References

1. 3.5. Tug "SAAM UXMAL"
   Propulsion:
   2 x ZF AT 7311 FP
   well mounted azimuth thrusters
   1,566 kW each at 1,600 rpm
   Bollard Pull: 55 tonnes
   Supplied to: Bonny Fair Development, Hong Kong
   Owner: SAAM, Chile

2. 5. Tugs "HERCULES / ORION / PHOENIX"
   Prime Mover:
   2 x Wärtsila 4L20
   720 kW each at 1,000 rpm
   Reduction Gear Unit:
   2 x ZF W17000 NR, 3.958:1
   Bollard Pull: 20 tonnes
   Supplied to: Nanjing East Star Shipbuilding, China
   Owner: OMS Shipping LLP, Kazakhstan

3. 5. Tugs "ANJAN / ANUP / ARGA / ATHAK / BALDEV / BALI"
   Propulsion:
   2 x ZF AT 4111 FP
   well mounted azimuth thrusters
   525 kW each at 1,800 rpm
   Bollard Pull: 10 tonnes
   Supplied to: Tebma Shipyards, India
   Owner: Indian Government Navy, India

4. 5. Tugs "CORMORAN I / FARDELA"
   Propulsion:
   2 x ZF AT 7111 FP
   well mounted azimuth thrusters
   1,650 kW each at 1,800 rpm
   Bollard Pull: 55 tonnes
   Supplied to: Suyang Shipyard, China
   Owner: SAAM, Chile

5. 5. Tugs "C BRILHANTE / DIAMANTE"
   Propulsion:
   2 x ZF AT 7111 FP
   well mounted azimuth thrusters
   1,650 kW each at 1,800 rpm
   Bollard Pull: 60 tonnes
   Supplied to: Detroit Brazil LTDA, Brazil
   Owner: Camarim Servicos Maritimos, Brazil

Tug Applications
Marine Propulsion Systems
For Azimuth Stern Drive Tug

ZF Fixed Pitch Azimuth Thrusters offer excellent thrust and maneuverability, two thrusters deliver bollard pull up to 70 tonnes for tug applications. ZF Thrusters offer wide range of installation variants, up to a power of 2,150 kW. Designed for excellent propulsion control, ZF ThrusterCommand® is easy to install, with ethernet-based redundant wiring. Our comprehensive system contains wheelhouse panel, optional wing panels, electronic control unit in machine room, and smooth interface with all prime movers, with options of electric or hydraulic steering motors.

**ZF Azimuth Thruster 4000...8000 WM Bollard Pull Range**

- ZF AT 5000 WM: 900 kW
- ZF AT 4000 WM: 525 kW
- ZF AT 6000 WM: 1,200 kW
- ZF AT 7000 WM: 1,680 kW
- ZF AT 8000 WM: 2,150 kW

For Conventional Tug

ZF Fixed Pitch Propellers are designed with optimal blade profiles for low speed applications, maximized bollard pull when operating in nozzle. Highly customizable and made-to-order, specific blade thickness can be manufactured for use in severe conditions while ensuring cavitation erosion is minimized. TowMaster series with standard profile or specific skew shape is especially suitable for harbour tug applications.

ZF ToughGear® earned its name for our transmissions designed and built for the most rigorous duty cycles, ensuring maximum uptime. Highlights include:

- Modular design for each transmission family offering large ratio spread
- Reversing and non-reversing gears, non-clutch version available on request
- Ample sized integral thrust bearings transmitting total propeller thrust to the foundation
- Robust designed cast iron housings
- Latest design process, techniques and material specifications achieving high power density
- Variety of accessories and features such as shaft brake, PTOs, PTI, standby pump and trolling
- Matching requirements of major classification societies, with existing type approvals

Together with our well established partners, ZF delivers a customized and complete shafting package. Our expertise from transmission to propeller includes and extends beyond design, selection and manufacturing, providing you a worry-free one-stop solution.