

Computer Controlled Air Isolation System - An Advanced Mounting System for Diesel Generators Onboard Luxury Watercrafts

An ideal mounting system for yacht diesel generators should be

1. Soft, while the yacht is not moving, i.e., the propulsion engines are off and calm and quiet are expected. This will prevent the transmission of vibration and noise, through the hull, to the living quarters of the yacht.
2. Stiff, when the yacht is moving or in rough waters.

No one passive solution quite satisfies both requirements listed above. Even the popular double mounting, using two sets of elastomeric (rubber) mounts at each mounting location with a massive inertia in between, while effective at high frequencies deteriorates the low-frequency isolation effectiveness of the mounting system. Shock isolation of double mounting is also inferior to that of single mounting. In addition, *double mounting imposes unfavorable weight, cost, and space penalties*. The complexity and difficulties of converting an existing mounting system to double mounting does not help the appeal of double mounting in retrofit applications.

DEICON's **Computer Controlled Air Isolation System** is an adjustable mounting system capable of meeting the conflicting requirements stated above. This is a pneumatic system using two sets of 'main' and 'lateral' air mounts. The main air mounts supporting the weight of the diesel generator provide soft mounting when the yacht is at port (or anchored) and water is calm. The reputation of air mounts for providing the highest degree of isolation of any type vibration isolator while being able to hold the weight of a massive machine is unsurpassed. Spectrum traces of the accelerations measured on the top (blue) and bottom (red) of an air mount used in isolating a mid-size diesel generator are shown in Figure 1.

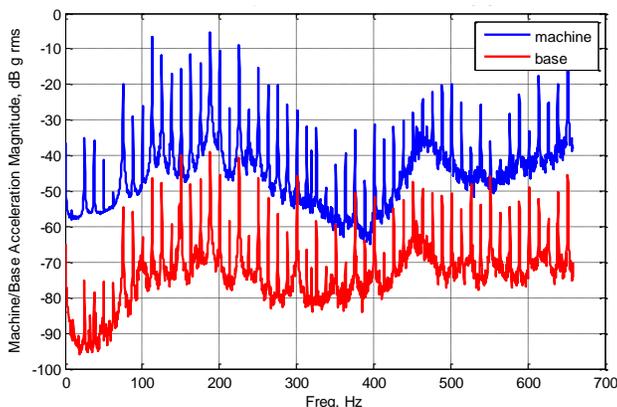


Figure 1 Power spectra of acceleration measured at both sides of a mounting foot

When sailing, noise and vibration created by gensets are normally masked by the noise and vibration created by the propulsion engines, propellers induced turbulence, etc. Thus, noise and vibration isolation attributes of gensets mounting system have a lower priority than its shock isolation attributes requiring mounts with *high stiffness and damping*. On the other hand, while the vessel is docked (and not on shore power) or anchored, gensets are the main source of noise and vibration which if not isolated by *soft, low-damping* mounts, will transmit their noise and vibration (specially at low-frequencies) through the hull to the living quarters, disturbing the occupants.

The incredible 35+ dBs reduction in transmitted vibration, especially at low frequencies, is what DEICON's system delivers; traditional elastomeric-based isolation schemes do not even deliver half as many dBs in isolation performance. One can touch the base of that genset and feel no vibration.

Considering that some air mounts do not provide sufficient lateral stiffness needed to secure the diesel generator while the vessel is in motion and/or water is rough, lateral support is provided by a set of smaller mounts which will be engaged, when needed. Lateral mounts in addition to providing lateral stiffness, increase the heave stiffness of the mounting system. Figure 2 shows a mounting foot of an air-mounted diesel generator onboard a yacht isolated by DEICON's Computer Controlled Air Isolation System.

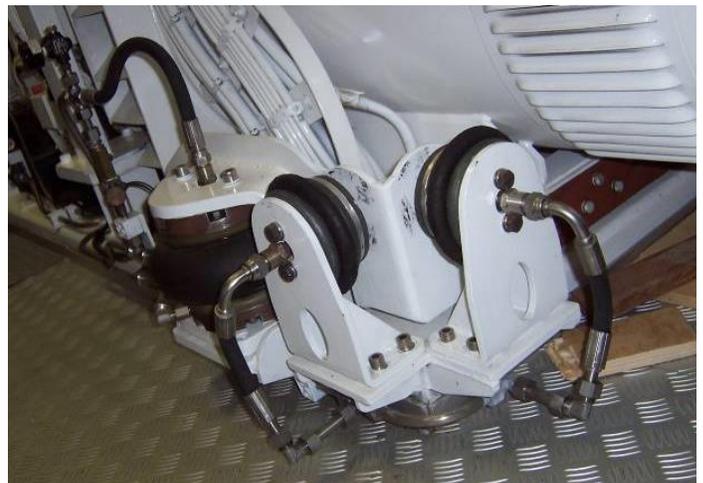


Figure 2 One mounting foot of a diesel generator isolated by DEICON's Air Isolation System

Further on-demand adjustment of stiffness could be provided by *DEICON's active stiffness control technology*. In addition, on-demand active damping of the air isolation system could be realized using *DEICON's active damping control technology*.