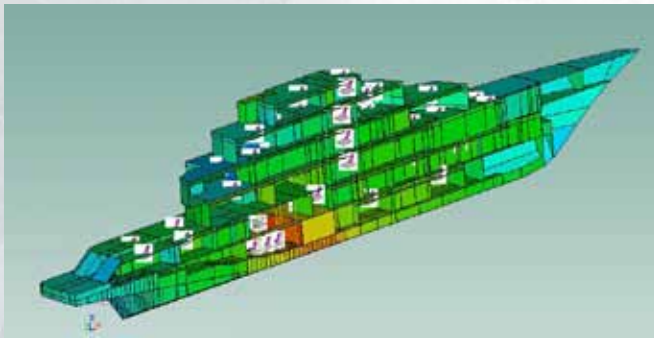


# NOISE LEVEL PREDICTIONS

Van Cappellen Consultancy uses the latest vibro-acoustic noise level prediction tool currently available on the market based on statistical energy analysis (SEA).

SEA is a prediction tool for noise and vibration analysis. It simulates a yacht's noise and vibration environment during the design process. At this stage, corrective measures can be taken at reasonable costs.

This virtual 3D tool predicts overall noise levels within 3 dB(A) for all areas on board



SEA is based on the principle of energy conservation: all energy put into a system (by means of mechanical or acoustic excitation) must leave the system through structural damping or radiation of sound and vibration.

Where empirical formula based noise level predictions are limited in terms of the type of construction and insulation materials used, SEA has no limits with respect to material used, provided some basic properties are available.

An additional advantage of SEA is the integration of detailed machinery foundation information, obtained by means of FE analysis or real life measurements. This also enables us to swiftly predict the change in noise levels when a foundation, a source or its resilient mounting is modified.

The power to see the influence of insulation material change is another strong feature, which could save weight, space and installation time on board.

If a project is in a very early stage of design or if an indication of possible noise levels is required, Van Cappellen Consultancy can also apply common empirical formula based noise level prediction.

## How Van Cappellen Consultancy builds its SEA models

The first building block is a coarse 3D model of the yacht (based on commonly used 3D files like STEP or IGES), including all cabins, tanks and machinery spaces. At this stage, CAD drawings and 3D information from our clients are indispensable. In the next step, the 3D geometry is converted into an SEA model. Assigning material properties to all structural and non structural materials used on board will finish the model and prepare it for source allocation.

An important step is estimating the energy input from sources to the vessel's structure. For this purpose, Van Cappellen Consultancy can build FE models of the machinery foundations. The foundations and their interaction with mounts and source are analysed for their dynamic behaviour and improved where necessary (see FEA). If under- or over-estimations of energy input are made, the noise levels will be equally under- or overpredicted. The result is higher noise levels. For this reason, we highly recommend performing these studies, as they lead to a more detailed real life situation.