

The SYT Engine Study

Author: Water Revolution Foundation | 12 March, 2025

1 Introduction

This report encapsulates findings from a study conducted by the Water Revolution Foundation. The study aimed to identify the most commonly installed engines across various categories of superyachts. Given the impact from a yacht's operational phase as part of its life cycle, prioritizing the main engines (and generators) is essential to understand yachts' environmental impact. Understanding the environmental impact (both upstream and downstream) of the most commonly used engines will accelerate the ability to assess a large amount of yachts more quickly.

The study focuses on the main engine due to its substantial influence on a yacht's onboard weight, overall design, and environmental footprint. Critical considerations include compliance with IMO Tier III standards, propulsion types, and fuel choices, all of which are pivotal in the yachting industry's ongoing discussions about environmental sustainability.

Data provided by Superyacht Times enriched this research, offering insights into trends related to total engine power and other vessel characteristics. These elements are thoroughly explored in the report, contributing to a comprehensive understanding of the current state and potential future directions in superyacht engine technology and its implications for environmental sustainability.

2 Data and methods

To discern trends in superyacht engine installations, the study categorized yachts based on several parameters, aiming to provide an overview of engine types relative to yacht characteristics. The chosen categories were:

- Length
- Yacht Type (Motor and Sailing, including subcategories)
- Delivery Year
- Prominent Yards
- Gross Tonnage (GT)
- Alternative Power Plants

These categories helped understand the frequency of various engines used within specific ranges or subcategories, enabling to identify the most commonly used engines to prioritize for assessment.

3 Results

3.1 Main engine brands Motor yacht vs Sailing yacht

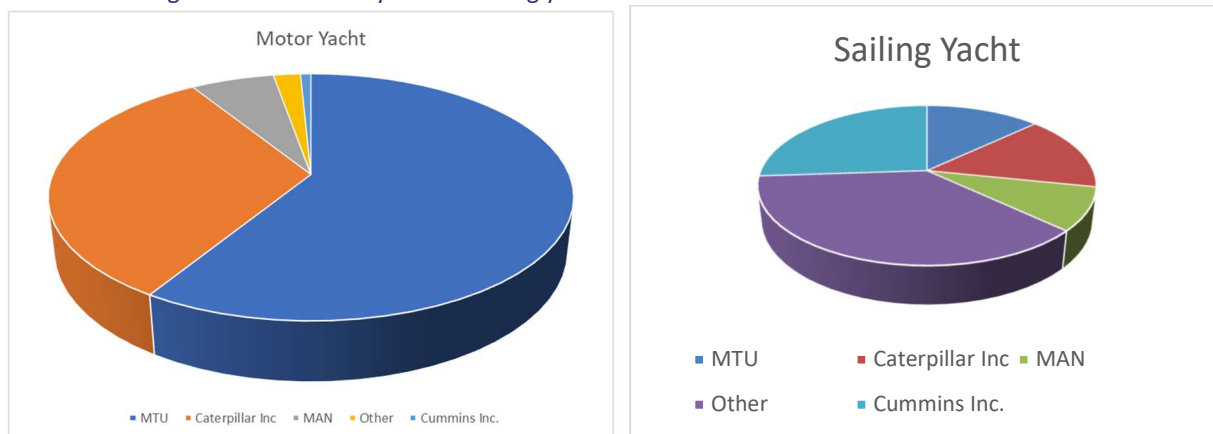


Figure 1 Percentage share of manufacturers of motor and sailing superyachts delivered since 2005 and over 30m in length.

Figure 1 illustrates that MTU engines dominate the motor yacht market, with Caterpillar engines as the second most prevalent. Other engine manufacturers represent a much smaller portion of the motor yacht sector. In contrast, the sailing yacht category exhibits a greater diversity in engine choices, with still the top two manufacturers, MTU and Caterpillar, leading by a narrower margin.

The variance in engine popularity between motor and sailing yachts can be attributed to their distinct operational profiles, power demands, and requirements. Specifically, sailing yachts often rely on sails for propulsion, which alters their power needs compared to motor yachts. This fundamental difference in how sailing yachts operate influences the selection of engines, contributing to the observed diversity in engine choices among sailing yachts compared to the more uniform preferences seen in the motor yacht fleet.

3.2 Motor yacht subcategories

The next figure shows the average ratio of engine horsepower to gross tonnage (GT) across motor yacht subcategories, ordered by increasing typical speed.

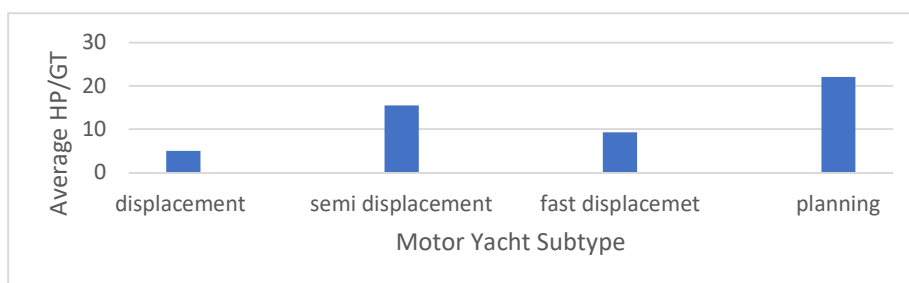


Figure 2 Average HP/GT for MY subtypes

Table 1 Most common engine for the different motoryacht subcategories of vessels delivered after 2015 and with length over 30m.

Yacht category	Most common Engine model
Motor yacht	MTU 16V 2000 M94
Sailing yacht	Cummins Inc. QSB 6.7 MCD
displacement	C32 Acert
Semi displacement	C32 Acert
Planning	MTU 16V 2000 M94
Fast displacement	Caterpillar C18

Figure 2 reveals that planning hull yachts have the highest horsepower per gross tonnage (HP/GT) to achieve contracted speeds, while displacement hulls require the least power due to

their lower speed needs. Interestingly, semi-displacement yachts demand more power than the faster fast displacement types, likely due to the dataset's limited sample size.

Analysis of sailing yacht categories was not as straightforward due to varied subcategory characteristics and smaller sample sizes, hence not included in this report. The figure also shows a clear preference for MTU engines in faster motor yacht subcategories, demonstrating MTU's dominance in high-speed segments.

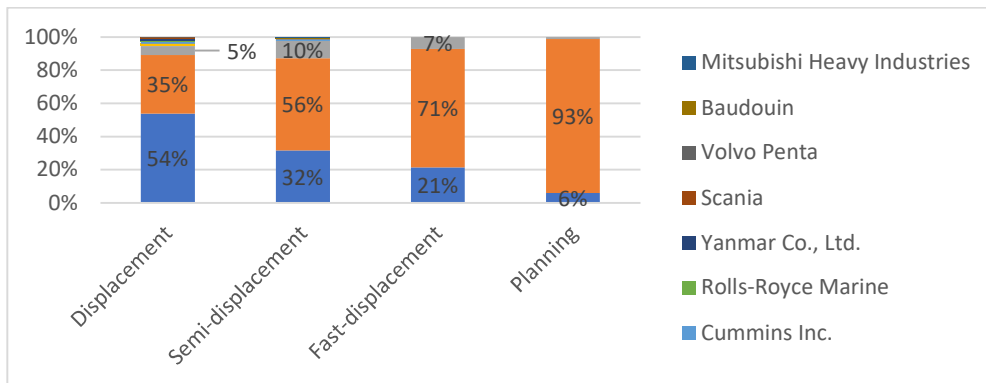


Figure 3 percentages of manufacturers of engines installed for the different motor yachts over 30m delivered between 2015 and ?.

3.3 GT/Length rates

Figure 4 indicates a trend of decreasing horsepower per gross tonnage (HP/GT) as the length of yachts increases, observed across all motor yacht (MY) subcategories.

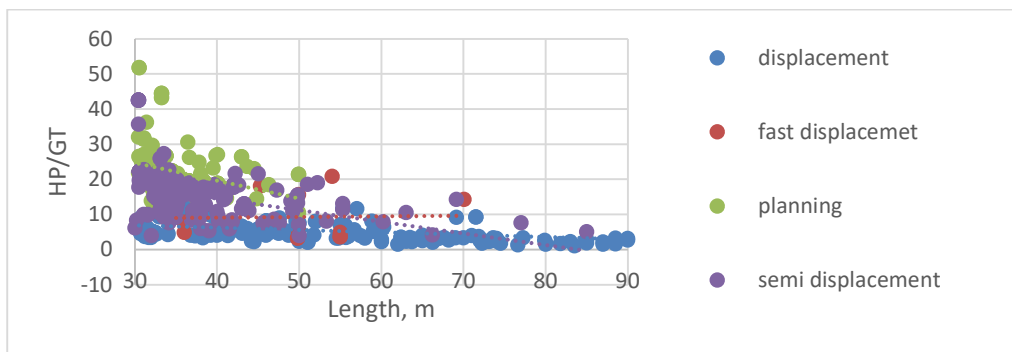


Figure 4 HP/GT against length for different Motor Yacht subcategory vessels for vessels over 30m delivered in the last 5 years.

3.4 Average HP per GT over time-delivery year

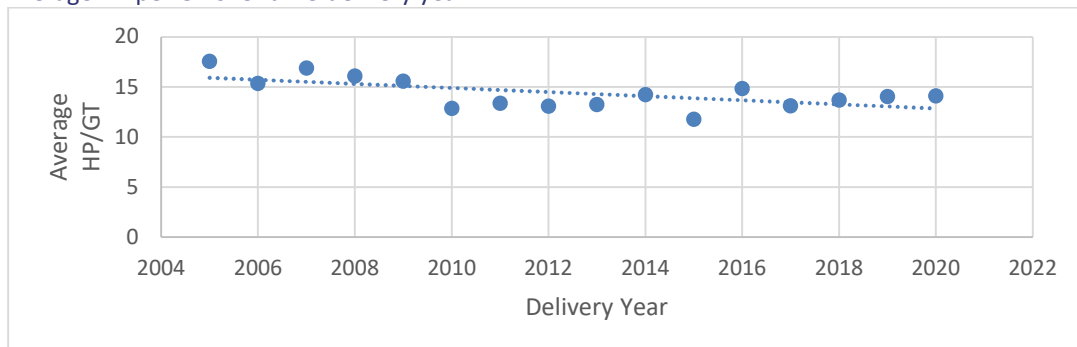


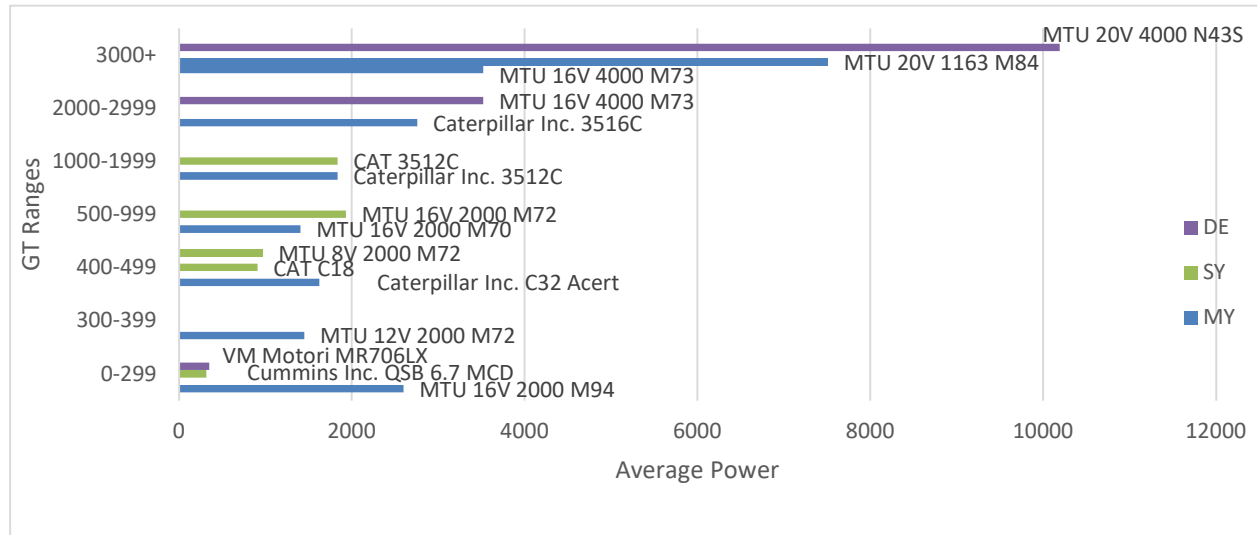
Figure 5 HP/GT vs delivery year for superyachts delivered since 2005 and over 30m in length.

This graph reveals that despite an overall increase in total horsepower (HP) over time when considering non-normalized averages, there's a noticeable reduction in horsepower per gross tonnage (HP/GT) across the years. This trend suggests that the growth in gross tonnage (GT)

over the years outpaces the increase in horsepower, leading to the observed decrease in HP/GT. Additionally, the construction of fast yachts has declined since the financial downturn in 2008, contributing to this trend. Pinpointing the exact reasons behind these shifts is challenging.

3.5 Engine power and model per GT Category

In the study, while various parameters were considered, gross tonnage (GT) ranges were pivotal for engine model selection due to their significant impact on engine choice and their effectiveness in representing the diversity within the superyacht fleet. The upcoming graphs display the outcomes of the engine selection process, highlighting the engines chosen for further analysis.



4 Conclusions

Figure 6 Average power for the most popular engine model of different yacht types and GT categories.

The analysis highlights key insights into yacht engine trends:

- Dominant Manufacturers: MTU and Caterpillar are the leading engine suppliers for yachts, with brands like MAN and Cummins also notable in certain subcategories.
- Variety in Sailing Yachts: Sailing yachts exhibit a broader diversity of engine manufacturers compared to motor yachts.
- Recent Consolidation: Over the last five years, the number of engine manufacturers has decreased from 27 to 15, suggesting industry consolidation through mergers or closures, such as MTU's acquisition of Detroit.
- Future Research Focus: The most common engines for motor vessels across various GT categories have been identified for detailed study. A tentative selection has also been made for sailing yachts and yachts with alternative propulsion systems, although with caution for further validation.

These trends point to a narrowing field of manufacturers and underline the need for further analysis on the recent evolution of yacht engines.

4.1 Additional findings

The MTU 16V 2000 M94 engine is the most prevalent, mainly due to the abundance of smaller yachts (30 to 40m).

Sailing yacht data analysis proved inconclusive, limited by the smaller sample size and unclear trends.

There's a trend towards installing less horsepower per gross tonnage over time, likely indicating improvements in design and technology efficiency.

A comprehensive analysis is provided in the full master thesis, accessible here: <https://repository.tudelft.nl/record/uuid:dfc252d5-9690-4687-b80b-5f2f91a54708>