

# ***Motors & Generators***

## ***Empowering the Future***



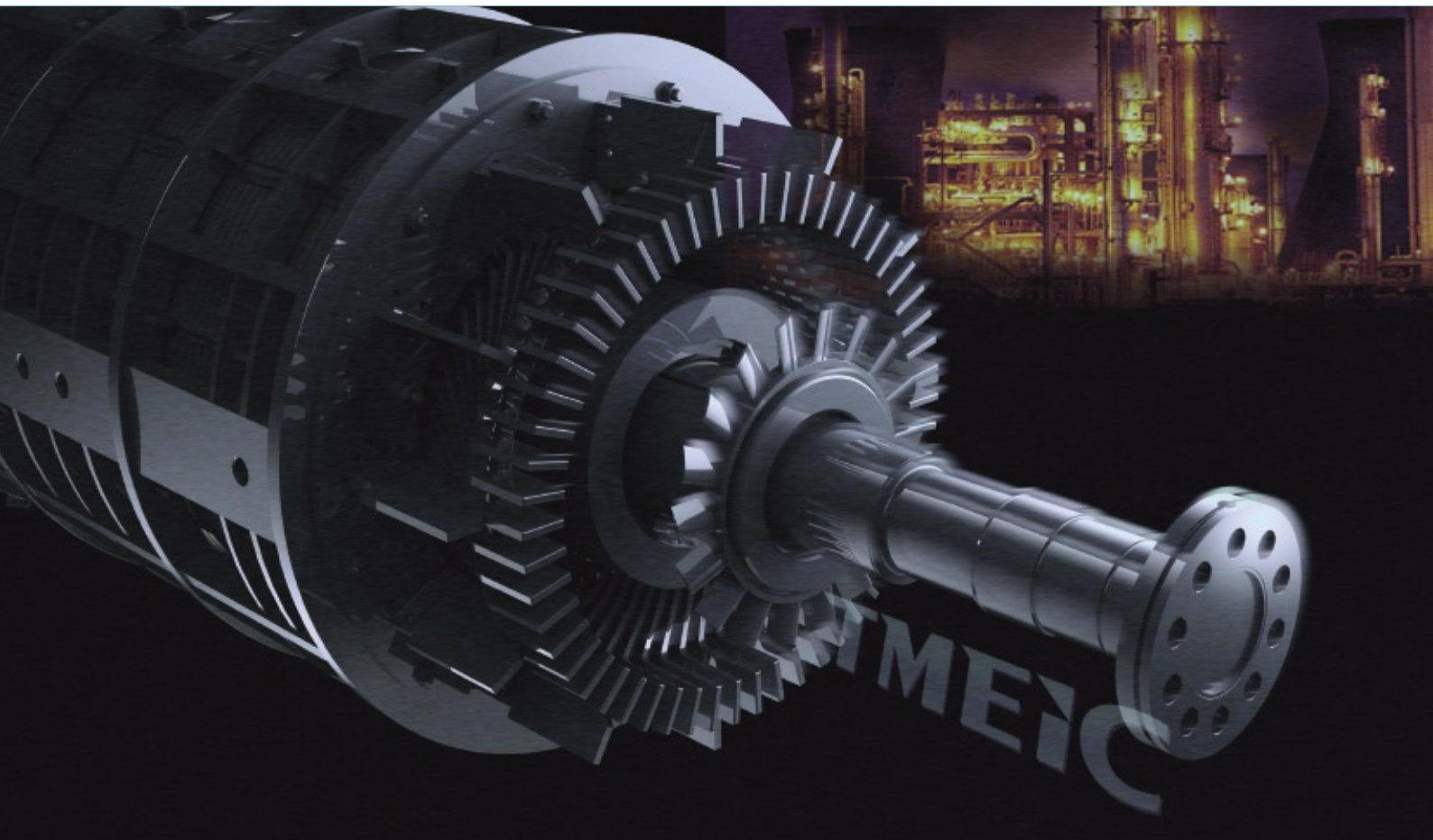
# Combining Over 200 Years of Experience In the Manufacture of Products

Toshiba Mitsubishi-Electric Industrial Systems Corporation (TMEIC) stands proud as a key player in ensuring the continuous operation of industrial manufacturing around the world. Our large-capacity, high-speed motors and generators are found at the core of production facilities driving equipment and systems in a diverse array of fields such as metals, paper, chemicals, oil and gas, materials handling and mining.

Combining the industrial production experience of parent companies Toshiba and Mitsubishi Electric, TMEIC products are developed based on more than 200 years of expertise, leading to the manufacture of highly reliable products that receive excellent customer evaluations for their superior quality, durability, low maintenance and long service life.

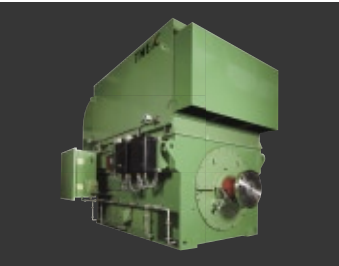
We produce motors and generators that provide best-match solutions for diverse applications in industrial facilities and power generation plants, and are confident that when it comes to products you must rely on, you'll be glad you chose TMEIC.

# perience & Expertise that Drive Industry



# Superior Quality, Durability and Supporting Industries around th

## Oil & Gas



### Ultrahigh-speed, large capacities and flexibility

A long history of reliability and the flexibility to adapt to diverse machinery layouts continue to attract customer praise. As a leading manufacturer, TMEIC proposes optimal drive and motor products, including specially designed ultrahigh-speed motors, and generators.

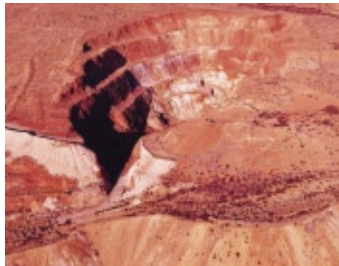
## Chemicals



### Highly reliable, explosion-proof with minimal maintenance requirements

Explosion-proof motors compliant with IEC/ATEX global standards and designed for use in petroleum refineries and petrochemical facilities. Safe and reliable operation is guaranteed, even in potentially dangerous areas where explosive gases could be present.

## Mining



### Excellent durability under harsh operating conditions

Motors for mining machinery like grinding mills, mine hoists and conveyors, all with proven durability in harsh operating environments. Whether a large-capacity motor, overhung installation or a motor/variable-frequency drive combination, TMEIC has a best-match product for you.

# Reliability e World

## Metals



### Robust operation in severe environments

Motors designed to withstand heat, steam, dust and other particulates, as well as impact force when operating in severe environments. When it comes to supplying reliable products and flexible solutions, TMEIC has an excellent record of customer satisfaction.

## Paper



### Compact in size with high-precision control

Compact, highly efficient motors compliant with international standards. Fin frame sizes up to 560 enable use where installation space is limited, while easy grease removal and bearing maintenance contribute to a long service life.

## Materials Handling



### Vibration resistant and low heat generation

Compact, durable motors designed for long-term use in diversified operating environments such as high altitudes and narrow, confined spaces. Characteristic features include high resistance to vibration, low heat generation when running and easy bearing maintenance, all of which contribute to a long service life.

## Features

**High Reliability** resulting from use of proven design technology, manufacturing expertise, wide use of robotics, tight quality control, and testing

**High Efficiency** resulting from detailed analysis of the electromagnetic field patterns and ventilating air flows

**High Strength Insulation** through the use of robotic insulation winding and use of an oversized epoxy resin vacuum impregnation tank for creating strong support and insulation

**High Mechanical Strength** through use of static and dynamic strength analysis of stator frame, rotor, shaft and bearings. Motor shafts are made of forged steel with high tensile strength.

## Benefits

Many years of excellent trouble-free service under difficult working conditions

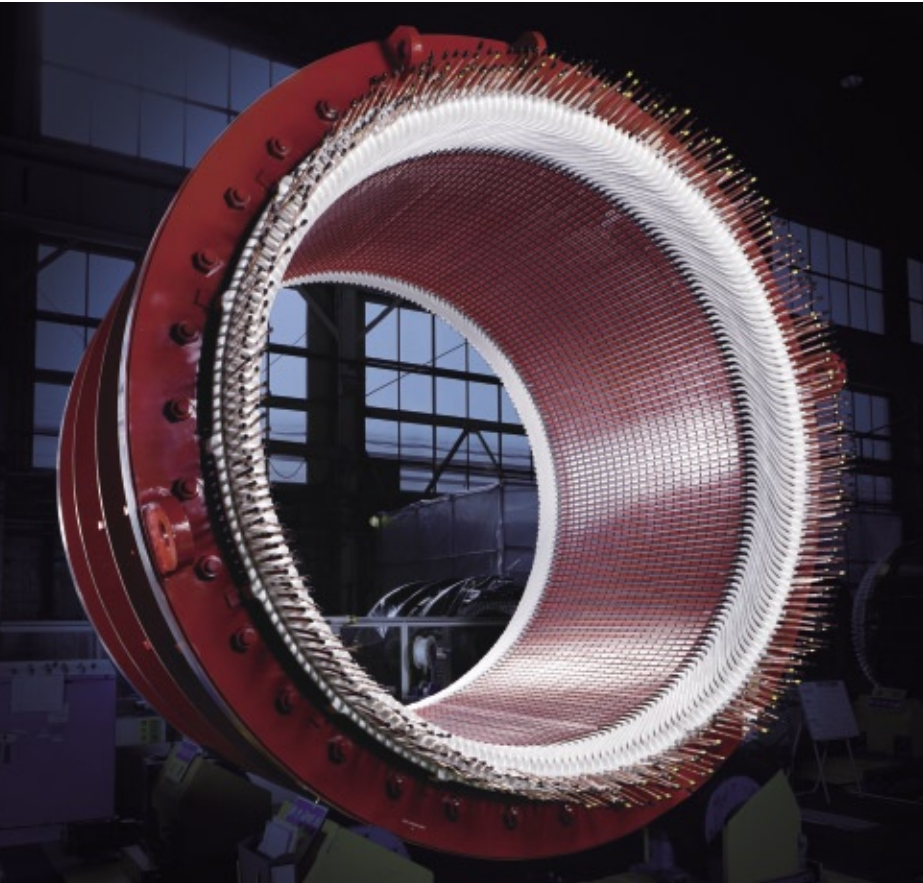
Low electrical losses and high power conversion

Withstands surge and minimizes electrical shorts and winding failure

Minimizes mechanical deflection and vibration



# Optimum Productivity



## Highly Reliable

### 24hr Nonstop Operation

TMEIC products are insulated using strict procedures and materials of the highest quality; features that contribute to stable, nonstop operation and a long service life. Advanced production, delivery and installation knowledge greatly shorten the start-up time for commissioning a system, minimizing the risk of delays, improving productivity and promoting trouble-free operation.

## Hands-on Approach

### Installation & Commissioning

TMEIC supplies motors and generators globally using some of the most advanced processes in the industry. The service network ensures efficient installation and commissioning of products, bringing direct benefits to customers by minimizing start-up time, and the risk of downtime and lost productivity. Sophisticated verification is utilized for onsite measurements when conducting machinery replacement.



## Superior Insulation Long Service Life

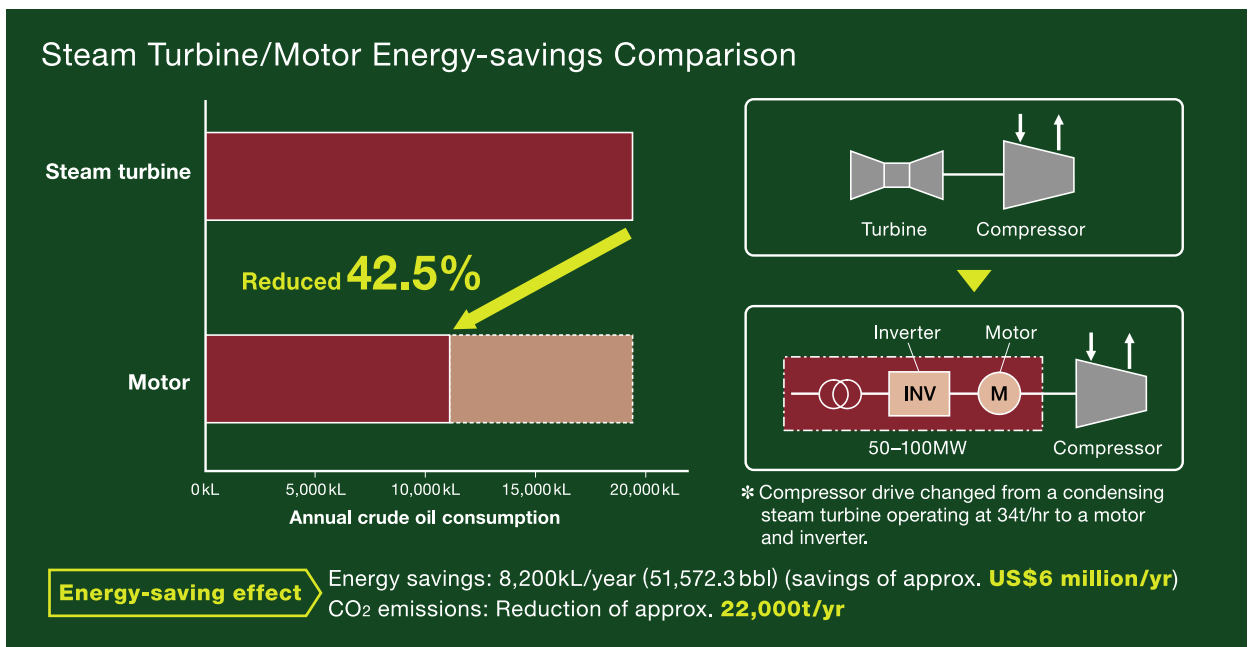
TMEIC motors and generators feature insulation quality second to none, a key factor for ensuring a long and reliable service life. Eliminating the need to frequently update or repair equipment helps to reduce costs and enables smoother, more efficient operations; features that contribute to maintaining the highest level of productivity.

# Ever Higher Efficiency

## Minimal Operation Costs

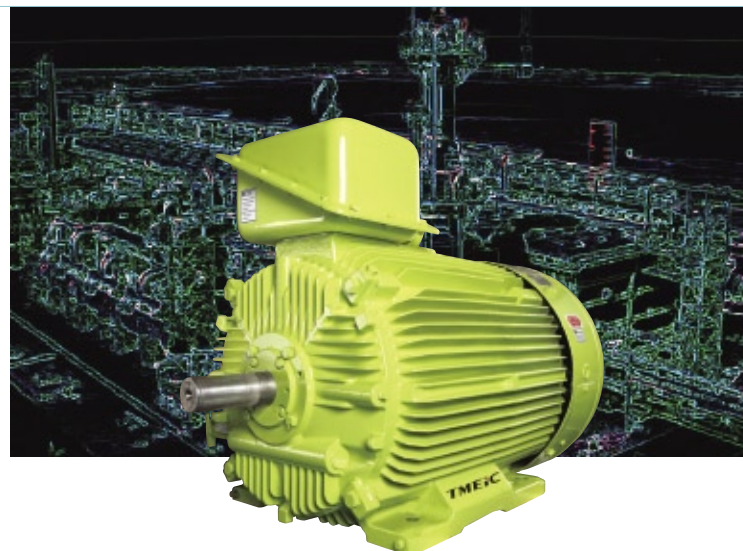
### Optimal Cost Performance

TMEIC is continuously working to enhance product efficiency. Benefits of improvements are passed on to the customer in the form of enabling the simultaneous achievement of higher productivity and lower operating costs when using ultrahigh-speed motors. Efforts are applied considering how to lower costs over the entire lifecycle of a product, thereby realizing optimal cost performance and maximum return on investment.



## High-efficiency motors compliant with IEC standards

The International Electrotechnical Commission (IEC) sets the standards for motor system efficiency around the world from the perspectives of energy efficiency and CO<sub>2</sub> emissions. Standards IEC60034-30 and IEC60034-31, published by the IEC, define the new efficiency classes for motors. TMEIC has a full line-up of IE3 motors that contribute to reducing CO<sub>2</sub> and have minimal negative effect on the environment.



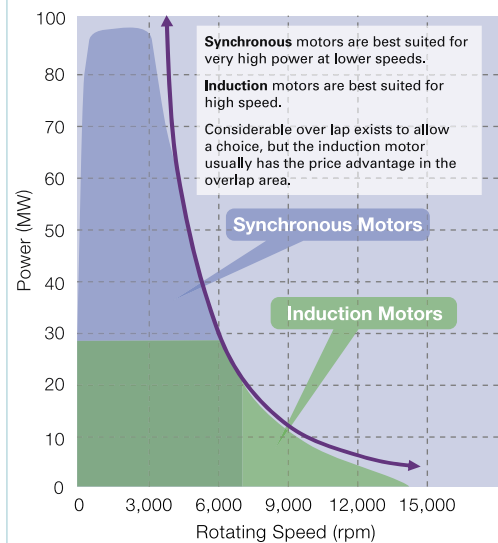
# Uses/Results/Sustainability



## Oil & Gas

### State-of-the-art Large-capacity, High-speed Solutions

Large capacity and high speed are the main qualities of TMEiC motors used in the oil and gas industries. These products provide improved performance while simultaneously requiring less maintenance as a result of being designed with fewer mechanical parts. More efficient operation is achieved as well. By replacing gas turbines with motors that drive compressors directly, the need for gears has been eliminated. This contributes to reducing initial cost and the overall size of the system, thereby saving space. Extremely reliable and easy to maintain, our motors offer the benefits of optimal productivity and trouble-free, low-cost plant operation.



## Metals

### Over 100 Satisfied Metals Industry Customers in More than 30 Countries

TMEiC provides motors of up to 17,000kW for applications in the metals industry, as well as system solutions services that contribute to optimizing overall productivity. An excellent example is our line-up of tough and robust main motors developed for use in the severe environment of hot rolling mill production lines. Customer evaluations continue to be high, and to date we have delivered over 500 medium-voltage motors to over 100 satisfied customers in more than 30 countries.



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# Pursuing Ever-higher Output

Unprecedented Large-capacity Motors



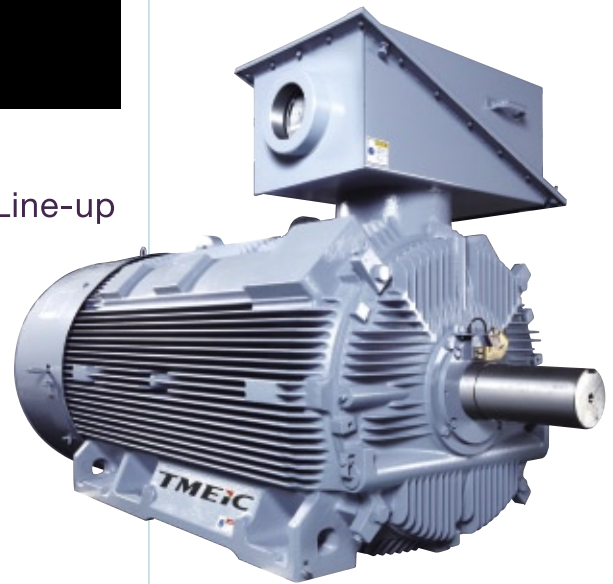
## Large-capacity Ex-d Motor Line-up

Frame sizes up to 900.

In addition to a wide range of explosion protected motors, TMEIC now produces large-capacity Ex-d (flameproof) motors in sizes up to 900 frames, expanding the company's contribution to plant operations in potentially explosive atmospheres. These motors reduce initial costs as there is no need for peripheral equipment and maintenance is simple, ensuring added customer convenience.

## Large-capacity Fin Frame Motor Line-up

Building on a vast line-up of medium-capacity fin frame motors that have contributed greatly to customers' operations, TMEIC has introduced a new line of large-capacity motors that offer enhanced customer benefits, such as lower running cost and increased space savings.



## Global Standards







TMEIC motors and generators are compliant with all global standards and backed by a worldwide service network ready to support customer needs. Quality, reliability and safety, the premises on which TMEIC products are built, are the same concepts global standards are based on. The end result is benefits for both customers and the environment. TMEIC motors have received hazardous area certification in most regions around the world.



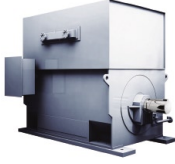



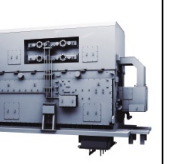
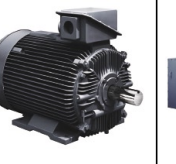

### Global Protection and Certification

	Europe	Russia	China	Korea	Australia	India	Japan	USA	Canada	Others
<b>Standard</b>	EN + ATEX	IEC or GOST	GB	IEC	IEC or AS	IEC	JIS	NEC	CSA	IEC or EN
<b>Certification Body</b>	Baseefa	CCVE	CQST	KOSHA or KGS	TestSafe or Baseefa	CCOE	TIIS	—	CSA	Baseefa

# From Small to Multi-megawatt Capacities...

Product	Induction Motors						
	IP55/ IC411, IC416 TEFC	IP55/IC37 TEFV	IP55/IC410 TENV	IP22/IC01, IC06 IP24W/IC01, IC06 DP, WP	IP55/ IC511, IC516 TEAAC	IP55/ IC611, IC616 TEAAC	
Typical View							
Power	37-2,300 kW (50-3,080hp)	44-370 kW (59-490 hp)	25-147 kW (34-197 hp)	Up to 25,000 kW (33,500 hp)	Up to 5,000 kW (6,700 hp)	Up to 17,000 kW (22,700 hp)	
Speed	Up to 3,600rpm	Up to 1,300rpm	Up to 1,200 rpm	Up to 3,600 rpm	Up to 1,800 rpm	Up to 3,600 rpm	
Voltage	Up to 6.9kV	Up to 690V	Up to 690V	Up to 13.8kV	Up to 13.8kV	Up to 13.8kV	
Frame	250-630	806-818 (DC motor dimension)	250-400	315-1,200	560-900	315-1,200	
Applicable types of protection	Exn, Exe, Exd	—	—	—	Exd	Exn, Exe, Exp	
Rotor construction	Aluminum cast rotor or Copper bar rotor	Aluminum cast rotor or Copper bar rotor	Aluminum cast rotor or Copper bar rotor	Aluminum cast rotor or Copper bar rotor	Copper bar rotor	Aluminum cast rotor or Copper bar rotor	
Typical Applications	Fans, Pumps, Blowers, Compressors, Conveyors	Metal rolling mills	Metal rolling mills (Roller tables)	Fans, Pumps, Blowers, Compressors, Mills	Fans, Blowers, Compressors	Fans, Pumps, Blowers, Compressors, Mills	

# Motors & Generators for Diverse Needs

Induction Motors			Synchronous Motors		Permanent Magnet Motors	Synchronous Generators
IP55/ IC81W, IC86W TEWAC	Vertical	Ultra High Speed		Ultra High Speed		
						
Up to 25,000 kW (33,500 hp)	Up to 6,500 kW (8,700 hp)	Up to 15,000 kW (20,100 hp)	Up to 100MW (134,000 hp)	Up to 80,000 kW (107,240 hp)	75 - 300 kW (100 - 400 hp)	Up to 100MVA
Up to 3,600 rpm	Up to 1,800 rpm	Up to 12,000 rpm	Up to 3,600 rpm	Up to 6,500 rpm	Up to 1,800 rpm	Up to 3,600 rpm
Up to 13.8kV	Up to 13.8kV	Up to 13.8kV	Up to 13.8kV	Up to 13.8kV	Up to 690V	Up to 13.8kV
315 - 1,200	Up to 3,300mm * Mounting pitch diameter	Up to 900	—	—	250 - 280	—
Exn, Exe, Exp	Exn, Exe, Exp	Exn, Exp	Exn, Exp	Exp	—	Exp
Aluminum cast rotor or Copper bar rotor	Aluminum cast rotor or Copper bar rotor	Copper bar rotor	Cylindrical rotor or Salient rotor	Cylindrical rotor	Permanent magnet rotor	Cylindrical rotor or Salient rotor
Fans, Pumps, Blowers, Compressors, Mills, Mixers	Pumps, Metal rolling mills	Gearless turbo compressors	Metal rolling mills, Compressors, Blowers, Mixers	Gearless turbo compressors	Fans, Pumps, Blowers, Compressors, Conveyors	Steam turbines, Gas turbines



# Global Sales/Service Network



## Corporate Profile

