



### *An inside look at the different parts of the helmet.*

*by Lyndsey White*

Gone are the days of simple hard plastic with a velveteen outer layer. Nowadays, helmets are held to a much higher standard of safety testing. They're more aerodynamic and better padded, without adding extra weight, and they are stylish so riders will want to wear them. The safety of every ride is the main goal for each helmet manufacturer as they strive year after year to develop the safest helmet they can, while keeping it comfortable, attractive and easy to wear.

A few of the top helmet manufacturers around the world shared with us some of their most important components when it comes to making helmets.

#### The Outer Shell

Each component of the helmet is equally important, but it's the outer shell that gets the most attention because it's easily seen. The outer shell's material must be made of something that can prevent penetration from an object such as a sharp rock or a horse's hoof. Manufacturers these days work to find the most stylish design that's lightweight, yet functional.

Ovation helmets, the Troxel Spirit helmet, and Back On Track's Trauma Void helmets all have an outer shell that is made out of acrylonitrile butadiene styrene (ABS) thermoplastic. What is ABS thermoplastic?

It is an engineering plastic that is easy to make and fabricate, and is a proven material for structural applications when impact resistance, strength and stiffness are required, such as a helmet.

The Gatehouse helmet is also constructed from a thermoplastic, with the additional of carbon fiber or aramid additional reinforcement.

### **The Middle Layer**

The middle layer of the helmet is what should absorb the majority of the impact from a fall or accident. Liners can be made from expanded polystyrene—which is a very lightweight product made of expanded polystyrene beads—made of more than 95 percent air and only about 5 percent foam. Expanded polystyrene, like that found in Gatehouse and Troxel helmets, has strong shock absorbing properties and is compression resistant.

KEP Italia helmets feature a polycarbonate and carbon fiber combination. Polycarbonate is a pliable material commonly used in eyeglasses, greenhouses, digital discs, etc. The impact strength of polycarbonate rates towards the top for impact strength, but can be susceptible to scratching.

### **The Inner Layer**

The inner layer of the helmet provides comfort for the wearer—if you had to wear something rigid day in and day out, you most likely wouldn't be compelled to wear it, right? So helmet manufacturers may add a thin liner to the inside of the helmet for a softer feel, while also protecting the shock absorbing layer from the inside.

These inner layers can include a mesh comfort liner to help wick away the rider's sweat, as well as some extra foam for the comfort and ability to make the fit a little more custom. One K's Air helmet even includes inflatable air pockets in the liner, which allows for the riders to adjust the

helmet for comfort and fit.

### Retention Straps

No helmet is effective if the retention, or chin, straps do not exist. The retention system, often referred to as straps and buckle, keep the helmet on the rider's head during a fall when fitted and used correctly.

Most retention straps are made from a nylon webbing and plastic buckle. Some may include soft fabric covers that can cover the underside, being held together with Velcro. Some, like Gatehouse, might also be made of suede or leather.

### Passing The Test

Did you know that wearing a helmet could reduce the risk of riding-related head injury by an estimated 50 percent, as well as the risk of death due to head injury by a whopping 70-80 percent? To ensure a helmet can accomplish these tasks, it must pass a series of tests. There are several different tests based on where you are located around the world. For instance, in the United States the standard is the ASTM/SEI (American Society for Testing and Materials/Safety Equipment Institute), which includes three main tests: the impact test, the side distortion test, and the penetration test.

The impact test measures the helmet's ability to absorb a blunt force impact should a rider fall on their head, say onto pavement while trail riding.

The side distortion test simulates what could happen if 1,200 pounds of horse happens to land on your head during a fall. It measures the ability of the helmet to resist distortion, should that scary accident happen to you.

The penetration test measures the resistance the helmet offers to a pointed object into the ventilation area. It uses an equestrian hazard anvil, designed to approximate the angle of a horseshoe or a jump standard edge, to ensure there is no penetration by a sharp object whilst

wearing your helmet.

Other testing certifications include the PAS 015 (British standard), and the AS/NZS 3838 and ARB HS 2012 (Australian standards).

### **Time for a Change?**

It is recommended that all helmets be replaced after an impact, even if you don't see much physical damage to the helmet with your naked eye. General wear and tear of a helmet not only shows its age perhaps on the outer layer, but the materials that soften the impact can degrade within three to five years.

"Longevity depends on how frequently the hat is used, the conditions of use and how the helmet is stored and even transported," says Paul Varnsberry, Technical and Safety Product Advisor for Gatehouse Hats.

All manufacturers recommend equestrians check their helmets regularly for any obvious signs of wear to the lining and retention straps, any cracks in the structure of the middle layer and the outer layer, and finally the operation and security of the buckle.

"Irrespective of any signs of deterioration, it is recommended to replace the helmet after five years because the protective capacity diminishes over time due to the ageing of materials," explains Silvia Fantoni with KEP Italia SRL.

### **Working Together**

There is no single most important material, or part of a helmet, because the manufacturers and safety experts believe these materials must work together to protect the rider.

The equestrian helmet covers more of a person's head than does a bicycle helmet, fitting lower on the head, particularly at the back of the skull, and has protection distributed evenly around the head, rather than concentrated in the front and top, which is why careful attention is taken

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