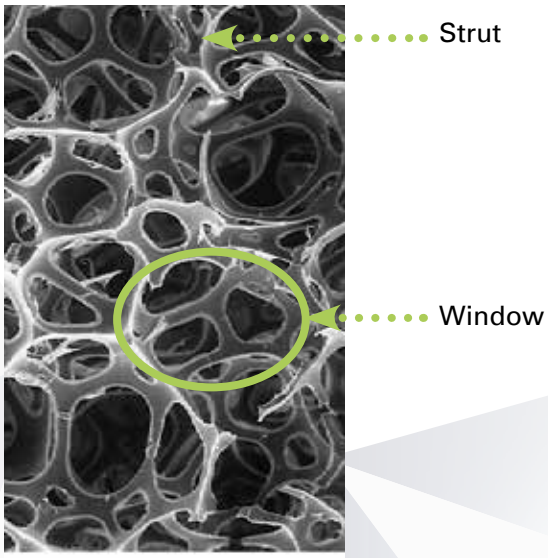
Invacare® | Matrx® Foam Technology

The High Resilient foam used in the Matrx range is constructed using a premium open cell, flexible polyurethane foam structure. This structure is produced by a chemical reaction and includes additives such as:

- **Flame Retardancy Chemicals**
  Reduces the flammability of the cushion
- **Blowing Agent**
  Carbon dioxide bubbles create the characteristic cell structure and can also help to determine the density of the foam
- **Surfactant**
  Used to modify foam characteristics helping to regulate the cell size and stabilise the foam's cell structure
- **Pigment**
  Determines the color of the foam

Foam technology



The foam is made up of tiny cells known as "struts" and "windows". The "struts" are key to the overall integrity of the foam, giving it that spring back action once a load has been removed. "Windows" are created when air pockets burst during the manufacturing process. Each burst air pocket (window) has an outer wall (strut), which makes up each individual cell. This open cell structure enables gases, liquid and air to move freely, helping the air to circulate.

Foam density v's foam firmness

Foam density is the weight of material in a given volume (e.g. kg/m³.). A lower density value means there are less struts and material to withstand loading forces. A high density cushion will have more struts making it more durable for longer lasting performance. Foam density is a good indicator of a foams "durability".

As with all load-bearing materials, extreme or repeated loading will change the physical properties of foam as strut fatigue occurs. Signs of fatigue mean a reduction in the foams height, recovery, or firmness. Higher density foam products exhibit better resistance to fatigue as there is more load bearing material to share the work. In other words, higher density foams will provide longer lasting support without gaining a compression set or bottoming out.

Invacare ***Matrx*** cushions and backs are manufactured using only high density foams that will provide long lasting support.

Foam firmness relates directly to the amount of force required to sink into the foam. To measure a foams load bearing properties (firmness), a standardized test using an indenter plate is used to compress the foam to 25% of its original thickness. This test is known as the Indentation Force Deflection (IFD) and is part of the International Organization for Standardization tests that characterize the properties of wheelchair cushions (ISO 16840-2).

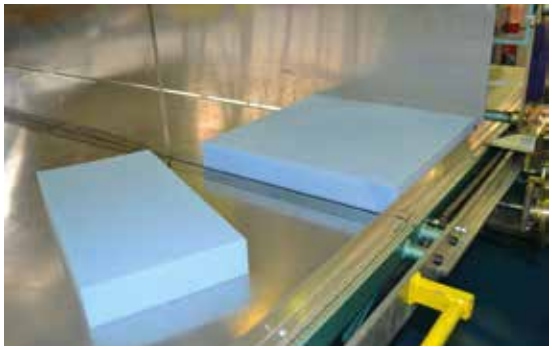
The specific firmness of foam required for seat and back cushion designs will vary depending on factors such as thickness, layering, shape and application.

Compression modulus

Also known as the support factor, compression modulus is a term used to describe the relationship between the top support surface firmness and the core support firmness in a piece of foam. Optimally, foam cushions should have a soft initial feel with good immersion and envelopment, and a core support that prevents bony prominences from bottoming out.

Slab foam vs. Moulded foam

Invacare ***Matrx*** cushions and backs are manufactured using a variety of high quality slab and moulded foams, depending on the application.



Slab foam comes from a foam block that has been cut down to size. In cases where less weight bearing is required, such as in back supports, a single layer of slab foam may provide adequate support and immersion. In cases where more load is applied, such as seat cushions and/or backs used in tilt/recline applications, thicker foam or multiple layers combining softer foam with firmer foam for increased immersion may be used.

Moulded foams are made by injecting a specific volume of chemical into a shaped mould at a set temperature. A chemical reaction then results in the creation of the foam structure. When removed from the mould, the foam is run through a roller machine to release any trapped carbon dioxide and the end result is a foam cushion.

Moulded foams, although more expensive to create and manufacture, can be made with much greater precision. Precise shapes, such as an anatomically formed pelvic well or abductor/adductor contouring, provide better support and fit. Also, the top finish adds durability and is easier to wipe clean compared to cut foam.

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Benefits of foam in wheelchair seating applications

The *Invacare* ***Matrx*** seating philosophy is the use of foam as a core support medium. This has the following advantages:

- **Performance**
  Provides excellent pressure re-distributing properties.
- **Stability**
  Offers a stable foundation to control pelvic movement for enhanced upper extremity function and aids in manual transfers.
- **Maintenance free**
  No need to adjust making it reliable.
- **Lightweight**
  Reducing weight in mobility systems improves portability and propulsion.
- **Comfort**
  Facilitates sitting for longer periods of time.
- **Suspension**
  Comfort is provided through shock absorption properties.
- **Durability**
  High quality foam structure maintains support properties.

References

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