Engtek Manoeuvra Systems Pte Ltd, part of the Engtek Group of companies is recognized as one of the worlds leading Electric Podedd Thruster and Propulsion Systems Manufacturer and introduces its unique Deck Mounted Electric Podedd Rotatable Propulsion Units for all types of Marine applications.

Offering “Dynamic Rotatable Propulsion Units”….with its “Electric-Podedd Technology”, Engtek offers compact designs, efficient, silent operation with low maintenance costs which are only a few of the remarkable properties….

- High Thrust to HP Ratio … Maximum Efficiency… No Hydraulic Drives
- Azimuthing with Draft adjustment… ability to be swiveled to the “Up” position
- Water Cooled
- Environmentally “Green” Friendly
- Proportional Thrust with VFD Drives…
- Effective Thrust Underway……
- Excellent Maneuverability

Ship Shape
“Stay on course with Engtek Manoeuvra Systems”
Designed especially for vessels that require deck or stern mounted propulsion systems, the Engtek Manoeuvra Systems Pte Ltd Deck Mounted Rotatable Electric Propulsion Systems combines full Maneuverability with effective azimuthing propulsion. The system is ROBUST with little required maintenance and is... RUTHLESSLY RELIABLE

<table>
<thead>
<tr>
<th>Propulsion “L” Leg</th>
<th>Power Enclosure</th>
</tr>
</thead>
<tbody>
<tr>
<td>L&quot; Drive with electric motor built in</td>
<td>Enclosure with Diesel/Gen Set</td>
</tr>
<tr>
<td>Emergency “Kick Up” protection</td>
<td>VFD Drive - Air Cooled</td>
</tr>
<tr>
<td>Ability to adjust Draft position</td>
<td>Fire Protection System</td>
</tr>
<tr>
<td>Ability to “Swing Up” 120 degrees</td>
<td>Local Control and Engr Panel</td>
</tr>
<tr>
<td>Steering or Fully Azimuthing</td>
<td>Fully Class Approved</td>
</tr>
</tbody>
</table>

Electric Power Available for other supply when not at full power

SIDE...............TRANSOM..........DECK MOUNTED

The Engtek Manoeuvra - Deck Mounted, Rotatable Propeller Drives are available from 175 Kw up to 4000 Kw are of a very heavy duty construction, offering 360 degree continuous steering in either rotation, built-in, Podded Electric Thruster units offers high thrust performance in a very efficient and compact drive package. The Electric Podded Thruster is controlled with a variable frequency (VFD) motor controller for full speed control.

The unit incorporates our unique transmission kick-up device which is specifically designed for protection in shallow water or beaching applications.

The Rotatable Propeller Drive can offer full height/depth adjustment to allow operation in shallow draft application.

Diesel/Electric Podded type Thruster Systems are preferable over the Diesel/Hydraulic type Thruster Systems for the following reasons:

- The Hydraulic Drive Type System is old technology
- Low Hydraulic Efficiencies
- High Maintenance
- Low Reliability
- Hi-Noise
- Possibility of Oil spillage

**Set-Up & Commissioning:**

Plug and Play Wiring......

- System components are furnished with pre-fabricated cables.
- Components “plug and play” with minimum set up
- Commissioning is a simple step-by-step process. No computer or special tools are required

- **DP Interface**
- **No Dry-Docking Required**

Engtek Maneuver Systems offers compact designs, efficient, silent operation with low maintenance costs which are only a few of the advantages......

- High Thrust to HP Ratio .... Maximum Efficiency
  - Hydraulic Efficiency... 75-80%
  - Electric Efficiency......... 94%
- Full Azimuthing with the ability to be swiveled to the “Up” position
- Water Cooled
• Environmentally “Green” Friendly
• Full Proportional Thrust with VFD Drives…
• Less moving parts…increased reliability

**Electrical Power Management and Propulsion System**

The electrical power available in the Generator-Sets can be used in various configurations and modes of operation. The power plant can automatically or manually adapt to the power demand and start or stop the right diesel generator.

The Chief Engineer can choose to use different generators, just to keep the running hours of the equipment equal. In case a generator fails or is not available, the thrusters can still operate at reduced power but retain the DP Mode of operation.
The AC electrical propulsion engines have the advantage they are low maintenance machines and very quiet with little vibration. The power management system can be programmed such to ensure the most efficient, maintenance friendly and most environmentally friendly operational mode is achieved.

The ultimate goal is to keep the generators running at their most efficient power range determined by the typical diesel characteristics with maximum fuel efficiency, and this is programmed into the power management system.

Automated power management simplifies the operation of the electrical power system by monitoring the electrical loads on the propulsion systems and starting and stopping generators as needed. Generator paralleling is provided as well as seamless transfers between generators.

**POWER MANAGEMENT FEATURES:**

- Auto start & seamless transfer to the main switchboard.
- Automatic parallel of each generator when loading increases Automatic rotation of generators on and off line to extend life Automatic seamless transfer to and from all power sources
- Failing generator's pre-alarms automatically start & transfer to standby generator
- Generator pre-start alarm warns engine room/bridge personnel of imminent start.

<table>
<thead>
<tr>
<th>Model</th>
<th>Unit</th>
<th>L200E</th>
<th>L275E</th>
<th>L350E</th>
<th>L500E</th>
<th>L800E</th>
<th>L1000E</th>
<th>L1200E</th>
<th>L1500E</th>
<th>L2100E</th>
<th>L3000E</th>
<th>L3500E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cont torque (MdaN)</td>
<td></td>
<td>200</td>
<td>300</td>
<td>480</td>
<td>860</td>
<td>1950</td>
<td>3400</td>
<td>4100</td>
<td>7000</td>
<td>9000</td>
<td>13300</td>
<td>16000</td>
</tr>
<tr>
<td>Continuous Power (Kw)</td>
<td></td>
<td>200</td>
<td>275</td>
<td>350</td>
<td>505</td>
<td>800</td>
<td>1000</td>
<td>1200</td>
<td>1500</td>
<td>2100</td>
<td>3000</td>
<td>3500</td>
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<tr>
<td>Voltage (VAC)</td>
<td></td>
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<td></td>
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<td></td>
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<td></td>
<td>380/400/440/690 50/60 available options</td>
<td></td>
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<tr>
<td>Prop Dia Rev speed (MM/RPM)</td>
<td></td>
<td>1100/580</td>
<td>1175/540</td>
<td>1250/500</td>
<td>1400/450</td>
<td>1750/360</td>
<td>1925/325</td>
<td>2300/265</td>
<td>2475/250</td>
<td>2800/215</td>
<td>3450/180</td>
<td>3700/165</td>
</tr>
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</table>

**Full DP Interfacing Capabilities - A Modular Dynamic Positioning System...**

**Ease of Installation with reduced costs...**

With the electric motor designed as part of the thruster pod and water cooled, there are no requirements for forced air ventilation of the electric motor, no shafting requirements with couplings and alignments necessary.

**Noise Suppression Technology...**

Because the electric motor is designed as an integral part of the thruster hub and attached directly to the propeller shaft, there are no gears boxes or gear reductions providing maximum system efficiency with lower noise and vibration levels produced.

**Diesel-Electric Propulsion Offers Distinct Advantages...**

**Power Management, Fuel Economy, Redundancy and Less Noise Are Key Features.**

For valid reasons, in recent years diesel-electric propulsion has gained remarkable interest over traditional propulsion within commercial shipping and yachting markets. Propulsion with the best possible fuel economy, lowest possible emissions, more flexible redundancy arrangements, considerable lower noise and vibration levels, diesel-electric propulsion offers significant economical, environmental and technical advantages. By eliminating the need for a traditional, mechanical gearbox or hydraulic systems...... **Operating performances are improved.**

Every single diesel-generator set is connected to its own generator inverter. For maximum reliability and safety, main propellers and the on-board electric network can be powered jointly or by each single inverter.
There is no chance of drifting powerless in the event either a diesel-generator, electric propeller motor, or any one of the inverters malfunction. A diesel-electric system also offers flexibility of addition and expansion of auxiliary equipment like winches or cable laying equipment without adding more prime movers. Power cables can be routed much more easily through ship’s bulkheads and decks than traditional mechanical or hydraulic based systems.

Diesel-electric propulsion system is inherently more efficient that a mechanical drive system and therefore the vessel owners can use lesser horse power engines which equate to lower fuel bills, lower maintenance costs and lower emissions.