UNIVERSITY OF Southampton

ISVR Anechoic and Reverberation Chambers

At the University of Southampton

UNIVERSITY OF Southampton

Our Facilities

Large Anechoic Chamber

Sound equipment testing within the anechoic chamber

- The Large Anechoic Room at the ISVR is one of the largest in the country.
- Construction
  - Built as a box within a box, it is acoustically isolated from the rest of the building and adjacent chambers by an air gap.
  - The reinforced concrete walls are 305 mm thick.
- Wall Lining
  - There are over 8,000 non-flammable glass-fibre cored wedges, extending 910 mm from the walls, floor and ceiling.
- Dimensions
  - Without wedges the bare chamber is 9.15 m x 9.15 m x 7.32 m, volume 611 cubic metres.

Large Reverberation chamber

Sound level testing within the Reverberation Chamber

- Construction
  - Built as a box within a box and isolated from the surrounding building.
    The internal surfaces are finished with a hard gloss paint to give a high reflection coefficient.
- Dimensions
  - Non-parallel walls, mean edge lengths 9.15 m × 6.25 m × 6.10 m high.
    Volume 348 cubic metres. Surface area 302 square metres.
- Access
  - Double doors and interconnecting doorway / test aperture to small chamber.

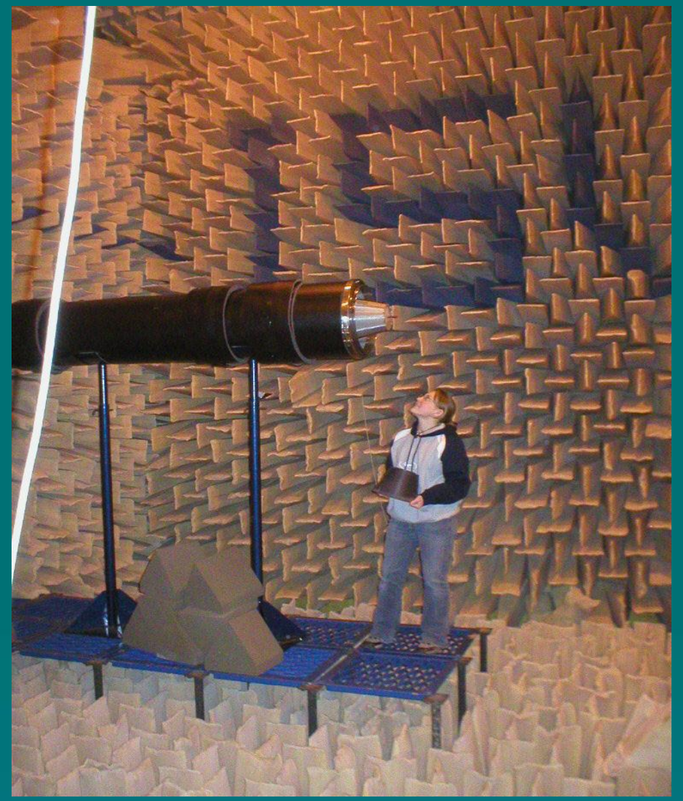
UNIVERSITY OF Southampton

ISVR Research

Research Groups:

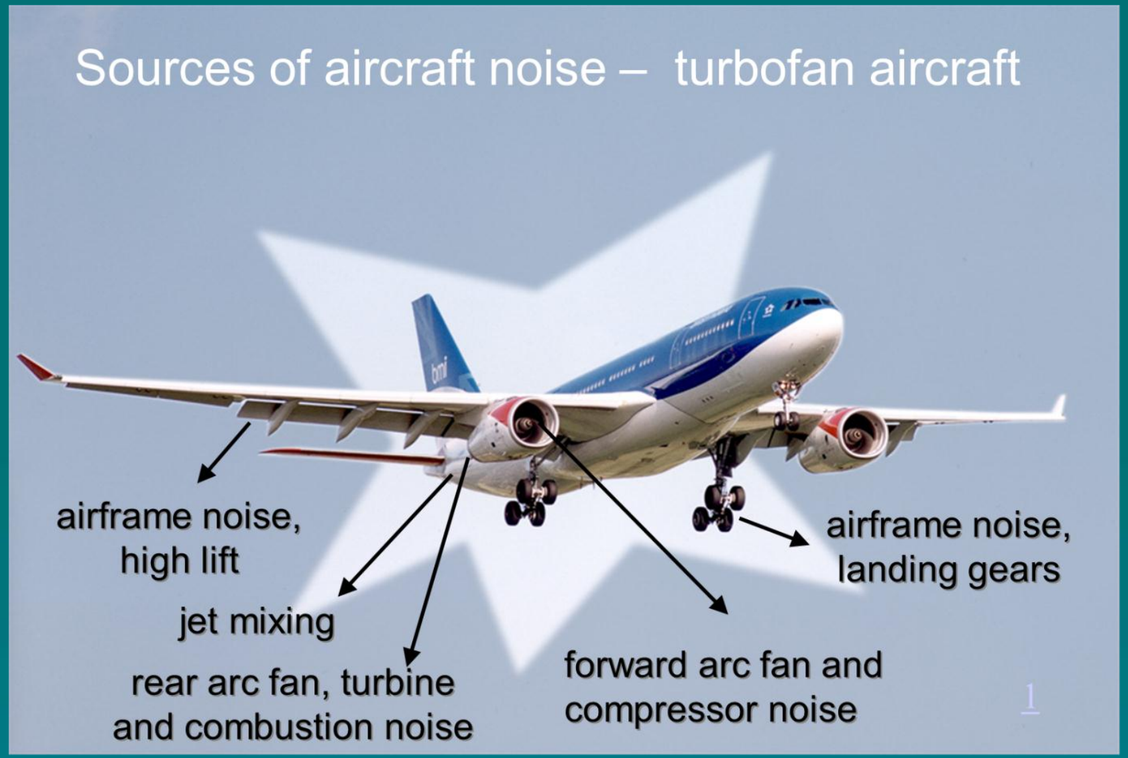
UNIVERSITY OF Southampton

- Fluid Dynamics & Acoustics
- Dynamics Group
- Signal Processing & Control
- Human Sciences Research Group
  (Tour of facilities separate to ISVR)



Fluid Dynamics and Acoustics: Aircraft noise (Rolls-Royce UTC)

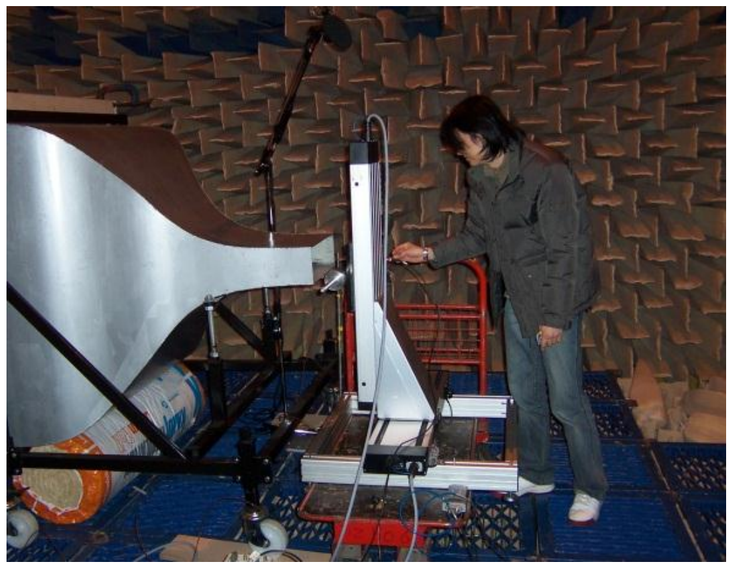
UNIVERSITY OF Southampton



Turbofan Noise

- Understand the fundamental mechanisms of fan noise generation and propagation.
- Work towards new low noise fan designs.
- Develop new methods to reduce fan noise.

Noise evaluations in the anechoic chamber



Jet and exhaust noise

- Understand the fundamental mechanisms of jet noise.
- Develop techniques to measure jet noise – source location.
- Develop methods to reduce/control jet noise.

Static engine test

4 inch bleed valve rig

Virtual acoustics and Audio Engineering

- Electroacoustics

  - Microphone arrays
  - Loudspeaker arrays
  - Transmission Line Loudspeakers
  - Compression Drivers

- Psychoacoustics

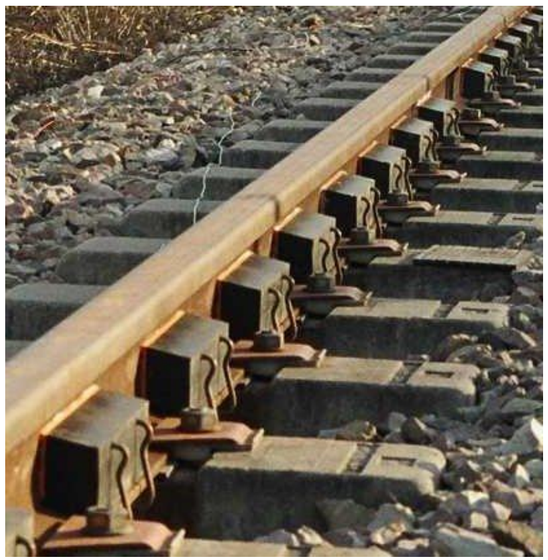
  - Auditory process models
  - Low frequency sound quality assessment

Forty channels spherical loudspeaker array

Railway noise and vibration

- Predict/measure noise (and vibration) from trains.
- Reduce the environmental impact of rail systems.
- Develop new technology to mitigate rail noise.

Field measurements of ground vibration



ISVR/Corus rail damper

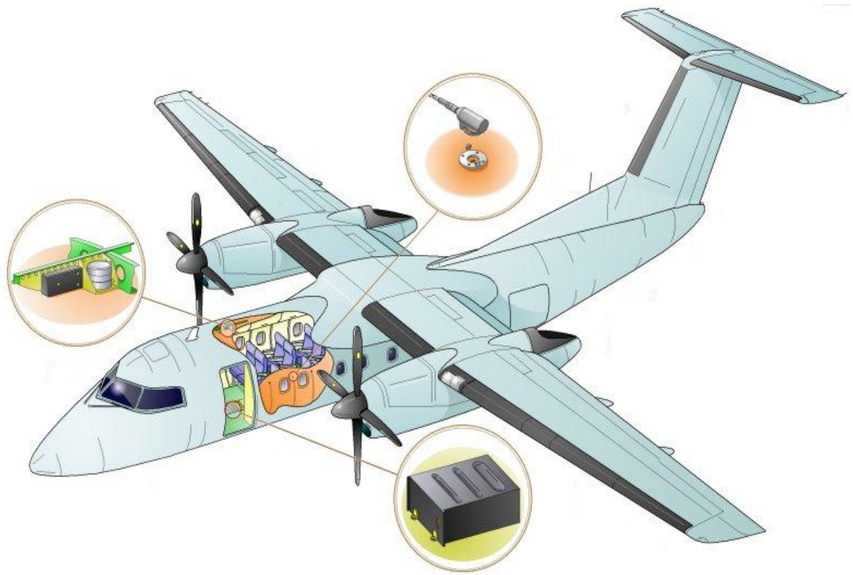
Signal Processing and Control

UNIVERSITY OF Southampton

Research Themes

- Active control of sound and vibration.
- Biomedical and Neural Signal Processing
- Bioacoustics and sonar
- Condition Monitoring

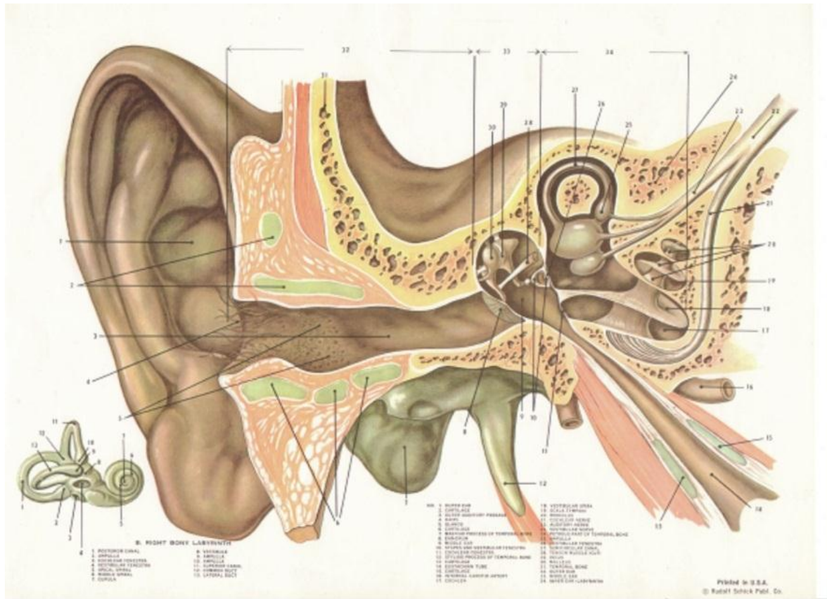
Control System for Propeller Aircraft Active Noise System



- Controller with 46 structural actuators and 72 microphones built by Ultra Electronics and now fitted to over 1,000 aircraft

Modelling Cochlear Mechanics

UNIVERSITY OF Southampton



- Modelling the physical mechanisms of normal hearing and of how the brain processes the signals it receives, helps us understand deafness and to develop aids for the hearing impaired.

UNIVERSITY OF Southampton

ISVR Enterprise

ISVR Consultancy Work

- Business areas include:
  - Anything that causes noise or vibration
  - Modelling
  - Measurements

  - Industrial
  - Transportation
  - Building Vibration
  - Automotive
  - Marine

Working with train companies to develop noise dampeners

Automotive and Marine

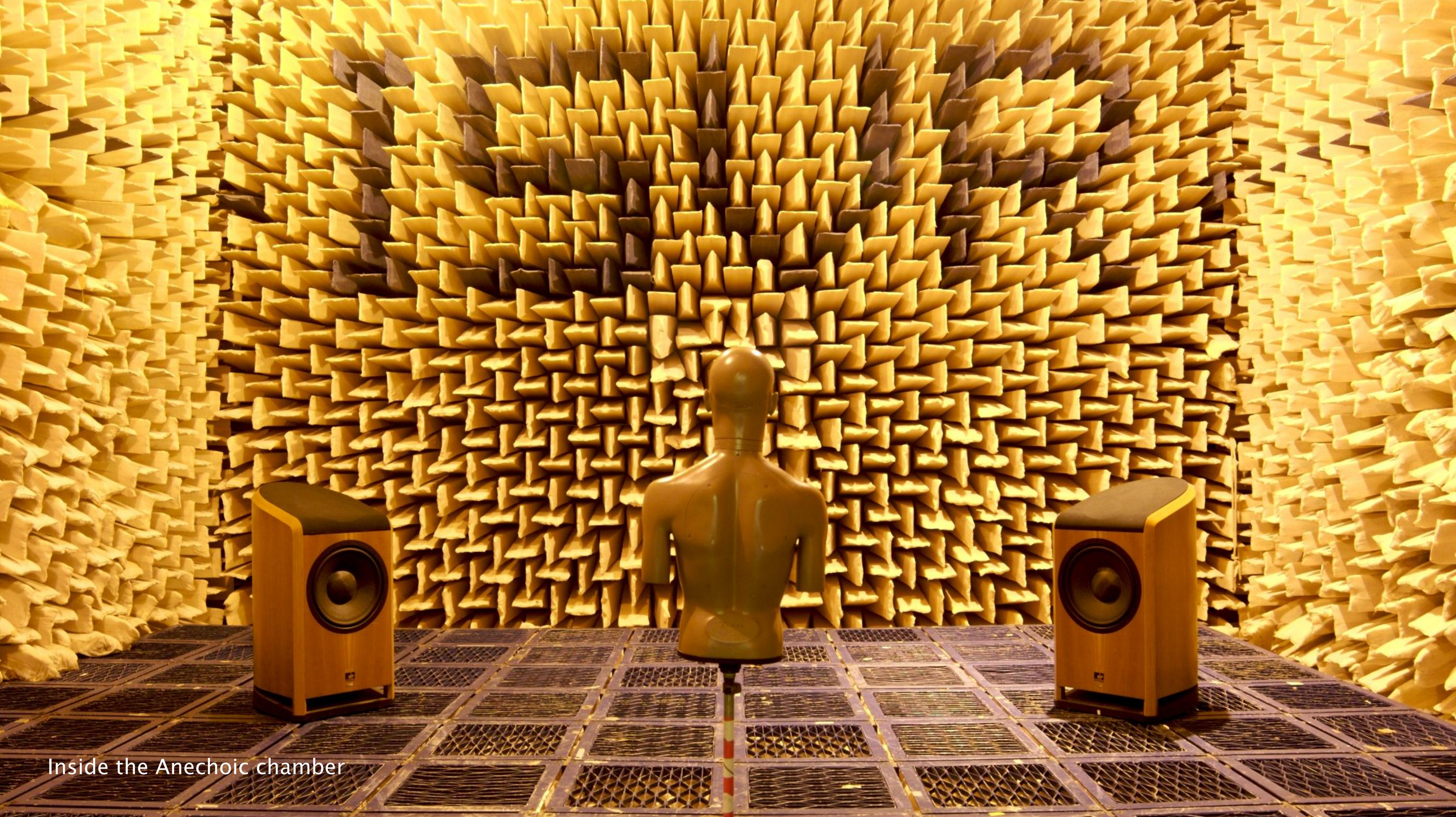
- Noise source and transmission path identification
- Silencer design
- Noise and vibration assessment and control (ships /oil rigs/ leisure)
- Active control of noise and vibration

Assessments of noise levels of marine craft used for leisure

Research aims to find ways of decreasing noise output

UNIVERSITY OF Southampton

The Anechoic Chamber



Inside the Anechoic chamber

Consultancy work

- Noise evaluations of consumer products
- If our experts detect more noise than desired they work with the manufacturer to develop the product so that noise levels are reduced.
- Tested products include microwave ovens, PCs, air conditioning units and computer back up devices.

Links to Aircraft Industry

- Noise radiation from scale models of aircraft engine nacelles are simulated in the chamber.
- Novel configurations can be tested cheaply for their noise characteristics.
- Acoustically absorbing panels are developed from such tests to reduce noise in real turbofan engines.

Research looks to find materials that can make aeroplane noise more tolerable

UNIVERSITY OF Southampton

The Reverberation Chamber

Consultancy work

- Companies use the chamber to test the “acoustical absorbance” of material, the sound transmission of materials and acoustic fatigue of components and structures.
- Applications to car manufacturing, aircraft manufacturing, train manufacturing and general building practices, where designers aim to use materials that can absorb and protect people from noise.
- Smaller chamber: Can be used to test the transmission of sound through materials such as doors and double glazing.

Links to Aircraft and Space Industry

- Researchers can generate high acoustic noise levels which are comparable to jet engines and space rockets.
- They can test whether equipment contained inside these craft can withstand high noise levels.

ISVR tests whether equipment inside space craft can withstand engine noise levels