Egg Carton Myth

We wanted to join the egg carton myth since it is an exciting and recurrent subject the community asked us to do as acoustical consultants. Noise absorption in rooms, studio garages, or storages is the kind of project for several individuals among music enthusiasts, early career professionals, and entrepreneurs.

In this opportunity, we used the Crystal Instrument Coco80X to measure the absorption coefficient of egg cartons, and we compared it with an acoustical foam. The equipment used consisted of an array of 4 microphones, a speaker, and two specimens to be tested (egg carton and 4" acoustical foam). The testing was done inside the MD Acoustics, LLC's anechoic chamber at the facilities in Gilbert, AZ.

Picture of the Experiment Setup

For each recording, the speaker was placed at the same distance from the specimen. A linear array of two-microphone probe was placed at each upstream and downstream locations, with the specimen in the midpoint between the upstream and downstream probe locations. The recordings were made over a 10-second period and were post-processed using the CI tool Post Analyzer, as shown in the figure below.

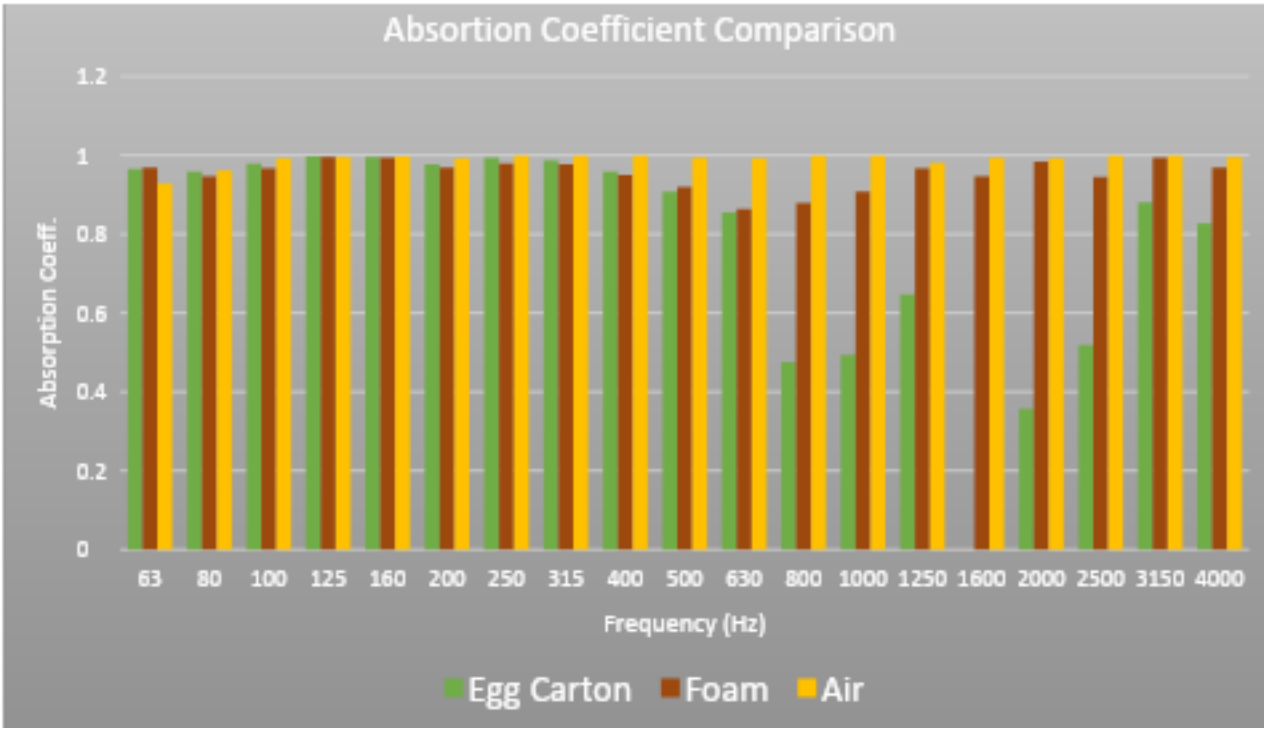
CI Post Analyzer Tool View of the Data

Three situations were analyzed for comparison purposes. The first situation was the measurement of the air since no specimen was placed. The second corresponded to the egg carton, and the third corresponded to the 1.5” acoustical foam. The absorption coefficient was calculated using a method like the transfer function method. The frequency range targeted was 63 Hz to 4 kHz. The absorption coefficient measure for each condition is shown in the table below.

Material	Absorption coefficient	TL [dB]
Air	0.98	2.2
Egg Carton	0.63	5.1
1.5” Acoustical Foam	0.91	5.2

Absorption coefficient values follow the assumption that the acoustical foam would do better than the egg carton. Also, the transmission loss (taken as the level difference between upstream and downstream positions) is similar for both materials, and both TL values are higher than the TL value when nothing was installed.

The figure below shows the one-third octave band analysis. The egg carton has high absorption coefficient values for frequencies below 630 Hz and a massive dip at 1.6kHz. Additionally, the spectrum obtained for the foam is regular over the complete frequency range analyzed, giving a superior sound absorption solution over the egg carton option. The absorption coefficient measured for the sample of egg carton is weak between 630 to 3150 Hz.



In conclusion, using egg cartons for sound absorption wall treatment will not work for all the frequencies. Depending on the sound environment where the application is meant to be, the egg carton solution will not be as effective as the acoustical foam. Keep in mind that the samples measured at this time were regular egg cartons found at grocery stores with some humidity content. The acoustical foam is 1.5” thick and is engineered for sound absorption. With that being said, it is possible to find some different values on other experiment results.

At MD Acousctis the use of the Crystal Instruments CoCo80X has been a key for projects involving flexible measurement methods with complex variables to acquire. On this occasion, we acquired data using 4 channels.

#Acoustical Testing and measurement