



THE TRITON PROJECT

Specific details and MDEM specialists' contribution

Nowadays, technologies of Industry 4.0 are entering our life almost everywhere and maritime community might have already heard about Triton Remote Ship Monitoring by Damen Digital Solutions. We are proud to inform you that MDEM experts from Engineering Services Department have joined Damen Digital Solutions team in order to contribute this outstanding and innovative service.

At a moment, the lineup of MDEM Triton team includes Oleksandr Vynogradov (Configuration Engineer) and Maksym Paniukov (Data Quality Engineer) - experienced MDEM E&A engineers that came from Electrical & Automation Group. Vitaliy Manko (Senior Lead Engineer Hull, Hull department) has supported the guys in the specific tasks related to macros implementation.

The history of the service started in September 2022, when MDEM Managing Director Olena Zhukova had received a request for support from Damen Digital Solutions main office in The Netherlands.

Olena is well-known in Ukraine for the Industry 4.0 technologies dissemination and for inspiring Ukrainian maritime community players to use the advanced technologies in their business. For more than 16 years MDEM experts have proven many times their professional skills and readiness to face the challenges. One of the examples could be MDEM R&D department that is successfully dealing with research

and scientific investigations in shipbuilding disciplines for the last years. No wonder, the best MDEM E&A engineers have been asked to support our colleagues from the main office in advance of Industry 4.0 technologies. It was a long hard fight - they had to change their mindset, master new technologies, learn the software, etc. And not in vain! They've joined Damen Triton team and continued doing all their best to find the unique solutions and solve the complicated tasks.

Let's explain how the digital platform works. Triton platform collects the data generated by the vessel's systems using a common interface and transmits it to the cloud with a 4G LTE antenna or satellite communication, depending on Client's preferences. Triton is a safe and easy-to-use platform with excellent visualization based on Big Data Industry 4.0 technologies. Smart sensors are used to define the deviations or any sort of malfunction as soon as possible and share this information with the crew and shipping company operators. The dashboard provides real-time visualization of

the vessel systems status, reduces data overload and provides access to the expertise and knowledge of equipment producers. Operators at the shipowners' office can log in to their vessel in real time and see the specifics of the vessel's performance and condition.

In addition, Triton deals with predictive maintenance, ensuring effective crew work and uninterrupted operations, reduces downtime, and provides monitoring value of vessel and overall condition. These tasks are also related to Industry 4.0 and namely to the Predictive Maintenance section.

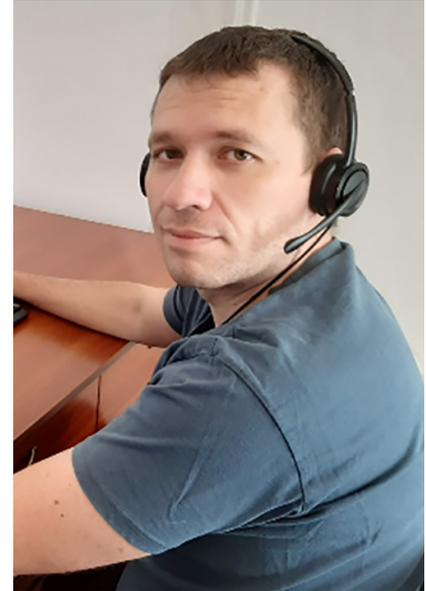
And some more details. Triton is a digital platform consisting of the hardware placed on the vessel with the software installed. The hardware (please see the figure below) consists of a 4G antenna, a router with a SIM card, Gateway, and multiplexer (receiving data from navigational systems). Data from the router is sent to the Gateway, then processed and sent further to the cloud storage. When received, Triton users may proceed with the information.



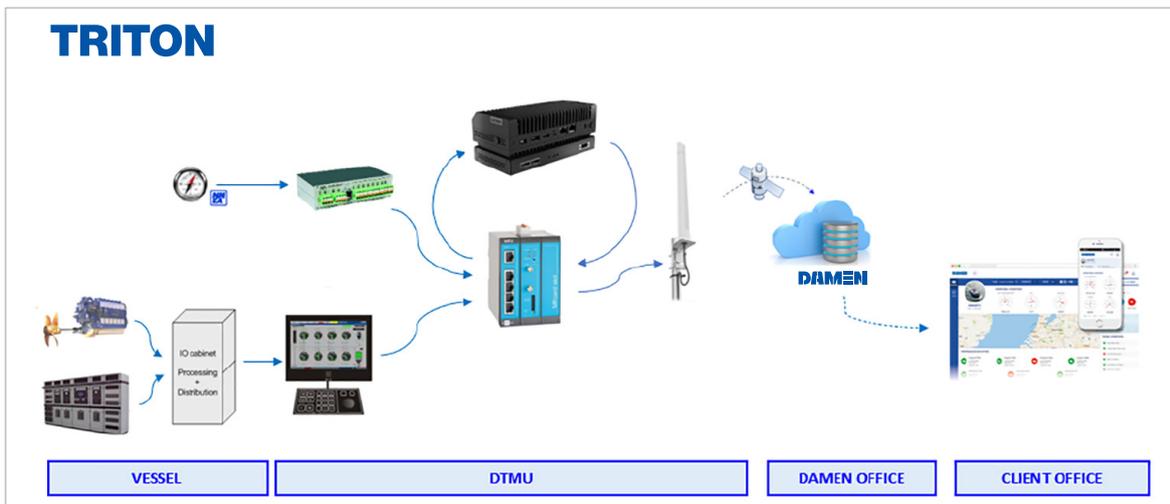
➤ Maksym Paniukov



➤ Oleksandr Vynogradov



➤ Vitaliy Manko



Hardware components used in Triton

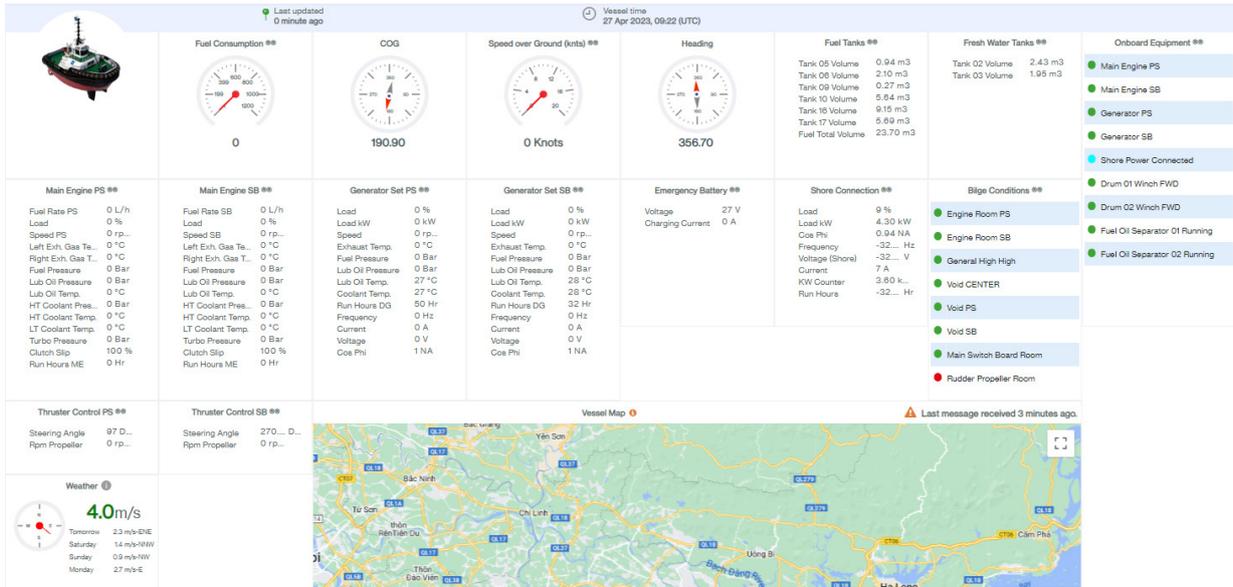
And here is an example: Triton equipment is installed during the building of a tug and Triton experts during the year of vessel operation give the possibility to the Client to receive standard data on the dashboard for further analysis. At a moment hundreds of vessels built by Damen have been equipped with Triton.

MDEM experts have joined Damen Triton team in September 2022. Responding to the new challenges, Oleksandr Vynogradov has struggled with processing of big

amount of information manually, that turned to be time-consuming and created the risk of mistakes. While searching for solution, Oleksandr has developed macros that allowed automatic sensors mapping generation for further sorting and analysis of the data.

Recently, our experts have met with a new challenge - ship data analysis for the Client. This time it was the loading of main engines and diesel generators for a duration of seven months. The clients' request was to define the loading rate, and then

to check if the right equipment selected and operational modes properly defined. This task was done using the Python software and the Pandas library. MDEM experts have received the data stream containing about 1,600,000 rows of engine loading data over a 7-month period. Data has been received every few seconds. MDEM specialists have created a software for data flow processing, and finally the Client received a presentation with monthly equipment loading and efficiency rate calculation.

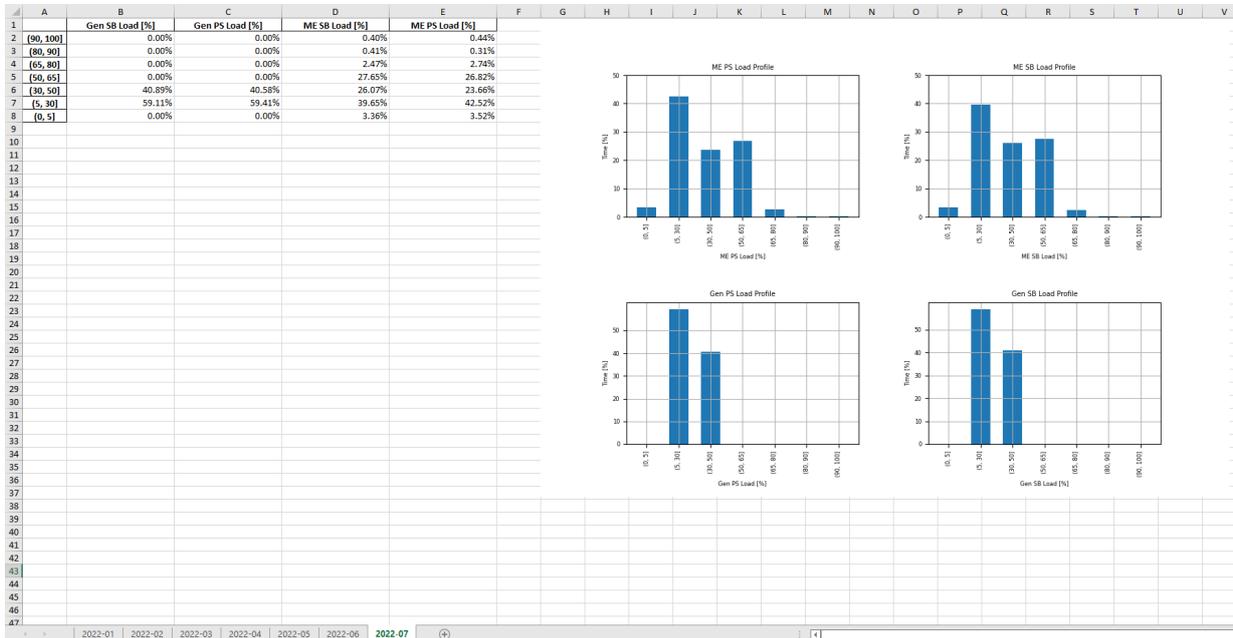


Triton Dashboard

Our experts have also started with the tasks of data analysis for several vessels. We are on the way and the training is going on. And no doubts that these guys will succeed.

We are proud of MDEM team providing outstanding engineering services using Industry 4.0 (Big Data, Predictive maintenance) innovative technologies, and creating

a high-quality service for Damen as well as representing our country as a high-tech and integrated into global technological value chains on the international stage. <<



Data Analysis example