

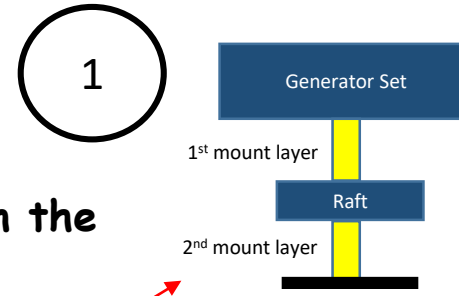
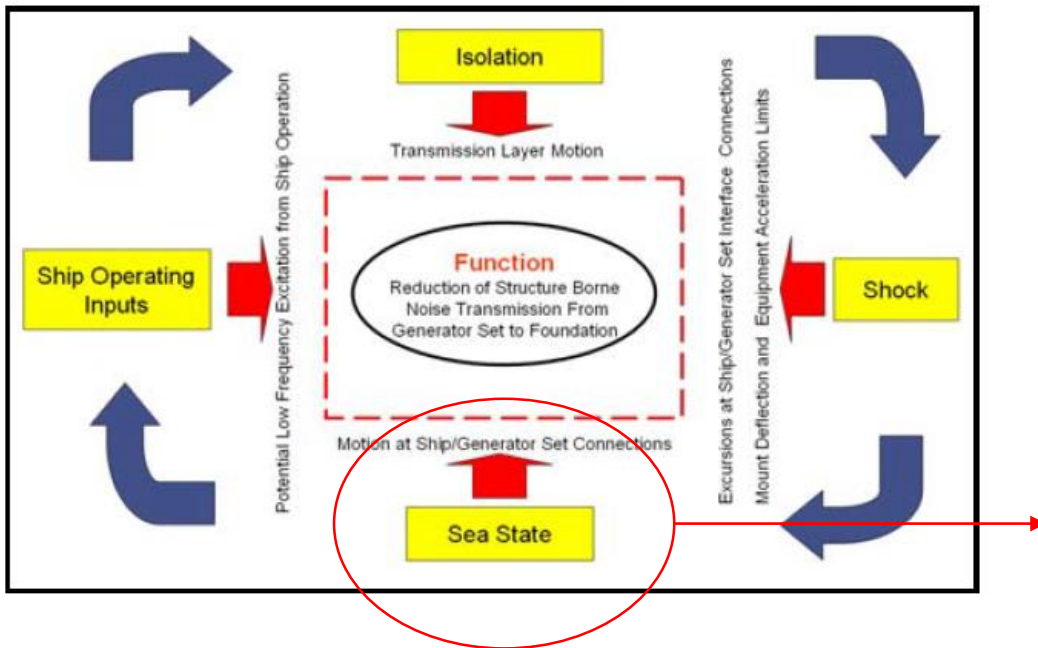


Integrated Systems Research, Inc

Employing ALD minimizes costs by reducing uncertainty in the design decision making process

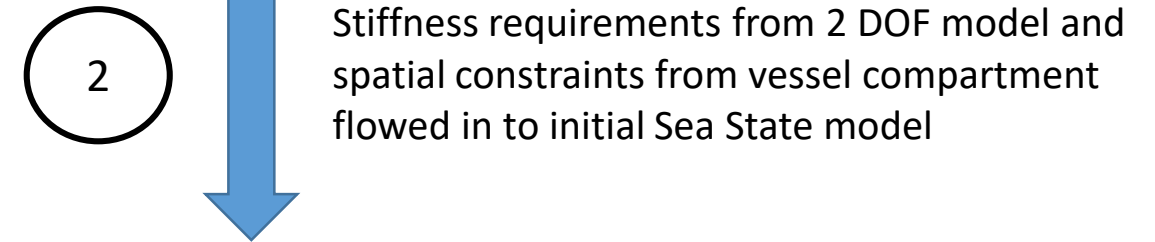
2 DOF Model – reduces uncertainty regarding whether the approach can meet specified impedance performance

Also evaluates the feasibility of meeting shock requirements

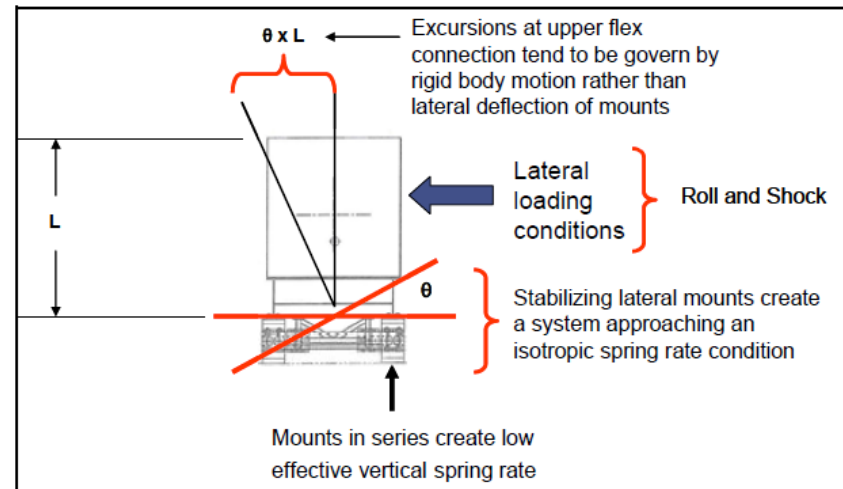


3 Necessary elements in ALD models:

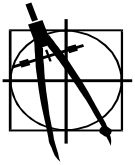
- **Spatial/Temporal:** Captured in the relative relationship between Generator and Raft (impedance) mass to ground
- **Operational Potential:** Magnitude of system masses and springs
- **Cause and Effect Continuum:** Springs between ground and masses



Stiffness requirements from 2 DOF model and spatial constraints from vessel compartment flowed in to initial Sea State model



Spring/mass model with greater spatial definition



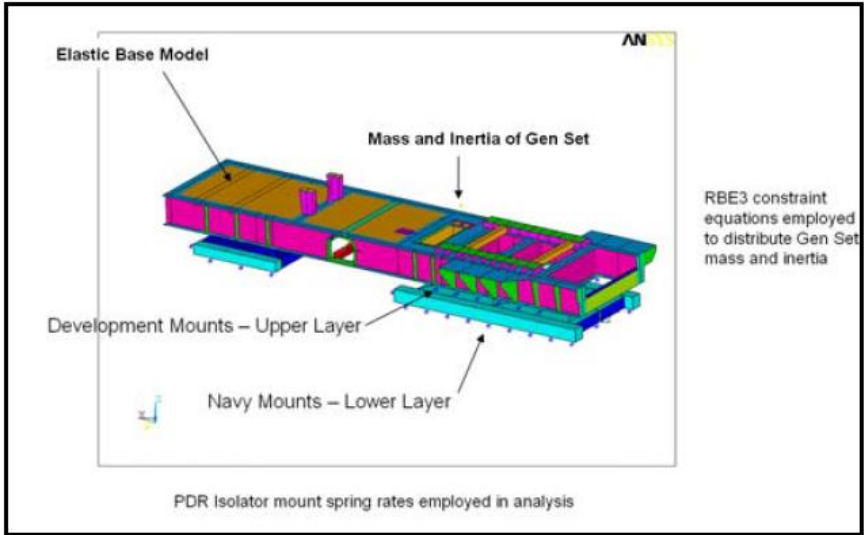
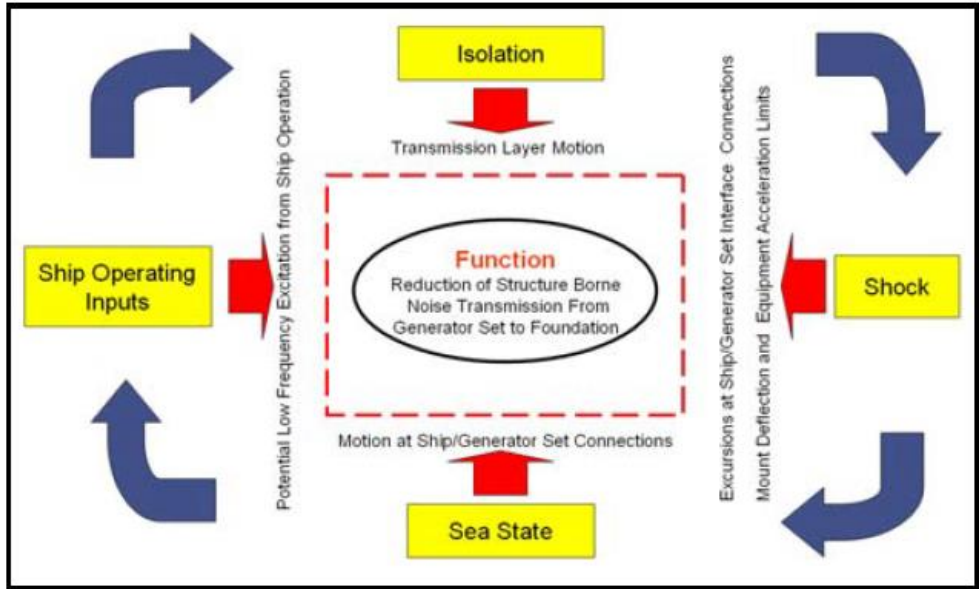
Analysis Leading Design (ALD)

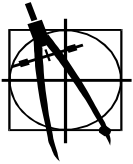
Initial models (1 and 2) lower uncertainty of design space for all four competing operating conditions: isolation, shock, sea state and ship operating inputs – Next level of models flush out hardware details

3

Next level of ALD models had further spatial definition and provided the following information:

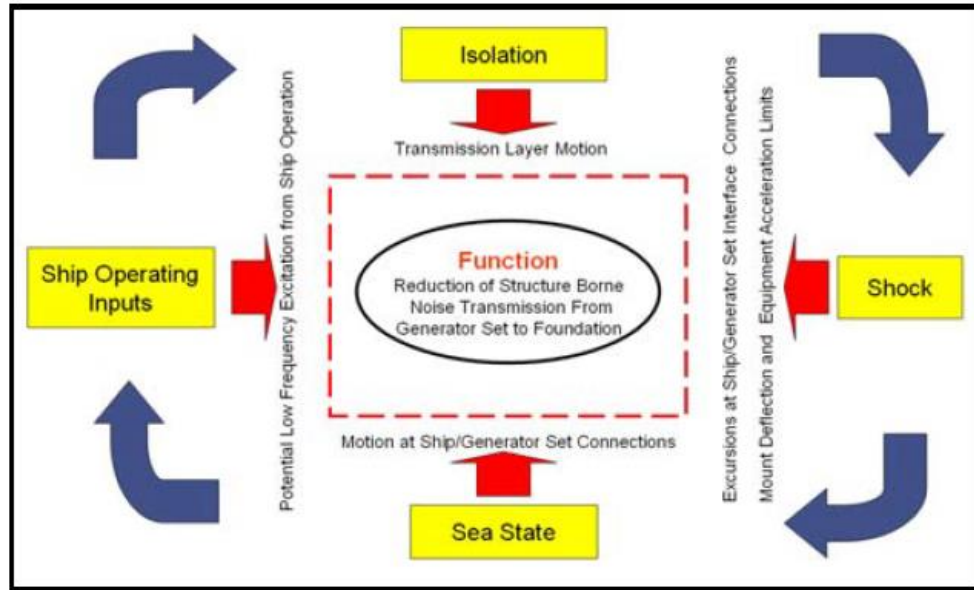
- Mass distribution within system impedance layer defined (2 Rafts)
- Construction requirements of rafts to obtain rigid body behavior in desired frequency range
- Finalize requirements for development of mount layers
 - Also used to direct testing of development mounts





Analysis Leading Design (ALD)

4



Using analysis to lead design and testing, facilitated identifying a system solution in less time as well as troubleshoot the impact of manufacturing nonconformity. This allowed the delivery of a fully compliant product in performance within cost and on schedule.

Final Structureborne Vibration Model

- ALD models used to validate final system model
- Final system model predicts compliance with performance requirements
- Initial noncompliance observed in runoff test
 - Model used to identify the source of noncompliance
 - Manufacturing nonconformity in raft
 - Information from ALD allowed for efficient remedial action to bring system into compliance
- ALD created successful product integration into Navy vessel

