RPG
ACOUSTICAL SYSTEMS - LLC

FlutterFree-T®

1D Diffusion

Original FlutterFree

FlutterFree_T

The First Optimized Acoustical Hardwood Molding
From The Acoustical Industry's Leading Innovator

RPG FlutterFree ushered in a new era of diffusive moldings, that minimized flutter echoes by diffusion, as opposed to the traditional use of fabric wrapped panels which, when used over large areas may produce a "dead" space. The 1" depth allowed use when space was limited, however, this resulted in only high frequency diffusion. Also, the symmetrical profile compromised uniform diffusion, when used in a repetitive pattern. RPG utilized its patented "Aperiodic Modulation of a Single Asymmetric Optimized Base Shape" technique to produce a new optimized, asymmetric FlutterFree, with folded wells to improve the diffusion bandwidth. When this new profile, with "L" shaped folded side wells is mounted in an aperiodic modulation, "T" shaped wells are formed between adjacent units, forming FlutterFree_T, with dramatically better performance.

Problem and Solution

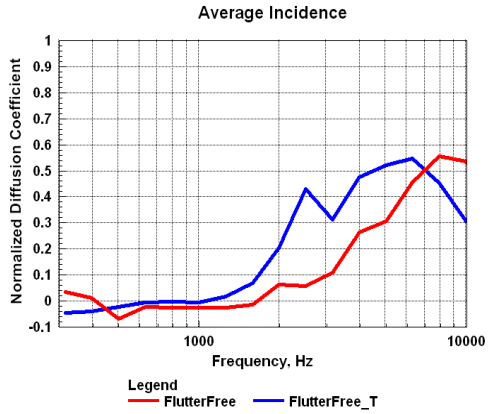
Problem

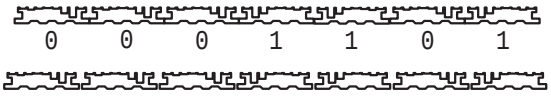
When shallow, symmetrical scattering surfaces, based on simple number theory algorithms, are placed in a periodic, repetitive pattern produce lobing (grating lobes) in certain diffraction directions, which degrade uniform diffusion. The shallow wells offer only high frequency diffusion.

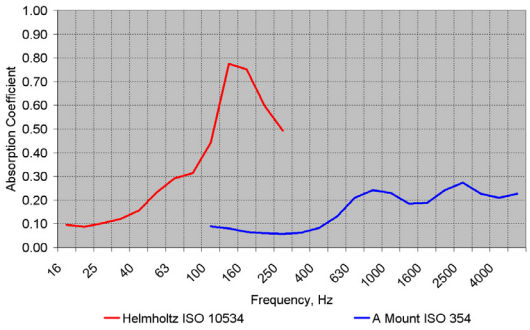
Solution

FlutterFree_T® is an acoustically optimized, shallow, asymmetric diffusor, with folded "L"-shaped side half-wells that provide deeper wells, without increasing the depth of the acoustic molding. The asymmetric profile allows aperiodic modulation, by flipping adjacent units according to the prescription of an optimal binary sequence. This aperiodic modulation minimizes grating lobes for optimally uniform diffusion and the "L" shaped side half-wells from adjacent units form "T"-shaped wells of longer depth, extending the onset of diffusion to 1000 HZ.

Performance Specifications







Diffusion

The graph at the top illustrates how FlutterFree®_T provides improved diffusion performance over the original FlutterFree®, when arranged in an aperiodic modulation arrangement as shown in the middle illustration. The orientation of adjacent FlutterFree®_T planks follows the prescription of an optimal binary sequence, where a binary 0 represents the base shape and a binary 1 represents the base shape flipped 180 degrees.

FlutterFree®_T planks can be spaced by 1/6" (1.6 mm), as shown in the bottom of the middle Helmholtz mounting illustration, to provide low frequency absorption. The red curve in the bottom graph illustrates the absorption coefficient in the Helmholtz mounting for a 3.5" (90 mm) cavity depth. The blue curve illustrates the absorption coefficient for a surface mount without Helmholtz resonator slots.

Installation

FlutterFree_T® is molded on a 5 head wood molder from hardwood that is kiln dried to 6-8% moisture content. RPG® takes every precaution to minimize warping by stress relieving the rear surface and treating all exposed surfaces on prefinished orders. FlutterFree_T® can either be nailed or glued directly to a wall surface or laterally spaced and mounted with a rear air cavity for low frequency absorption. In this Helmholtz mounting, a semi rigid fiberglass panel is mounted directly behind the FlutterFree_T®, where the particle velocity is a maximum , as opposed to on the rear wall. When used as wall panels, a hardwood frame (not supplied) is suggested.

FEATURES

- *Furniture grade, hardwood, sound diffusing acoustical molding*
- *Low frequency absorption mounting option*
- *FlutterFree_T® incorporates folded end half wells and optimized, asymmetric well depths*
- *Modular asymmetric extruded diffusive strips*

BENEFITS

- *Handsome furniture grade hardwood finish offers specifiers a new approach to flutter echo control that does not rely on the use of fabric upholstered fiberglass panels*
- *Offers an almost unlimited variety of lacquered, stained, or painted finishes and hardwood options*
- *Diffusive flutter control minimizes flutter echoes, without making the space acoustically "dead"*
- *Diffusive flutter control provides an ambient environment to support speech in conference rooms for less fatigue, greater coverage, and high speech intelligibility*
- *Mounting spaced FlutterFree_T® planks over an air cavity provides low frequency absorption to minimize boominess and lack of definition in small rooms*

APPLICATIONS

Conference and teleconference rooms, Lecture Halls, Distance Learning Rooms, Public spaces, Listening rooms, Recording and broadcast studios, Post production studios, Home theaters, Rehearsal rooms, Auditoriums, Performance spaces

SPECIFICATIONS

- *Size: 96" max (L) x 5" (W) x 1-1/16" (D)*
- *Custom lengths are available up to 8', call for longer lengths.*
- *Weight: 1 lb/ft*
- *Finishing: FlutterFree®_T can be supplied unfinished, clear lacquered, stained and lacquered, and painted*
- *When field finishing, all exposed surfaces, including the cut end surfaces, should be treated to minimize warping*

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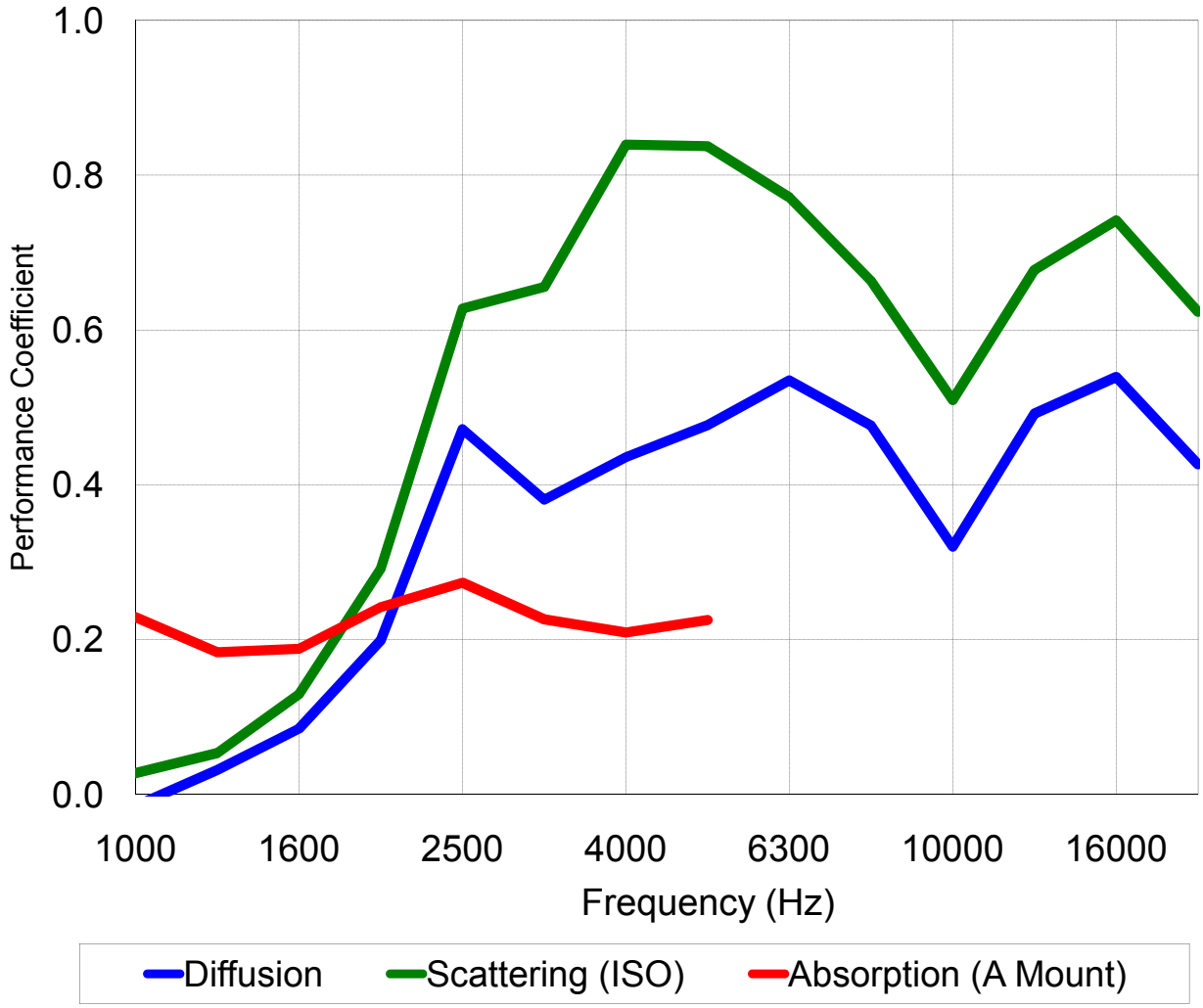
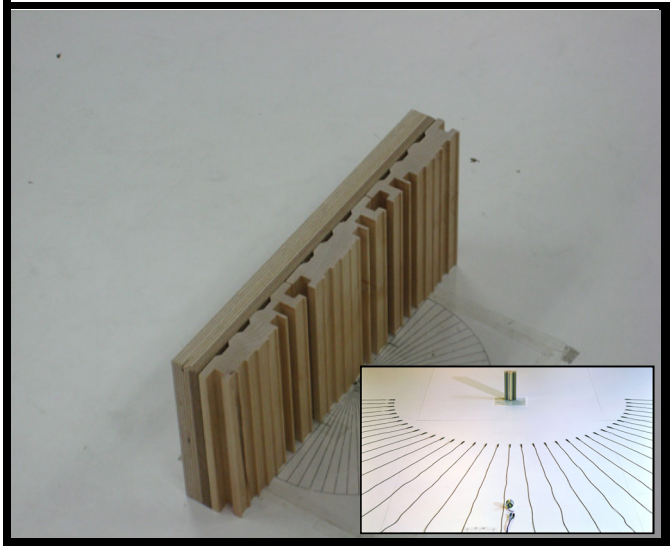
FlutterFree®-T *Random Incidence* Performance Data





Freq (Hz)	Diffusion	Scattering (ISO)	Absorption (A Mount)
1000	-0.01	0.03	0.23
1250	0.03	0.05	0.18
1600	0.09	0.13	0.19
2000	0.20	0.29	0.24
2500	0.47	0.63	0.27
3150	0.38	0.66	0.23
4000	0.44	0.84	0.21
5000	0.48	0.84	0.23
6300	0.53	0.77	
8000	0.48	0.66	
10000	0.32	0.51	
12500	0.49	0.68	
16000	0.54	0.74	
20000	0.43	0.62	

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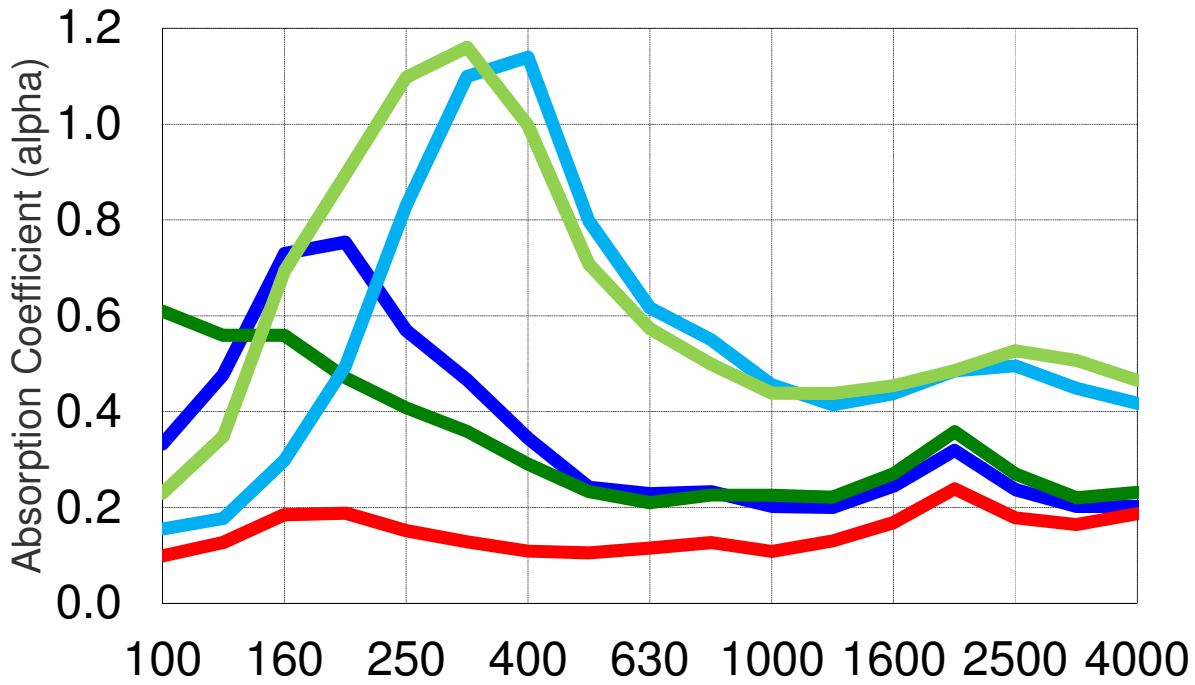
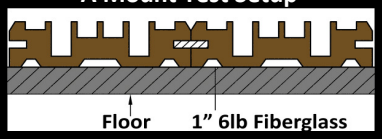
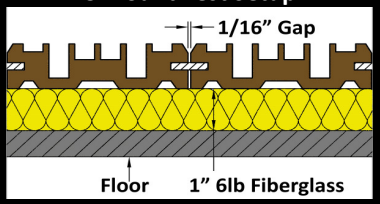
FlutterFree® T
Supplemental Random Incidence Absorption Data



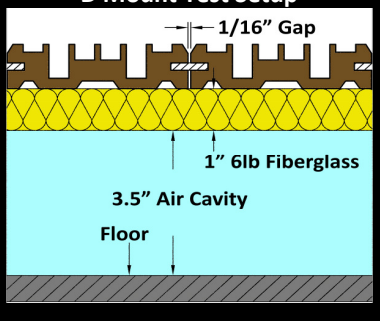
A Mount Test Setup



C Mount Test Setup



D Mount Test Setup



FREQ	A Mount	C Mount w/ Helmholtz	C Mount w/ Slots	D Mount w/ Helmholtz	D Mount w/ Slots
100	0.07	0.18	0.00	0.48	0.27
125	0.10	0.33	0.15	0.61	0.23
160	0.13	0.48	0.18	0.56	0.35
200	0.19	0.73	0.30	0.56	0.69
250	0.19	0.75	0.49	0.47	0.89
315	0.15	0.57	0.83	0.41	1.10
400	0.13	0.47	1.10	0.36	1.16
500	0.11	0.34	1.14	0.29	1.00
630	0.11	0.24	0.80	0.23	0.71
800	0.12	0.23	0.62	0.21	0.57
1000	0.13	0.23	0.55	0.23	0.50
1250	0.11	0.20	0.46	0.23	0.44
1600	0.13	0.20	0.41	0.22	0.44
2000	0.17	0.24	0.44	0.27	0.45
2500	0.24	0.32	0.49	0.36	0.49
3150	0.18	0.24	0.50	0.27	0.53
4000	0.16	0.20	0.45	0.22	0.51
5000	0.19	0.20	0.42	0.23	0.47