAC REEFER**

REGAL REXNORD



**marathon** Generators

PRODUCT FACTS

**360 LIMA MAC IRRIGATOR ALTERNATOR**

DO NOT GET BY WITH A CHEAP IRRIGATOR

REGAL REXNORD



**marathon** Generators

**PANCAKE**

REGAL REXNORD



**marathon** Generators

FOR ALL YOUR HOUSE POWER GENERATOR NEEDS

**MAGNASELECT**

REGAL REXNORD



**marathon** Generators

**HARSH DUTY**

REGAL REXNORD



**marathon** Generators

FOR EXCELLENT TRANSIENT PERFORMANCE AND HANDLING OF HIGH LINEAR LOADS

**400 HZ GENERATORS**

REGAL REXNORD



**marathon** Generators

**MARINER**

REGAL REXNORD



**marathon** Generators

THE OPTIMUM CHOICE FOR THE MOST DEMANDING DRINKING WATER APPLICATIONS

**MARINER DEPSS**

REGAL REXNORD



**marathon** Generators

**ATEX HAZARDOUS DUTY**

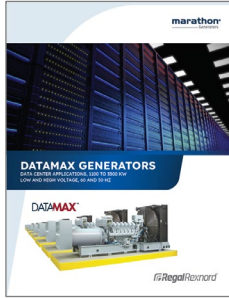
REGAL REXNORD



**marathon** Generators

**ATEX IP44**

REGAL REXNORD

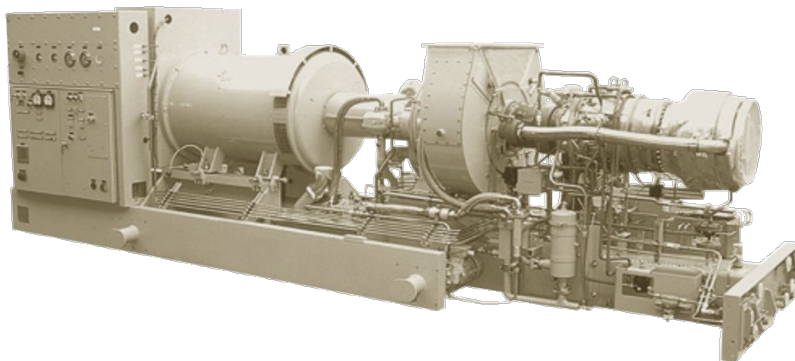


**marathon** Generators

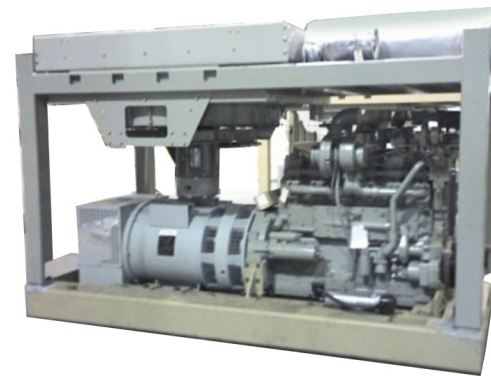
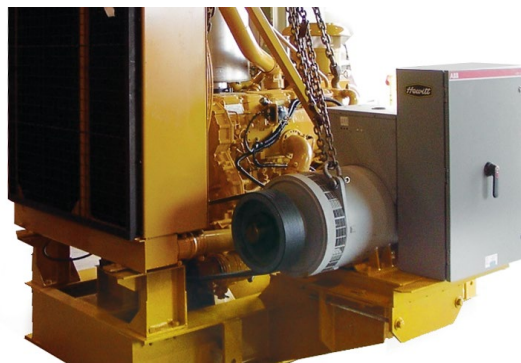
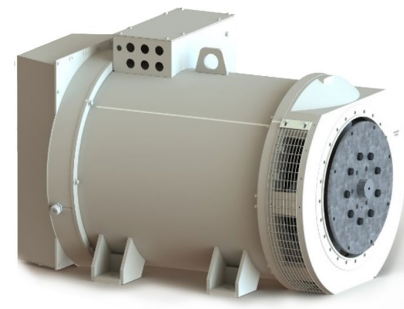
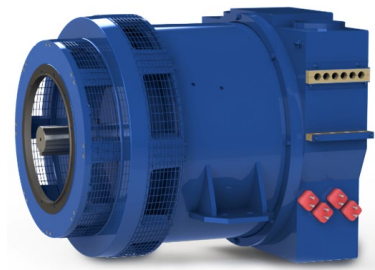
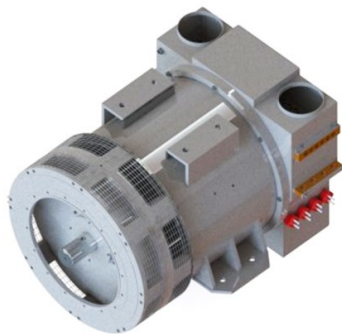
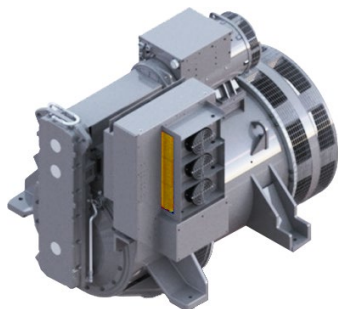
**DATAMAX GENERATORS**

REGAL REXNORD

## SPECIALTY PRODUCTS & APPLICATIONS

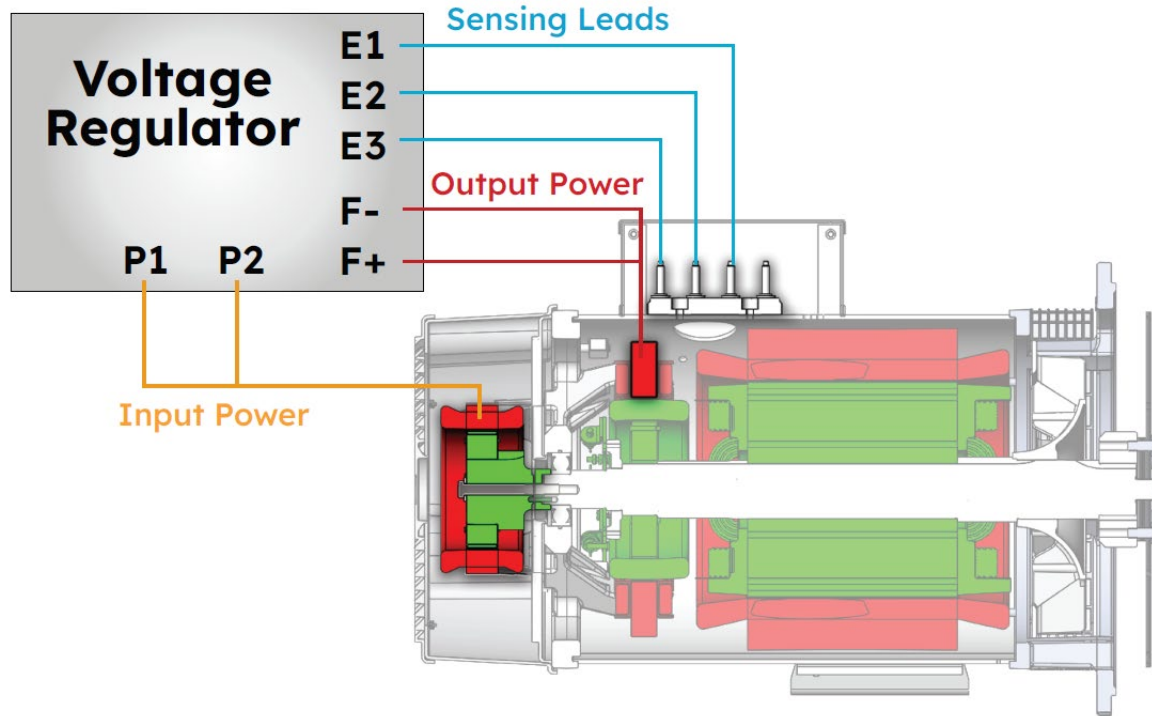


## SPECIALTY PRODUCTS & APPLICATIONS



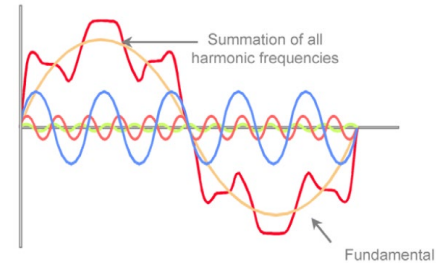


## Key Advantages of PMG

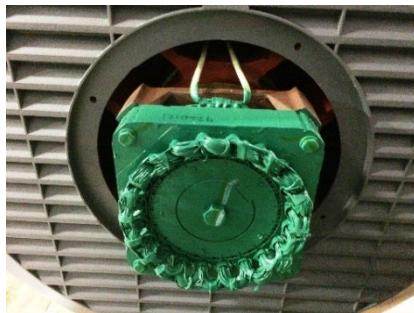
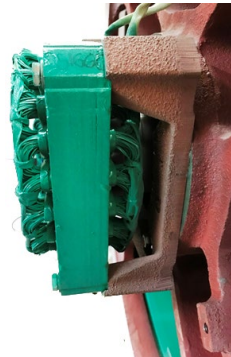
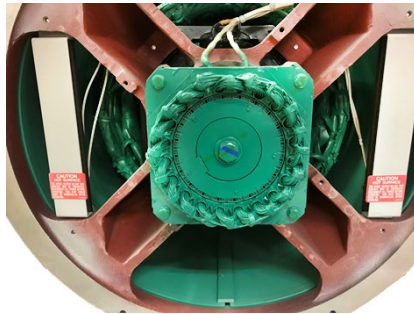


- Voltage build up
- Isolated AVR/DVR power supply
- Best performance – load conditions
- Short circuit capability (300%/10s)
- Easy field install/retrofit/replace

### Harmonic Distortion



## Add on (kits) or build up

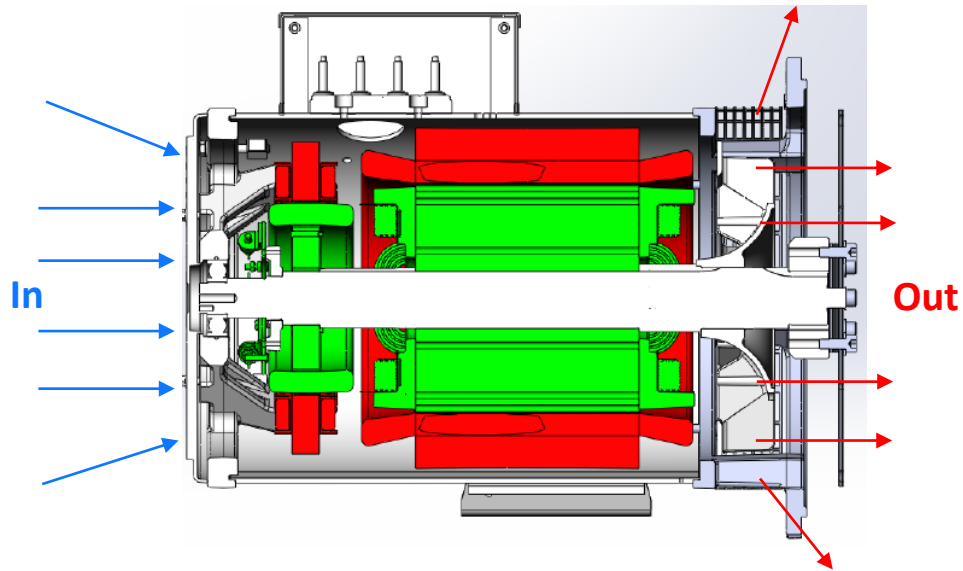






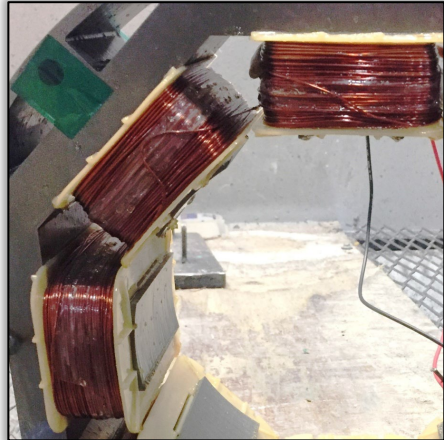
## Key differences on “Harsh” applications/environments

- Air intake / fan

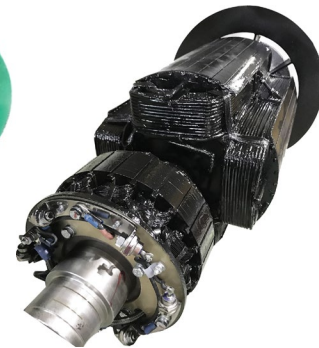
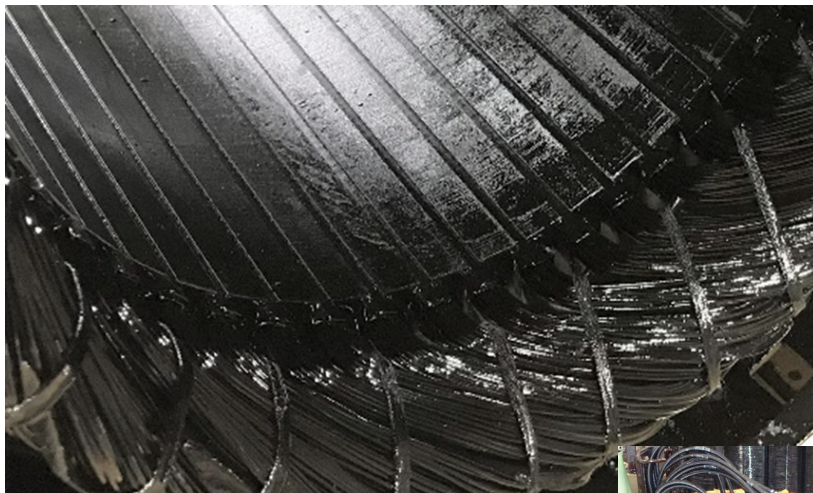


## Key differences on “Harsh” applications/environments

- Winding protection (MD&B, VPI, Coatings)
- Primers and paints (high quality/corrosion resistant)



## Key differences on “Harsh” applications/environments



## Key differences on “Harsh” applications/environments

- Filters
- IP (Ingress Protection) (ODP, TEAAC, TEWAC, etc...)

