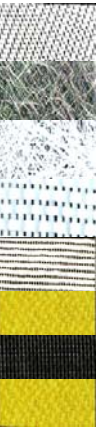
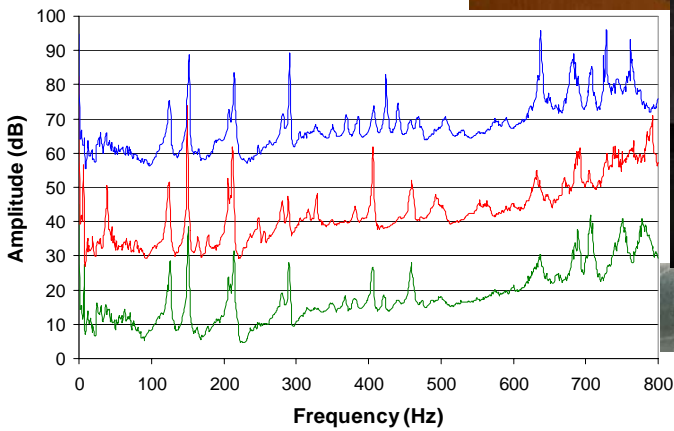
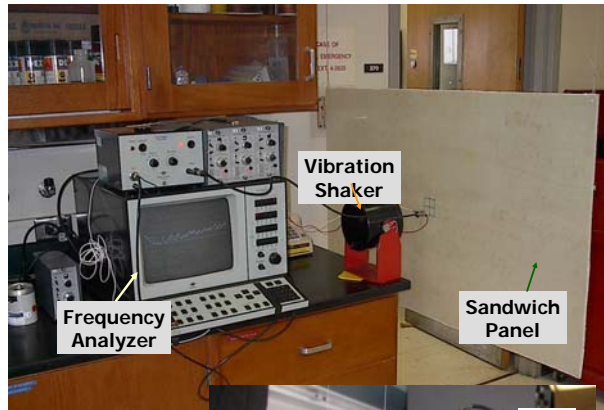


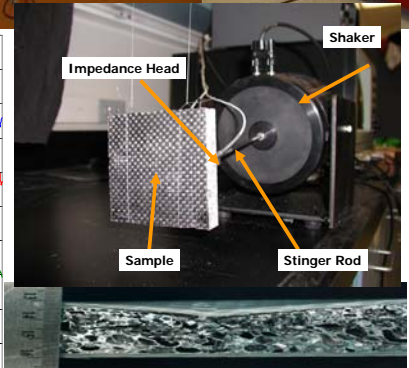
You use vibration analysis almost every day of your life. You thump a watermelon to assess the ripeness by the sounds or vibrations coming from the melon. You listen for new sounds or a change in the frequency (pitch/cycles per second tone) of noises made by your automobile or other engine driven vehicle, appliance, or whatever. When the structural damage is small or it is in the interior of the system, its detection cannot be done visually. A useful more elaborate nondestructive evaluation tool is vibration monitoring. It relies on the fact that occurrence of damage or loss of integrity in a structural system leads to changes in the dynamic properties of the structure (eigenfrequencies, modal damping rates, mode shapes and/or transfer functions). In composite structures, damage from delaminations, fiber breaks and matrix cracks cause changes in their vibration response.



**Bending and torsional vibration excitation of large structural foam core sandwich panels used in boats, buildings, aircraft and vehicles**



Frequency Response Function for Foam Core Sandwich Panels



### Vibration Modes of a Bus Structure

*Choice of materials plays an important role in optimizing Natural Frequency, Damping Ratio and Mode Shapes of Mass Transit Structures*

