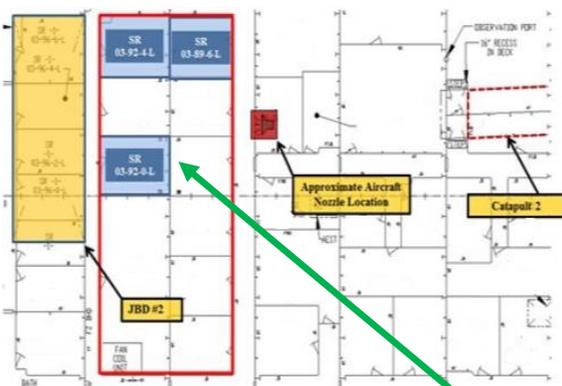


Case History: Noise Control on U.S. Navy Aircraft Carriers

Modern weapon systems, particularly those existing on aircraft carriers, expose naval personnel to extremely high levels of noise for prolonged periods of time. The Veterans Administration currently pays in excess of \$4B dollars annually to veterans as a direct result of noise induced hearing loss (NIHL) disabilities. NIHL related issues have the direct effect of decreasing the quality of life of those affected, and in addition to this, increasing warfighter down-time, decreasing productivity and effectiveness (thus survivability) and losing good personnel through medical disqualifications. The development of effective treatments, which can be applied to high noise areas and reduce the overall noise exposure of the ship's force can help to reverse these undesirable trends. Initial efforts validated the effectiveness of a novel damping treatment on an aircraft carrier in reducing noise levels.



Physical Noise and Vibration Measurements

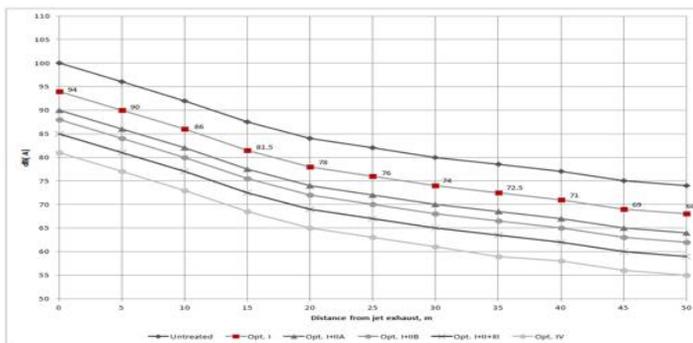
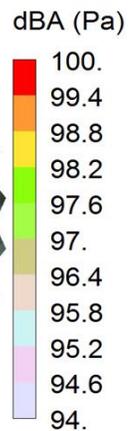
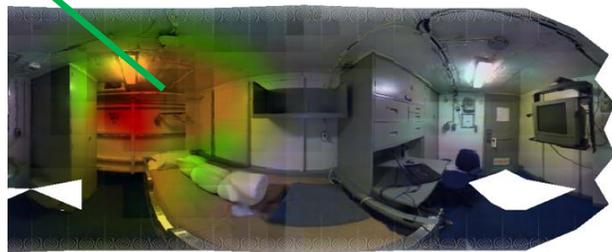


The first step in the process was to take measurements during flight operations to determine baseline levels. Measurements were acquired over a large number of areas on the Gallery deck (level right under the flight deck) during a period of three days aboard the USS Dwight D. Eisenhower (CVN69).

- 107 channels of instrumentation installed (microphones and accelerometers)
- Data acquired for over 90 launches
- Measurements also taken with acoustic array to determine primary paths of acoustic energy into the compartments

Test Results

Noise levels were quantified and aircraft source levels were confirmed. Acoustic array measurements also verified that the primary path of noise into many of the compartments was the structural bulkheads. The test results along with acoustic modeling techniques were then used to develop a noise map of critical areas of the Gallery Deck so that priority areas for reducing noise levels could be evaluated. Finally, an optimized noise control scheme was developed.



Option Number	Required Noise Reduction (dB)	Treatment description
I	5-7	1. Damping spray 3-4 mm thick on the structural bulkheads 2. Damping spray 1 mm thick on the joiner bulkheads
IIA	8-10	Option I + 2" thick additional fiberglass layer on the overhead
IIB	10-12	Option I + 3" thick additional fiberglass layer on the overhead
III	15-16	1. 2" thick fiberglass layer on the structural bulkhead 2. Floating floor (3 mm thick steel plating+2" thick fiberglass)
IV	19	Option I + Modular cabin with a floating floor.

