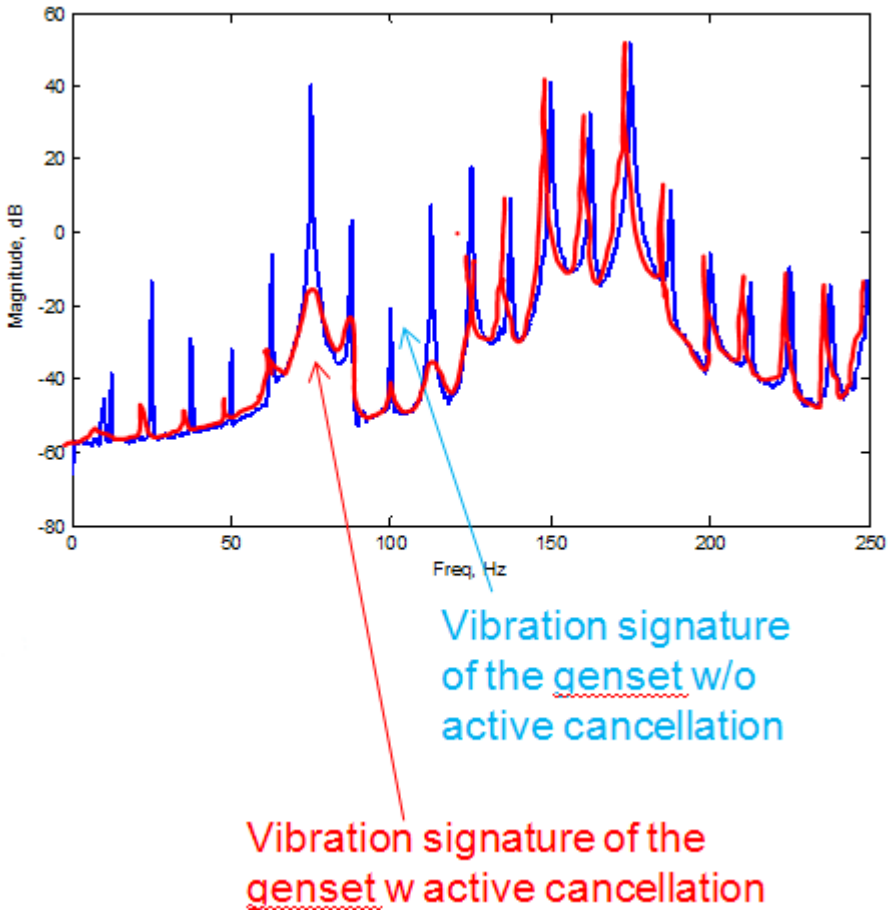
Comparison of MTU-Paulstra Active Isolation System with DEICON's "Computer Controlled Air Isolation System'

The vibration of a Diesel engine occurs mainly at the harmonics of the Diesel's half order (1/2 of the shaft's revolution/second). That is, if the Diesel runs at 1500 rpm (25 rev/sec), the vibration frequencies will be 12.5, 25, 37.5, 50, … Hz.

The MTU-Paulstra active isolation system is a combination of an elastomeric passive mounting scheme and a rather large number of full-authority, electromagnetic, proof-mass actuators which along with a correspondingly large number of sensors. An elaborate adaptive Least Mean Square (LMS) vibration cancellation algorithm, being fed by the sensory information, drives the actuators out of phase with the vibration force in an attempt to cancel a preselected number of harmonics of the of the engine vibration.

The passive isolation scheme component of the MTU-Paulstra scheme provides vibration isolation effectiveness of 10-15 dBs at low-frequencies, typical of a single stage rubber mounting.
The active component of this scheme enhances the vibration isolation effectiveness of the passive mounting by cancelling a pre-determined number (10-25) of individual low-frequency harmonics of the engine vibration to the tune of 10-30 dBs. The blue and red traces in the figure depict the vibration signatures of a genset without and with such an active cancellation scheme. Ten harmonics are under active control; the remaining uncontrolled harmonics is unaffected by the active control scheme.



The active component of the MTU-Paulstra scheme has no effect on shock isolation which is solely determined by the passive component (which is mostly a single stage rubber mounting) of that scheme.

The combination of the passive low-frequency isolation effectiveness (of about 12 dBs on average), and the active cancellation at the controlled harmonics (about 20 dBs on average) will result in the overall isolation effectiveness of 30-35 dBs at the controlled harmonics. The isolation effectiveness of the uncontrolled harmonics (e.g. 137.5 Hz and above in the figure) will be what the passive isolation system provides.

In short MTU-Paulstra active isolation system is definitely a respectable piece of isolation technology. It is a combination of an active scheme comprised of an extensive combination of hardware and software and a traditional passive isolation (mainly a single stage rubber mounting) system. The active component lowers the extent of the engine vibration at a set of predetermined vibration harmonics by partially canceling them, at the source (the machine). The passive component of the isolation system lowers the transmission of vibration, to the base, of all the harmonics including the actively controlled ones which are already small in magnitude. The shock isolation attributes of the MTU-Paulstra scheme is what the passive component of that isolation scheme delivers.

DEICON's 'Computer Controlled Air Isolation System' is just an adjustable passive mounting scheme which takes advantage of the adjustability of air mounts to intermittently or continuously adjusts its parameters (mainly damping and stiffness) to realize the highest shock and vibration isolation effectiveness for the for the circumstance on hand. DEICON's system uses no additional actuators to exercise the control. It is by far less elaborate and less expensive than the MTU-Paulstra active isolation system while delivering nearly as much vibration isolation effectiveness as the MTU-Paulstra delivers at its actively controlled harmonics, and more at the uncontrolled harmonics. Besides, *DEICON's system also enhances the shock attributes of the isolation performance*.