



TECNOVERITAS®

Dedicated to innovation

- WORLD CLASS ENGINEERING SOLUTIONS
- COST EFFECTIVE SOLUTIONS
- QUALITY POLICY

VASCO DA GAMA

In compliance with Marpol NOx Tier III



VASCO DA GAMA is a luxurious 27 years old vessel with a loyal clientele. The actual ship owner Mystic Ocean decided to keep the vessel in service on the most desired destinations, like the Heritage Fjords of Norway and the Baltic, where the most stringent air pollution regulations are in force. Looking forward, and considering the near future air pollution regulations under Marpol, namely the NOx emissions and EEXI,

it was decided to perform a study on how that can be achieved for the next 10 to 15 years. As a consequence, the vessel received a number of high tech improvements to become compliant with Tier III-NOx, Digitalisation and Sewage for the Baltic Sea operation (MEPC.227(65)), and Slick hull paint. With these improvements a new opportunity for the vessel successful operation around the world is possible. The vessel received a new notation from the class,

the EGCS (SCR). This project is considered a good example of circular economy applied to shipping industry, and a good example to follow. Instead of dismantling a superb cruise vessel like VASCO DA GAMA, dismantling related emissions, originated by scrapping (consequent melting of steel), were avoided, along with the waste of a vast quantity of other materials. Also, this project proves that existing vessels are not

condemned to be scrapped, but being revamped in all environmental aspects, namely emissions, sewage, energy consumption, and passenger comfort, can compete with new built vessels on the same grounds, resulting in a more sustainable cruise shipping activity:

- The fuel efficiency increased 6%, therefore ➤

20 YEARS DELIVERING INNOVATIVE SOLUTIONS

TO MARINE AND POWER INDUSTRIES



TECNOVERITAS®

Dedicated to innovation

- CO₂ EMISSIONS REDUCED BY 6%
- NO_x EMISSIONS DECREASED BY 82%
- SO₂ EMISSIONS ELIMINATED BY 81,5 %

VASCO DA GAMA: The first successful shipping circular economy example



Dr Jorge Antunes, CEO at TecnoVeritas



Pavlos Zampelis, naval architect business development manager at TecnoVeritas and executive director at Nac-MC Portugal

accounting for a reduction of CO₂ emissions of about 6% too.

- NO_x emissions (compliant with Tier III) had a decrease of 82% regarding the original emissions.
- SO₂ emissions had a decrease of 81.5%. The project was based on extensive marine engineering studies, closely monitored by the class (LR), obtaining the new notation EGCS (SCR).

The vessel arrived to Lisbon on December 2020 and at LISNAVE Shipyards on the 1st January 2021, for drydocking and initiation of the project. Immediately, despite Covid-19 constraints, the project was initiated "full ahead". The engine room was Laser scanned and the studies of accesses initiated while calculations based on the engines exhaust gas flowrates were running in parallel. Once the five independent housings spaces were identified, their housings for the new catalysts were defined, their construction started, and engine room cutting initiated.

Stability calculations for the 5 housings (each of 5 tonnes), and DB urea bunker tank, were running in parallel, with other project activities like new bunkering stations, digitalisation system for performance monitoring using the TecnoVeritas own cloudbased software BOEM.

On the 22nd of June the vessel returned to water, for sea trials, during 6 days trip from Setubal to Amsterdam.

While catalysts works were on progress, the vessel had three engines overhauled, receiving the components that needed

to be replaced according to NO_x Code, as well as two new turbochargers, and overhauling the others. The systems and the project were surveyed and approved by LR, and emissions were tested independently by ECOxy from Norway, for Norwegian Maritime Authority. ECOxy performed the measurements during the sea trials.

It was found from the viability study, that the payback time is less than one year, provided the pandemic allows.

The present project is a novelty in terms of circular economy, and its dimension. The systems installed were capable of achieving NO_x values well below the Tier III limit, on the original vessel SULZER ZA40S engines (pre-2000). All the five catalysers are by themselves unique pieces, their design was made to achieve extremely low NO_x emissions, while keeping the exhaust gas pressure drop to a minimum, and their operation controlled based on artificial intelligence, so that the five Selective Catalytic Reactors, are continuously optimised in terms of their individual performance to minimise the consumption of urea, and therefore complying with the future ammonia slip regulations, so that constitutes is an innovation. The operation of the catalysers is optimised by considering the inlet air temperature, the engine load, the fuel quality, and supported by a feedback control loop that dynamically and optimally adjusts the reactors operations. Scrapping decisions have

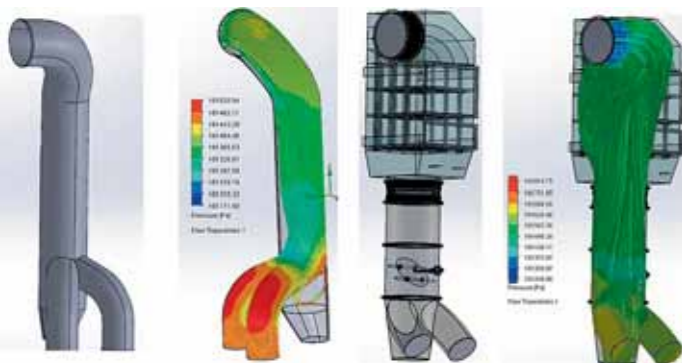
Πρότυπο κυκλικής οικονομίας από την TecnoVeritas

Μέσα στη γενική παγκόσμια προσπάθεια να μειωθούν οι ρύποι των πλοίων για την προστασία του επιβαρυσμένου περιβάλλοντος, τα περισσότερα κράτη με πρωτεργάτες τα βορειοευρωπαϊκά, όπως η Νορβηγία και η Δανία, καθώς και τα βαλτικά, Εσθονία, Λετονία και Λιθουανία, έχουν θέσει σε ισχύ τη νομοθεσία Marpol Nox-Tier III που έχει επιβάλει ο IMO και αφορά τις μειωμένες εκπομπές αερίων ρύπων στην ατμόσφαιρα. Η συμμόρφωση με τα πρότυπα του παραπάνω κανονισμού πράγματι επιφέρει από τεχνικής άποψης αξιοσημείωτη εξοικονόμηση στην κατανάλωση καυσίμου του πλοίου, μειώνοντας σημαντικά το λειτουργικό κόστος, το οποίο επωφελείται ο πλοιοκτήτης. Όσα πλοία έχουν ναυπηγηθεί μετά το 2000 μπορούν να επισκέπτονται ανενόχλητα τα μοναδικά φιορδ της Νορβηγίας και τους ξεχωριστούς τουριστικούς προορισμούς της Βαλτικής Θάλασσας. Όσα ωστόσο έχουν κλείσει την πρώτη εικοσαετία στη θάλασσα θα πρέπει να συμμορφωθούν άμεσα, καθώς από την 1η Ιανουαρίου 2023 τίθεται σε ισχύ το νέο κανονιστικό πλαίσιο και στα υπόλοιπα ευρωπαϊκά λιμάνια. Σε αυτό το πλαίσιο, η TecnoVeritas με έδρα την Πορτογαλία και ιδρυτή τον δρ Jorge Antunes, που διαθέτει πολύχρονη πείρα σε καινοτόμες λύσεις στα συστήματα ελέγχου των πλοίων και ιδιαίτερα στον τομέα των καυσίμων, έχει μελετήσει και παραγάγει ένα ολοκληρωμένο σύστημα απαντώντας στην επερχόμενη πρόκληση. Μέσα στο 2021, και σε χρόνο



AS THE TIME GOES BY, WE KEEP OUR DEDICATION TO

INNOVATION, AND TO OUR CLIENTS AND PARTNERS



This project proves that existing vessels are not condemned to be scrapped, but being revamped in all environmental aspects can compete with new built vessels

- FUEL EFFICIENCY INCREASED 6%
- MONITORED BY LLOYD'S REGISTER
- OBTAINED THE NEW NOTATION EGCS (SCR)

been made, mainly based on the environmental considerations, namely by making shipowners to believe that their ships cannot be environmentally competitive, being this instigated by ship building, banks and engine manufacturers. This project has proven that Marpol Tier III-NOx level of emissions can be achieved by a 27 years old vessel, at controlled costs, and that their environmental performance can be as good, or even better than many recently built vessels. In the present project, no EIAPP certificate issued, although NOx regulations, namely Tier III, were achieved and officially confirmed for the Norwegian Maritime Authority, therefore proving that EIAPP certificates should also be awarded to vessels equipped with exhaust gas cleaning systems, like M/V VASCO DA GAMA.

Therefore, providing evidence that it's possible older engines to comply with NOx emission standards. This matter has been responsible for the dismantling of many vessels, that if environmentally revamped could have their operational life extended for some years more. Scraping and recovery of the materials will originate a huge carbon footprint that will take a long time to become nil. A consortium formed by TecnoVeritas and Lisnave Shipyards is now offering similar turnkey solutions, including the vessel digitalisation and energy optimisation (considering the coming EEXI regulations), therefore making possible to extend the profitable operation life of many existing vessels, mainly cruise vessels allowing their operation in the most preferred touristic spots, complying with the stricter air pollution regulations (namely Tier III).

ρεκόρ παρά τους περιορισμούς της πανδημίας, εγκαταστάθηκε στο ναυπηγείο Lisnave της Λισαβόνας με απόλυτη επιτυχία το ως άνω σύστημα στο VASCO DA GAMA. Η πορτογαλική πλοιοκτήτρια Mystic Ocean, που παραδοσιακά υιοθετεί τις πιο σύγχρονες τεχνολογικές λύσεις στον στόλο της, μπορεί να υπερηφανεύεται για το 27χρονο κρουαζιερόπλοίο της, καθώς αποτελεί το πρώτο παράδειγμα επιτυχούς κυκλικής οικονομίας της εγχώριας ναυπηγικής βιομηχανίας που ανοίγει τον δρόμο και για τα επόμενα πρότζεκτ. Έναν χρόνο μετά τις εργασίες που υπέστη ώστε να εναρμονίζεται με τα νέα πρότυπα του IMO, καταγράφει εξαιρετικές επιδόσεις περνώντας επιτυχώς τους αυστηρούς ελέγχους της Norwegian Maritime Authority και αυξάνοντας έτσι τον χρόνο ζωής και λειτουργίας του. Ειδικότερα, έχει σημειωθεί εξοικονόμηση στην κατανάλωση καυσίμου κατά 6% λόγω της αύξησης της θερμικής απόδοσης του χρησιμοποιούμενου καυσίμου, μείωση της εκπομπής των γενικών ρύπων κατά 82% και των ρύπων SO₂ κατά 6%, προς ικανοποίηση τόσο της πλοιοκτήτριας εταιρείας όσο και των εκάστοτε λιμενικών αρχών. Τα στάδια του πρότζεκτ παρουσιάζονται από τον δρ Jorge Antunes στο άρθρο που παρατίθεται. Με την ίδια επιτυχία θα μπορούσε επίσης να εφαρμοστεί στα περισσότερα επιβατηγά πλοία ελληνικών συμφερόντων που έχουν ναυπηγηθεί πριν το 2000 και είναι αρκετά. Για περισσότερες πληροφορίες μπορείτε να μας συναντήσετε στα Ποσειδώνια και συγκεκριμένα στο περίπτερο 1.368 (της Πορτογαλίας) στον εκθεσιακό χώρο Metropolitan Expo. Θα χαρούμε να σας λύσουμε οποιαδήποτε απορία και να σας παρουσιάσουμε τη μελέτη της TecnoVeritas σχετικά με τη χρήση υδρογόνου αντί diesel μέσω ενός σύγχρονου συστήματος που έχουμε αναπτύξει.

MEET US AT POSIDONIA 2022 • PAVILION 1.368

SHIP REPAIRS & REFIT NAC-MC PORTUGAL

NAVAL ARCHITECTS CONSULTANCY - MARINE CLAIMS

Despite your deviation, is your safest and most reliable investment for marine solutions to any issue concerning ship's repairs and refit



WHAT WE DO

- Repairs and conversions
- Design / architectural drawings / specification
- Asbestos / removal and disposal / certification
- Insurance policies / placing and marine claims
- WBS installation / implementation of current rules for control of emissions / Tier iii
- Towage from / to your home port
- Reliable shipyards representation which respect customer's budget and schedule

OUR OBJECTIVE is to serve you on a cost effective way with quality and respect to the **ECO SYSTEM** and **ENVIRONMENT**

MSC-PORTUGAL.COM



NAVAL ARCHITECTS CONSULTANCY - MARINE CLAIMS UNIPessoal LDA

Praça D. Maria II, Nº 101, 1 E 4900-489
Viana do Castelo | PORTUGAL

(+351) 258 404 111 / 920 565 060 (24/7)
marinesolutionsconsultancy@outlook.com