CONGRESO INTERNACIONAL DE

V DISEÑO E INGENIERÍA NAVAL

Marzo 15 - 17 de 2017

CONGRESO INTERNACIONAL DE V DISEÑO E INGENIERÍA NAVAL

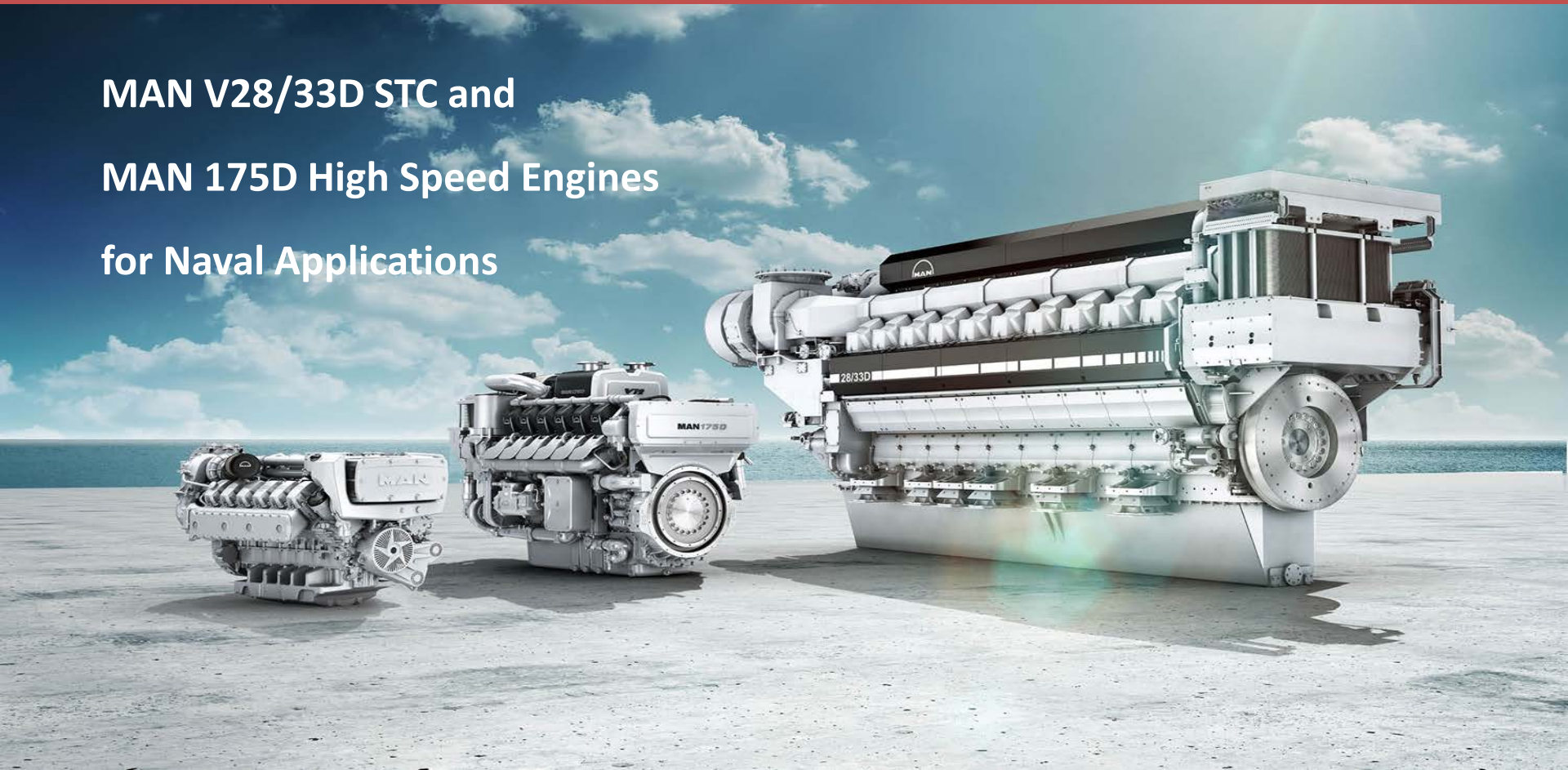
Colombiamar 2017

MAN

MAN V28/33D STC and

MAN 175D High Speed Engines

for Naval Applications



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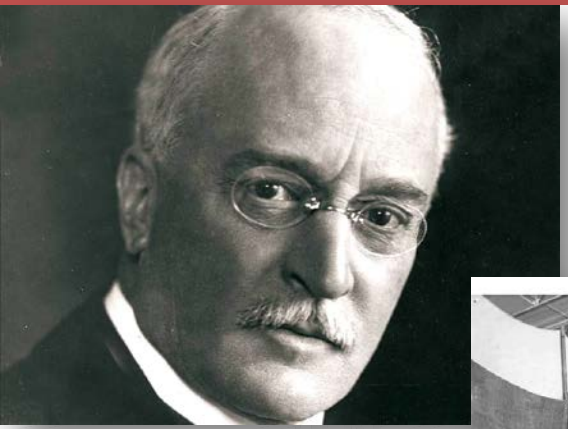
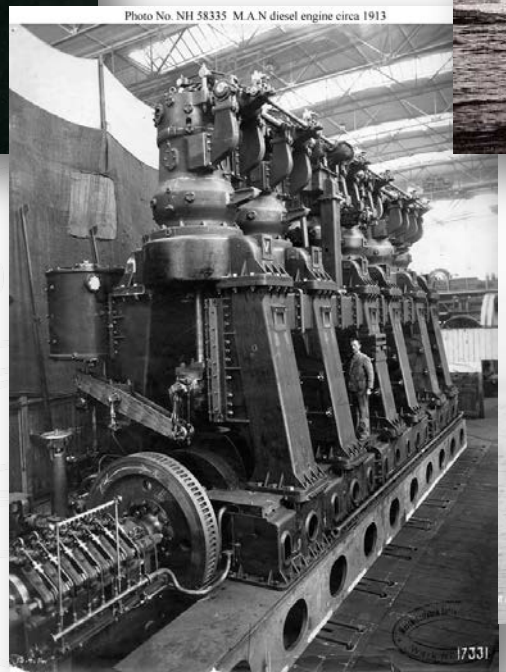
MAN: A history of innovation

At the dawn of modern naval warfare



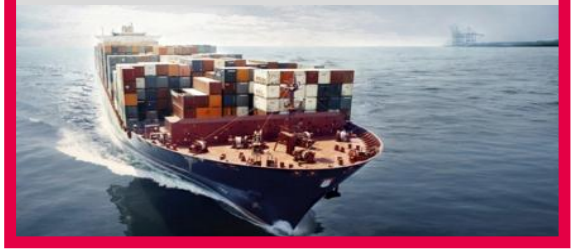
Diesel



MAN Group

Key Figures 2015

MAN SE

Business areas	**Commercial Vehicles**		**Power Engineering**	
Divisions	MAN Truck & Bus Revenue ‘15: € 8.9 bn	**MAN Latin America** Revenue ‘15: € 1.0 bn	**MAN Diesel & Turbo** Revenue ‘15: € 3.3 bn	**Renk** (76 %) Revenue ‘15: € 0.5 bn
				
Investments	**Sinotruk** (25.0 % +1 share), **Scania** (17.4 %*)			

The MAN Group in 2015: €13.7 billion revenue, 55,030 employees

* Voting rights

MAN DIESEL & TURBO Engines on Naval Vessels

(MAN, Paxman, Ruston, Pielstick)

59 Navies in the world have selected MAN Diesel engines for their Naval Vessels

- Algeria
- Argentina
- Australia
- Bangladesh
- Barbados
- Belgium
- Brazil
- Brunei
- Canada
- Chile
- Colombia
- Croatia
- Cyprus
- Denmark
- Egypt
- Finland
- France
- Germany
- Greece
- India
- Indonesia
- Ireland
- Italy
- Japan
- Kenya
- Libya
- Lithuania
- Malaysia
- Mexico
- Morocco
- Netherlands
- New Zealand
- Oman
- Pakistan
- Philippines
- Portugal
- P.R. China
- Qatar
- Russia
- Saudi Arabia
- Senegal
- Seychelles
- Singapore
- South Africa
- South Korea
- Spain
- Sri Lanka
- Sweden
- Taiwan
- Thailand
- Trinidad and Tobago
- Tunisia
- Turkey
- Ukraine
- United Arab Emirates
- United Kingdom
- United States of America
- Uruguay
- Vietnam

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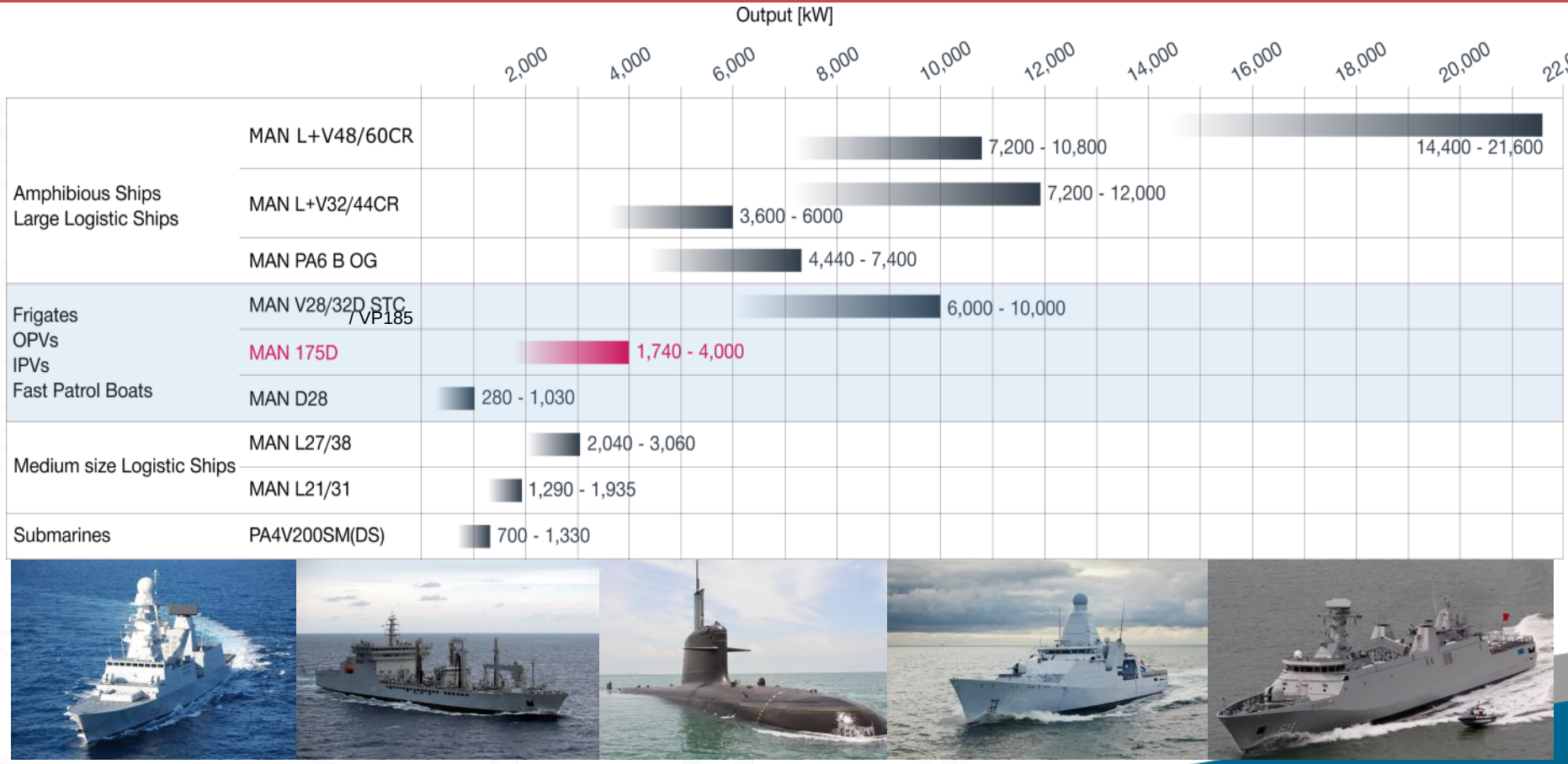
MAN Naval Engine Portfolio

Medium and High-Speed engines for Naval Applications

MAN



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MAN 20V28/33D STC – 10MW

MAN V28/33D STC Performance, Facts & Figures

MAN V28/33D STC Main Engine Data

MAN V28/33D STC Performance, Facts & Figures

MAN V28/33D STC: 455 kW/cyl. (500 kW/cyl. available for Naval Applications)

Complete engine family with 12V, 16V and 20V

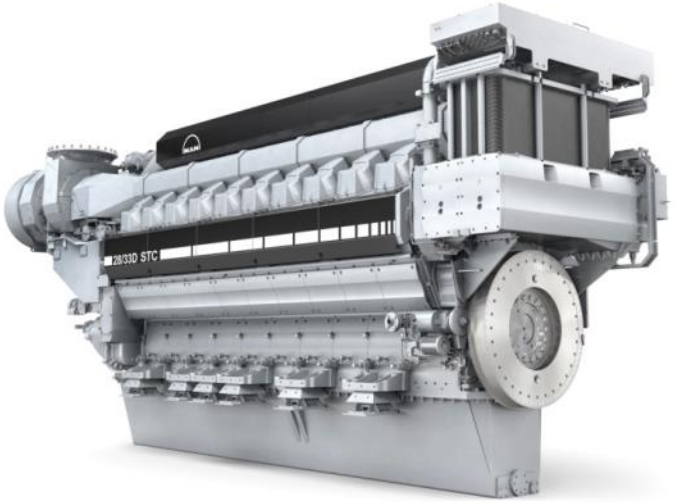
Emission: IMO Tier II and EPA Tier 2 compliant

Bore: 280 mm, Stroke: 330 mm

Speed	r/min	1000	1032
Mean eff. Pressure	bar	26,9	28,6
Mean Piston Speed	m/s	11.0	11.35

	kW	**kW**
MAN 12V28/33D STC	5,460	**6,000**
MAN 16V28/33D STC	7,280	**8,000**
MAN 20V28/33D STC	9,100	**10,000**

Weight and performance parameters refer to engine with fly wheel, TC silencer, attached pumps, oil filters and lube oil cooler



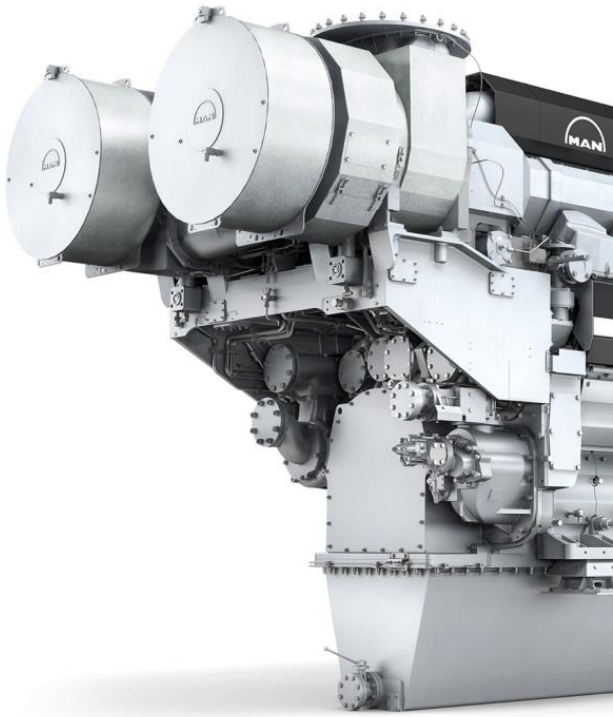
STC – Features & Explanation

Design, Features & Benefits

STC = Sequential Turbo Charging

- Operates with high efficiency turbo charging
- Second turbo charger will be switched on/off automatically/system-controlled
- Always running at its optimum operating point

The result is an extended torque operating envelope at low engine speeds!



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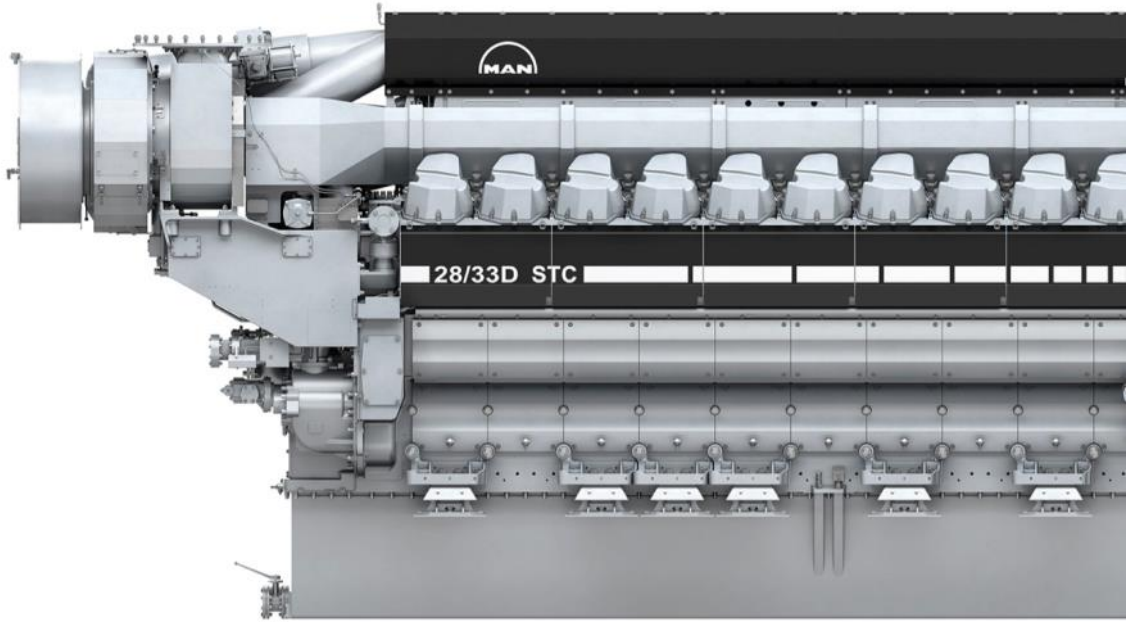
Advantages of MAN V28/33D STC

MAN V28/33D STC: Technical Design & Benefits

- 12V, 16V and 20V **engine family**
- IMO Tier II / EPA Tier 2 compliant
- 32.000 hrs TBO
- High power-to-weight ratio
- Low fuel consumption

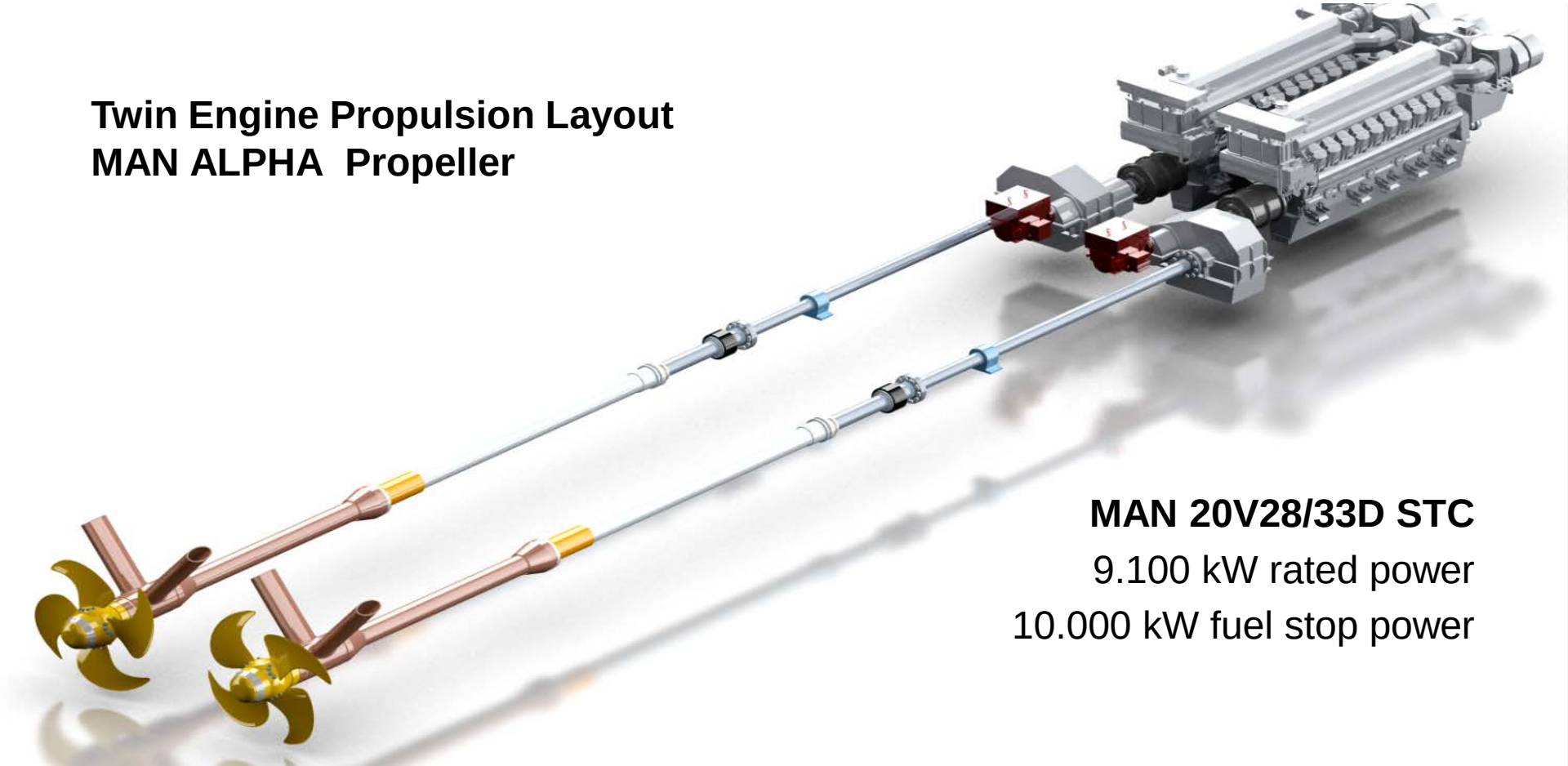


! **Engine family available of 12V & 16V & 20V**

Solutions for Propulsion Arrangements

Solutions for IMO TIER III Regulations and Market Requirements

Twin Engine Propulsion Layout
MAN ALPHA Propeller



MAN 20V28/33D STC

9.100 kW rated power

10.000 kW fuel stop power

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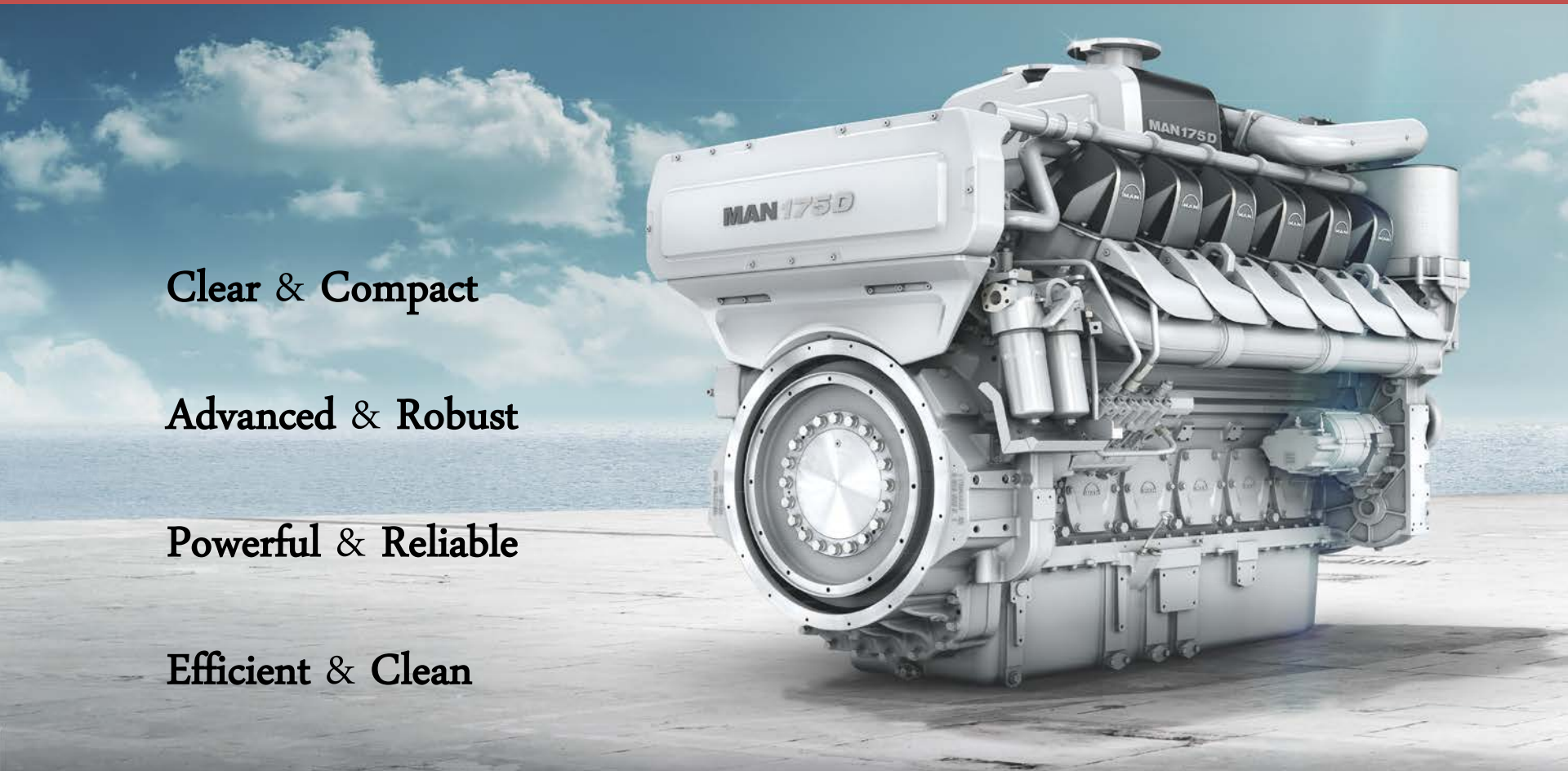
MAN 175D

Design Philosophy



Clear & Compact

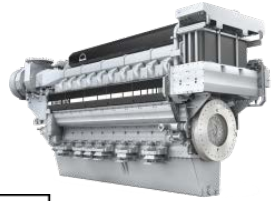
Advanced & Robust

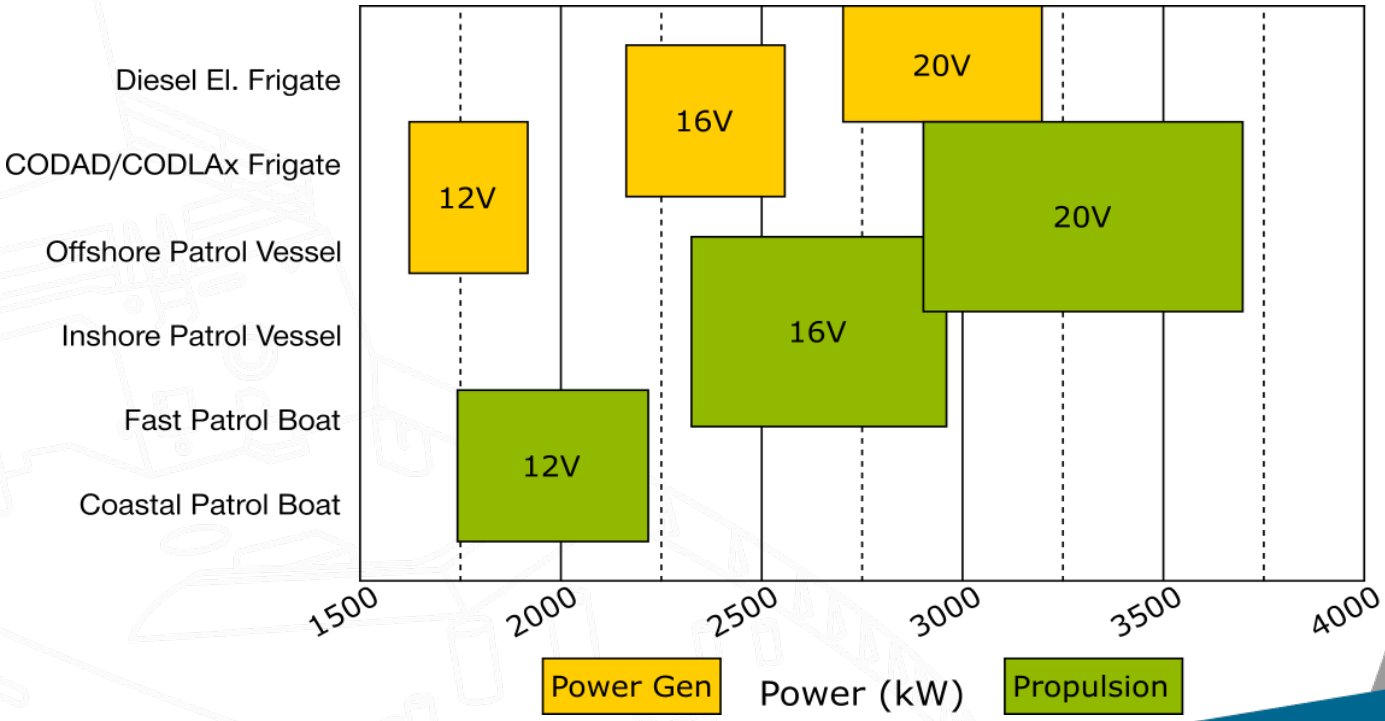
Powerful & Reliable

Efficient & Clean

MAN 175D

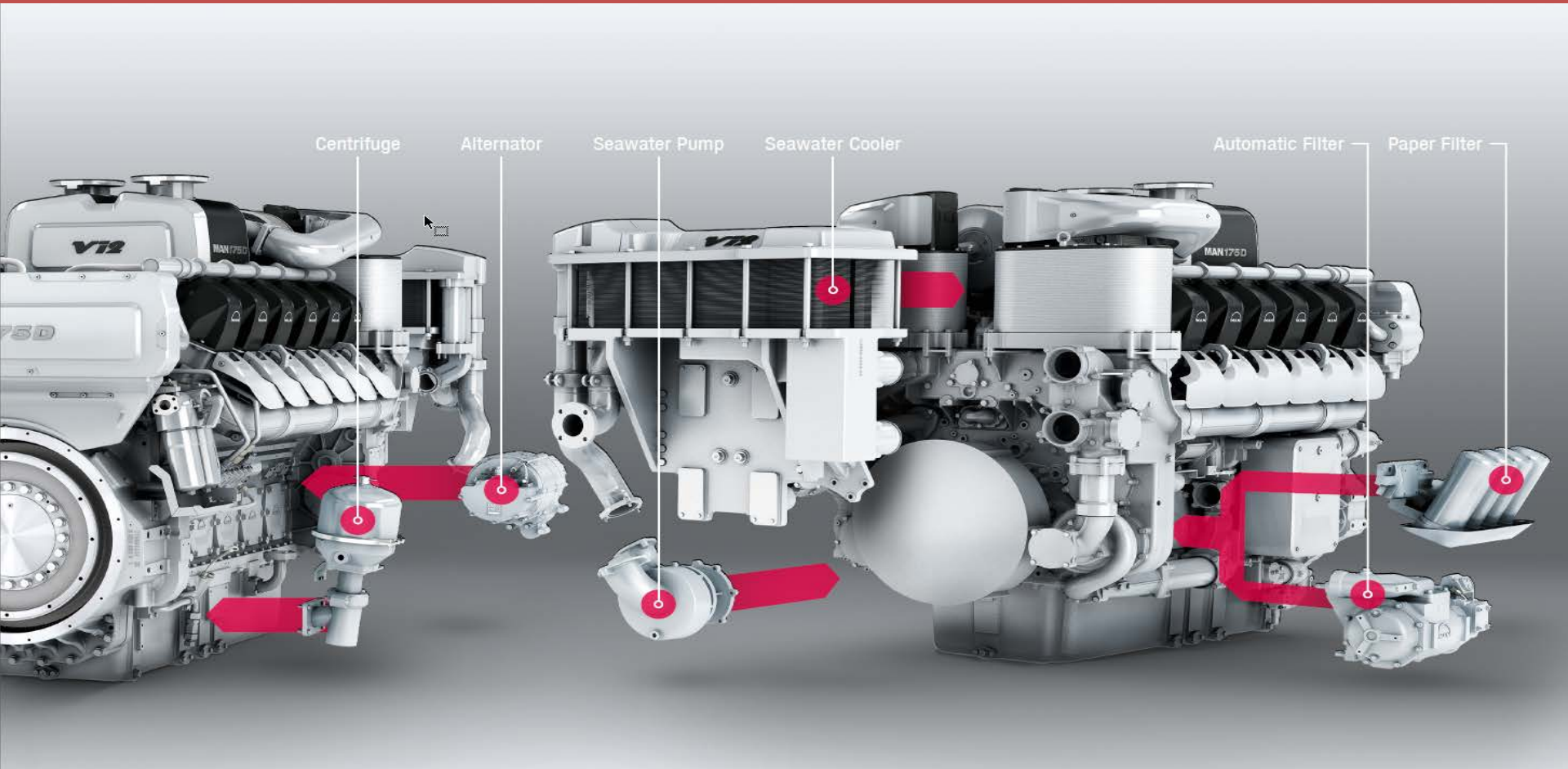
A wide field of application





MAN 175D

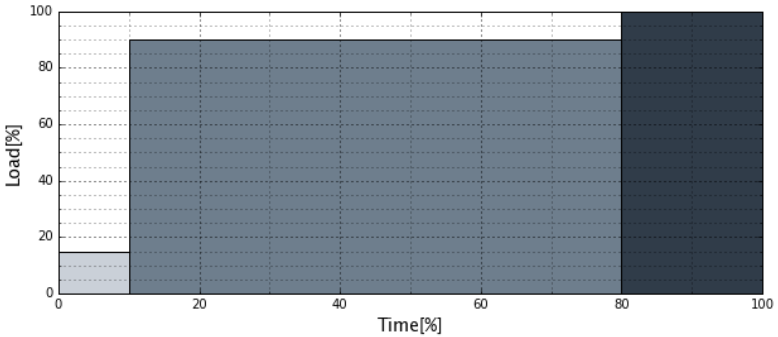
Modular Concept



MAN 175D

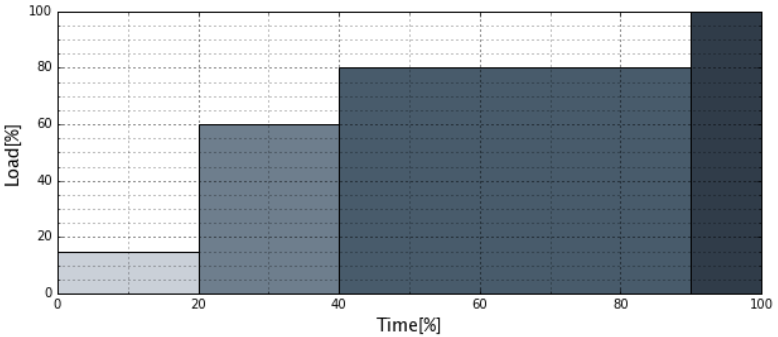
Propulsion applications

Heavy Duty (MH) – 1,740 kW



- 85% average load
- Up to 5,000 hours per year
- Working boats, OSVs, Ferries

Medium Duty (MM) – 2,220 kW



- 65% average load
- Up to 3,000 hours
- Harbor tugs, yachts, patrol boats

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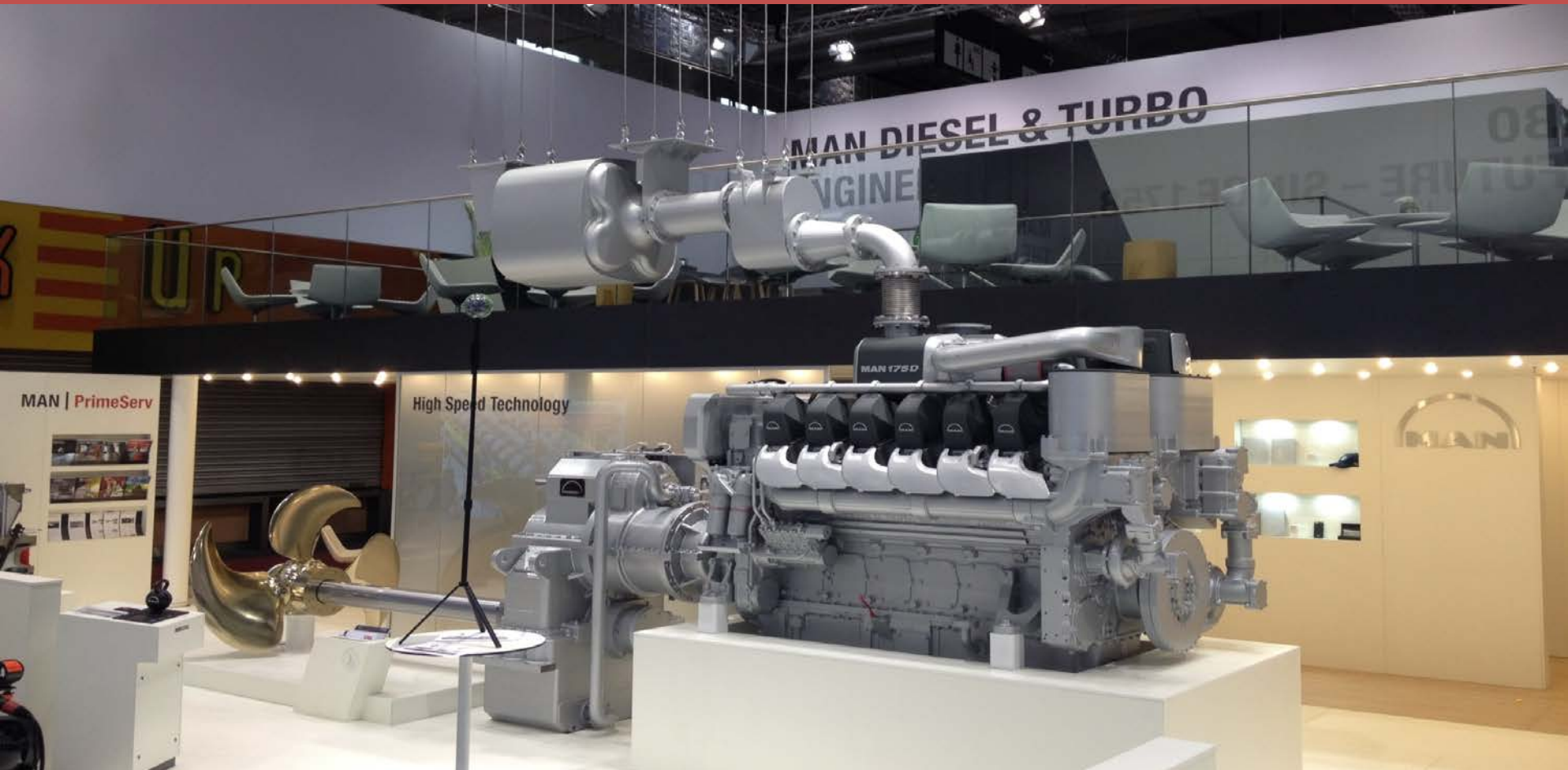
MAN 175D Propulsion Package

Presentation at the SMM 2016



MAN 175D Standard Marine GenSet

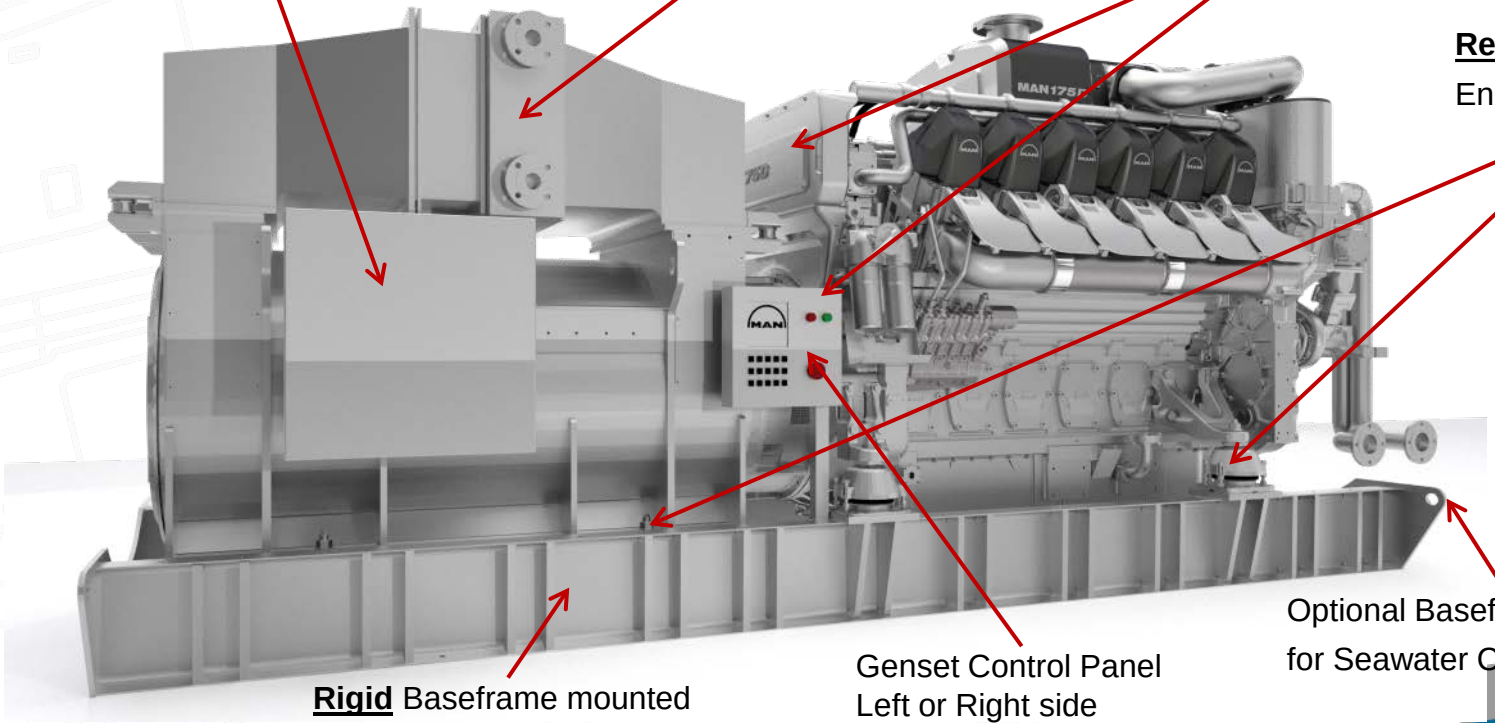
Overall Concept & Main Features

Power output cables Left or Right side access

Water-cooled Alternator with cooling water connections on Left or Right side

SaCoS engine LOP integrated into Genset Control Panel

Resilient mounted
Engine & Alternator



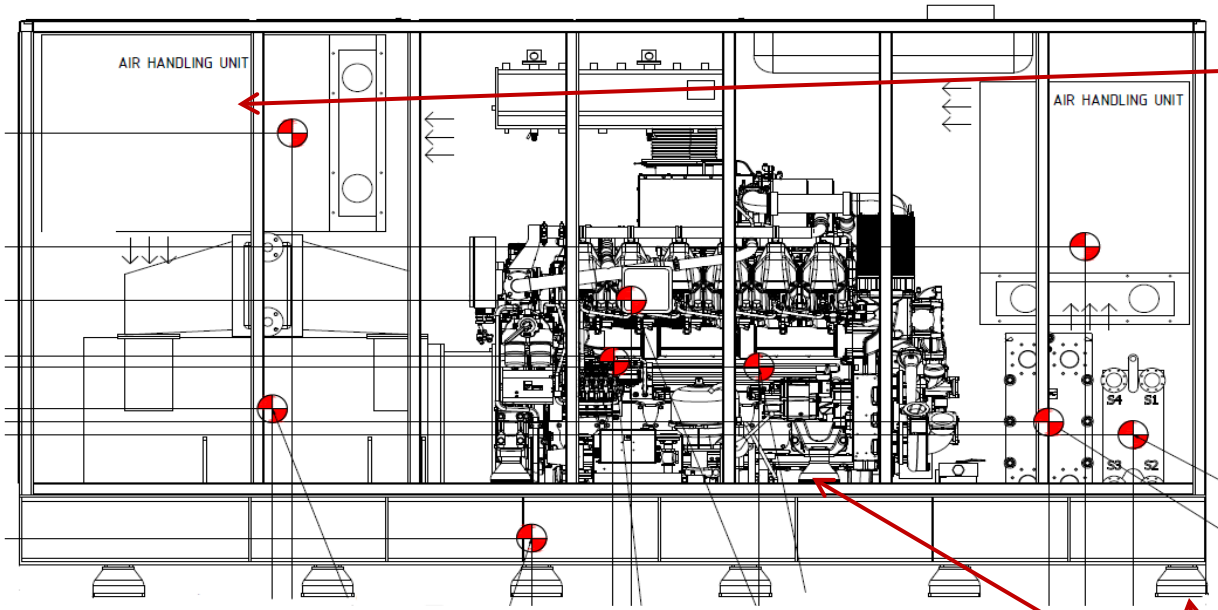
Rigid Baseframe mounted on vessel deck

Genset Control Panel Left or Right side location

Optional Baseframe extension for Seawater Cooler

MAN 175D Typical Navy GenSet package

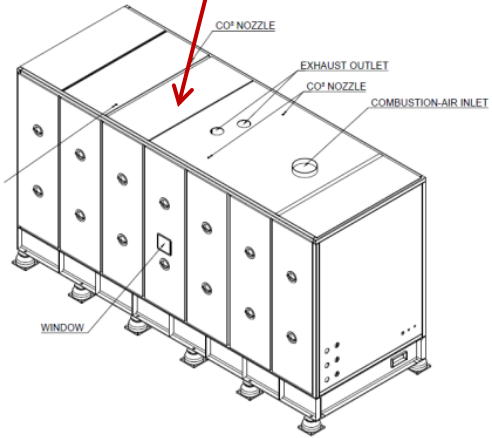
Features – Enclosed Genset



Air circulation cooling equipment

Noise reduction enclosure

Double Elastic mounting



Additional typical Navy requirements:

- Air-bourne & Structure-bourne noise level restrictions
- Use of military spec. Fuel & Lube Oil
- Special Bell-housing design to allow in situ coupling maintenance
- Higher military specifications than normal IEC standards & classes

GenSet Solutions

Double elastic seating

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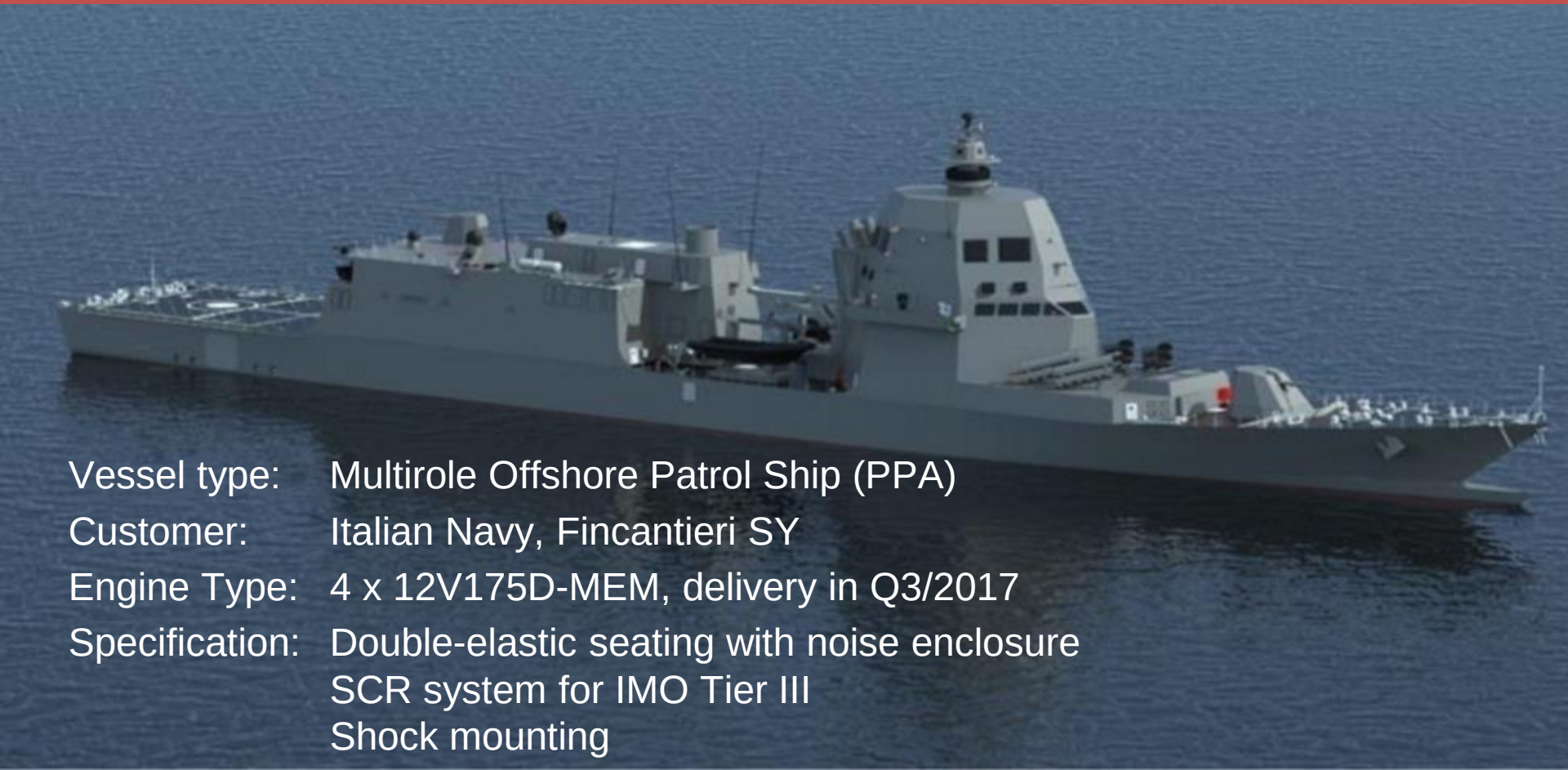
MAN 175D – First Order in October 2016

Multirole Offshore Patrol Ship (PPA)



Vessel type:	Multirole Offshore Patrol Ship (PPA)
Customer:	Italian Navy, Fincantieri SY
Engine Type:	4 x 12V175D-MEM, delivery in Q3/2017
Specification:	Double-elastic seating with noise enclosure SCR system for IMO Tier III Shock mounting

Thank you for your attention

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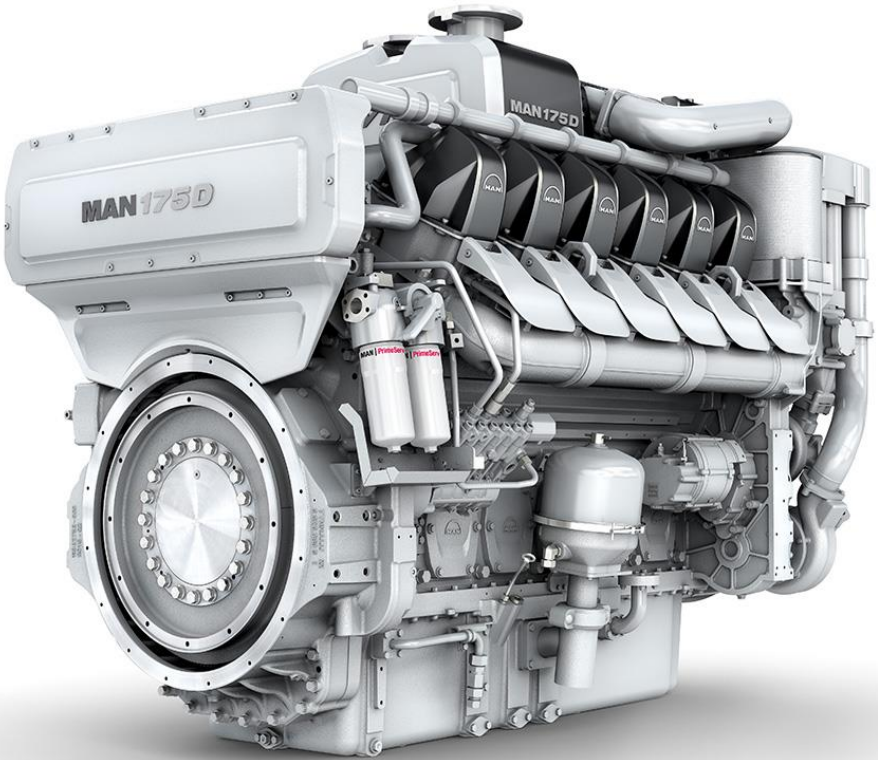

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