

**SIGNATURE CONTROL FOR NAVAL SHIPS,
COMMERCIAL VESSELS & OCEAN
ENGINEERING STRUCTURES**

Specifications, procedures and processes have been developed to manufacture new types of hydroacoustic coatings. Drawings and accessory tooling have been made for pilot batched-flow production of 1x1m tiles. The Krylov Institute have also investigated acoustic, strength and service properties of the prototype batches of 1x1m tiles manufactured at the new production facility and developed technical documentation required for serial production and delivery of hydroacoustic tiles.



Tiles of hydroacoustic coating



Hydroacoustic coating of the "Saint-Petersburg" submarine

**DEVELOPMENT OF NOISE REDUCTION
TECHNOLOGY BASED ON ACTIVE
METHODS**

Development of effective noise and vibration reduction tools and measures for transport are of key importance for environment protection and calls for new engineering solutions to meet vibration & acoustic, sanitary & hygienic and operational requirements.

This task involves:

- ▶ Development of system algorithms and software;
- ▶ Elaboration of engineering solutions for development a multi-channel system for active suppression of air noise (AS).

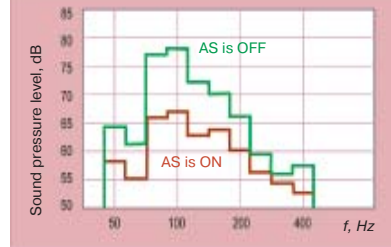
Results of completed investigations:

- ✓ Mockup specimen of a multi-channel active air noise-suppression with sensors based on piezo-electrical and ceramic & polymer materials was developed for suppression of discrete components within frequency range 50–500Hz;
- ✓ Algorithms and software for mockup prototype of active air noise-suppression system for on-line operation, adapted for digital signal processors and further industrial use.



Multi-channel active air noise suppression system

Experimental evaluation of active noise-suppression system efficiency



Air noise reduction within rooms at one meter distance from the window

Completed experimental investigation of mockup prototype demonstrated that at certain frequencies the air noise reduction may reach 15–20dB.

Introduction of AS system in transport will keep down noise levels in passenger compartments of transport vehicles and reduce noise pollution of environment.

**DEVELOPMENT OF METHODOLOGY FOR
DESIGN & LAYOUT OPTIMIZATION OF
OSCILLATION SYSTEMS**

Development of competitive low-noise marine installations, as well as surface transport, aerial and marine structures is feasible only due to design & layout optimization of oscillation system from noise sources to the environment.

Since noise reduction methods potential on the basis of kinematic parameters processing and analysis is mostly exhausted, further noise reduction inside the structures and environment by means of design & layout optimization can be achieved based on methodology that consider the processes for oscillation energy propagation in all media with due regard of oscillation type conversion.

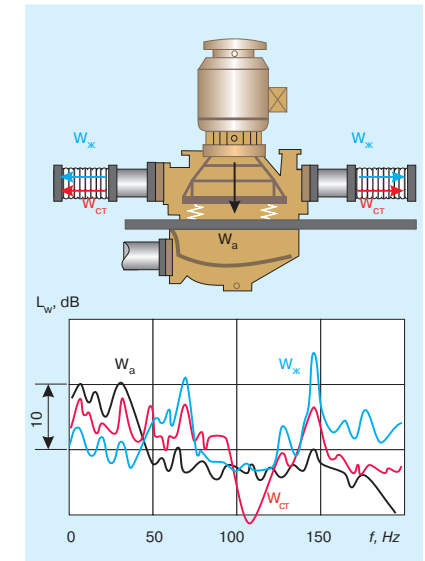
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Achieving this target has required to:

- ▶ define the relationship between mechanical energy of installation and radiated power;
- ▶ develop methods for assessment of the system vibration insulating properties;
- ▶ define coefficients of energy transfer in the systems.

The performed work has resulted in:

- ✓ Obtaining the data on the relationship between mechanical energy of installations and radiated oscillating power;
- ✓ Developing energy computation methods for unique assessment of vibration insulating properties for spatial oscillation systems;



Energy propagation along the bearing and non-bearing links