THE HERO OF THE HARBOR
FULLY INTEGRATED TUG SYSTEMS TO OPTIMIZE PERFORMANCE
There's no question that tugs need more power to handle today's larger vessels. But as we know, it's not just about trolley pull anymore. New emission regulations and pressure to reduce CAPEX and OPEX mean finding those elusive efficiency gains is more important than ever.

We can help. As your single-source provider of fully integrated power and propulsion systems, we have everything you need to boost efficiency and keep your costs to a minimum—all the way from design and construction through your tug's entire operational life.

And because care for the environment has been a core value for us from the very beginning, we are naturally ahead of the market in providing solutions that support your efforts to be greener. It's all part of our promise to help our customers build a better world.

**TYPICAL OPERATIONAL PROFILE**

If only about 3% of your tug's operational life is spent at full power while 80% is spent below 20% power, you need solutions that will optimize performance at all times—not just during high-load operations.
FLEXIBLE DESIGNS
We not only have the range to cover all your power needs. We also have the technology to combine different types of engines, giving you more flexibility in the design. Not to mention the tools to help you evaluate and choose the equipment that will deliver the most value for the lowest total ownership cost.

STREAMLINED CONSTRUCTION
We remove risk for the shipyard and owner by taking on the responsibility for equipment selection, drawings, benchmarking and matching all components – from engines, gensets, propellers and thrusters to electrical components, alarms and bridge panels – ensuring a seamless flow from start to finish.

EFFICIENT OPERATION
With smart tools to reduce fuel consumption, optimize engine load and extend maintenance intervals, we keep your vessels performing at their best – minute by minute. And our unparalleled global support network is on permanent standby to ensure maximum uptime.

MAKE THE RIGHT CALL
We offer a number of tools to help you evaluate performance and predict costs, such as:

CAT SELECT
Combine different power and propulsion solutions according to your vessel’s operational profile, and compare their affect on CAPEX and OPEX.

CAT EVA (ENGINE VALUE ANALYSIS)
Competitively compare performance and fuel consumption of different engines according to your vessel’s operational profile.

CAT ECE (EQUIPMENT COST ESTIMATOR)
Calculate your vessel’s life cycle cost over several years and decades. Results can be based on a specific Cat engine model and include inflation and liquids pricing.
We have an extensive portfolio of MTA thrusters. Whether your vessel’s applications are intermittent (such as with a harbor tug) or heavy duty (such as with an offshore or cargo vessel), we have a solution for you. Our thrusters are available in both fixed-pitch and controllable-pitch versions.

Our tug package features the market-leading CAT 3500 with additional integration to further reduce operating costs. This solution includes an engine mounted clutch, an integrated truster and engine control, and a simplified cooling system for fast and easy installation.

### 1. AZIMUTH THRUSTER
- Nozzle optimized for bollard-pull operations
- Robust construction reduces downtime and maintenance costs
- Compact design simplifies installation
- Interface suitable for hybrid systems

### 2. SHAFT ARRANGEMENT
- Straight long – solid shaft
- Straight short – tube shaft in steel or composite
- Custom designed for your tug

### 3. HIGH SPEED ENGINE & CLUTCH
- Engine and clutch integrated as one unit for easy installation
- Faster response time and lower emissions levels
- Longer maintenance intervals, reduced parts and services costs
- Slip to idle clutch

### 4. CONTROL SYSTEM
- One control panel for both clutch and thruster
- Engine start/stop
- Display of engine parameters
- Interface to Autopilot, DP and Joystick

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**TORQUE, THRUST AND CONTROL**

**The Cat® MTA tug propulsion package**

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<table>
<thead>
<tr>
<th>Type</th>
<th>Diameter [m]</th>
<th>Prop. type</th>
<th>Power [kW]</th>
<th>Thrust [ton]*</th>
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<tbody>
<tr>
<td>MTA 318 / C32</td>
<td>1.85</td>
<td>FP</td>
<td>1081</td>
<td>33-35</td>
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<td>MTA 420 / 3512</td>
<td>2.05</td>
<td>FP</td>
<td>1500</td>
<td>44-47</td>
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<td>CP / FP</td>
<td>1902</td>
<td>60-62</td>
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<tr>
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<td>2.4</td>
<td>CP / FP</td>
<td>1920</td>
<td>61-63</td>
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<td>2525</td>
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<td>CP / FP</td>
<td>2525</td>
<td>80-84</td>
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</table>

*Power listed in table above is max values for respective thruster size.

Thrust refers to twin units and typical ASD tug boat design. Bollard pull figures (Metric tons) are indicative and final thrust will depend on vessel design and bollard pull conditions.
**MAIN ENGINES**

**Cat® High speed**
Ideal for tugs that have variable power needs in terms of acceleration time, bollard pull and maneuverability. Can form part of a fully integrated propulsion system.

**MaK™ Medium speed**
Heavy-fuel oil, marine diesel and dual fuel engines for heavy-duty operations and higher average loads.

**Electro-Motive Diesel (EMD)**
A medium-speed two-cycle engine with short response time. Complies with environmental regulations and gives you the power and reliability you need.

**GENERATOR SETS**
As the world’s largest manufacturer of generator sets, we build our auxiliary engines to offer high efficiency and low fuel consumption while meeting global emissions regulations. Whether you need prime, continuous, emergency or standby power, count on them to be reliable, clean and efficient – even in the most demanding conditions.

**FI-FI SOLUTIONS**
Fire pump engines must start on demand – always. Cat engines have a reputation for reliable starts and the lowest owning and operating costs. The C32 is specifically developed to run fire pumps and covers a wide range of installations.

**AZIMUTH THRUSTERS**

**For harbor and terminal tugs**
This MTA is optimized for an operational profile with low average loads and fewer operating hours. Compact and designed for easy installation and service. Comes as a package with a high-speed engine.

**For heavy-duty operations**
This MTA is optimized for an operational profile with continuous high average loads, more operating hours and dynamic positioning applications. Suitable for use with Cat, MaK and EMD engines. Robust gears and bearings meet all major classification standards. Thrust range is between 35 and 120 tons.
HYBRID SYSTEM

A diesel engine and an electric motor that independently or simultaneously drive a propulsion shaft. They’re ideal for boosting efficiency at low loads or for maximizing pushing force, and they can help you meet or exceed increasingly stringent environmental requirements.

CONTROL SYSTEM

Specially designed with the latest microprocessor technology, the MPC 800 control and monitoring system is unbelievably easy to use. It provides the operator with clear information and full control of all propellers, thrusters and engines. The MPC 800 can easily be configured to control and interface with a wide range of supplementary systems.

CAT® CONNECT

Know the location, health, and efficiency of your vessels — and predict problems before they happen. Cat® Connect turns onboard data into actionable information to help you manage your fleet. You’ll find it easier to do everything from tracking equipment and scheduling maintenance to completing compliance reports.

SELECTIVE CATALYTIC REDUCTION

An exhaust gas aftertreatment solution compliant with EPA Tier 4 and IMO Tier III emission standards. Easy to install for yards and naval architects, our SCR system is a sustainable way to reduce NOx emissions without any of the negative effects of exhaust gas recirculation systems.
Our Hybrid Propulsion System gives operators the full diesel-mechanic power and performance they need in work mode — then lets them switch to more efficient diesel-electric operation in other applications. The result? Higher average engine load, fuel savings, significantly reduced maintenance costs, increased uptime and a lot more.

**Reduced maintenance costs**
Caterpillar’s generator sets are smaller than the 3500 engines, which means they are easier to service, and cost less to do so. Captains can take advantage of this by prioritizing generator usage whenever possible.

**Increased fuel efficiency**
In transit or standby, the vessel can run its smaller generators at a higher load, getting more out of every drop of fuel.

**Reduced running hours**
With additional power options on the vessel, captains can protect their primary engines from unnecessary wear.

**Reduced emissions**
Better fuel efficiency and higher average engine load means lower emissions.

**CONVENTIONAL VS. HYBRID**
Thanks to booster motors, hybrid systems can achieve the same maximum power as conventional propulsion systems but with smaller main engines. Just as important, hybrid is more efficient at low loads. Vessels that spend most of their time in standby or transit modes will see the biggest benefit.

**EXAMPLE CASE**
80 TBP tug with MTA 628 propeller

**Conventional power** 3516 / 1920kW

**Hybrid power**
3512 / 1901kW + 400kW booster motor

**EXAMPLE CASE**
60 TBP tug with MTA 524 propeller

**Conventional power** 3516 / 1920kW

**Hybrid power**
3512 / 1901kW + 400kW booster motor
PUSH AHEAD

Fully integrated tug systems to give you a competitive edge at every step

Flexible designs
We have the knowledge and the product range to give you the performance you need and keep vessel size small.

Streamlined construction
We do it all, from equipment selection and drawings to benchmarking and testing all components. Everything you need to remove risk and ensure a seamless flow from start to finish.

Efficient operation
Our integrated power, propulsion and control systems give you an unbroken chain of reliability from torque to thrust – ensuring maximum uptime and the lowest operating cost.

Worldwide Dealer Network
The global dealer network of Caterpillar – the strongest in the world – ensures customer access to a whole support team, from people at the local branch to those at the corporate level. Service locations offer dealer personnel who know and understand their local market, their customers, and their customers’ businesses.

TALK TO US