

# IN•TOUCH

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## The Role Of Flexible Polyurethane Foam In Relation To Fiber and Springs

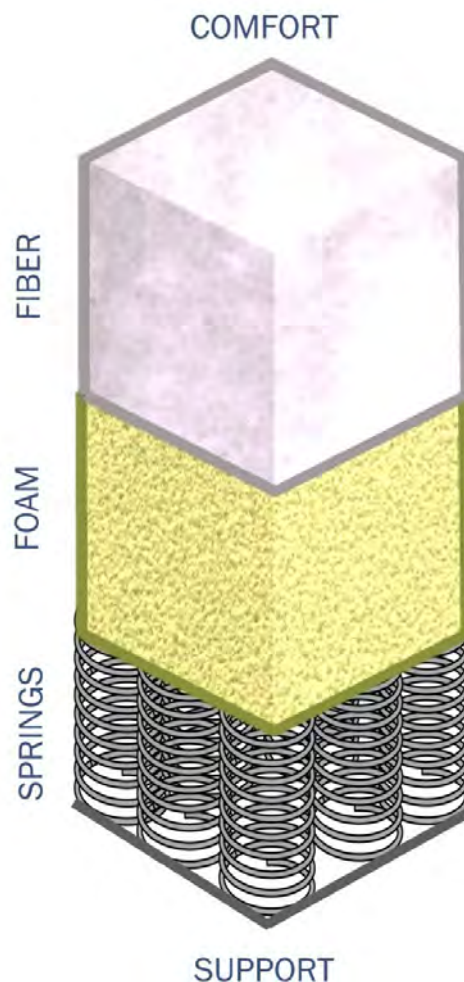
**F**lexible polyurethane foam is almost always used as a component in a composite seating or sleep system. It is used in conjunction with a variety of other materials to provide the benefits of support, comfort and durability.

Foam's role in relation to other materials can vary, however. In home furnishings, the two most common materials foam is used in conjunction with are fiber (polyester fiberfill) and springs (coil or sinuous wire).

Foam is often combined with fiber in furniture seat or back cushions, and it can be used in conjunction with fiber in mattresses. Foam may be used with springs in some high-end furniture seat cushions, and a combination of foam and springs is the most widely used mattress construction.

But what factors influence how foam is used in different applications with springs and fiber? One of the big benefits of flexible polyurethane foam is that it can play a variety of roles.

In fact, foam serves as the "bridge" material that can tailor itself to supplement the other materials which have definitely defined functions, like springs (support) and fiber (comfort).



**What are comfort and support? These two terms have a direct relationship to each other.**

**Comfort is the ability of the cushioning structure to deflect at the surface and conform to body shape, preventing a concentration of pressure on the body.**

**Support is the ability of the cushioning structure to hold the body in a relaxed position and allow free body movement by providing a firm base to push against.**

*Foam serves as a "bridge" between fiber and springs. Since it provides comfort and support, foam can be used with other components or by itself.*

## How Foam and Fiber Coordinate

Fiber and foam combinations are used extensively in upholstered furniture, and foam and fiber combinations are also often used in "pillowtop" mattress constructions. In these systems, a fiber layer is usually applied over the foam, so the fiber is the final major cushioning layer before the cover material. This is done because fiber can provide an extra soft feel and produce a good "hand" for the cushion or mattress surface.

This same type of feel can be created simply by using multiple layers of foam, particularly some of the "supersoft" foams. Supersoft foams can have IFD (firmness) measurements as low as 5 to 8 pounds, which makes them very comparable in feel to fiber.

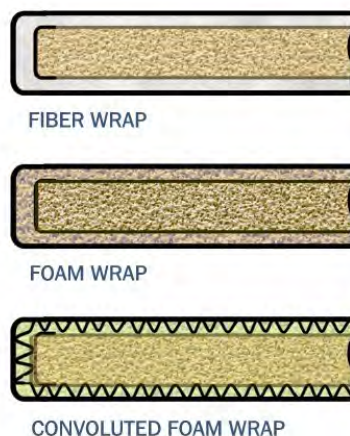
Another approach to using an all-foam cushion with extra surface softness is to use a convoluted foam. The dimples in the foam help to increase softness, even for firmer foam grades. Viscoelastic or "memory" foam can also be an option for creating extra surface softness.

Using supersoft or convoluted foam as a final cushioning layer can make cushions very specific shapes, like curves or bullnoses, easier to produce.

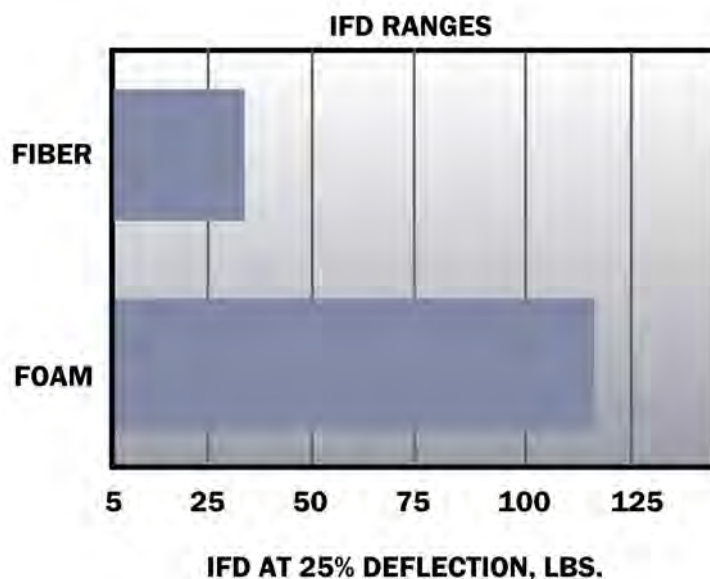
The use of foam as a quilting layer in mattress constructions assists bedding manufacturers in complying with federally-mandated smolder resistance requirements. An additional benefit is that foam used in quilting complements "ticking hand," can add surface comfort, and makes the mattress look more appealing.

Another factor to consider is durability. Durability is the ability of a product to have maximum retention of its original properties, including size and shape. In applications where the cushion thickness retention is important, foam can often be a better choice.

Some manufacturers use foam with a thin layer of softer foam to provide a good hand but still allow the cushion to retain its original shape. One key point to remember is that foam can provide both support and comfort, while most fiber cushioning functions primarily as a comfort layer. In situations where a cushion must be load-bearing, foam can be the better choice. Durability of both foam and fiber are affected by the grade of product specified. Higher density foams typically perform better, as do higher ounce weights of fiber.



Foam and fiber are both used as a final cushioning layer under a cover fabric. "Supersoft" foam can have the soft hand of fiber, and for complex designs, foam can provide "cleaner" curves and edges.



*Ranges of IFDs available from foam and fiber.*

## Foam And Springs In Bedding

Foam and springs are the primary components in most bedding products. In these constructions, springs provide the major source of support for the sleeper, while the foam plays several roles.

In bedding, foam typically is used as the major comfort providing material. Thus it also serves as an extra insulator to keep the sleeper from feeling the spring unit. And in some mattress constructions that use thick layers of foam, foam can also provide a level of support along with the spring unit.

The tendency during the past several years is for mattresses to use more foam, as consumers have shown a preference for thicker, more comfortable bedding. Because foam can produce support for sleepers, full-foam mattresses are also popular and make up a large part of the bedding market. It's also interesting to note that some extra-thick innerspring

mattresses contain more foam by weight than thinner full-foam mattress products.

Through the years, the ability of foam to produce support has been improved. "High performance" foam formulations allow foam cushioning to have a straight line deflection similar to the support characteristics of springs. Higher support factors can provide straight line deflection. (For a definition of support factor, see INTOUCH Bulletin Volume 1, Number 1.)

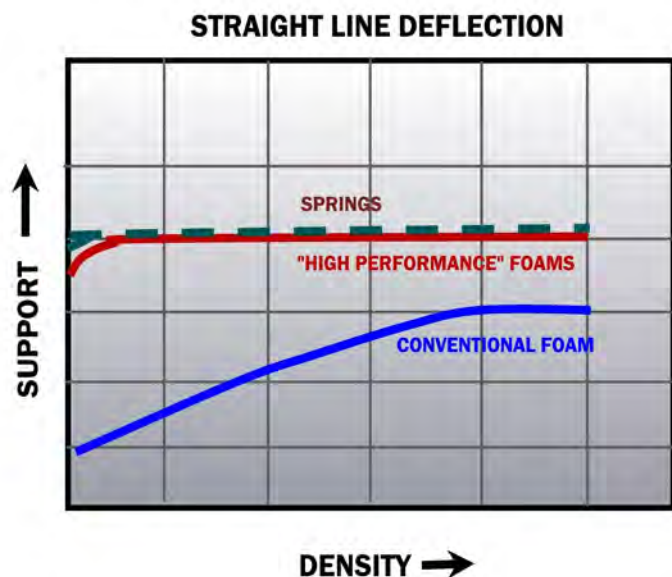
In other words, as you compress a spring, it "pushes back" with the same level of force applied to it. On a graph, this represents a straight line. Conventional grades of foam, when compressed, can be very soft initially and then feel firmer when compressed more. "High performance" foams have higher support factors and can be produced to reduce the transition feeling of soft to firm, more like springs.

## Selecting Foam for Mattress Applications

As in upholstery, specifying different foam firmnesses (IFDs) or fabrication techniques (like using convoluted or viscoelastic foams) can change the final "feel" of the mattress. As thicker layers of foam are used, it can be valuable to look at support factors as well, since the foam can contribute to the support offered by the mattress.

Viscoelastic foams can also dramatically contribute to the feel and comfort of a mattress. Because viscoelastic foam conforms to the contours of the human body, it can alleviate pressure points and provide additional comfort benefits. (For a detailed look at viscoelastic foam, see INTOUCH Bulletin Volume 11, Number 1.)

Since many of today's mattress products contain more foam by weight than other components, foam durability is critical. As always, foam density impacts the durability of the foam. The use of higher density foams in upholstering layers in topper pads helps eliminate body impressions and increase firmness and height retention. Different foam technologies can also enhance the durability of foams used in bedding.



*"High performance" foams can provide the same support characteristics as springs to allow the two components to work better together. With foam grades that offer better support, it's easier for mattress producers to design products that provide even, progressive comfort and support. The final effect can be an integrated system that works in harmony with both springs and foam, producing a system of comfort and support that adjusts to sleepers of different sizes and weights.*





## Summary

- Flexible polyurethane foam is almost always used as a component in a composite home furnishings system. It is most often used with fiber and springs.
- Flexible polyurethane foam serves as a “bridge” between fiber and springs because it provides the benefits of both materials. Fiber is primarily used to produce comfort. Springs are used to provide support. Foam functions to create both comfort and support.
- “Supersoft” or convoluted foams can be used in place of fiber in upholstery cushioning to provide a “good hand” for the cushion, and to give the cushion a cleaner look.
- Because of growing consumer preferences for comfort, more foam is being used in mattresses than ever before. In fact, many innerspring mattresses contain more foam by weight than some full-foam mattresses. Viscoelastic, or “memory,” foam conforms to the body to alleviate pressure points, making it a popular option in bedding applications.
- In bedding, foam provides both comfort and support benefits. Improvements in foam in recent years allow foam to produce the same type of support as spring systems, which allows mattress producers to use components that work better in harmony with each other.
- In upholstered furniture, foam can improve cushion, back, and arm durability. Foam can help all these applications retain shape better. Higher density foams and “high performance” foam formulations can help seat cushions and mattresses provide better comfort and support.
- In bedding, foam quality must be considered in applications where more durability is needed. Higher density foams and “high performance” foam formulations can provide better durability. Some mattress producers, for example, have increased foam densities in quilting foam, topper pads, and foam mattress cores to help eliminate body impressions.

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334 Lakeside Plaza, Loudon, TN 37774  
Phone (865) 657-9840 | Fax (865) 381-1292

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