

Marine Solutions



TECO   **Westinghouse**



About TECO-Westinghouse

THE TECO-WESTINGHOUSE LEGACY OF INNOVATION AND QUALITY in the design and production of electric motors and generators for the marine industry spans more than a hundred years. Building on George Westinghouse and Nicola Tesla's achievements at the turn of the century, we continue to set the standards for engineering excellence, technical innovation, and product reliability.

The Keys to the TWMC distinguished record of success are:

- **People** – Highly qualified staff of experienced engineers and production technicians
- **Sophisticated computer programs and design tools** – Over four decades of computer aided designs along with the latest FEA software
- **Tradition of Excellence** – Over 100 years of large motor design and manufacture
- **Flexibility** – Our engineers work with shipyards, design firms and major component suppliers to provide an optimum solution for our customer
- **Manufacturing facility** – Four state-of-the-art manufacturing facilities
- **Testing Facility** – Large test facility for custom testing, including combined tests with other marine equipment
- **R & D** – Research & Development engineers with extensive experience in developing new products

TWMC can provide a complete line of AC and DC propulsion motors and generators that are compatible with any quality power electronic products and drives. Our offerings can meet any of the world's standard marine specifications including ABS, DNV, BV, LLOYDS, etc. Additionally, TWMC supplies auxiliary motors, adjustable frequency drives, combined propulsion packages, installation and maintenance services, spare parts, and R&D development services.

With reliability, innovation, and a tradition of excellence, TWMC is the obvious choice for marine electrical solutions for commercial and military vessels and offshore applications.



Engineering



Factory

Induction Propulsion Motors



Horizontal Motor



Vertical Motor

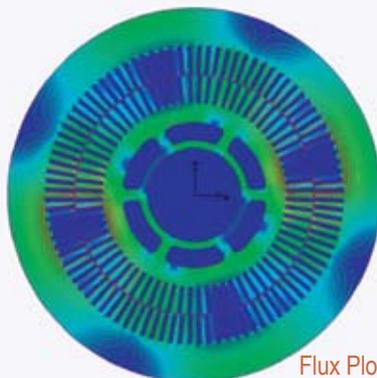
TECO-Westinghouse heavy duty, high efficiency, marine induction motors are specifically designed for variable speed, marine propulsion service and meet any of the major marine classification specifications. These motors are used for a variety of applications, including thrusters (vertical or horizontal), direct or geared conventional propeller installations, and with hybrid systems that share load with mechanical propulsion equipment. Motor designs can be engineered to meet specific ship requirements. An induction motor is the simplest type of propulsion motor and requires only one control.

Capabilities:

- HP – From 500 to 35,000 HP (373 to 26,110 kW)
- SPEED – From 100 RPM (direct drive) to 1800 RPM (geared applications)
- VOLTAGE – 480, 690, 3000, 4160, 6600, 13,800 Volts (other voltages by request)
- WINDINGS – Multi three phase windings are available for low voltage applications
- BEARINGS – Sleeve or anti-friction options. The latter is usually grease lubricated.
- CONSTRUCTION – Smaller motors are bracket type, larger motors are pedestal type.
- COOLING TYPE – Force ventilated or TEWAC

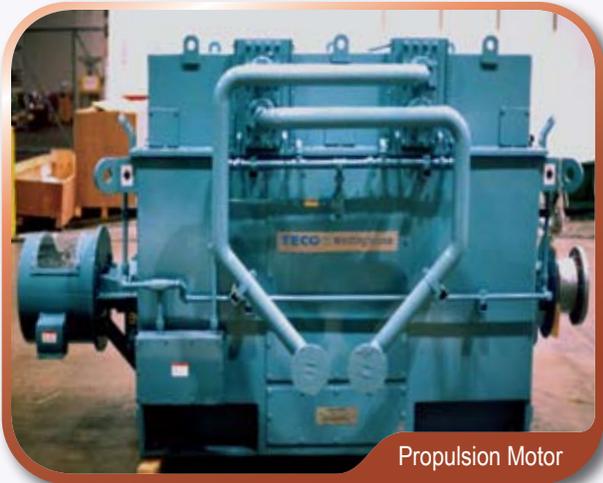
Special Motor Designs

TWMC can provide custom engineered propulsion motors designed to fit in a specific location or meet any unusual constraints required for the ship.

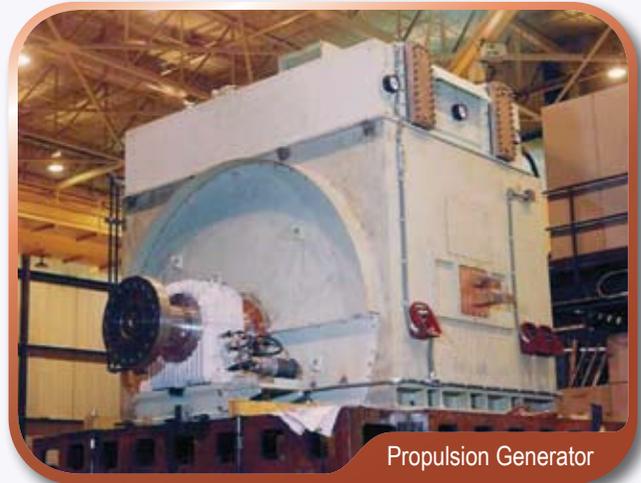


Flux Plot

Synchronous Motors and Generators



Propulsion Motor



Propulsion Generator

TWMC offers a full line of synchronous motors and generators to meet any marine propulsion requirements. These heavy duty machines are designed specifically for marine propulsion applications utilizing a modern adjustable frequency drive from any qualified manufacturer. Synchronous motors are more complex than induction motors, but have a higher efficiency. These machines comply with the major world marine codes, including ABS, DNV, LLOYDS, etc. These motors are used for thrusters (vertical and horizontal) and direct drive or geared installations. They are also used for hybrid propulsion in conjunction with mechanical propulsion configurations.

Synchronous generators are used for diesel or turbine generator sets.

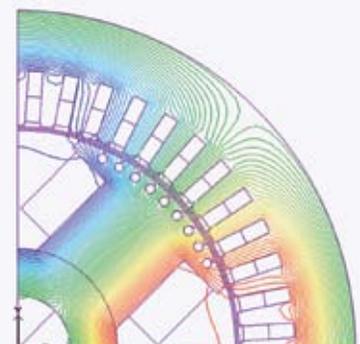
TWMC can also supply permanent magnet motors for propulsion needs.

Capabilities:

- HP – From 500 HP to 60,000 HP (373 to 44,760 kW)
- SPEED – From 100 RPM (direct drive) to 1800 RPM (geared applications)
- VOLTAGE – 690, 3000, 4160, 6600, 13,800 Volts (other voltages by request)
- WINDINGS – Multi three phase windings are available for low voltage applications
- BEARINGS – Sleeve or anti-friction options. The latter is usually grease lubricated.
- CONSTRUCTION – Smaller motors are bracket type, larger motors are pedestal type.
- COOLING TYPE – Force ventilated or TEWAC
- EXCITATION – Either static with rings or brushless type

Special Motor Designs

TWMC can provide custom engineered propulsion motors designed to fit in a specific location or meet any unusual constraints required for the ship.

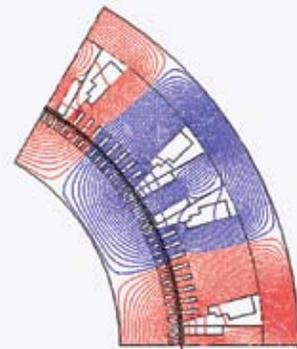


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DC Motors & Generators



DC Propulsion Motor



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TWMC offers DC motors and generators for marine applications. These motors and generators are of heavy duty construction and are based on our rolling mill duty motor designs. The motors are custom engineered, high efficiency designs and require minimal maintenance. All of the motors have readily removable covers for ease of maintenance and inspection.

TWMC is the world leader with our exclusive “super quiet” propulsion motors that meet the structureborne noise limits required by ICES CCR 209 for fisheries research vessels. The motors are mounted completely assembled on a rigid fabricated base structure and are offered either as single motors for multi-screw vessels or in a tandem arrangement for redundancy in single screw vessels. All motors are completely factory tested for noise prior to shipping. When required, TWMC has capabilities to perform a combined test with the motor, thyristor drive, and transformer in our facility.

Capabilities:

- HP - From 100 to 35,000 HP (75 to 26,110 kW)
- SPEED - From 100 to 2000 RPM
- VOLTAGE - 450 to 1000 Volts
- BEARINGS - Sleeve or anti-friction options. Main propeller thrust bearing can be incorporated into one of the motor bearings.
- CONSTRUCTION - Smaller motors are bracket type, larger motors are pedestal type.
- COOLING TYPE - Force ventilated or TEWAC

Auxiliary Motors & Drives

TECO-Westinghouse Motor Company supplies low voltage inverter duty auxiliary motors from 1 HP to 800 HP (0.75 to 597 kW) and low voltage AC drives from 5 HP to 500 HP (3 to 373 kW) for your marine duty applications. These motors comply with the major world marine codes, including ABS, etc.

Marine Duty Low Voltage Motor Features:

- Quality Construction with Special Epoxy Coatings
- Custom-designed Modifications
- 1.15 Continuous Service Factor
- Premium Efficiency
- Meets IEEE 45
- Low Noise



Low voltage inverter duty marine motor

Marine Duty Low Voltage AC Drive Features:

- Remote Analog Operator
- Either LED or LCD Digital Operators
- Output Card
- PID Relay Card
- Various Communication Cards Available
- Energy Saving Software
- Computer Link Software
- PID sleep Mode Function



Marine duty low voltage drive

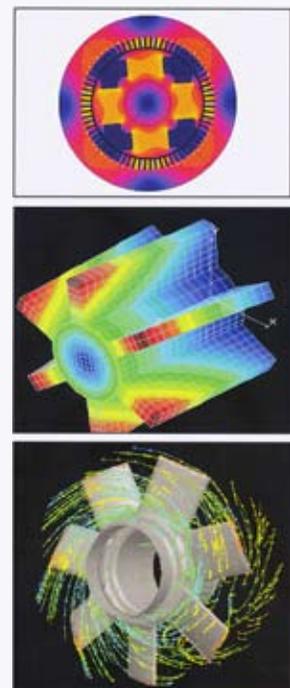
Research & Development

TWMC has a global R&D center located in Round Rock, Texas. Its mission is to lead the company to the forefront of the motor industry with new concepts and technology. This group is supported by TECO's global consulting network and has an affiliation with a number of major engineering Universities around the world that are involved in research.

The center is in an excellent position to tackle the most complex technical challenges of rotating machines of all types with its people, advanced materials lab, and ability to manufacture and fully test prototype machines in house.

The R&D center has a staff of over 20 experienced highly qualified engineers including ph.D. level researchers in electrical, mechanical, thermal management, and insulation system engineering. They utilize advanced modeling software packages such as Magsoft, Ansys, and Fluent among others.

The team develops new products, processes, and materials to extend TWMC's competitive edge. They also provide customer technical support, develop marine standards, and are available on a contracted basis for project development.



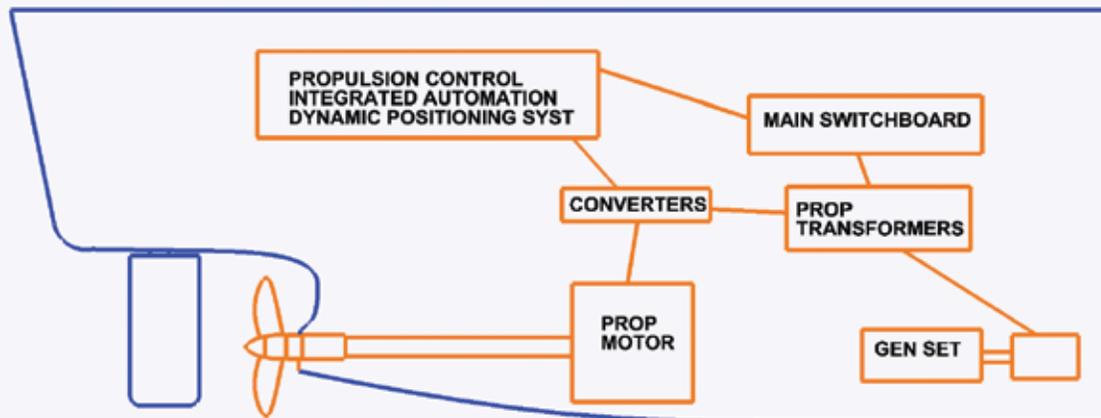
Technical Analysis by Software

Ship Propulsion System Integration

TWMC can provide the complete propulsion system package by combining our products with other quality component vendors and leading the coordination effort of those vendors. This process assures that the optimum system will be provided and offers a single point of contact to the customer for the entire system.



System Study



Propulsion System

Service & Parts

TWMC's large motor service group has the unique capability to rebuild, repair and re-engineer motors, including those from other suppliers. They offer repair solutions which include engineering studies on installed motors, upgrading horsepower ratings, motor specific maintenance, and generation of new technical manuals.

Our field service team is staffed with knowledgeable engineers who have experience in installing new equipment, making repairs onsite, and providing training for ship maintenance personnel worldwide.

The field service team is supported by our highly skilled staff of factory design and R&D engineers. Our rebuild and repair services follow the same design and manufacturing procedures, modern, and quality standards that we utilize for our new motors.

Also headquartered in Round Rock, Texas, the TWMC Renewal Parts Group offers engineered replacement components and renewal parts for all previously built Westinghouse motors and generators.



Motor Testing



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