

# The Doorway

A Publication of The Gill Corporation

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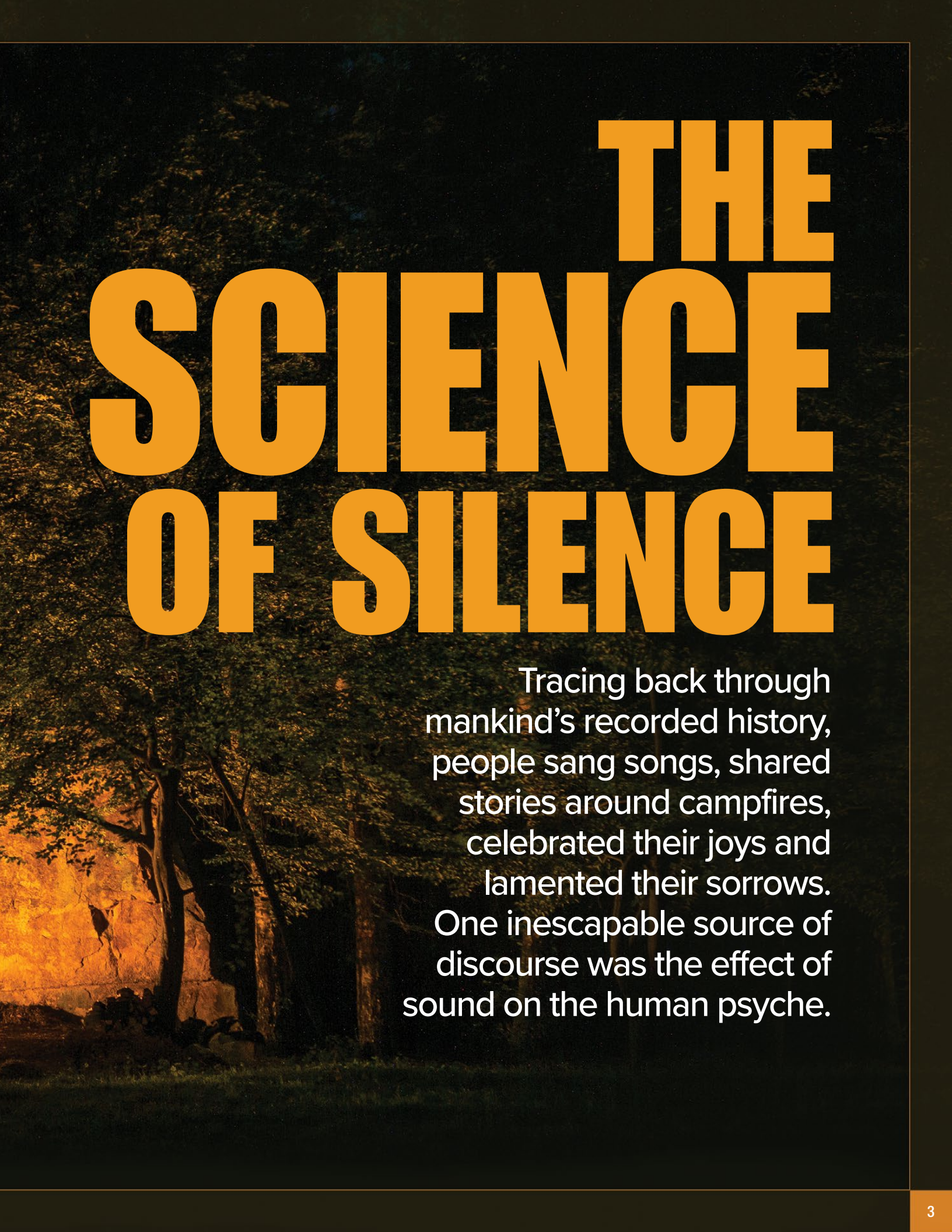


# THE SCIENCE OF SILENCE









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Tracing back through mankind's recorded history, people sang songs, shared stories around campfires, celebrated their joys and lamented their sorrows. One inescapable source of discourse was the effect of sound on the human psyche.



The world is a cacophony of sounds. Some are soothing and evoke fond memories that remind us of good times past. There are also sounds better categorized as noise that annoy, disturb and frighten. As mankind has advanced along the spectrum of modern technology the “noise” our society must endure has become a constant in our lives with a never-ending background hum that is an irritant at best and crippling at worst.

Noise health effects are the physical and psychological health consequences of regular exposure to consistent elevated sound levels. Elevated workplace or environmental noise can cause hearing impairment, hypertension, ischemic heart disease, annoyance, and sleep disturbance. Changes in the immune system and birth defects also have been attributed to noise exposure. Stress from time spent around







elevated noise levels has been linked with increased workplace accident rates, aggression and other anti-social behaviors. The most significant sources are vehicles, aircraft, prolonged exposure to loud music, and industrial noise.<sup>1</sup>

The individual who divines a method for controlling noise likens himself to a modern-day wizard who amazes with his collection of wondrous inventions.

At The Gill Corporation our scientists are real wizards who don't need smoke and mirrors to amaze the aerospace industry. We're crafting solutions to quiet the noise and keep the hum at bay.

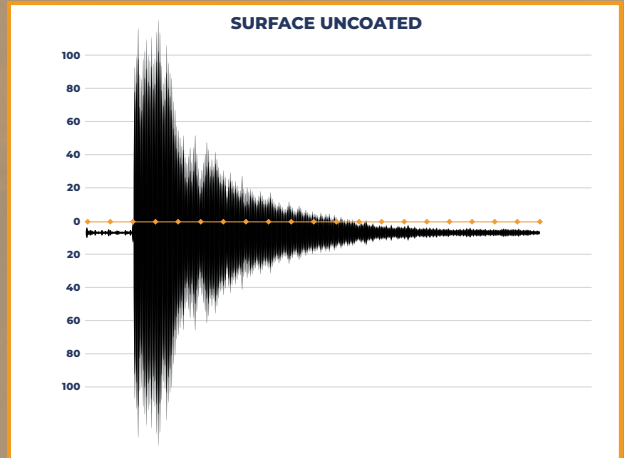
One of the most exciting new developments at The Gill Corporation is an emerging technology that targets vibration and reduces noise both inside and outside an aircraft.

<sup>1</sup> [www.wikipedia.org](http://www.wikipedia.org), *Health Effects From Noise*, 8/10/2018

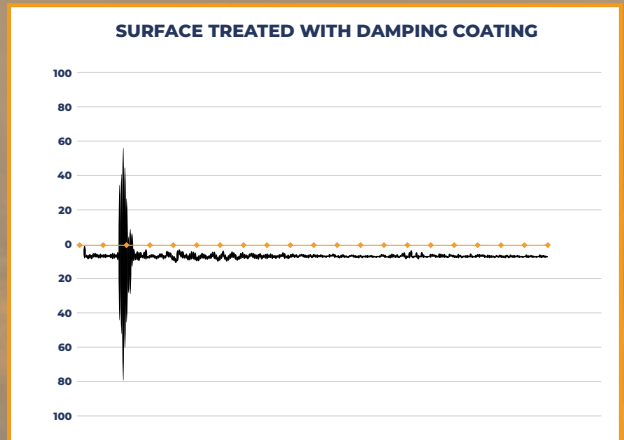
GillVANA® is a patent-pending proprietary process that involves controlled application of a specially designed coating on raw honeycomb slices for targeted optimal performance.

“Visco-elasticity” of synthetic polymers translates into an excellent damping property against mechanical perturbations such as vibration or sound. The damping effect reaches maximum performance under certain temperatures and range of frequencies. Sandwich structures containing damping material bring about acoustic benefits, while still meeting physical, mechanical and fire, smoke and toxicity (FST) requirements. In addition, sandwich panels can be designed to deliver improved acoustics for specific applications with minimal weight increase.

GillVANA sandwich panels are ideally suited for commercial passenger aircraft flooring, sidewalls and ceiling panels delivering a weight-efficient solution of vibration and noise attenuation.

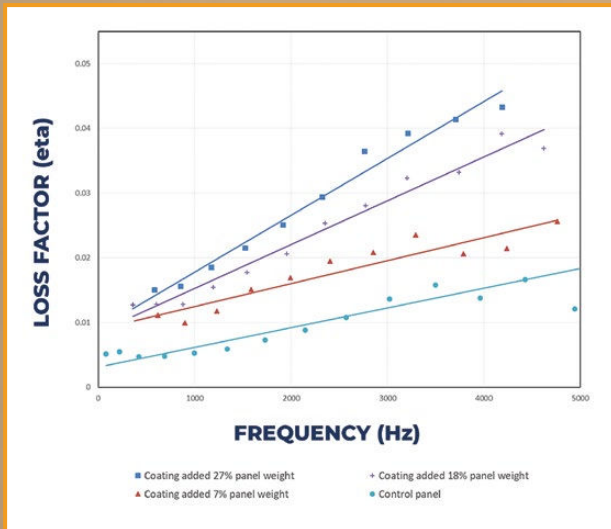


*Vibrational amplitude pattern of a metal sheet after one hard strike.\**

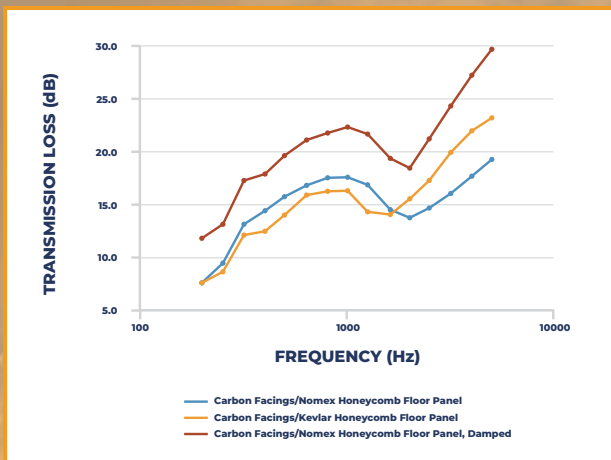


\* Vibrational amplitude charts provided by [www.mascoat.com/sound-damping-and-control.html](http://www.mascoat.com/sound-damping-and-control.html)





*Treated honeycomb shows strong damping performance, measured by Loss Factor. A heavier coating weight shows a stronger effect.*



*Airplane floor panels also see better sound insulation with GillVANA coating added, as indicated by transmission loss test.*

While our West Coast wizards deserve applause for GillVANA, our East Coast scientists have worked their magic on another noise-reducing material they developed called HUSHGRID®.

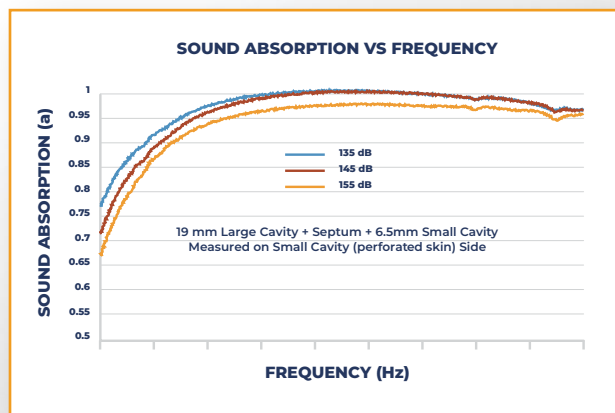
HUSHGRID is The Gill Corporation's proprietary development of material that allows operators to reduce engine noise levels with the application of HUSHGRID material in the engine nacelle.

Anyone who has flown in a commercial aircraft can attest to the high level of noise generated by engaged engines. Medical experts recently began working with the Federal Aviation Administration (FAA) to gain a better understanding of long-term effects caused by this type of noise. The University of Pennsylvania, School of Medicine has received federal funding through the FAA to study the impact of aircraft noise on sleep and work by developing models that predict sleep disruption for different aircraft noise levels and profiles.<sup>2</sup>

Clearly, there is a need to minimize the debilitating effects created by engine noise (both inside and outside an aircraft) associated with commercial air travel. Fortunately, The Gill Corporation has a proven track record of providing innovative solutions and customer service that is unrivaled in the aerospace industry.

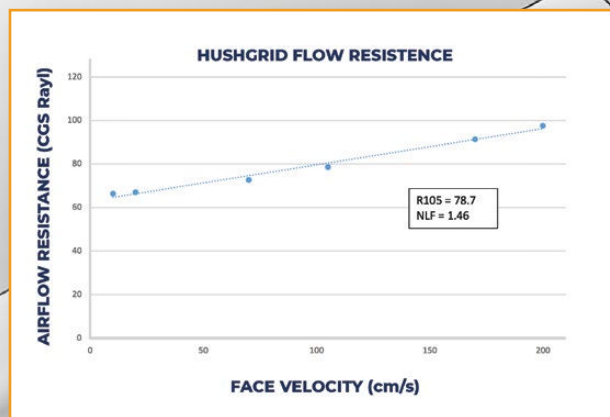


## HUSHGRID Acoustic Testing Chart



**HUSHGRID exhibits strong sound absorption over a broad range of frequencies (Hz) and remains strong even at the very high sound pressures (dB) of jet engine noise.**

## Linear Resistance to Flow “NLF”

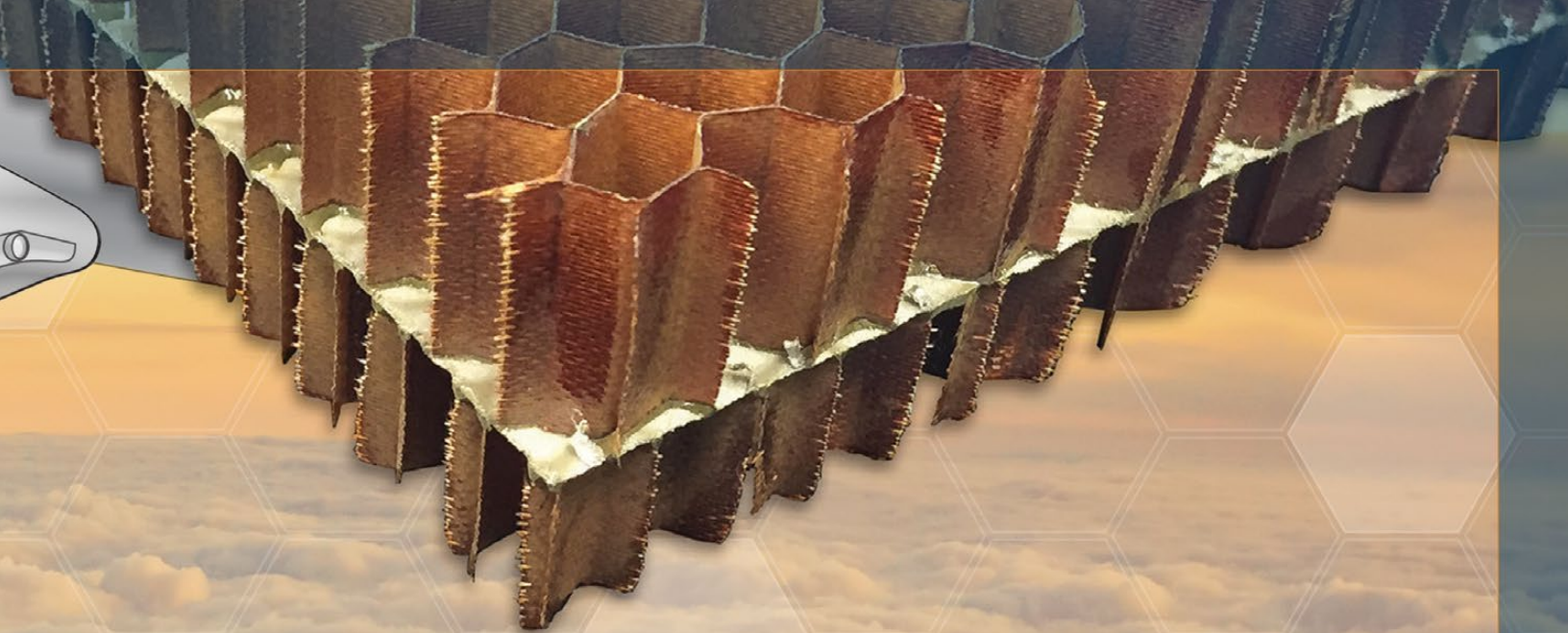


**Increasing air flow through the HUSHGRID septum does not become turbulent (or non-linear) which is necessary to scale sound suppression over a wide range of sound pressures. (Note: A NLF of 1 is ideal and unachievable).**

Inner Transcowl  
(Acoustic)

Inlet Cowl  
(Acoustic)





The Gill Corporation has been a leader in the field of supplying honeycomb parts and bonded subassemblies to the aviation industry for decades. The Maryland division has dedicated significant resources to meet those requirements from flight control surfaces to engine nacelles. Through the research and development process, The Gill Corporation has developed numerous proprietary technologies in order to facilitate easier and more efficient manufacturing techniques for engine nacelles.

Modern aircraft today are a lot quieter than earlier aircraft designs. This is attributable to the engine manufacturers driving new technologies such as high-bypass ratio turbofans, reduction drives to the main fan, increased operating temperatures and the use of composite materials to reduce weight. Another very important factor is the design and development of the engine nacelle.

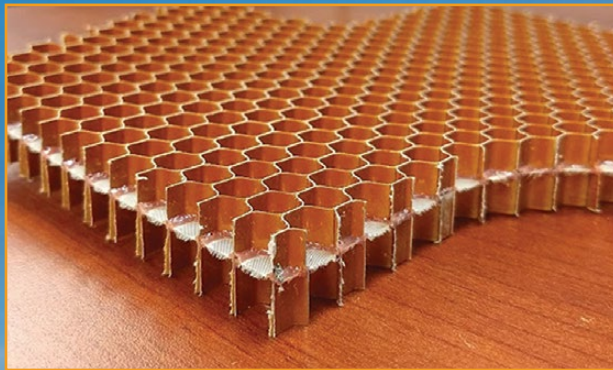
The engine nacelle consists of three basic parts. These are the inlet cowl, the fan cowls and the thrust reverser unit. Of these, the two biggest contributors to reducing engine noise are the inlet cowl and the thrust reverser unit. These inlets

and thrust reversers are manufactured from composite core materials. Honeycomb is used as the filler between the skins increasing the overall rigidity of the structure. The honeycomb structure serves two purposes. The first is to create a shear carrying “filler,” keeping the skins apart and improving rigidity as well as acting as a sound-absorbing structure. This is where The Gill Corporation has focused its research.

In the last decade, the research and development team in Maryland has worked diligently to develop a core material that assists in the reduction of noise in both the inlet cowl and the thrust reverser. The resulting product is HUSHGRID.

HUSHGRID is a honeycomb material with reproducible broadband sound absorption qualities. It exhibits strong sound absorption over a broad range of frequencies (Hz) and remains strong even at the very high sound pressures (dB) of jet engine noise. HUSHGRID is a fully scalable product with little or no splice bonding, formable to large or small radii and available in metallic and non-metallic honeycomb. Hushgrid offers increased shear strength in the honeycomb structure with increased dimensional stability.

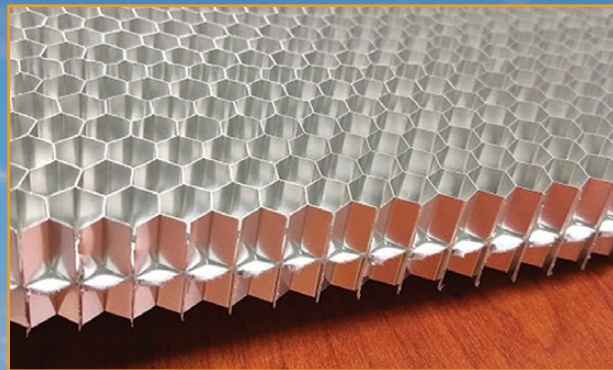




*Non-metallic HUSHGRID*

HUSHGRID is essentially a piece of honeycomb divided into two acoustic chambers by a semi-porous material known as a septum. For example, in the construction of an inlet cowl, the septumized honeycomb is sandwiched between two carbon-fiber reinforced polymer (CFRP) skins. The inner skin will be perforated with thousands of tiny holes. These holes allow air to flow through the skin and into the honeycomb structure. The septumized honeycomb acts as a sound absorber, thus helping to reduce the noise of the fan through a range of frequencies.

The Gill Corporation has developed both aluminum and fiberglass honeycomb core options for the engine nacelle industry.



*Metallic HUSHGRID*

The aluminum solution uses phosphoric-acid-anodized and coated honeycomb for extra corrosion protection. Both the aluminum and fiberglass solutions are formable to the complex contours of the engine nacelle parts.

The technology developed allows The Gill Corporation to “tune” the acoustic properties of the HUSHGRID to the unique acoustic properties of different engines in both the inlet cowl and the thrust reverser units.

In both cases, the combination of hard science and creative inspiration results in elegant solutions to a pervasive modern problem: controlling the noise.





**Our scientists,  
engineers, and  
production personnel  
may look like  
everyday folk, but  
to the aerospace  
industry they're  
modern wizards  
behind the Gill magic.**



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*The Gill Corporation – Maryland does not sell  
sandwich panels. Contact The Gill Corporation – El Monte  
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AND SHOULD BE RECYCLED



# THE FUNNY SIDE

# Trivia

**Two windmills are standing in a field. One asks the other, "What kind of music do you like?"**

The other one says, "I'm a big metal fan."

**What do you call an imaginary color?**

A pigment of your imagination.

**My favorite color is purple.**

I like it more than blue and red combined.

**What do you call a sad strawberry?**

A blueberry.

**My friend is a structural engineer.**

He's always complaining about stress at work.

**I used to be a narcissist.**

But now look at me.

**What's the difference between a hippo and a Zippo?**

One's really heavy, the other's a little lighter.

1. A "sounder" is the term used to refer to a group of what type of animal?
2. The aardvark is native to which continent?
3. What is the only mammal that can truly fly?
4. What is the name for the offspring of a male lion and a female tiger?
5. What spiny venous fish, common in home aquariums, has become an invasive species in the Caribbean Sea and U.S. Atlantic coastal waters?
6. What is the largest rodent found in North America?
7. What is the only bird known to fly backwards?
8. What chemical element gives the blood of a lobster a bluish tint?
9. A panda's daily diet consists almost entirely of what plant?
10. What is the largest species of terrestrial crab in the world?
11. Cynophobia is the fear of what kind of animal?
12. Which of the traditional five senses are dolphins believed not to possess?
13. What is the proper term for a group of parrots?
14. What is the national animal of Scotland?

1. Wild swine, pigs or boars. 2. Africa 3. The bat  
4. A Liger 5. Lionfish 6. Beaver 7. Hummingbird  
8. Copper 9. Bamboo 10. The coconut crab  
(Birgus latro) 11. Dogs 12. Smell 13. Pandemonium  
14. The Unicorn

