

The Doorway

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AIRCRAFT INTERIORS



ANTIMICROBIAL TREATED

Advanced composite panels are an integral part of commercial aircraft interiors. Used in applications ranging from structural floor panels, sidewalls and ceilings to overhead stowage bins and monuments, sandwich panels can be tailored, using different combinations of fiber reinforcements, resins, and core materials to meet diverse strength, weight and flammability characteristics. Sandwich panels can also be produced as flat or curved, providing further design flexibility for cabin interiors. Compared to alternative thermoplastic and thermoset technologies, the high strength-to-weight and high stiffness-to-weight ratios inherent to sandwich structures provides an optimum solution for interior structures. Even panels having a low-density core and single ply facings can achieve good stiffness at a comparatively low weight and cost.

SAFETY

The flammability, smoke and toxicity characteristics of interior panels are critical to the safety of passengers and crew. Ongoing collaboration between airframe manufacturers and airworthiness authorities has resulted in interiors that are designed to increase the safety and survivability of accidents that occur during takeoff or landing. Many of the enhanced cabin safety regulations imposed today are the result of information gained from past incidents.¹

The flammability requirements for cabin interiors are governed by Title 14 of the Code of Federal Regulations, Part 25 – Airworthiness Standards; Transport Category Airplanes, Subpart D – Design and Construction, Subgroup – Fire Protection, Section § 25.853 – Compartment interiors.

All cabin interior panels must be self-extinguishing when subjected to the 60 second vertical burn test prescribed by FAR Part 25 Appendix F Part I. For aircraft with a capacity of twenty or more passengers, interior panels not isolated by doors or other means during take-offs and landings must also meet Parts IV and V. To prevent the onset of a flashover (i.e., the simultaneous ignition of all flammable material in an enclosed area), Part IV limits the heat release rate (HRR) of cabin materials exposed to radiant heat to 65/65 KW min/m² (total/peak). Part V limits the smoke emission of cabin materials to a maximum smoke density (Ds) of 200 to mitigate smoke inhalation and maintain visibility to emergency exits.



Resistance to fire and toxic smoke is an advanced feature of The Gill Corporation's woven glass phenolic and aramid core honeycomb panels.

¹ www.faa.gov, Improvement to Aircraft Survivability, Feb 4, 2020

INTERIOR PANEL DESIGN

The Gill Corporation's (TGC) comprehensive portfolio of advanced composite sandwich panels features a variety of designs that are optimized for use in cabin interiors. These primary product constructions can be further tailored to meet the most stringent customer specifications. All panel designs meet the requirements for FAR Part 25 Appendix F Part I. Gillfab® panels developed with phenolic resin systems also meet FAR Part 25 Appendix F Parts IV and V.

TGC interior panels are used extensively in production, refurbishment, and retrofit programs. Depending on cosmetic requirements, most interior panels are available with a polyvinyl fluoride (PVF) film on one or both sides.

Sandwich panels offer maximum design flexibility whereby specific mechanical and physical properties can be achieved using different cores, facing materials and build ups.

REINFORCEMENTS

- Unidirectional glass (E/S)
- Woven glass (E/S)
- Unidirectional carbon
- Aluminum

RESIN MATRICES

- Epoxy
- Phenolic
- Polyester

CORES

- Aluminum honeycomb
- Meta-aramid honeycomb
- Para-aramid honeycomb

ADHESIVES

- Epoxy
- Phenolic
- Contact



PANELS

Gillfab® 4117 is a panel made with woven fiberglass cloth reinforced epoxy facings bonded to meta-aramid honeycomb core and is designed for use in commercial aircraft nonstructural interiors and galley areas.

Gillfab® 4417 is a high strength panel made from unidirectional fiberglass reinforced epoxy facings bonded to meta-aramid honeycomb core. It is a versatile panel available in multiple Types making it suitable for different areas of an aircraft.

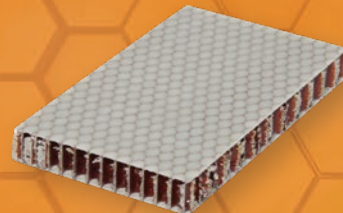
Gillfab® 4122 is a family of lightweight and low smoke and toxicity panels made from woven glass reinforced phenolic facings bonded to meta-aramid honeycomb core. They are versatile panels typically used for sidewall, cargo compartment, bulkhead, galley, lavatory, crew rest and ceiling panels.

Gillfab® 4422 is a lightweight and low smoke cargo liner panel made from woven fiberglass reinforced phenolic facings bonded to meta-aramid honeycomb core. It is designed for use as cargo compartment lining in sidewalls, ceilings, partition walls, and as decompression panels.

Gillfab® 4117



Gillfab® 4417

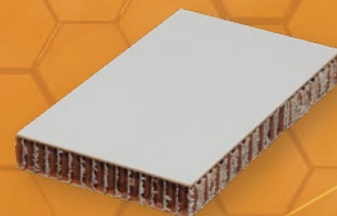


**Gillfab® 4122S
With PVF**



Without PVF

Gillfab® 4422



Bulkhead Panel

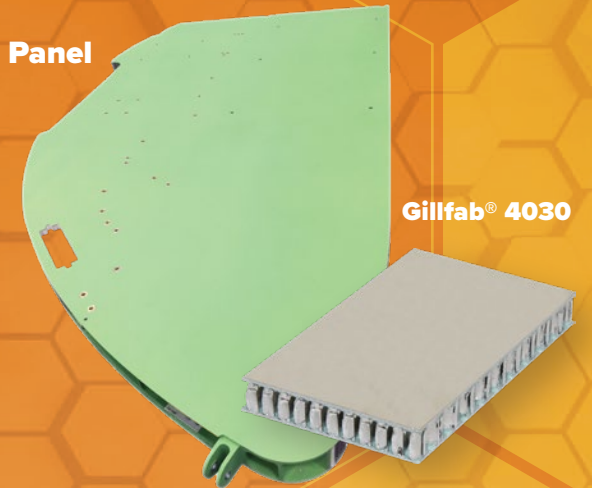
Gillfab® 4030 is a structural sandwich panel made from aluminum facings bonded to aluminum honeycomb core. The skin thickness, alloy, honeycomb density, and panel thickness can be customized to meet end use requirements. Gillfab® 4030 is available with alodined or anodized skins for corrosion protection.

Gillfab® 4034 is a lightweight, high performance panel made from unidirectional carbon fiber reinforced epoxy facings bonded to aluminum core. It is designed for use in aircraft cabin interior structures such as galleys, lavatories, bulkheads, partitions, storage compartments and electronic pocket doors.

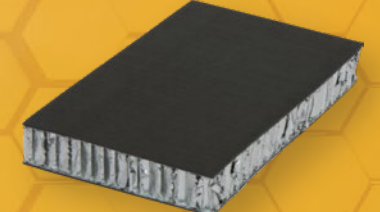
Gillfab® 5071A/5072A are lightweight, high performance panels made from woven fiberglass reinforced phenolic facings bonded to meta-aramid honeycomb core and are designed for use in interior structures such as galleys, lavatories, bulkheads, partitions, storage compartments and crew rests.

Gillfab® 5075 is a family of lightweight, high performance panels made from woven fiberglass reinforced phenolic facings bonded to meta-aramid honeycomb core. Gillfab® 5075 is the basic construction. Gillfab® 5075T offers options of 2 mil white PVF film or 1.5 mil granite gray PVF film on the back side of the panel. Gillfab® 5075E offers the same options on both sides of the panel. The panels are designed for use in aircraft cabin interior structures such as galleys, lavatories, bulkheads, partitions, stowage compartments and crew rests.

Gillfab® 4030



Gillfab® 4034



Gillfab® 5071A/5072A



Gillfab® 5075



CONTOURED AND CURVED PANELS

Sandwich panels are commonly associated as flat sheets; however, they are also produced in a wide range of shapes and contours to meet specific design objectives. Depending on the complexity of the finished part, there are different methods that can be used to produce a contoured sandwich structure.

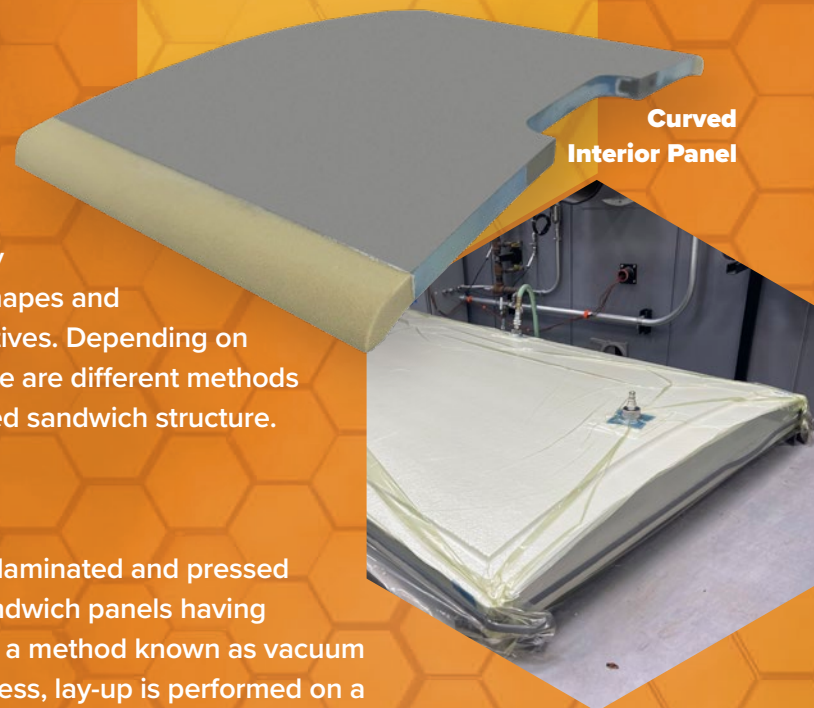
Vacuum Bag Oven Cure

While flat Gillfab® sandwich panels are laminated and pressed using multi opening platen presses, sandwich panels having complex curves can be produced using a method known as vacuum bag, oven cure (VBOC). Using this process, lay-up is performed on a custom tool that is designed to yield a specific shape. Constituent materials (e.g. prepreg, honeycomb, and adhesive) are assembled according to the process specification. The part is then covered with a bagging film, subjected to vacuum pressure and transferred to an oven to complete the lamination and cure process.

Cut and Fold

Most honeycomb sandwich panels can be fabricated into contoured components using a method known as 'cut and fold'. This process involves removing a strip of the panel facing from one side to facilitate 'folding' of the sandwich. To maintain the shape, an adhesive paste is applied to the exposed honeycomb. The panel is then folded to the desired angle and restrained using a simple jig or fixture until the adhesive is fully cured.

The cut and fold method is an economical technique for yielding a contoured component from a flat sandwich panel.



VALUE-ADDED CAPABILITIES

TGC's extensive in-house fabrication capabilities support material from semi-finished sheet stock to fully assembled components. These competencies include:

- Flat, curved, formed or contoured parts
- Machined details, bonded parts, complex assemblies, or complete shipset kits
- Inserts and hardware installation
- Edge-fill and edge closeouts
- Machined titanium and aluminum parts



TGC utilizes 3-, 5-, and 6-axis CNC machines and highly trained operators and fabrication personnel to precisely machine parts, install components, inspect, and kit parts. Finished assembly capabilities include monuments, dog houses, oxygen bottle racks, crew rest pods, stow bins, EE bay hatch, and other aircraft interiors.



Baggage Compartment Assemblies



Galley Frame



EE Bay Hatch



Oxygen Bottle Rack

NEW

FAA APPROVED B-BASIS ALLOWABLES – GILLFAB® 4122S

Modifying an aircraft interior or converting an aircraft to a freighter configuration requires significant investment and engineering resources. Considering that the average service life of a passenger aircraft is 22–30 years, most commercial aircraft will undergo modification at least once during its service life.² All modifications and structures must be certified by the FAA.

The selection of materials for aircraft structures is assessed based on mechanical strength, weight, flammability characteristics and a host of other factors. During the design process, engineers need reliable data to support analysis and select materials that meet the design specifications. Materials having FAA certified allowables lend confidence to this process and mitigate risk during the selection process.

In 2022, TGC completed its first FAA approved allowables program, developing B-basis allowables for Gillfab® 4122S panels. When Structural Integrity Engineering (SIE) selected Gillfab® 4122S for use in the stow bins, forward galley, lavatory, and ceilings of their new narrow body freighter conversion program, TGC's R&D team worked with SIE engineers and the FAA on an accelerated timeline to achieve approved allowables.

TGC EXPANDS FAA APPROVED ALLOWABLES FOR GILLFAB® 4122S

As part of its ongoing commitment to supporting cabin interior programs, TGC recently commenced a follow-on project to expand FAA approved allowables for Gillfab® 4122S to include a 1.0" thick panel construction. This was a collaborative effort between TGC and Aviation Technical Services (ATS) when Gillfab® 4122S was selected for use in the ATS Crew Rest Module (CRM).

The CRM is a self-contained module that offers freight operators maximum operational flexibility while providing the requisite amenities and safety features for crew members. It is interchangeable and allows quick removal and transfer between provisioned aircraft as needed.



STOW BIN REPAIRS

When stow bin surfaces get damaged, they can easily be replaced with Gillfab® 1368A and 1369A liners.

Gillfab® 1368A/1369A, constructed using a combination of woven E and/or S-glass cloth with a modified phenolic resin system and a 1 mil white PVF film overlay on the face side, are high strength, low flammability, smoke and toxicity grade liners approved for repairs.



Gillfab® 1368A

For technical data, please refer to the data sheet at www.thegillcorp.com



Photos above are courtesy of Aeroco Group International



² www.iaata.org, Best Practices Guide For Cabin Interior Retrofits and Entry Into Service, February 1, 2019
Photos courtesy of ATS

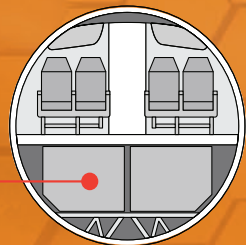
PANELS

PRODUCT	DESCRIPTION	SPECIFICATION
Gillfab® 4030	Aluminum facings, aluminum honeycomb core	FAR Part 25 Appendix F Part I
Gillfab® 4034	Unidirectional carbon reinforced epoxy facings, aluminum honeycomb core	FAR Part 25 Appendix F Part I
Gillfab® 4117	Woven glass reinforced epoxy facings, meta-aramid honeycomb core	FAR Part 25 Appendix F Part I
Gillfab® 4122 Series	Woven glass reinforced phenolic facings, meta-aramid honeycomb core	FAR Part 25 Appendix F Parts I, IV and V
Gillfab® 4422	Woven glass reinforced phenolic facings, meta-aramid honeycomb core	FAR Part 25 Appendix F Parts I and III
Gillfab® 5071A/5072A	Woven glass reinforced phenolic facings, meta-aramid honeycomb core	FAR Part 25 Appendix F Parts I, IV and V
Gillfab® 5075	Woven glass phenolic facings, meta-aramid honeycomb core	FAR/JAR Part 25 Appendix F Parts I, IV, and V

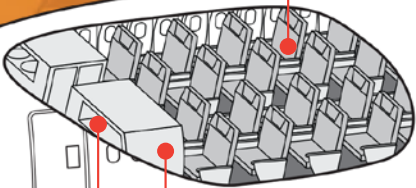
LAMINATES

PRODUCT	DESCRIPTION	SPECIFICATION
Gillfab® 1368A/1369A	High strength, low FST grade liners constructed using a combination of woven E and/or S-glass cloth with a modified phenolic resin system and an optional 1 mil white Polyvinyl Fluoride (PVF) film overlay on the face and/or back side	FAR 25.853 and 25.855

CARGO COMPARTMENTS



BUSINESS CLASS SEAT SHELLS



GALLEYS

BULKHEADS

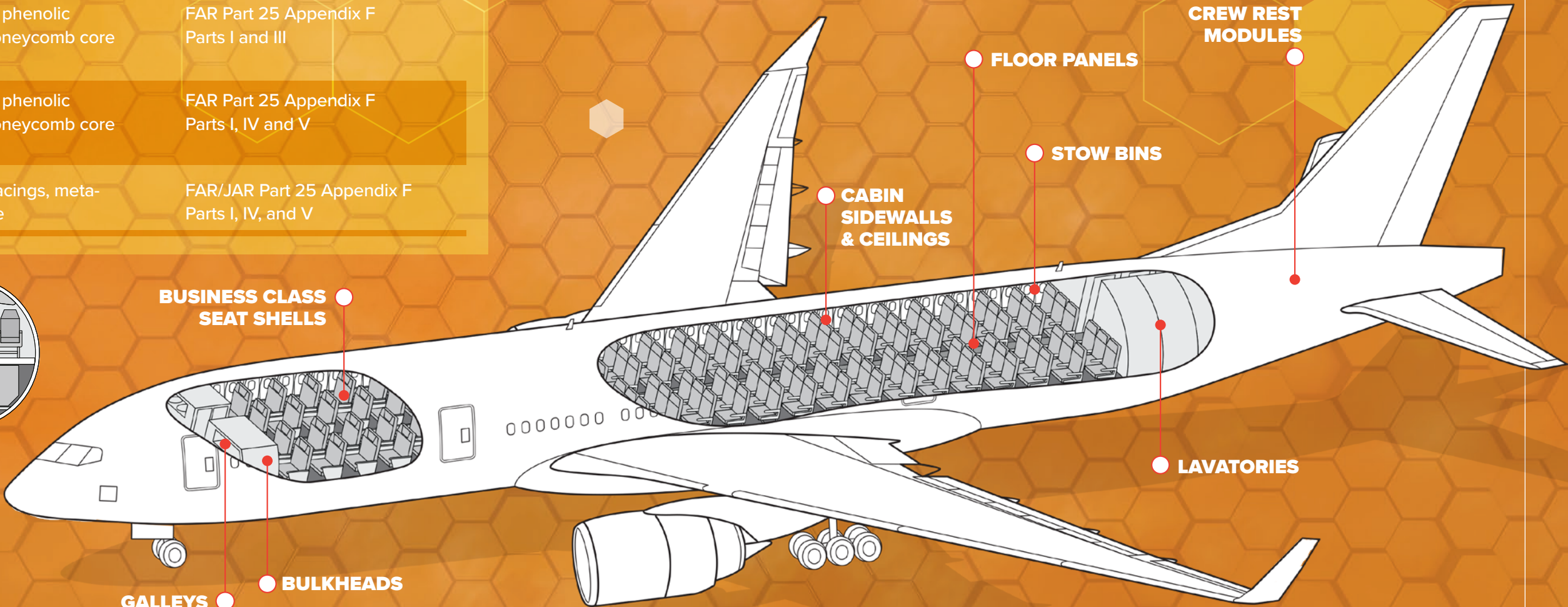
CABIN SIDEWALLS & CEILINGS

FLOOR PANELS

STOW BINS

CREW REST MODULES

LAVATORIES



This is not an all inclusive list of where TGC products are used. TGC interiors products are sold to customers around the world for use in many applications.

Fun Facts

Animals that lay eggs don't have belly buttons.

Mr. Potato Head was the first toy to be advertised on TV.

Boanthropy is the psychological disorder in which patients believe they are a cow.

Camels have three eyelids.

There is a McDonalds in every continent except Antarctica.

Mosquitos are attracted to people who just ate bananas.

In South Korea, there is an emergency number to report suspected spies (it's 113!).

Cats have more than 100 vocal cords.

Bullfrogs do not sleep.

Sonic the Hedgehog's full name is Ogilvie Maurice Hedgehog.

The world's termites outweigh the world's humans about 10 to 1.

Most toilet paper sold in France is pink.

The Hawaiian alphabet only has 12 letters.

The human nose can remember 50,000 different scents.

Children tend to grow faster in the spring.

The television was invented two years after the invention of sliced bread.

If you keep a goldfish in a dark room, it will eventually turn white.

A snail breathes through its foot.

Fish cough.

It took the creator of the Rubik's Cube one month to solve the cube after he created it.

Japanese square watermelons aren't edible. They are purely ornamental!

An ant's sense of smell is stronger than a dog's.

Tigers have striped skin, not just striped fur. The stripes are like fingerprints—no two tigers have the same pattern.

Elephants are the only mammal that can't jump.



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