KOROYD® vs EPS Foam

PROTECTED BY KOROYD

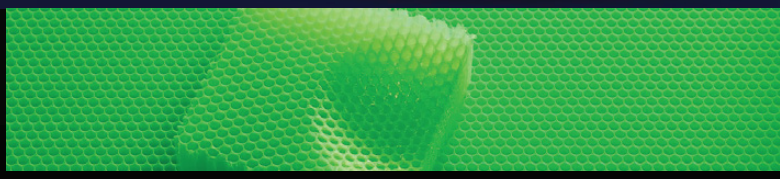
The Science of Koroyd®

Koroyd's welded tubes crumple instantly and consistently on impact, absorbing maximum force in a controlled manner, minimizing energy transferred to your head. Traditional energy absorbers act like a spring, storing the energy from an impact and releasing it over a micro-moment of time. Due to this, more energy could be transferred to the head, increasing the risk of injury.

WHAT IS KOROYD®?

Koroyd is a welded tube structure designed to crumple instantly and consistently on impact, absorbing maximum force in a controlled manner, minimizing energy transferred to your head. Koroyd KOR its made of the world's thinnest walled tubes, Koroyd's structure is 95% air, providing reduced weight and enhanced comfort without compromising on safety.

Koroyd reacts to force with a combination of controlled buckling and efficient packing up to densification in order to achieve high volumetric energy absorption.
In other words...
Koroyd's welded tubes crumple instantly and consistently on impact, absorbing maximum force in a controlled manner, mienergy transferred to your head.



VALIDATED BY SCIENCE

DEVELOPED FROM AEROSPACE SAFETY As a result of an aerospace safety research project, cylindrical seat tube structures were found to absorb the most amount of energy for a given distance.

Koroyd was developed after being inspired by this research, and has now been successfully integrated into a whole range of applications.

WHAT IS EPS?

Expanded Polystyrene (EPS) is a rigid and tough, closed-cell foam made of pre-expanded polystyrene beads. This foam is traditionally used to package food and for building insulaltion.

Helmet manufacturers use this material because it's cheap, relatively light, durable and can absorb some energy in the event of a impact

- ESP was accidentally discovered in 1839
- Used to package food since the 1970s

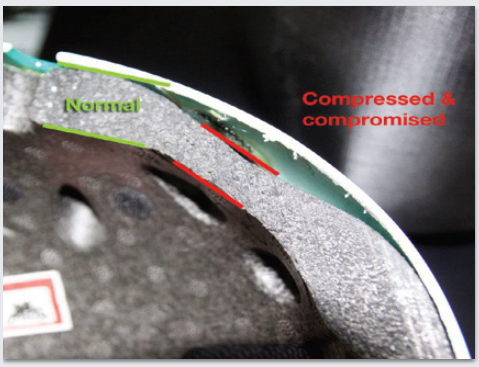
IMPACT PROPERTIES AND FOAM LIMITATIONS

When foams are impacted, they compress to absorb energy. This is what happens:
- Collapse of internal pores
- Copression of air
- Bending, buckling or fracturing of cell

Due to the randomness of the material's structure and variable factors of compression, consistency and reliability is inevitably a problem.

Due to the random arrangement of the internal geometry of foams, the bead walls get closer to each other during compression, increasing the load necessary to continue the compression. In other terms, the foam hardens, becoming stiffer and less effective at absorbing energy. Therefore, more force is transferred to the head and brain. The optimisation of foams is more limited in terms of adapting to different applications.

Compromised EPS under the shell



KOROYD® vs EPS Foam

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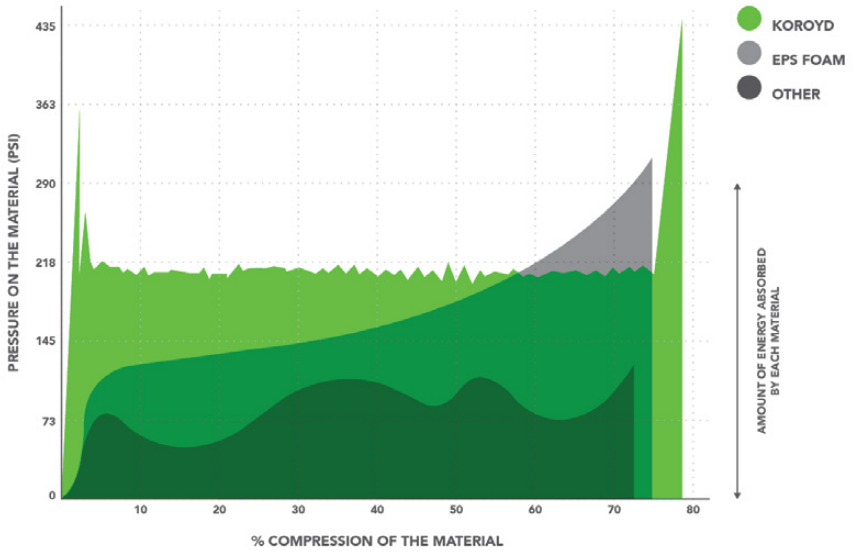


KOROYD STRESS PLATEU

Koroyd has an immediate loading curve meaning a large amount of energy is absorbed from the moment of impact.

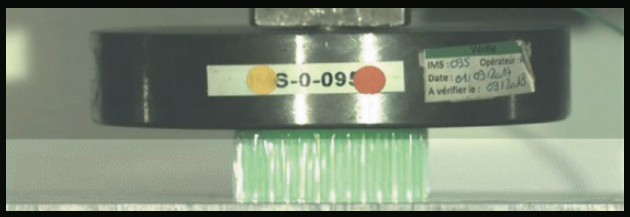
Note the 'stress plateau' for Koroyd is completely straight (the bright green line) compared to the EPS foam stress plateau which constantly increases (the grey line).

As Koroyd is a welded tube structure, when compressed, the tubes buckle/crush starting from one end. As the compression continues, the structure's resistance to compression remains constant, allowing for efficient absorption of energy up until densification.

In comparison, EPS foam's stress plateau increases because Expanded Polystyrene is made with beads.

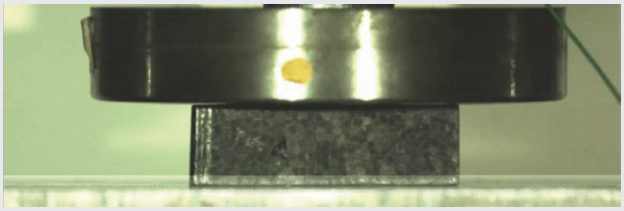
As the beads get more compressed against each other, the material has a higher resistance to compression (it gets stiffer and could pass on more forces as a result). Therefore, the load needed to continue the compression increases.

The energy from a typical accident is fixed and does not increase. At some point, an EPS foam becomes too stiff to absorb the energy.



KOROYD® IMPACT TECHNOLOGY

- Engineered from aerospace safety research
- Strong, uniform open cell technology
- Protection in not compromised for airflow
- Highly tunable to each application
- Consistent performance from -20°C to +50°C
- Consistent and reliable energy absorption
- Highly effective up to 78% desification



EPS IMPACT TECHNOLOGY

- Accidently discovered, used to package food
- Fragile, irregular closed cell material
- To allow airflow, material is removed
- Limited optimisation opportunities
- Performance limited by temperature
- Inconsistent, hardening as compressed
- Moderately effective up to 60% desification

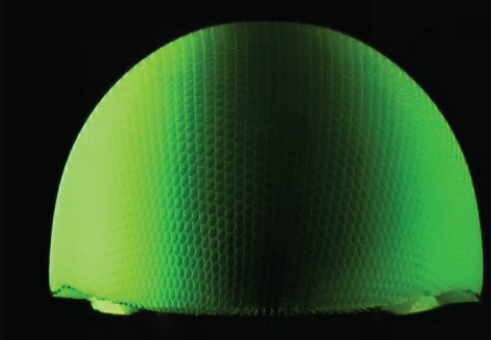
TECH TAKEAWAYS

PLASTIC DEFORMATION

With Koroyd, energy from an impact is converted through plastic deformation, a little bit of heat and a little bit of noise.

MINIMAL REBOUND

Because Koroyd has less elasticity compared to EPS foam, there is less risk of a second pulse from the energy absorbed during the loading phase (less rebound).



LARGE COMPRESSION VOLUME

Koroyd can use up to 78% of the material thickness to absorb energy from an impact.

EPS FOAM LIMITATIONS

EPS foam densifies when around 60% of the material thickness is compressed, limiting its performance and potentially resulting in more energy being transferred to the head and brain.

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