DIESEL INTERNATIONAL

Second LIFE

Volvo Penta writes a new chapter - MAN V12-2000&AB

Comparisons: 16 and 30 liters - FPT - Wärtsila&Liebherr - Isotta

Benetti goes hybrid, Wider Yachts as well - Sunreef&Deere

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DIESEL SUPPLEMENT

July 2019

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DIESEL INTERNATIONAL '*MARINE*'
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«IMO rejected a proposal submitted by ICOMIA that sought to mitigate the impact caused by the Tier III regulation»

BIMOTOR - FPT - TRANSFLUID

FOR AN HYBRID LAGOON

Balancing the battery's size and weight: Bimotor takes on the challenge. The 150 kg battery pack is fitted on the bow. The battery charge status can be monitored from the control board

Among the canals and the solemn shipyards of the Arsenale, on the same area as the Art Biennale, recreational boating returns to Venice after a long absence to give the town a second chance. With strong support by the Ferretti Group, the seeds of this hybrid engine project involving Venice found fertile soil at FPT Industrial. FPT's silhouette thus towered on the Canal Grande alongside that of Transfluid, but Bimotor had a hand in it, too. The project's prelude was staged thursday, 18 June at 1.30 pm, and featured the HM560-12 hybrid system by Transfluid that breathed new life into a taxi boat fitted with an FPT S30 169 kW 4000 rpm engine and a Bravo 2 sterndrive. Under Bimotor's supervision, the boat's combustion engine was paired with a 12 kW permanent magnet generator powered by a battery pack close to 10 kWh. The blow-by rate, keeping lube oil consumption low, testifies to the good compatibility of the 3 liter engine with this hybrid system, and so does the torque curve, stably in the 2000 to 3000 rpm range. Transfluid sure does not lack the necessary know-how: in France, it has already hybridised 28 metre long passenger boats. Ugo Pavesi, Transfluid's CEO, commented: *«Transfluid's strenghth lies in the fact it provides a turnkey solution: the system is certified down to the every single component, including its software and CAN bus networks. Its hybrid units, electric engines and batteries have all passed the test to be granted DNV-GL Type Approval»*.

At Bimotor, they also highlight that their solution is scalable, retrofittable, it favours Internal Combustion Engine downsizing and is also user-friendly, in that it is fitted with a single control lever for both diesel and electric propulsion.■

H as Hepic, H as Hydrogen

Hepic is the first hydrogen boat for passenger transport on the Venice Lagoon. Being 16m long and 3.2m wide it can accommodate 24 passengers and provides an electric back up in case of failure. Created by Alilaguna and Cantieri Vizianello, it's waiting for the cycle of tests required to obtain approval by RINA (Registro Italiano Navale) to be completed.

LNG IS BOOMING! 100 SHIPS FOR THE TOP 5

GLOBALLY 89 LNG CARRIER IN THE ORDER BOOK WITH AN AGGREGATE CAPACITY OF 15.5 MILION CUBIC METERS AND VALUE OF USD 18,2 BILLION

Twelve years ago there were 90 country-to-country LNG trade routes worldwide. Based on the LNG Trade & Transport 2018 report, intercountry LNG trades currently cover 11 percent of global gas demand and 35 percent of import/export flows.

According to VesselsValue, as of 1 August 2018 there were 481 large LNG carriers of over 100,000 m^3 in service, including floating storage and regasification units (FSRUs) estimated to be worth 52.9 billion dollars and totalling 76.6 million m3 in capacity. Globally, there were another 89 vessels of the same type on order, with an aggregate capacity of 15.5 million m^3 and a value of approximately 18.2 billion dollars.

The top five owners of LNG carriers sailing global trading routes control over 100 ships with a combined capacity of 19.5 million m^3 - almost a quarter of the total.

«The nature of LNG trades as one of the fastest growing sectors of the maritime market leaves the door open to newcomers» VesselsValue expert commented. D.C.

OXE DIESEL 200&300

OXE Diesel 200 is a diesel off-shore engine that provides 200 hp and 415 Nm. CIMCO Marine is now developping a six cylinders, twin turbo, 3-liter, diesel engine from BMW as a basis. Start of production is scheduled for spring 2020. *«The Bison P1A* (Editor's note: the OXE 300) *will be delivering 300 hp on the propeller shaft, meeting the required emission standards and expected fuel consumption. The Bison P1A will now be fully evaluated in laboratory and field tests, final efforts related to weight and geometrical optimization will be completed before the cowl design is frozen».*

IN 2018 FERRETTI YACHTS CHOOSE VENICE TO CELEBRATE THE 50TH ANNIVERSARY. IN 2019 IS BACK AT THE VENICE BOAT SHOW

ROLLS-ROYCE POWER SYSTEMS AND KONGSBERG

Rolls-Royce confirmed the completion of the sale of its commercial marine business to Kongsberg, based in Norway. The transaction is now officially complete, following the go-ahead by the competent regulatory authorities. The original agreement dates back to July of 2018. Activities in the naval gas turbine sector and propulsion activities based in the United States, previously included in the former Marine operating unit, have already been consolidated in the Rolls-Royce Defense activities, as announced in January 2018. Net proceeds after transaction costs and other adjustments reach a value of around 350 million pounds.

AMER94 TWIN

HOW TO SAVE FUEL

Amer Yachts is among the winners of the International Design Awards (IDA) 2018 with her eco-project motor yacht Amer 94' Twin Superleggera

Amer Yachts aims to combine style and reduction in consumption. We believe this will start a trend. The Amer 94' has won the 2018 Boat Builder Award in the Environmental Initiative category at the MetsTrade. Barbara Amerio illustrates the reasons of this success.

«With the Amer94 twin we can demonstrate that the use of lighter materials will lower the environmental impact. A 20 tons reduction compared to a boat of equal length means that the Venice Montecarlo route may be completed without refuelling with only 5000 litres of fuel.

We make use of circular economy materials such as recycled or recyclable ones, in line with the blue economy, either reusing or using long lasting resources.

The ability to navigate at 9 knots with a 3.1 lt. per mile consumption is an exceptional achievement for a 94 ft superyacht with 1350 IPS double motorisation of 1000 HP each, half of the power commonly used by competitor boats of equal length.

Te keel wrap in lieu of the traditional anti-fauling one and the carbon stabilisers are other means to improve performances.

This boat scored the highest points in the Green plus certification category (147 points) both for the reduction in consumption and for the use of new environmentally friendly materials on board. It could be interesting to see whether using HVO, a new generation fuel, the IPS, already certified for its use, could reduce atmospheric emissions. In the future we will test the Volvo Penta hybrid which will be available from 2021/22 and we will follow closely the development of new generation batteries, fundamental to improve the product». **F.B.**

Rolls-Royce and ZF for the Equipment Health Management System

MTU and ZF overlook Lake Constance. The vocation for water is not the only common denominator: 70 per cent of MTU's marine engines have been delivered with ZF transmission systems. Rolls-Royce is now developing a new electronic monitoring system together with ZF. The Equipment Health Management System (EHMS) collects and analyses data from the MTU engines, ZF transmission systems and other key components on a vessel, taking into account additional factors, such as wind, waves and currents.

PATRINI MOUNTS

XXL SIZE OF MAR RANGE OF METAL RUBBER ANTIVIBRATION MOUNTS

We're talking of MAR-04, introduced at Seatec in Carrara (Italy) as an engine or generator mount for large marine and military applications. The new metal rubber antivibration mount MAR-04 joins three other MAR versions and features high sturdiness having been designed for heavy duty applications, in particular for large diesel engines. The ideal applications of MAR family are in marine environment on compressors or generators where different stiffness grades on the three axis are required. These anti-vibration mounts combine a large bending ratio in the axial direction with high longitudinal and lateral rigidity to offer the best possible insulation.

MAR-04 is available in different compounds that can handle axial loads from 950 up to 2,200 kg. The coating of the metal part is corrosion resistant. The assembly of the anti-vibration support MAR-04 features a central M24 threaded hole with tear-proof system, increasing the safety margin due to its harsh operating conditions.

All MAR line mounts feature laser engravings on the metal base displaying compound hardness and production date. This allows traceability even after a long period of use.

ECOSPRAY TECHNOLOGIES AGAINST POLLUTANTS

Ecospray Technologies is setting up a department focused on the development of NOx, Particulate, Methane Slip filtration systems in partnership with a manufacturer of catalytic/filtering substrates for the automotive industry (truck, light duty vehicle, car, motorbike). The philosophy that inspires this project is meant to combine the experience in industrial DeNOx applications with the competence in supports and their chemistry (as the substrates for the chemical/oxidative and/or filtering reaction).

ABB 'HYBRIDIZES' A FERRY ON LAKE MAGGIORE

Striving to conquer more than just railways, paved roads, and high seas routes, the quest for electric (hybrid) propulsion continues on the shores of Lake Maggiore, and onboard the San Cristoforo, a 386 tonne ferry that can carry up to 450 passengers and 27 cars. The ferry makes no secret of the 55 years spent in service from the day of its launch, but thanks to a project by ABB it will be fitted with a battery powered electric propulsion system that will enable the vessel to operate in hybrid and zero-emission mode.

Known as Onboard Microgrid, this technology was designed specifically for smaller vessels running on batteries, fuel cells, or fuel cell/battery hybrids. It's a compact DC grid platform recently launched to optimize fuel efficiency and curb consumption by making the best use of available power. The expected energy saving can reach up to 20%.

Davide Canevari

MAN CRYO & ELIO

Elio is a 133-meter long and 21.5-meter wide ferryboat that has a capacity of up to 290 cars on two vehicle decks, and 1,500 passengers with a service speed of 18.5 knots. MAN Cryo provided the LNG fuel system for the Elio at the Sefine Shipyard in Yalova, Turkey. The system will supply gas to the three dual-fuel propulsion engines.

ITALIAN BOATING INDUSTRY

5 YEARS OF GROWTH

NOX TIER III RULE TO BE IMPLEMENTED

«The International Maritime Organisation (IMO), at its Marine Environment Protection Committee meeting held from 13-17 May rejected a proposal submitted by Turkey and ICOMIA that sought to mitigate the impact caused by the Tier III regulation. Vessels above 500gt constructed on or after 1 January 2016 must already comply with the emission limits, and from 2021 vessels below 500gt but above 24 meters will also be covered. The proposal that Turkey and ICOMIA submitted aimed to offer an alternative emission standard for vessels currently covered under a delay provision (above 24m and below 500gt). This delay provision expires in 2021 after which all recreational vessels above 24m, if operating in designated Emission Control Areas, must comply with a 2g/kWh standard. It is understood this standard can only be met by use of exhaust gas aftertreatment systems, currently available designs require a minimum of 30% additional space of the engine installation envelope».

Udo **Kleinitz**, Secretary General of ICOMIA: «*We are most grateful to those IMO Member States who supported our proposal, and would like to mention in particular Turkey for co-sponsoring this document and the associated lobbying efforts, as well as Malta for their efforts on the European stage. I also would like to thank the yards who supported our advocacy effort, namely Ferretti Group, Overmarine, Monte Carlo Yachts, Princess Yachts, Sanlorenzo Yachts, Sunseeker and Viking Yachts* ».

It's been a few years now since Italy's boating industry embarked on a journey towards recovery that turned into what can now be considered a fully-fledged structural trend. Consolidated figures will only be disclosed at the Genoa Boat Show, but according to UCINA (Italy's leisure boating companies association, established in 1960) the Italian nautical industry's 2018 global turnover is projected at approximately 4.25 billion euros – or anyway expected to fall in the range between 4.18 and 4.32 billion euros.

This is equal to a relative growth rate that the statistical sample of businesses interviewed by UCINA's studies office have reported to range between 7.7 and 11.3%.

We are still far below the peaks recorded in 2007 and 2008, hitting a record 6.2 and 6.18 billion euros, respectively. However, we should not forget the crisis-ridden abyss this sector was dragged into in 2013, reaching its lowest point with 2.4 billion euros.

> Italy prepares to grow for the sixth year in a row, with a turnover exceeding 4.2 billion in 2018. Despite a patchier global picture, overall very few businesses are seeing their bank accounts go into the red

With 2018, therefore, the industry successfully achieved five consecutive years of growth (soon to become six, as the year progresses), pulling off a 75% increase in turnover as against the minimum values recorded in 2013.

Shipyards alone are estimated to have reached a turnover of 2.74 billion euros in 2018 versus the 2.48 recorded in 2017 (+10.4%) and the 2.16 billion euros of 2016. Here too, therefore, the uptrend seems here to stay and qualified to be considered structural in nature.

As for accessories, equipment, spare parts and maritime engines – making up the other component in the boating industry basket (segments in which Italy, as is well-known, is not ranking among titans), estimates for 2018 are slightly above a billion and a half euros (+7.8%).

While waiting for last year's consolidated data, forecasts have been made for 2019, too, confirming the positive trends observed in Italian boating sector, often unparalleled in other countries.

«*The survey was carried out by our Studies Office and covered a statistically significant sample of companies*» experts from UCINA commented. «*63% of the companies interviewed said that based on their order books, the turnover for 2019 is likely to grow: 35% of respondents stated they expect it to rise by up to 5 percentage points, 14% say their growth will likely be in the range between 5 and 10 percentage points, while another 14% spoke of an increase of over 10 points. According to 28% of the respondents, 2019 was a 'year of stability'*».

Maybe even more importantly, only 9 businesses in 100 are expecting their turnover to be lower.

Things look a bit more complex on the international scene, for which statistics are provided by the International Council of Marine Industry Associations (ICOMIA) and by the European Boating Industry (EBI).

Starting with a few reference figures, 2007 market shares in the global boating business were as follows: USA 68%, Europe 25%, other countries 7%. In 2018, the US share decreased to 48%, Europe dropped to 18%, while the rest of the world accounted for over a third of global shares. In absolute numbers, units rose from some 23 million to over 32 million.

At present, the United States are still the undisputed global leader in terms of business turnover. Furthermore, based on projections, 2019 should confirm the uptrend, showing growth for the eighth year in a row.

Canada, instead, fell victim of its neighbour's trade war, whose higher tariffs are a major stumbling block.

South America did not manage to break through the deadlock, with Brazil and Argentina still unable to kickstart the market.

Regarding Asia, undergoing a phase of expansion, ICOMIA reports paint a mixed picture, speaking of

THE CRUISE INDUSTRY AND ENVIRONMENTAL IMPACT

The Cruise Lines International Association (CLIA) asserted the commitment of the global cruise industry to reach zero-emission. As reported by the Association, the cruise industry is closer to reaching the goal than any other sector.
«*111 cruise ships, with a capacity of more than 305,000 passengers, have already been fitted with Exhaust Gas Cleaning Technology (EGCS). 12 additional ships are being retrofitted with EGCS, and 30 more are scheduled to be retrofitted. 27 new ships that are being built will all have EGCS*».
«*Next to this*» added the Association «*over 70% of the global cruise fleet, 152 ships, are already 'dual fuel', while 2 ships are able to use LNG while in port, thus reducing emissions in port cities. In addition, more than one-third of all new ships that will be built in the next few months, 25 ships total, will use LNG as their primary propulsion fuel*».
As for the system known as shore-side electricity – enabling ships to turn off engines and plug into the shore grid while docked – problems seem being shifted from the ship to the shore. First of all, currently only 13 ports offer a possibility to plug into shore power at docks capable to accommodate large vessels, while 55 cruise ships are already fitted with shore-side electricity systems and another 28 are either being adapted or ready to be launched. Secondly, "at the moment there is not one connecting standard system used everywhere, which makes it even more difficult for our members to invest in this technology." said CLIA.

«Growth in Hong Kong (the last gateway to the Chinese market; reduced business volumes in Singapore) a key hub to access South East Asia; and a stable situation in Japan, matched by a slight recovery in imports».
With only a handful of exceptions, happy faces are the majority among the representatives of Europe's boating community. Indeed, all the countries bordering the Mediterranean, including Greece and with the only exception of Croatia, have good reasons to smile. Poland's internal market is still immature, but its shipyards are remarkably lively. (editor's note: see page 36, Sunreef and John Deere article). Germany, Sweden, Finland, the Netherlands, Denmark, Ireland, Norway and Estonia are also all doing fine. Brexit - whose loose ends in late June were still far from being tied up – seems to have taken its toll on the United Kingdom; whereas the main culprit for the very poor performance of Turkish shipyards is the generalised crisis affecting the country's economy, political credibility and currency. For its part, Russia is still waiting for a recovery worthy of this name.
The Gulf region seems unable to lessen its dependence on a market that's dominated almost exclusively by the super-luxury segment and whose mid-level customer segment is still fairly undeveloped.
Australia's internal demand and exports are both doing well (and, consequently so is manufacturing) New Zealand remains stable (with the stronger negative impact being on exports), while South Africa has definitely moved into negative territory.

> The United States are still the undisputed global leader in terms of business turnover. Furthermore, based on projections, 2019 should confirm the uptrend, showing growth fot the eight year in a row should confirm the uptrend

SIX-STAR YACHTS: ITALY LEADS THE MARKET

When it comes to yachts with the comfort and feel of an ultraluxury six-star hotel, Italy becomes a point of reference. According to the statistics of the Global Order Book 2019, last year the Italian industry had 379 projects in build or on order (+26 as compared to 2017) out of a global market totalling 830 superyachts. A market share of 46% that leaves no doubt as to Italy's undisputed leadership. That of Italian made yachts is a well-consolidated supremacy, as shown by the trends of the last 10 years.
"By the way, Italian builders fill the top three positions in the Order Book" said a note by UCINA "The top three alone account for 20% of the global number of orders. Also, Italy has 8 shipyards in the Builders' Top 20, and it leads again in the collective gross tonnage stakes with a total gross tonnage of 135,434 GT, followed by the Netherlands with 96,366 GT, and Germany with 86,698 GT".
Germany drives the gigayacht segment, with an average of 5,149 GT per unit delivered, as against an Italian average of 358 GT. The Netherlands occupies the middle position with 1302 GT, thus establishing its leadership in the megayacht segment.

TREND OF SUPERYACHTS ORDERS

YEAR	TOTAL	ITALY	% ITALY SHARE
2010	763	383	50,2
2011	749	309	41,3
2012	728	317	43,5
2013	692	272	39,3
2014	735	274	37,3
2015	734	269	36,6
2016	770	323	41,9
2017	773	353	45,7
2018	830	379	45,7

EUROPEAN BOATING INDUSTRY:
*«On Monday, 3 June 2019, European Boating Industry held its Assembly General. The Council unanimously appointed Jean-Pierre **Goudant** (FIN – France), as the President»*.

BOAT SHOW DÜSSELDORF 2019

WELCOME ON BOARD

Boot Show 2019 set a new record, with almost 2,000 exhibitors from 73 countries and displays covering 220,000 m² of stand space. Nearly 250,000 water sports fans (Boot 2018: 247,000 visitors) came to Düsseldorf from over 100 countries

A window onto next year, the Boat show in Düsseldorf is an anticipation of the trends of the approaching nautical season. Parent companies are hard to find, often replaced by important dealers such as Marx and Allpa. According to official figures, the exhibitors will be 2 thousand, 60% of which foreigners, for 220 thousand square metres of exposition. Absent CAT, FPT Industrial, MAN, MTU, the only star of the exposition comes from France. We spoke to Gregorio Passani, COO of Nanni Diesel, in the last issue. The Platinum series by Scania has reached its peak with the official presentation of the N16.1100 Cr3. The 16 litre truck-derived engine (that holds, with Volvo, the record for road power, over 700 hp) yields 809 kW and logs the best specific consumption at 1,600 rpm, with 4,027 Nm. Nanni thus completes the upgrade of its range, which began with the Silver series by John Deere.

According to the exhibitors, Düsseldorf has proven over the years to be an important meeting point. Obvious logistic limitations prevent targets and engines of important size and power from being present. Off-shores and Scania-based Nanni Diesel 16 litres are under the spotlight. We discussed with Nanni in the previous issue of Diesel International

The 1,500 boats displayed in Düsseldorf are intended mainly for two propulsion types: petrol driven offshore and diesel or petrol inboard up to 200 hp. Another target of interest for the exhibitors, following an expanding trend, is the chase boat, which substitutes the tender and relieves the burden of parking by offering the shipowner a flexible alternative to mooring. The most active shipyards in chase boats are Cranchi (manor of Volvo Penta), SACS, Fairline, Princess and Fjord. Another emerging trend is the 'fractional ownership': specialised agencies allow the partial purchase of the boat, a third, a sixth or a ninth, for a right of use between six and eight weeks in the water per year. Cummins turned up with the QSB6.7, available also in its slim version to satisfy the reduced volumes of the engine compartment of planing and sailing boats. The 6 cylinder with 1.1 litre liner (AxC 107 x 124 mm) yields 550 hp in its most aggressive calibration, amounting to 405 kW at 3,300 rpm. Only the pamphlet of the QSK95 was available, for obvious lack of space. The 16 cylinder, relatively to its displacement, represents the state-of-the-art for shipbuilding. The common rail and dual turbine (one blower per cylinder bank) reach just over 3 MegaWatt of power, both at variable and fixed rpm for on board generation.

Volvo Penta brings almost the full team, the Duoprop system installed on D3 and D6, D2 and D8, Its1350 and V8 for petrol.

Yanmar as well displays an anthology of workhorses, in symbiosis with common rail, like the 6LY, a 324 kW 5.8 litre engine and the V8, a 4.46 litre engine yielding 272 kW. Further innovations come from big size outboard, such as the Dtorque, a diesel 2 cylinder with Bosch injection, and the 7Marine. Fully aluminum, the 627 is a 6.1 litre engine yielding as many as 468 kW at 5,600 rpm. The Yamaha F375 Ito is described in the box.

Markus Bierhoff

YAMAHA F375 XTO

F375 XTO is the youngest of the Yamaha, only a few months from the 425 hp V8 XTO. 5.6 litres, 375 hp, direct injection and inte-grated electric steering system.The direct injection system features five fuel pumps and generates an injection pressure up to 200 bar. The three-stage injection system includes two independent fuel pumps.

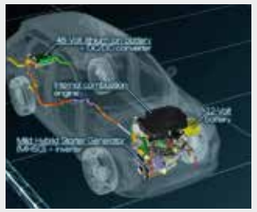
The F375 XTO is equipped with a two-stage water pump and a double chamber oil pump, each designed for constant operation, suitable for high rpm. In addition to an oversized gearbox, reinforced gears and sturdy mounting plate and engine mountings, the F375 XTO utilises plasma fusion technology for the cylinder liners. It will be available next autumn, in the classic Yamaha grey.

HYUNDAI SEASALL

CRUISING ON AN SUV

TUCSON: MILD-HYBRID ON THE ROAD

Hyundai has replicated the success of its Tucson Suv mild hybrid associated to the 185 hp 2 litre diesel engine, with the 136 hp 6 litre CRDi. The 48 V mild hybrid system is based on three fundamental elements: first of all the 48V battery, a 0.46 kWh lithium polymer ion accumulator located under the luggage compartment. The core consists of the MHSG device, the motor-generator connected with a belt to the crankshaft of the 4 cylinder 1,591 cc turbodiesel engine with 136 cv Euro6d emissions and 320 Nm maximum torque. This motor-generator is capable of yielding 12 kW power and 55 Nm torque. The last element is the Lcd controller-converter (Low Voltage DC/DC) which, amongst his secondary functions, can stabilise the general circuit of the suv Hyundai at 12V.



"ASIDE": *«The diesel outboard market is expected to replace existing gasoline outboards in Korea. We expect the S30-OB to play an important role as a cash cow in the company,» said* ***Seung-Kab Jeong****, CEO of Hyundai SeasAll.* The S30-OB diesel outboard was unveiled during the Gyeonggi International Boat Show, in May 2019. The engine is the highest power diesel outboard-type motor currently in *production with a maximum output of* **270 hp.**

It's a short step from the center line of the road to the rear wake of a boat. Hyundai Seasall profits from its domestic connections with automotive both for yachting, with the High Speed series, and for work boats, with the Commercial series.
U140 marinises the 1,600 Hyundai Tucson, which will make its appearance on the Hyundai Seasall listing next spring. Downsized compared to the previous 1.7 litre engine in order to comply with the EuroD temp, it has been listed amongst the low environmental impact engines by the French and German governments. The CRDi yields 100 kW and 320 Nm and is coupled in the mild hybrid version to a 12kW and 55 Nm mono-generator and to an LCD converter. The battery is 48 V, the 0.46 kWh lithium polymer ion accumulator is located under the luggage compartment on the Tucson.
Alongside the marinised CRDi will be the R200 and the S270. The former yields 147 kW (200 hp) at 3,800 rpm, it's a 2.2 litre 4 cylinder engine (AxC 85.4 x 96 mm), with Bosch common rail and variable geometry turbo. The shafting is completed with an inverter and Mercury foot. Rcd 2 certified, it doesn't require post-treatment.
The engine on the launch pad changes cooling system and housings, which have been adapted to enable coupling with the foot.
Higher engine capacity for the S270, a V 6 cylinder with a 3 litre compact graphite monoblock (Bore x Stroke 84x89 mm) with 4 valves per cylinder, which reaches 199 kW (270 hp) at 3,800 rpm, with 1,800 Bosch common rail and Vgt. In the 4-wheel mainstream scene, the Hyundai Santa Fe engine is by far the most sold of the Korean brand. Amongst its applications are taxis for the Venetian laguna, police pilot boats and boats equipped for the San Marco Battalion. The manufacturer lists as its pluses the reduced consumption (circa 25 litres/hour at cruising speed) and minimised vibration, thanks also to its V architecture. The inverter is by ZF.
To conclude, an overview of the Commercial series. The H signature is available with two calibrations, in hp, at 1,800 and 2,000 rpm: H380 and H410. It's a 9.96 litre inline 6 cylinder engine with Delphi electric injection pumps and eVgt.
Another striking element is the peak torque at 1,100 rpm. The 380 is applied mostly on fishing vessels, a sector that, for example in Sicily, is still thriving, the 410 is applied on intermediate applications such as passenger transport. The 6 cylinder 12.7 litre inline engine, by L500, uses waste gate and Delphi injection pumps. The 500 hp (367.6 kW) are available at 1,800 rpm, whereas the 400 already at 1,200. The torque curve is stable between 1,100 and 1,300. The L500 is by nature a labourer, suitable for tugboats, pilot boats and trawl fishing. Since 2019 Hyundai has marketed calibrations over 1,800 rpm: the L600, at 2,000 rpm, for passenger transport; the L700, at 2,300 rpm, for leisure and light duty commercial.
Its activity reaches 1,500 hours, and not 400 hours like pure leisure.

From 2020 Hyundai Tucson's 1,600 cc will be also available in its marinised version by Hyundai Seasall. Its automotive origins can be seen in injection, phasing and supercharging

BRAND MODEL	HYUNDAI SEASALL R200	HYUNDAI SEASALL S270S
I. D.		
B x S mm - S/B	85 x 96 - 1,12	84 x 89 - 1,06
N. cil. - dm³	4 - 2,20	6 - 2,95
Maximum power kW - rpm	147 - 3.800	**199** - 3.800
Mep at max power bar	**21,5**	21,7
Piston speed m/s	12,2	**11,3**
Maximum torque Nm - rpm	431 - 2.000	**568** - 2.000
Torque at max power Nm	372	**500**
% power at max torque (kW)	61,4 (90)	59,80 (**119**)
DETAILS		
Specific power kW/dm³	66,8	**67,3**
Specific torque Nm/dm³	**195,9**	191,9

VOLVO PENTA D4, D6 AND D8

A BREATH OF FRESH AIR

Chief Project Manager, Petter **ANDOLF**: «*Even though the IPS and Aquamatic sterndrive were already superior propulsion systems, at Volvo Penta we listen to our customers and strive to deliver the highest boating standards. So in 2019 we have given both the IPS and the sterndrive a thorough revamp*».

THE PROGRESSION OF SELF-DOCKING

Last year Volvo Penta unveiled its innovative self-docking concept. In a live demonstration a 68 ft yacht automatically maneuvered itself into a docking berth. This year, Volvo presented the current state of the development of this technology.
In fact, boaters are already asking for a technology that can assist in tricky maneuvers without the need of a continuous manual adjustment. The first step is the assist phase and it is currently in the development stage and set to be launched in 2020. The second step will be the automatic avoiding of obstacles.
The development is involving new components, mostly software enhancements that help existing systems work in a more integrated manner. This solution will use the functions of Volvo Penta's IPS joystick and Dynamic Positioning System to realize the assisted docking/maneuvering functionality.

Like the new hit song for the summer, that comes out right before the hot season so that you can sing it for the next three months, Volvo Penta decided to come out with big news that will surely bring up the discussion during the marine season. The big announcement is that Volvo Penta decided to give a new life to the 'D family' of its engines, focusing in particular on the D4, the D6 and the D8, together with the inclusion of the IPS and the new Aquamatic sterndrive (DPI).
Starting from the VIPs of this event, both the D4 and the D6 got a full update with the clear aim to grant them more raw power, an objective that was achieved by using all Volvo Penta's available know-how and by making substantial changes. In fact,

Volvo Penta came prepared to the summer of this year, with quite big surprises to bring to the seaside both for work and for leisure. The names and the looks are already well-known, but, like a present, the real surprise is inside. We are talking about the new concepts that Volvo Penta presented for the D4, the D6 and the D8 engines for the marine sector

Petter Andolf, Chief Project Manager for the D4 and D6 rework, explained: «*The list of performance upgrades is lengthy and includes a new engine management system, new fuel injection system, new turbocharger and a new supercharger*». Clearly not just some small adjustments here and there; we are looking at proper 'new old' engines. So, we can start to dig right into this new structure. Starting from the already mentioned power, the D4 and D6 deliver performance outputs between 110 and 350 kW (150 and 480 hp). In top specification the D4 now is able to reach an output of 235 kW (320 hp), while the D6 in top spec boasts 350 kW (480 hp). All specifications are available in either 12 or 24 V. These figures represent a double digit increase from the past, with 10% more power across the range. It is also worth mentioning that their fuel efficiency followed the positive trend, with an increase between 1% up to 7% (in E5 cycle).
And, of course, there is more. «*The majority of the components are re-engineered to manage the increased power as well as reaching the extended reliability targets*» explained Ingela Nordström, Product Manager for the D4 and D6 engines. The cylinder head, pistons and valves are new, to cope with the increased performance, and the crankshaft is also now stronger to handle bigger loads. New materials were also brought into the game. For example, a Diamond Like Carbon (DLC) coating was used on the piston pin to reduce friction and increase durability. The common rail fuel injection system now can work really well 'under pressure', up to 2,000 bar. All the package is under control by the new Engine Management System, that allows for more precise calibration of parameters controlling the injection, so that the engines can run smoother and deliver more fuel efficiency at the same time.
New components? New design? What about the maintenance of all this new package? Volvo Penta brought a clear answer for this issue. This new generation of D4 and D6 offers reduced maintenance costs, thanks to extended service intervals, fewer service items, and simpler maintenance operations. Moreover, the upgraded Electronic Vessel Control (EVC) system delivers improved service capabilities through an onboard service assistant that provides information about time left to next service. The icing on the cake? Each propulsion system comes as one complete package, with the installation dimensions that are basically the same as the previous generation.
These engines usually don't work alone. This is why Volvo Penta decided to provide a new style also to its Inboard Performance System (IPS). The Swedish manufacturer focused on updating the serviceability, reliability, and performance of its IPS. First of all, now it simpler than ever before to monitor and service the IPS system. Filters and oil can now be accessed directly from inside the hull and the oil only needs changing every second year. Quite a difference, considering that now the oil exchange can be done with the boat inside the water. There

NEW GENERATION OF GENSETS

Volvo Penta improved its efforts in the development of gensets to answer the current requests of the market. Following this path, the Swedish manufacturer recently presented the new D8 and D16 gensets. The D8 was presented as the "complete solution for a ship's onboard power requirements" and so it comes complete with engine, generator and monitoring system. A convenient package ready for installation. The D8 MG (Marine Genset) is an in-line 6-cylinder, marine diesel genset using common-rail fuel injection, double overhead camshafts, and a twin-entry turbo with pulse charging. It delivers power in 50 Hz and 60 Hz in a range from 136 kWe to 250 kWe. The focus is on compactness, in favor of vessels that have to maximize volume for payload.

The D16 genset comes as the answer to the increasing requests of alternative propulsion systems, for hybrid and diesel-electric vessels. Therefore, the D16 range received an upgrade to meet 450 and 500 kW. These IMO II-compliant engines now produce 479 kWm at 1,500 rpm and 532 kWm at 1,800 kWm. This corresponds to a 50 Hz genset providing 450 kWe or 500 kWe at 60 Hz.

Clearly, two new packages that have the potential to bring quite the difference for marine customers.

are also sensors reading the differential oil pressure to rapidly identify the clogging of filters. Also, a water in oil sensor was added to detect any ingress of water in an early state, preventing damages to the transmission. Volvo Penta really wanted to underline how reliable this kind of system can be, therefore they proceeded to reinforce the gear material with high strength steel. The propeller shaft seal, input bearing carrier and upper shaft and bearings have also all been redesigned in favor of durability.

Volvo Penta was clearly not satisfied enough with all these changes, for this reason it decided to introduce some of them also to the DPI. The new hydraulic clutch now allows silent and smooth shifting. It also enables slipping at low engine speeds for greater maneuverability. The hydraulic clutch, together with electric steering now standard for DPI, gives improved joystick docking functionality. It also enabled the introduction of the Dynamic Positioning System, which automatically maintains a boat's heading and position, even during strong currents or windy conditions, ideal for docking. We at Diesel International have had the opportunity to test these changes directly at sea. The improvement is palpable when you're on board.

«An electrical output of 450/500 kWe has developed into a near standard for coastal heavy-duty installations, where gensets are part of the propulsion system. With these new power ratings Volvo Penta's D16 genset is now part of this standard»

As already mentioned, this is not all: Volvo Penta also presented its new concept for the D8 MH. The D8 was given a heavy-duty 1-2 rating, making it available to power heavy duty applications such as pilot boats and tugboats. This version of the engine will start its journey of emissions coverage with IMO II, USA EPA 3 and China 2 ratings, to answer current market demands, and it will then proceed towards IMO III. The D8 MH is an in-line 6-cylinder, 7.7-liter diesel engine with common-rail fuel injection, double overhead camshafts and twin-entry turbo. It comes with a ladder frame bolted to the engine block and features a rigid cast-iron cylinder block and cylinder head. **A.F.**

Product Planning Manager, Marine Commercial, Thomas **LANTZ**, about D16: *«This is an important improvement in that it delivers power and yet consumes less fuel in doing so»*.

ELECTRIC-POWERED FERRY

Starting from the Gothenburg's ElectriCity project, an all-electric ferry service will join the City's existing electric bus service. The electric marine propulsion system is provided by Volvo Penta, who joins the initiative following the success of Volvo Buses. Volvo Buses supplied the buses to the Route 55 electric bus route and the electric articulated buses on Route 16. Aimed to be the model of future clean urban development, the new electric-powered ferry will link both sides of the Göta River. While Gothenburg's waterways already feature ferries powered by electricity, in the form of diesel-electric engines, these operate on short routes across the river. ElectriCity's Volvo Penta-powered electric vessel, meanwhile, will be the first fully-electric ferry in the city. They will be able to complete longer, multi-stop routes along the river, and ultimately incorporate quick charging capabilities. The opening of the route is part of a longer-term plan to introduce more clean energy ferry solutions. While also developing a marine demo arena. Cities around the world are often built around waterways and connecting on-road with on-water sustainable transport in a unified traffic system is a final objective.

ALSO FPT AND NANNI AT 1,000 HP

ON A WAVE OF ENTHUSIASM

Fabio **Buzzi** powered the three-point hull that reached the record speed of 277.5 Km/h with a FPT 16 liters diesel engine. He said to Diesel International: «*I hope that the engine manufacturers will stand up for Diesel engines. There is room for improvement, but the electric motor is not the panacea*».

The 1,000 HP range is basically a 13 liters domain. Best seller is Volvo Penta, the protagonist in 2017 of IPS 1350 launch, which is equipped with the 1,000 HP D13 (736 kW) that was joined by the Cursor 16, Diesel of the year in 2014. Nanni also deployed its big shots to fight back the competitors, the Scania – derived 13 liters, delivering 925 HP and an enviable weight-power ratio. A few months after Cannes, in Düsseldorf, Nanni Diesel introduced the Scania 16 liters which joins the 13 liters. Here we took into consideration the 13 liters and inserted the 16 liters in a box together with the MTU (both at 1,100 HP)

We have three 13 liters competitors, including the 16 FPT that matches the 13 liters displacement. MAN features the only 8 cylinders engine featuring the displacement and power of the V-series, and the 'out of range' 18 liters, the CAT C18.

This comparison includes the marine applications of the Cursor 16, four years after the Diesel of the Year and a year and a half after Fabio Buzzi's record. The 15.9 boosted by FPT and FB Design reached 1,700 HP and 277 km/h. At 1,000 HP we also find Nanni with Scania D13, challenging Caterpillar, Man, Mtu and the indestructible Volvo Penta. At 1,100 MTU and Nanni Diesel V8

The DIESEL index gathers the competitors in a small range of few percentage points. The C16 1000 features the Bosch 2200 bar common rail and a waste gate per bank (mounted in its industrial version on New Holland Fr650 and Fr780 harvesters and included in Himoinsa's HFW genset). The winning features of the C16 are the sturdiness and reliability of a 16 liters, calibrated to fit the dimensions of the Cursor 13, as shown by the comparison with the Cat C12.9, which is the overboosted evolution of marine Cursor 13. Power density meets off-road premises and ranks behind Volvo Penta D13. The index that measures the displacement/dimensions ratio rewards the Italian-Swiss 15.9 (if we consider the contribution of Arbon's research and development) in absolute value. Even the nominal torque, 3,058 Nm, enhances the responsiveness, translating the torque into response to transients and stresses on the joystick (maximum torque stands at 3,500 Nm). The air, water, oil and fuel circuits have been adapted to make the monobloc salt corrosion and water wear resistant. To ease the installation in yacht's engine room the kit includes a high-flow seawater pump, a heat exchanger for greater heat dissipation, anodized intake pipes, an air filter in epoxy material more resistant to salt and moisture and twisted wiring to provide maximum resistance against dirt, water and mud.

Nanni Diesel also stands at 1,000 HP and introduced the Platinum series following the agreement with Scania. After John Deere

BRAND MODEL	CATERPILLAR C12.9	FPT INDUSTRIAL C16 1000	MAN V8	NANNI DIESEL N 13.930 CR3	VOLVO PENTA D13 1000
I. D.					
B x S mm - S/B	135 x 150 - 1,11	141 x 170 - 1,21	128 x 157 - 1,23	130 x 160 - 1,23	131 x 158 - 1,21
N. cil. - dm3	6 - 12,88	6 - 15,92	8 - 16,16	6 - 12,74	6 - 12,77
Maximum power kW - rpm	735 - 2.300	**736** - 2.300	735 - 2.300	680 - 2.300	735 - 2.400
Mep at max power bar	30,4	24,6	**24,2**	28,4	29,3
Piston speed m/s	**11,5**	13	12	12,3	12,6
Maximum torque Nm - rpm	3.205 - 1.000	3500 - 1.500	3303 - 1.200	3145 - 1.700	**3.528** - 1.800
% power at max torque (kW)	33,6	37,6	34,9	36,2	**38**
Torque at max power Nm	3.048	**3.058**	3.048	2.822	2.920
% power at max torque (kW)	45,7 (336)	74,70 (550)	56,50 (415)	82,40 (560)	90,50 (**665**)
DETAILS					
Specific power kW/dm³	57	46,2	45,4	53,3	**57,5**
Specific torque Nm/dm³	248,8	219,7	204,3	246,8	**276,1**
Areal spec. power kW/dm$_2$	85,56	78,55	71,43	85,43	**90,85**
RULES AND BALANCE					
Dry weight kg	1.598	1.690	1.875	1.285	1.635
L x W x H mm	2.003x1.110x1.085	1.465x1.136x1.160	1.745x1.153x1.177	1.809x1.389x1.115	1.447x1.089x1.053
Volume m³	2,41	1,93	2,37	2,80	**1,66**
Weight/power kg/kW	2,2	2,3	2,6	**1,9**	2,2
Weight/displacement kg/dm³	124	106,1	116	**100,8**	128
Power density kW/m³	305	381,4	310,1	242,9	**442,8**
Total density t/m³	0,66	0,88	0,79	0,46	0,98
Displacement/volume dm³/m³	5,35	**8,25**	6,82	4,55	7,70

That 10 percent more: MTU and NANNI

V-shaped architecture, 8 cylinders, almost the same power, 810 and 809 kW. The rotation speed is different - 2,450 rpm for the 2000M84, 2,300 rpm for the N16 1100 Cr3 – and also the displacement, 17.86 liters for MTU (BxS 135 x 156 mm and 1.23 S/B ratio) and 16.35 for Scania derived Nanni (BxS 130 x 154 mm, 1.18 S/B ratio). The common features also include supercharging with double stage, turbo for each bank and common rail, Bosch for 2000 series, 2,400 bar XPI for N16. And what about nominal torque? Here Nanni takes off delivering 3,361 Nm compared to 3,156 Nm for MTU. Dimensions also speak French-Swedish: 2.02 vs 2.82 cubic meters.

13.5 Silver series it was the turn of the six cylinders, followed by the 8 V (see box). The MEP variation shows that the path is clear: Nanni wants to get out of lobsters and hulls under 80 feet, Scania, instead, focuses more on utility applications. The 12.7 liters could dare more in terms of torque but shows good specific power, delivering 53.3 kW per liter. Fuel is managed by XPI, which is still not evenly featured on offroad versions and could suffer from high sulfur diesel in marine applicatoins.

Also Volvo features 13 liters and double stage, showing a prudential stress index. This approach does not jeopardize a powerful power density. Even the maximum power/torque is the only equivalent to 90 percent of the power at the propeller with 665 kilowatts available.

The C12.9 comes in 1,000 HP version, contractually forbidden to its FPT C13 counterpart that the brand from Turin reached with its 16 liters. Compared to the family standard, the V8 by Man is a bit toned down. Its elder brother, also unveiled at Cannes as the Cursor 16, delivers instead 1,300 HP. ■

BRAND MODEL	CATERPILLAR CATERPILLAR C12.9	FPT INDUSTRIAL C16 1000	MAN V8	NANNI DIESEL N 13.930 CR3	VOLVO PENTA D13 1000
INDEX					
Torque	**17**	12,1	14,4	10,3	10,8
Performance	9,2	8,5	7,9	9,2	**9,9**
Stress	14,5	13,7	**12,7**	14,7	16
Lightness	**18,6**	16,3	16,5	15	18,1
Density	7,7	8,9	6,3	6,4	**12**
DIESEL INDEX	8,4	8,5	8,1	8,5	8,5

1 NANNI

2 FPT

3 VOLVO

A CHALLENGE FOR V12

IT'S A REAL PLEASURE

MAN Engines delivers its first MAN V12-2000 engine to AB Yachts. The Italian shipyard will install a three-engine system with ZF transmissions and MJP water jets. «We have been relying on engines from MAN Engines for a long time». says Francesco **Guidetti,** Head of AB Yachts. «*The new AB 100 will enable us to achieve new goals once again*» (See pag. 34)

We are in a pleasure boats range historically dominated by CAT, MAN and MTU. Baudouin came in with its platform promoted in synergy with Weichai. Therefore there is not only power generation, a sensitive target for the French in the last 2-3 years. Baudouin plays again the cards shown at SMM in Hamburg, now five years ago, for commercial applications. MAN strongly responded to MTU, winning the DIESEL Index.

Nuremberg chose the path of gradual upgrade of the two liters cylinder, step by step. And so 1,800 HP became 1,900 and finally 2,000, settling on top in the ranking. It was difficult to undermine the 12V2000M96L since that September 2014, when the 26.8 liters from Friedrichshafen showed its muscles for the first time in Cannes. What has changed in the 2000 series update? The three turbo in sequence trigger the central one for air compression and start the pistons, redesigned to improve nebulization in the combustion chamber. MTU engineering introduced a second air cooling element before igniting the combustion, in order to prevent the NOxs. Also the injectors were revised, Bosch has been confirmed but with a different nozzles profile and a high-pressure pump designed from scratch by L'Orange (which in the meantime was sold by Rolls-Royce to the Woodward group). Also the alternator features a higher capacity (the UC7 was replaced by the UC9), while the diesel filtration features another filter to purify residues, leaks and the dust in excess due to the increased air intake.

Baudouin entered a power range band that belongs to Caterpillar, MAN and MTU. The two German manufacturers are still facing each other step by step to relaunch a technological challenge and compete for performance supremacy. Man introduced the V12 2,000 hp update at the Cannes Yachting Festival last year and wins the DIESEL Index

A real show of strength that seemed to leave no way out. And instead the V12-2000, introduced at Cannes Motor Show in 2018 and released in February this year, came out of the lion's sleeve. This version has been conceived both as an answer to MTU and to the requests of shipyards - especially Italian ones - specialized in yachts over 80 feet. MAN takes the lead in all strategic indexes, specific curves and, above all, power density, where the V12-2000 has over 40 percentage points gap from the runner-up.

Let's focus on the other two competitors. Baudouin features a made in China cast iron engine block and European components such as Bosch 1,800 bar common rail and control unit, the cooling system with heat exchanger and aftercooler by the French Mota, and supercharging by Honeywell. A natural market could be that of the engine room of Ferretti yachts. As stated by President of SHIG-Weichai Group Tan Xuguang at the time of the acquisition

BRAND MODEL	BAUDOUIN 12 M26.3	CATERPILLAR C32 ACERT	MAN V12 - 2000	MTU 12 V2000 M96L
I. D.				
B x S mm - S/B	150 x 150 - 1	145 x 162 - 1.12	128 x 157 - 1.23	135 x 156 - 1.16
N. cil. - dm³	12 - 31.80	12 - 32.10	12 - 24.24	12 - 26.79
Maximum power kW - rpm	1214 - 2400	1420 - 2300	1342 - 2300	**1432** - 2450
Mep at max power bar	**19.5**	23.5	29.5	26.7
Piston speed m/s	**12**	12.4	**12**	12.7
Maximum torque Nm - rpm	4850 - 1400	5488 - 1400	**6500** - 1200	5566 - 1300
Torque rise %	**19.6**	21.9	34.4	26.6
% power at max torque (kW)	30	28.7	**38.4**	28.9
Torque at max power Nm	4831	**5890**	5566	5576
% power at max torque (kW)	58.6 (711)	56.70 (805)	60.90 (**817**)	52.90 (758)
DETAILS				
Specific power kW/dm³	38.1	44.2	**55.3**	53.4
Specific torque Nm/dm³	152.4	170.9	**268.1**	207.7
Areal spec. power kW/dm²	57.24	71.64	**86.92**	83.35
RULES AND BALANCE				
Dry weight kg	3.215	3.075	2.380	3.265
L x W x H mm	2333x1350x1494	2106x1482x1445	2139x1153x1265	2516x1293x1440
Volume m³	4.71	4.51	**3.12**	4.68
Weight/power kg/kW	2.6	2.2	**1.8**	2.3
Weight/displacement kg/dm³	101.1	**95.8**	98.2	121.8
Power density kW/m³	257.8	314.9	**430.1**	306
Total density t/m³	0.68	0.68	0.76	0.70
Displacement/volume dm³/m³	6.75	7.12	**7.77**	5.73

E-Motion

In 2018 at the Palais du Cinema in Cannes stands E-motion, a creature of the Italian company Diesel Center. The module design, consisting of MAN V12 - 2000, inverter, clutch and electric motor, shows competitive dimensions compared to the endothermic 16 cylinders. E-motion features seven modes. The endothermic draws on the diesel-electric with thermal in generator function to drive the propeller. The zero emissions and hotel applications, which relies entirely on batteries, differ in delta absorption. The operating time ranges from 90 minutes to 12 hours in hotel mode. Other modes are economy, which activates a single diesel engine cutting the consumption of a third, power boost, which works in parallel delivering 2,410 HP, and cruising boost. E-motion made its debut on an 86 and a 106 feet from San Lorenzo yard.

of Ferretti Group, «*there are several ossible synergies between SHIG-Weichai Group and Ferretti, which can be carried out through resources sharing and industrial integration*». Among the evergreens we find the C32 Acert from Caterpillar, which is positioned a few kW below the MTU 12 cylinders, running over 150 rpm less. Torque at maximum power is outstanding, while weight is not as good. Despite this, the yellow 32 liters is still the alternative to German dominance, also due to the reliability of the brand and its service network.

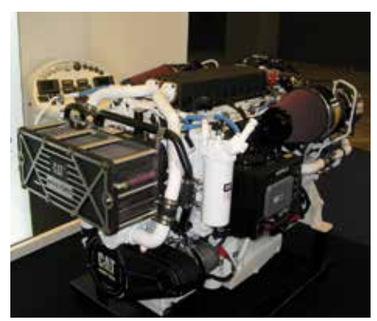
■

BRAND MODEL	BAUDOUIN BAUDOUIN 12 M26.3	CATERPILLAR C32 ACERT	MAN V12 - 2000	MTU 12 V2000 M96L
INDEX				
Torque	13	12,4	**15,3**	15,2
Performance	6,5	7,2	9,7	8,3
Stress	**10,5**	11,4	15,5	13,1
Lightness	16,9	16,1	14,1	19,2
Density	2,7	3,2	**6,1**	3,5
DIESEL INDEX	7,6	8	**9,2**	8,4

1 MAN

2 MTU

3 CATERPILLAR



WIDER 165, MAN AND EST FLOATTECH

LUXURY LIKES HYBRID

“Marche’s shypyard not only involved the yacht designer Fulvio De Simoni and Lelio Falletta’s naval architecture firm Sydac (one of the most popular today) but also overturned the layout of MAN driveline thanks to partners such as Nidec and EST Floattech, continuing the journey started with the younger brother Wider 150”

MAN D2876 LE443

What's powering the Wider 165? The well-known MAN D2876 LE443, a six-cylinder in line that traveled so much onroad (on trucks) and whose medium duty version delivers 500 kW, here lowered to 350 kW in continuous use. In fact, medium duty means for MAN 3,000 hours per year and 50% average load, so cutting 30% of power made it fit for the Wider 165. Besides that we find the two-liter cylinder with 4-valve head, turbocharger with intercooler and waste gate and Bosch injection pump. Choosing a 2 + 2 configuration (but don't worry, the four engines can sustain the same loads under the wise direction of Nidec's PMS when needed) and the variable speed operating logic surely provide infinite combinations of operating modes. For example, battery packs can be recharged both at the dock station (provided you find a suitable power connection) or en route. In this case the various loads (pods, on-board services and battery recharging) add up and the engines adjust the power supplied to the total load.

EST Floattech

Green Orca was developed by EST Floattech for marine use and is built around the lithium NMC (Nickel Manganese Cobalt Oxide) polymer cells made by the Korean company Kokam. The cells are assembled with particular care and have a much smaller footprint compared to the prismatic or cylindrical ones. Built according to DNV-GL and Norwegian Maritime Authority (NAM) regulations these cells feature a couple of solutions to prevent the risk of fire before BMS itself. Each module is independent and any gas leakage from the batteries is conveyed outside the danger areas. C-rate is 2 in discharge and 1 in charge but for 10 seconds you can go to a 3C. The capacity of each module is 10.5 kWh while the total capacity is 544 kWh, with 52V nominal voltage for the single module.

Results are for all to see, as confirmed by the coveted prize in the 'Displacement motor yacht between 300 and 499GT - 48m and above' category at the World Superyachts Awards 2019. On board there's everything and more: the owner's cabin featuring a foldable terrace, 4/5 cabins for guests that include common spaces (lounges and extendable beach club) and a salt-water swimming pool (which is also a launch platform for a submarine), sauna, gym and a couple of Jacuzzis. Guests can easily travel by helicopter thanks to the helipad at the bow. For those who are not interested in the submarine, a 10 meter tender can take the place of the 8 meter tender. We also have a crew area, featuring 5 double cabins plus one for the captain, as well as dedicated kitchen, canteen and recreational area.The aluminum hull, almost 50 meters long and named Cecilia, features a hybrid engine like its younger brother Wider 150 and the engine room for the four MAN engines delivering 350 kW each placed in the bow. Power is no longer brought to propellers through classic axles but simple electric cables. That's a great advantage in terms of space and comfort: moving the machine room freed the most valued areas, which are precisely those in the stern where the boat movement is less perceivable. A total 1,400 kW drive through Nidec Power Management System (PMS) (which also supplied the Human Machine Interface - HMI -, the black box and remote control systems) the two azimuthal pods (obviously the traditional helm is no longer needed) VETH VZ 450 CRE delivering 533 kW each and featuring two counter-rotating propellers (4 blades front, 5 rear) and the two 70 kW thrusters. The engines work in pairs and each pair drives a pod and a thurster, has its own battery pack and helps powering the yacht's loads. Performances are top notch, above all in terms of efficiency.

Traveling at a maximum speed of 13 knots you can travel up to 2,000 nautical miles, which become 3,000 (with standard 52,000 liter tank) at the cruising speed of 11.7 knots, and even 4,700 traveling at the economic speed of 10 knots or 5,000 at 9 knots. Of course these are indicative values, since they can be heavily influenced by sea conditions. Fuel consumption in eco mode (84 liters/hour) is surely interesting, but the absence of vibrations and noise due to the new location of the engine room and the absence of the crankshaft is absolutely extraordinary.

LATEST NEWS

On 5 July 2019, Wider has been acquired by Monaco-based group Nautical Hybrid Tech, headed up by Marcello Maggi, in partnership with Zepter Group and Hopafi Holding

WIDER 165 IN FIGURES

Manufacturer	WIDER YACHTS
Endothermic Engine	MAN
Displacement	12,82 lt
Engines/Max. Power	4/350 kW
Batteries: Brand/Model	EST Floatech ORCA
Batteries features	1050 Poly LI NMC
Capacity	10,5 kWh
Total Capacity	544 kWh
C-Rate Charge	1 C
C-Rate Discharge	2 C
Cycles	>20.000
Amplitude	400 V

AND THE WINNER IS...

«The system allows for fuel economy as her pair of 535kW gensets, which supply house load as well as propulsive power, are a third of the output of those found aboard Cecilia's competitors»

MAN AND AB YACHTS

PLANING AT THE TOP

BENETTI FB 272. GIGAYACHT WITH CAT

There are once again crazy numbers behind Benetti's latest creation, a giga yacht that is 100 m long and 17 m wide, has a total of 6 decks (and some rooms on the main deck fitted with windows that are 3 metres tall) and a gross tonnage above 5,500.
She is fitted with 6 diesel engines (despite the silence surrounding these yachts and their owners, she is likely to be fitted with CAT generators, probably six C32 derated to 1000 kW each) feeding two Azipod propellers, 2,200 kW each.
The spare kW are used to feed the hunger for energy of onboard systems: onboard climate experts Heinen&Hopman provided the giga yacht with an air conditioning system that, alone, consumes a minimum of 600 kW; in addition, there are over 500 km of cables running across her structure to power onboard motors and all of onboard service appliances.
But what impresses most about her is certainly her 35 ton battery pack that can operate the yacht for up to 12 hours with no need to start the engine.
Her hybrid propulsion system was realised with technological support from Caterpillar, Seastema (Fincantieri Group) and ABB.

In an age when environmental activists are heralding the apocalypse and simply uttering the word diesel can make you feel as uncomfortable as a beef farmer at a vegan gathering, there are still those who enjoy a nice wave ride at more than 100 km/h. Actually, said boat speed would be best measured as "55 knots", but the charm of the 100 km/h barrier is definitely hard to beat.
Tuscany-based AB Yacht does break such barrier with a breath-taking 100 feet boat (no less than 30.48 metres) powered by MAN V12-2000 engines supplied to the AB shipyard of Viareggio by Ranieri Tonissi, Italian dealer of the lion-branded engines from the Nuremberg manufacturer.
And, speaking of MAN engines, AB Yacht features even three of them, totalling 6000 Hp: again, said engine power would be best expressed as 4412 kW but measuring it the old-fashioned way does make quite an impression.

It's not just about their astounding size anymore: large yachts are now meant to push the boundaries of current technology... and they do, with figures that never fail to impress, whether it's the over 4400 kW and 55 knots of AB Yacht 100 or the 100 metres and 35-ton battery of Benetti's FB 272

And, by the way, since we are speaking of a 24.2 liter engine, specific power reaches a monstrous 55,3 kW/l (over 75.2 HP per liter!) for a weight of only 1.8 kg/kW.
But this engine's true nature is only revealed by its specific values. At a first glance, indeed, geometric parameters are nothing out of the ordinary, and its 98.18 kg/l global density or its 7.66 kg/l relative density - 0.75 kg/l absolute density do not leave us filled with wonder.
But when considered in combination with a specific power of 55,3 kW/l and to an areal power of 86,92 kW/dm^2, one can instantly see how this engine superbly matches the sheer precision of materials usage with a performance of absolute excellence.
A performance that stems from accurate technical choices:

first and foremost, a linear speed slightly above 12 m/s that commands respect, made possible by the brisk 2,000 rpm engine speed the boat can reach, and a stroke ratio that vastly exceed 1.2; but what's truly astonishing, is the mean effective pressure, reaching a stellar 31.66 bar.
The credit for such specific values does not go entirely to mechanical sizing. The engines' intended use also play a substantial role, with engines only required to deliver their maximum power for a few hours a year.
To be precise, according to MAN, the anticipated usage profile stands at below 1000 hours a year, of which less than 20% at full power.
Sounds reasonable, considering that sailing at a speed of over 50 knots, albeit exhilarating (and despite the excellent integrity and comfort of the hull 'made-in-Viareggio') can get quite challenging, not least because of fuel consumption per hour. Indeed, this easily waltzes up to 1000 l/h, and does not get much lower than that, even when cruising slower (but one might argue that 45 knots is not that slow, actually).
As for the engine architecture, it is not a novelty for the German manufacturer: 12 cylinders in 90° V arrangement, common rail, quite obviously featuring a turbocharger that boasts a new design, just like the cylinder heads. To ensure a smooth handling of performance over time, there are also a newly designed cooling system and a further reinforced crankcase.

Alberto Scalchi

SUNREEF AND JOHN DEERE

ALL TOGETHER FOR THE SAIL

The Sunreef 80 Power is approaching its debut. Below deck will house the 13.5 liters by John Deere Power System, a natural evolution of a path that starts from afar.

It was easy for 2018 edition of Boat Exhibition's visitors in Vieux port in Cannes to fall in love with the brand new Sunreef 80 because of its innovative style which still follow the traditional design of the company. Sunreef definition is to offer not only great boats, in this case catamarans, but provide a luxury product by customising each product on customer's choice with high performance and quality products.

Sunreef choose to motorize its models with most efficient John Deere's engines: as Sebastian Mrówczyńsky, referent for Techbud, the official JDPS dealer in Poland, states «*Whenever a client requests fuel economy and long life, we recommend John Deere engines; they offer the best balance between speed and fuel consumption*».

It's important to analyse the reason of the success of Sunreef /JDPS partnership.

During September 2018, in front of the Cannes Croisette boulevard, Sunreef showcased catamarans equipped with 4.5Lts and 6.8Lts for Sunreef 80 7X Split which are used for all 60, 70, 80 series: the high request of order for their customized products affirmed the success of the latest sailboat catamaran and confirmed the use of 13.5 liters diesel engines for the new Sunreef Power 80 which will be launched in the second half of the year.

Sunreef 80 confirms its position in providing one of the best products for luxury leisure due to its customized design and never-ending attention to details for very exigent customers. Offering an overall elegant and fresh image, the customization lies within its space completely dedicated to offer extreme comfort for special and relaxing sailing experience. The new design of Sunreef 80, completely designed by their in-house architects, brings the catamaran to look like a modern sailing superyacht: the profile is highlighted by a dark glazed surface on the main deck which looks like a continuous piece of glass.

On the other hand, functionality is the key-factor both for interior decoration and for cruise/sailing performance. The Polish manufacturer suggest eight options for interior division of spaces (living spaces are about 340sqm) and provides a high quality of up-to-dated design furniture. The spacious cabins in the hulls make feel more like those in on a motor yacht. Made of composite, its length is 24.4 meters with a maximum beam of 11.5 meters. The main sail is 200sqm, while the Genoa is 3155sqm.

The luxurious experience relies also in the new technology of the two 13.5Lts engines (4-valves per cylinder) perfectly adapting to a relaxing cruise experience: «*John Deere engines build power faster and cruise at a higher speed with lower rpm, less noise and greater fuel efficiency*» Francis Lapp, founder and owner of Sunreef Yachts declared. «*They ensure our customized, luxury vessels offer stress-free cruising in any weather conditions*».

The propulsion power rating of 6135AFM85 (Turbocharged and aftercooled, air-to-engine coolant model) has a range of 272 – 429 kW (365 – 575 hp), while 6135SFM85 (seawater tubocharged and aftercooled model) has a range of 317 – 559 kW (425 – 750 hp). Very important for JDPS and Sunreef is that their engines satisfy IMO and EPA requirements.

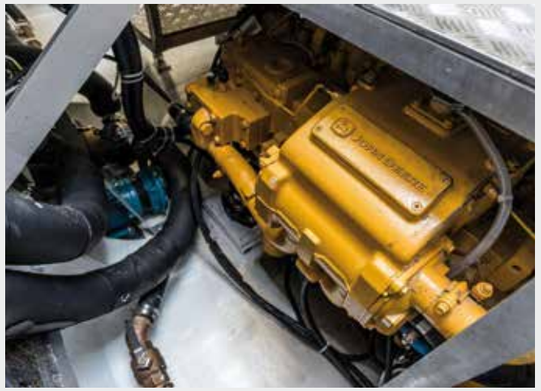
Roberta Ronda

The luxury experience of the new SUNREEF POWER 80: the choice of engines makes the difference. The catamaran is powered by 13.5 liters displacement diesel engines manufactured by John Deere Power System

The new 4045SFM85 has two ratings, an M4 rating with 205 kW (275 hp) at 2600 rpm and M5 rating with 235 kW (315 hp) at 2800 rpm. «*The sea trials offered us the opportunity to evaluate the installation and performance of the 4045S in varied boating applications,*» Mike ***Van Donsel*** said, senior marine application engineer.

DEER LIKES SALTY WATER

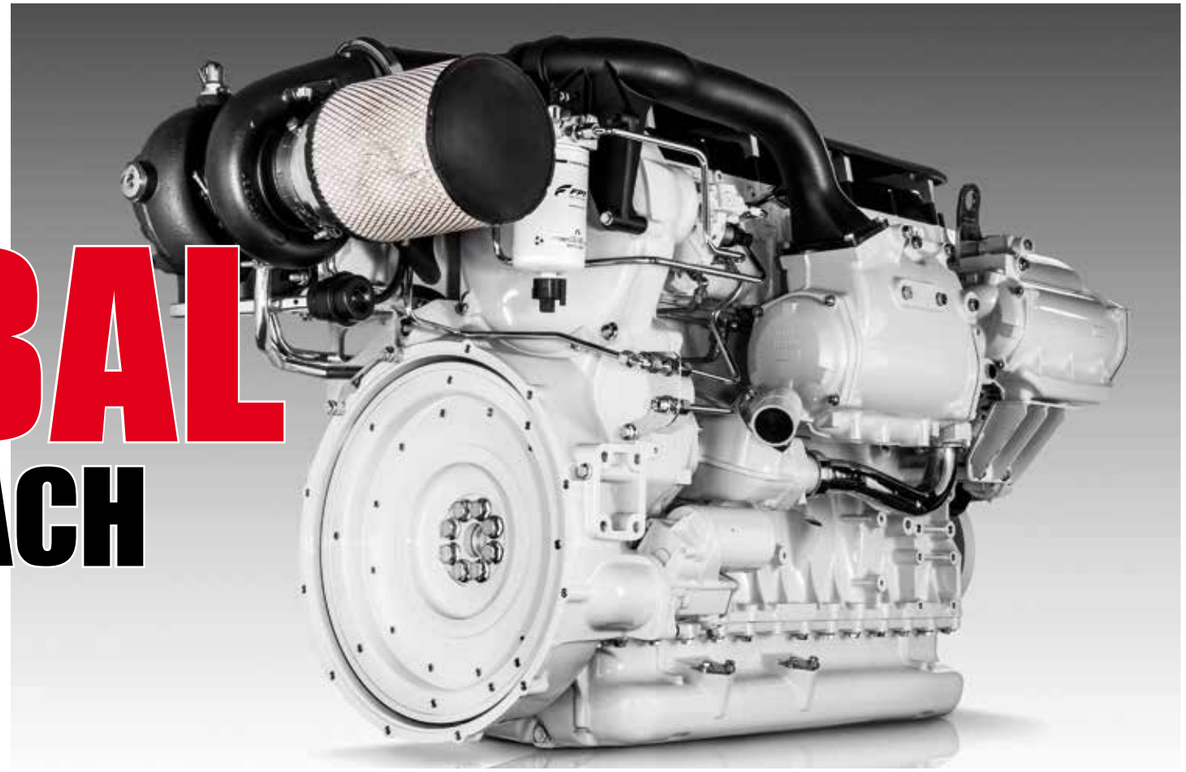
Able to provide a power curve from 56 to 599 kilowatts, the marinized versions of the industrial John Deere engines feel comfortable to power light commercial boats and also fit well below the yachts engines vain, as demonstrated by the motorization of the Sunreef catamarans. The top of the range of the Deer's family is the PowerTech 13.5L, complying IMO Tier III emissions standards. The six in-line cylinders (BxS 135 x 162 mm) is turbocharged and air-to-air aftercooled. No nostalgia for the original agricultural application: The 4-valve cylinder head provides a better transient response and ECU calls the tune of common rail, with injection pressures up to 2,000 bar.



At 2,200 rpm the 13.5 liters engine provides 559 kW at the top. The torque@maximum power is 2,421 Nm. Power density? 426,7 kW.

FPT INDUSTRIAL AND FINCANTIERI

FOR A GLOBAL APPROACH



FPT Industrial and the sea is a relationship that has gradually been harmonized, to the point that marine environment is becoming one of the natural habitats of CNH Industrial's Powertrain Division. In Cannes 2018 the marine version of 1,000 HP Cursor 16 was launched. Then the announcement of the 'gentlemen agreement' with Fincantieri, a platform that projects the FPT hologram well beyond the seven seas.

Massimo **Rubatto**, Industrial Vice President, Global sales, has thus framed the interaction between the two multinationals with their heart in Italy and their branches spread across the globe: «*We are proud to become a preferred supplier of Fincantieri: this strategic partnership confirms our leadership in powertrain technology for marine applications*».
Diesel International has gone further. We asked Guglielmo **Tummarello**, Sales Director of Fpt Industrial marine division to introduce us to this collaboration.

FPT Industrial and Fincantieri signed a strategic partnership. The agreement was announced during the International WorkBoat Show which took place in New Orleans, USA, in late November 2018

Good morning, Tummarello. What does the existing contract contains?
More than a commercial agreement, it is a strategic partnership. FPT and Fincantieri have agreed on the synergic development of some projects. The coordinates of the two players are converging: Fincantieri thus meets the need to identify a preferential supplier in the propulsion area.
For FPT, on the other hand, it is an opportunity to continue the path taken for some time towards a global development, not only in terms of geographic expansion but of emancipation from our "comfort zone", also in terms of applications. Fincantieri is in fact oriented towards 'custom' and 'tailor made' solutions.
When we talk about more innovative propulsion we are not referring to the so-called alternative systems, but to ad hoc solutions, which are not part of the standardization in our portfolio.
To give you an example, starting from the base of the C9 (editor's note: exhibited at the Fincantieri stand at the IWBS in New Orleans) *we will implement features such as cold startability to guarantee ignition under extreme environmental conditions or the SOLAS kit to allow the engine working even if turned 360°. Other features include the number, type and location of the filters designed to extend the TBO, to reduce and simplify routine maintenance and thus minimize downtime. We cannot add details at the moment. But surely we will be involved in very different projects, as are the areas in which Fincantieri operates, including military applications. In general, the availability of motorizations involves a very wide range of solutions, for example, at the propulsive level, with multiple configurations. Auxiliary applications are also included in the target.*

Massimo **Rubatto**, FPT Industrial Vice President, Global Sales: «*We powered the world's fastest diesel powerboat this year with our Cursor 16 engine, achieving a speed of 277.5 km/h and breaking a Guinness World Records looking at several niches and applications*».

Will there be only diesel engines at the core of the common platform?
The solutions engineered by Fpt independently will converge, as soon as they are available, in the common portfolio of Fincantieri. The agreement is focused on diesel engines, not on 'exotic' scenarios, at least at present.

Which are the implications on onboard generation?
We can anticipate that Fincantieri has involved us in a series of projects. In the background of this involvement is our product development program which will complement all propulsion engines with a genset version.

Why at the International WorkBoat show?
It is one of the most interesting fairs in the lively and strategic market of North America. That resonance chamber, so far from Italy, allows us to emphasize the international dimension of FPT Industrial, in tune with that of Fincantieri.

FPT, WHEN ART IS THE ENGINE

The connection between FPT Industrial and the arts implies a logical thread: the meaning of manufacturing as an expression of human creativity, which contains the roots of the artistic expression in its DNA. In Venice, this bond can be seen in two suggestive locations: the Galleries of the Academy of Venice, home of the celebration of Leonardo Da Vinci's 500 years, and the Arsenale, in the Italian Pavilion. The exhibition 'The man is a model of the world' shows both scientific research (such as Vitruvian Man) and the preparatory steps of some paintings. At the Italian Pavilion of the Biennale di Arte, of which FPT is the main sponsor, a labyrinth leads visitors to the sense of discovery. A path that that is very close to the logic of a research laboratory. On the other side of the Arsenale, anchored in front of the FPT stand at the Boat Show, there is 'Consider yourself as a guest (Cornucopia)' by Christian Holstad, a symbol of prosperity made with plastic waste. The symbolic meaning of the work is connected with the Clean Sea Life project, which involves FPT together with twelve fishing boats in the 'fishing' of plastic objects in the Adriatic Sea.

LIEBHERR AND WÄRTSILÄ: W14

WHAT NOBLE PARENTS

It is not only Deutz that's on the horizon of Liebherr's technological and commercial cooperation. The Liebherr Components Division 'jumped into the water' together with Wärtsilä. The result of this collaboration is called W14. We directly asked the 'parents' of the engine to explain the genesis of the project.

Why Liebherr started the cooperation with Wärtsilä?
Liebherr has significantly expanded its portfolio of diesel and gas engines over the past few years. Each industry, however, requires a dedicated and specialized approach in terms of development, production, distribution and service.
Liebherr and Wärtsilä teamed up in this project to exploit both companies' competencies to have a strong and competitive offering in the global maritime markets.

Why did the presentation take place at the IWS in New Orleans?
On the one hand, workboats are one of the target applications for the Wärtsilä 14 engine. On the other hand, it was roughly one year before the first pilot applications were scheduled to be set into the sea. Therefore, our partner Wärtsilä decided that this would be the right place and time to launch the new engine.

Wärtsilä and Liebherr designed the W14 for smaller vessels such as tugboats, fishing vessels and small passenger crafts or ferries. The engine will be available in 12- and 16-cylinder configurations based on the D96 engine series

What is technological genesis of the W14 engine?
The engine is based on the Liebherr D96 engine, which has been introduced in the power generation markets some years ago. Of course, there were also some modifications to the engine itself. While the power generation market demands a fixed-speed engine for diesel-electric drives, mechanical propulsion has a much wider operating profile. The performance curve of a maritime engine as well as the requirements put on it differ from those of the power generation. These are, for example, further requirements of the controls for maritime use, as well as the stipulations of class and SOLAS. Moreover, as an engine for mechanical propulsion it requires different performance and torque curves as well as a very responsive engine behaviour.
In the new engine Wärtsilä has integrated its NOx reduction system (NOR) to comply with IMO Tier III.

Which applications does it target? To name one, the tugboats.
Of course, tugboats are the key application for this engine. In the propulsion configuration, the engine is suitable for smaller vessels such as fishing vessels and small passenger crafts or ferries, while in the diesel-electric mode providing auxiliary power it is likely to find application in special vessels e.g. tugs, on offshore support vessels and coastal tankers. Wärtsilä furthermore integrates the W14 engine into their system offerings, e.g. the Wärtsilä HY Tug 40 concept.

«Building on a solid and proven base engine design, Liebherr implements the maritime features and requirements into the product. Wärtsilä with its long-term and successful experience in the maritime markets is the perfect partner to make this marinization project efficient and quick»

Can you explain to us how you have pursued the following three objectives: reduction of space, weight and management costs (lower Capex).
Reduction of space and weight has been possible due to a particular focus on these points upon design by taking into consideration modern engine design concepts. The modular engine family design and a huge number of common parts for other applications allow us to benefit from economies of scale. In addition to that, the complexity in procurement and production is reduced and - not to forget - on the customer service side the equality of parts integrated into the 12V and 16V engines are beneficial to customers having both of these engines on their ships.

Does Liebherr supply other components that can be matched with the engine?

Products as Liebherr electric machines, energy storage or drive systems have been proven in maritime applications, as well. In cooperation with Wärtsilä, we initially focus on the engine and explore further opportunities, e.g. for drive systems, energy storage or electric machines as a further step.

IPSE DIXIT: WÄRTSILÄ

Can you give us more details about the hybrid package?

Wärtsilä introduced HYTug 40 design and concept to the market last year. A smaller version of the HYTug is designed for shallow draft operation. This evolution features two Wärtsilä 14 engines along with a hybrid propulsion solution, which deliver various flexible operating settings, including a zero-emissions mode. Indeed, the HYTug 40 is characterised by low maintenance and operating costs, in full compliance with global environmental regulations. When fitted with a Wärtsilä NOx reduction system (NOR), it also comfortably meets IMO Tier III requirements.

What about noise reduction technologies?

IMO sets the limitations for maximum noise in an engine room, the fact that every engine maker and ship designer must take into consideration.
For exhaust gas noise reduction, Wärtsilä can offer exhaust gas silencer based on customer requirements.

ISOTTA FRASCHINI

BACK TO THE BASIC

ISOTTA PRESIDENT SERGIO RAZETO SAID:

The company's strategy is to create an Innovation and Development Centre, integral to Isotta Fraschini Motori.
Three projects are in the oven.
1) Back to basic: restore Isotta Fraschini's original quality, detect and resolve engine defects (starting a year from the Centre establishment);
2) An industrial generator engine with existing thermodynamic characteristics but novel accessories. We will apply modularity and comply with communality systems, with the same components on 8, 12 and 16 cylinders. The idea is of a base engine on which standardised packages are implemented, according to emission requirements (two year timeframe).
3) A newly designed engine block, with novel bore and stroke, ranging between different fuels, dual and gasified, for applications integrated with fuel cell, hybrid, batteries, wind fields, photovoltaic.

Alberto **Maestrini**, General Manager of FINCANTIERI: «*Within the next five years we must have entirely new products, perhaps niche products, but as leaders. The demand of electrical production is increasing, both in the military and cruising sectors, and Isotta Fraschini must play a key role*»

The 16V170C2 is the result of the partnership between Isotta Fraschini and Fincantieri. This application, a multipurpose offshore patrol vessel (PPA) for the Italian Navy, is the starting point of a far-reaching strategy. The message coming from the headquarters in Bari (Italy) is that Isotta Fraschini will always remain a strategic asset for Fincantieri and will most likely become a player in the nautical sector and PG in the next decade. The diesel generator for the offshore patrol vessel has been redesigned to comply with the requirements of the Italian Navy, with 3700 validation hours: 1400 in motion for the prototype (crankcase, power and turbo line, oil cup, hydraulic circuits), 1200 with the new engine (auxiliary systems and hydraulic circuits, rpm check, automation and monitoring, SCR), 1100 hours in motion for the final validation with SCR. Gianluca **Piscopo**, head of design, illustrates the project.

Isotta Fraschini has delivered diesel generators to the Italian Navy. The 16 cylinders, completely redesigned with an anti-polishing ring, gives new impetus to Isotta Fraschini, as they set up an R&D centre in order to restore the brand's original quality, modernise the existing platform and embark on a new industrial engine

Where does the match between Isotta Fraschini and this PPA come from?

For the PPA we presented the 170 mm bore, 16 cylinder engine of the 1700 series, already known to the Italian Navy as it is used on FREMM and Orizzonte. We established a team bringing together Isotta Fraschini, Fincantieri, Italian Navy, NAVARM and OCCAM, which followed the development of the diesel generator and made sure it complied with the requirements. Right from the beginning all stakeholders had defined all validation processes.

Why this engine?

In our family the 16V170C2 reaches the target of power and MTBO, and therefore the maintenance timeframe. Amongst the requirements were both annual hours of use and type of load. The electric power demand on the PPA is considerable (as a consequence, amongst other things, of the presence of four radar installations). On applications such as FREMM and PPA the diesel generators are used for propulsion. The main load is not due only to the auxiliaries, but also to the propelling motors (FREMM) and manoeuvre engines (PPA), which provide the greatest transients, because with normal usage the boat remains steady in terms of power load and the transients are mild. The heaviest conditions are reached in manoeuvre.
Despite the required nominal power being equal, 1,600 kWe, on PPA and Orizzonte (although the latter displays mechanical injection), the duty cycle on a PPA is tougher, because on Orizzonte the diesel runs on average at 50% of load and endures far less transients.
This has prompted us to deeply revise the engine. The crankcase is different and the pistons are sill made of steel but designed to work with a sleeve featuring an anti polishing ring, a device that prevents carbon deposits on the piston from polishing the sleeve, reducing its life.

Other features of the 16 cylider?

It has no EGR, since the IMO Tier 2 does not require it, and it has a Bosch 1,600 bar common rail. We expect a future transition to 2,200 bar. EGR and SCR are both compatible with IMO Tier 3. We chose the latter solution, thanks to the collaboration with IFOG Engineering, because of the engine reliance and its efficiency which renders recirculation useless. It is a solution of industrial origin, with 40% urea solution. On the PPA the SCR doesn't have to always be active. DOC and DPF are not required.

AS LABRUNA SEA4.0

THE BIG BROTHER

«We, at AS Labruna, have selected the sensors, identified the data and developed the algorithms. Even the Ecu, a double dual core microprocessor with 3 can channels, is a Labruna product.»

Predictive maintenance, an ever present motto of the 4.0. AS Labruna has applied this concept to the powertrain to achieve a truly predictive system. We asked their CEO, Massimo Labruna.

SEA 4.0. What is it all about?
It is a project in collaboration with Technosec (information technology and cloud) and Dell for the creation of a predictive maintenance system to be installed on boats.
Briefly, we collect data from the engine and thedrive line, we store it and we send it to the cloud.
This is not only a console for the static logging of data, SEA 4.0 is able to analyse and map that data in order to schedule the maintenance on the basis of the actual engine usage. The official presentation will be at the Mets in Amsterdam.

Can an alert save a life?
Let me give you an example. If the oil level sensor detects a consumption higher than a predefined percentage of the fuel consumption, an alert will warn both the maintenance technician and the ship owner of an abnormal oil consumption which could indicate potential failure in the future.

SEA4.0 and predictive maintenance. There are three possible types of approach to maintenance: reactive (things are repaired when they break), preventive (through ordinary periodical maintenance) and, precisely, predictive (based on the real usage)

Hence does it simplify the procedures on board?
With an augmented reality device the technician can split the screen to be able to monitor the parameters in real time while reading the manual. The prediction is therefore made using real data.

SEA4.0 includes a sensor for ferromagnetic contamination.
Oil can be contaminated with ferrous particles or ingress of water. This sensor makes it possible to identify the symptoms and promptly take action.

How is the work divided between the three participants in the project?
DELL has provided a multifunction router-modem with CAN interface. Technosec, on the other hand, has provided the cloud infrastructure.

Fabio Butturi

SCANIA AND CONNECTIVITY

AN HOLISTIC POINT OF VIEW

A2V AND SCANIA DL13

"*The answer, my friend, is 'surfing' in the wind...*" you could dare, paraphrasing Bob Dylan's masterpiece.
There's a futuristic passenger boat with an all-European anatomy. The French boatbuilder Advanced Aerodynamic Vessels (A2V) has designed and manufactured a 25-seater passenger boat is equipped with two Scania 600 hp DI13 engines. With a fuel consumption at 50 knots, of approximately 9 litres/100 km per passenger, the required propulsive power of the vessel depends mostly on the weight carried by the water. «*That nearly corresponds to the fuel consumption there is when travelling by car*,» says A2V's Managing Director Lionel Huetz. In comparison, the best crew boats typically consume more than 30 litres/100 km per passenger and travel below 40 knots, the company said.

Scania Interim **Report January–March 2019**: «*Scania's net sales rose to SEK 36.1 billion and earnings in the first quarter amounted to an all-time-high of SEK 4,207 m., which gave an operating margin of 11.7 percent.*»

The driveline is no longer simply responsible for thermal parameters, transmission to the propeller and polluting emissions balance. The synergy between propulsion and shaft line, or stern drive, is one of the main drivers of TCO. If we consider the off-road regulations, the scarecrow is the association between Stage V and price gap. An equation that can also be projected into the nautical sector. The fear is that the irruption of the IMO Tier 3 and RCD2 will increase the cost and volume of exhaust treatment devices. But things are not exactly like that. That's an evaluation that even shipyards and shipowners will have to do. In fact, considering 2,000 hours of operation of a Stage V machine the end user may see significant savings on the cost of use and maintenance. The same assessment is applicable to marine applications, also because Scania analysis involves the total cost of use, not just servicing but also fuel, urea, oil filters and labor. The total ownership expense per 2,000 hours. There is a side of Total Cost of Ownership that is all to be explored: connectivity, which avoids or at least reduces downtime. The Griffin extends the know how gained in bus & truck to the nautical assistance network. In the first half of 2019 over 350 thousand vehicles were connected. The OEM package for construction sites provides access to control data, which require the operator's authorization, without burdening the company costs. Among the included parameters there are indicators that are linked in particular to heavy-duty uses of commercial applications, such as time and frequency of use, and others that perfectly match the needs of pure pleasure boats such as fuel consumption (and soon AdBlue) and polluting emissions. Fleet Management services are divided into three solutions: the monitoring package provides digital updates on a weekly, monthly and annual basis. The next upgrade is the control package, which gives to real-time information. The data access package includes integrates the operating parameters with the systems and telematic data from other manufacturers. Among the included services, the localization, the operating status (on/off), the cruising speed, the real-time monitoring of the engines.

As Stage V shows, regulations do not necessarily entail a higher cost. Digitalisation supports TCO reducing machine downtimes to a minimum. Scania offers three fleet management solutions. An automotive pedigree, with over 350 thousand vehicles connected in the first half of 2019

EPA, IMO AND ECAS

EPA says: «*Vessels operating in Emission Control Areas must meet the following requirements: Fuel-sulfur concentrations may not exceed 0.10 weight percent, or vessels may use an approved equivalent method (such as SOx scrubbers, also known as exhaust gas cleaning systems).*
Engines above 130 kW installed on vessels built (or modified) since 2000 must be certified to meet appropriate emission standards corresponding to the vessel's build date (or modification date). As of January 1, 2016, engines installed on new and modified vessels are subject to the Annex VI Tier III NOx standards while those engines are operating in the ECA. The international standards apply to both U.S. vessels and to foreign vessels».

MAN ENGINES AND PILOT BOAT

DUAL FUEL? YES THANKS!

Three new pilot vessels are now on the way to renew the fleet. The first of these is expected to come into service in 2020 and will be equipped with the exhaust gas after treatment system from MAN Engines

IMO TIER III, MAN AND SCR

IMO Tier III regulations are on the way and they are coming with quite the impact. Customers in Canada and the US East and West Coast will have to face regulatory limits around 70% stricter than IMO Tier II starting from January 2021. Man heard the call and decided to answer with its 12-cylinder engines for workboats with a power range between 551 and 1,213 kW. The compliance is managed by the modular exhaust gas after treatment system, presented at the SMM fair last year. Man, of course, is not new to the use and management of SCR systems, and now it is bringing its expertise to the needs of the workboat world. A system that comes together with its compactness and flexibility to allow for a wide range of installations. Also, there are no DPFs and no OCCs involved, keeping the engine as lightweight as possible.

MAN decided to answer the call for IMO Tier III compliance by developing a field test together with the Dutch Pilot Association. The project involved the 23-meter-long pilot boat Luna and its twin MAN D2862 LE469 engines. Tjeerd de Vos, fleet manager for the pilot service, explained the plan: «*For environmental reasons and to satisfy the tougher IMO tier III emission standards we decided to collaborate with MAN Engines and test the exhaust gas after treatment (EAT) system on the two engines*». MAN has been using SCR systems for its own trucks since 2006; together with the experience gained from the agricultural and industrial sectors, where the technology has been in serial production since 2015 for in-line and V engines. Now the group decided to apply its expertise in favor of this particular field test.

> The previous IMO Tier II exhaust emissions standard permitted 7.7 g/kW of nitrogene oxide emissions. From 2021, compliance with IMO tier III will be mandatory, requiring around 70% reduction in nitrogen oxides, depending on the maximum rotational speed of the engine.

An exhaust gas after treatment system was installed for each cylinder bank of each engine. This system introduced a metered amount of urea solution (AdBlue) which reduces nitrogen oxide levels. The 32.5 percent aqueous urea solution is meted via the SCR mixer which is incorporated in the exhaust gas system immediately upstream of the catalytic converter. This generates a homogeneous mixture of AdBlue fluid and exhaust gas, which reacts with the nitrogen oxides (NOx) to form water (H2O) and harmless nitrogen gas (N2).

Focusing on an SCR-only system allowed MAN Engines to get rid of heavy components such as diesel particulate filters and oxidation catalytic converters, keeping the engines as lightweight as possible. Compactness and lightness are for sure appreciated qualities, especially on boats. This is why MAN decided to focus on these aspects for both their engines and the associated EAT systems. The engines, in particular, weigh 2,270 kg each. At the same time, the D2862 is able to deliver 1,029 kW at 2,100 rpm.

The overall lightness brings, for sure, particular advantages when maneuvering the pilot boat, yet the implementation of the new SCR system was quite a jump into the unknown at the beginning. Peter Nieuwveld, project manager at MAN Rollo, explained: «*The SCR system is highly compact. However, the installation was quite a challenge, because at that early stage in the development there was no detailed instruction manual available for such an installation. Together with MAN, we are learning as we go along*».

«*The Luna must be ready for service at all times and must operate under difficult conditions, such as a swell with waves up to three metres high*», explained Tjeerd de Vos. So, the engines must perform reliably at high power for around 3,000 operating hours a year. Specifically, that means operations at full power for 50-60% of the duty cycle. The two engines each drive a Waterjet and can accelerate the pilot boat to speeds in excess of 30 knots (55.6 km/h).

The field trial was agreed initially for one year with an option for a further twelve months that has finally been taken up. De Vos, in conclusion of the initial test, commented: «*Overall we are pleased with the performance of the selective catalytic reduction system, as well as with the engines. The crew particularly appreciate the low noise level and smooth running of the engines*». Benzler also added: «*The AdBlue fluid needed is about what we had expected. We have reliably satisfied the new limit of 2 g/kWh for nitrogen oxides*». **Alessandro Faberi**

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QUOTE

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