

Air Isolation of a Diesel Generator

To lower the vibration transmitted from a 170 KVA diesel generators onboard a superyacht, to the hull (and thus the living quarters) of the boat, it was decided to soft mount that diesel-generator by changing its conventional (elastomeric) mounts to air mounts. The attachment of the exhaust pipe to the engine, as well as its hanging on the engine room wall were modified to allow for the added motion of the machine during the start-up and shut-down. Moreover, precautions were exercised to prevent the unwanted motion of the machine due to possible large perturbation caused by rough waters. Figure 1 depicts two images of the air mounted diesel generator.



Figure 1. The air mount under the generator (a) and under the diesel engine (b)

To objectively evaluate the impact of the changes stated above, in terms of reduction in the level of vibration, accelerations (in vertical direction) at various locations on the yacht were measured ‘before’ and ‘after’ the modifications. A piezoelectric accelerometer was used as the sensor. The measurements were done while the star-board diesel generator mounted on its original elastomeric mounts in the ‘before’ measurements and mounted on the new air mounts in the ‘after’ measurements was running, at 1500 rpm, under the normal docking load.

All measurements attest to the effectiveness of air mounting in lowering the transmitted vibration to the hull at low and mid-frequencies. For the sake of brevity, only the ‘before’ and ‘after’ measurements at a location in the engine room next to one of the mounting legs of the generator set and one location in the living quarters (dining room) are shown here. Figures 2 and 3 depicts these power spectrums prior to the replacement, ‘before’, and

Vibration isolation mounts with low stiffness (soft) provide the highest degree of low-frequency vibration isolation. Mid frequency vibration isolation can be achieved using mounts having no or negligible amount of damping. Air mounts possess both attributes of low stiffness and low damping and are smaller in size than conventional isolators of comparable softness.

after the replacement, ‘after’, of the conventional mounts with air mounts.

Clear from Figures 2 and 3, switching the elastomeric mounts to air mounts, as well as further softening of the exhaust pipe attachments to the engine and the engine room wall have caused drastic abatement in the vibration, over the low and mid frequencies, transmitted from the star-board diesel generator to the yacht.

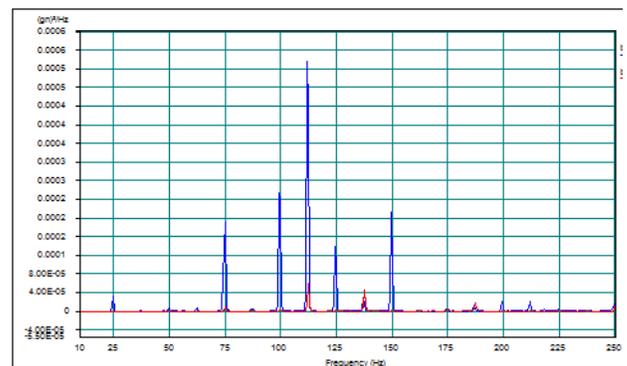


Figure 2 Power spectra of the acceleration measured at a location on the engine room floor, before (blue) and after (red) air mounting

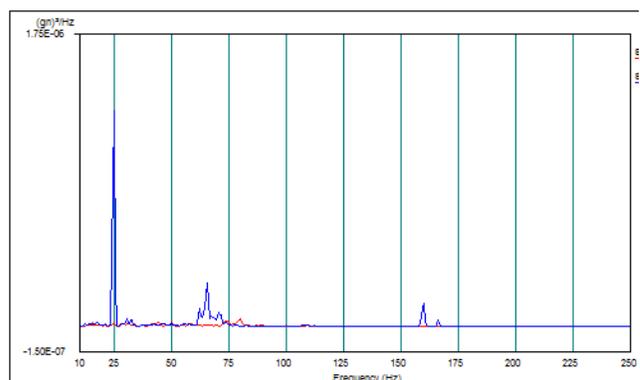


Figure 3 Power spectra of the acceleration measured at a location in the dining room, before (blue) and after (red) air mounting