

## Reduction in Vibration Transmission of a Diesel-Generator via Air Mounting

To lower the vibration transmitted from one of the three 170 KVA diesel generators in a motor yacht, to the hull (and thus the living quarters) of the boat, it was decided to soft mount that (the star-board) 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 to 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 shock disturbances to the generator. Figure 1 depicts two shots of the air mounted diesel generator.

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 have the two attributes of low stiffness and low damping and are smaller in size than conventional isolators of comparable softness.

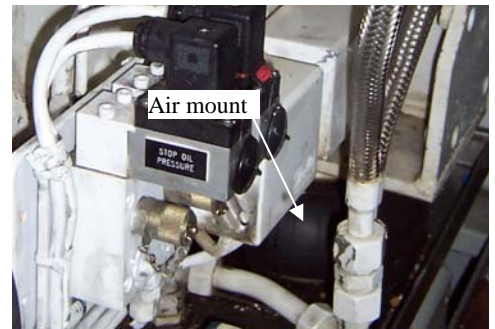
To objectively evaluate the impact of the changes stated above, in terms of reduction in the level of vibration, accelerations (in vertical direction) at various locations on the yacht were measured 'before' and 'after' the modifications. A piezoelectric accelerometer was used as the sensor. The measurements 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 mounts 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 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.



(a)



(b)

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

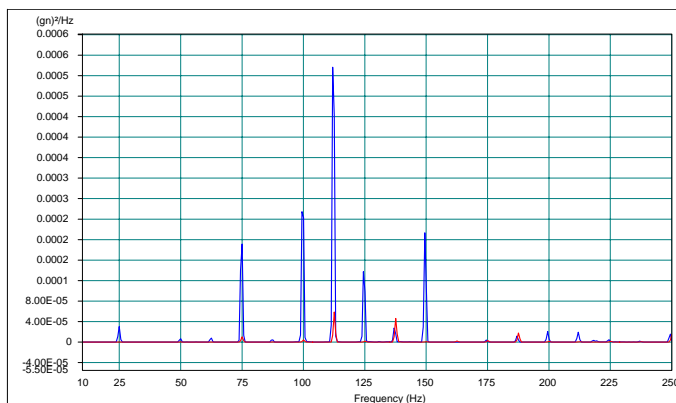


Figure 2 Power spectrum of the acceleration measured at a location on the engine room floor, before (blue) and after (red) air mounting

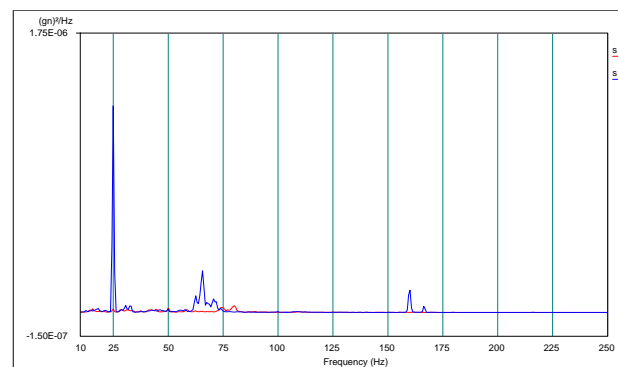


Figure 3 Power spectrum of the acceleration measured at a location in the dining room, before (blue) and after (red) air mounting