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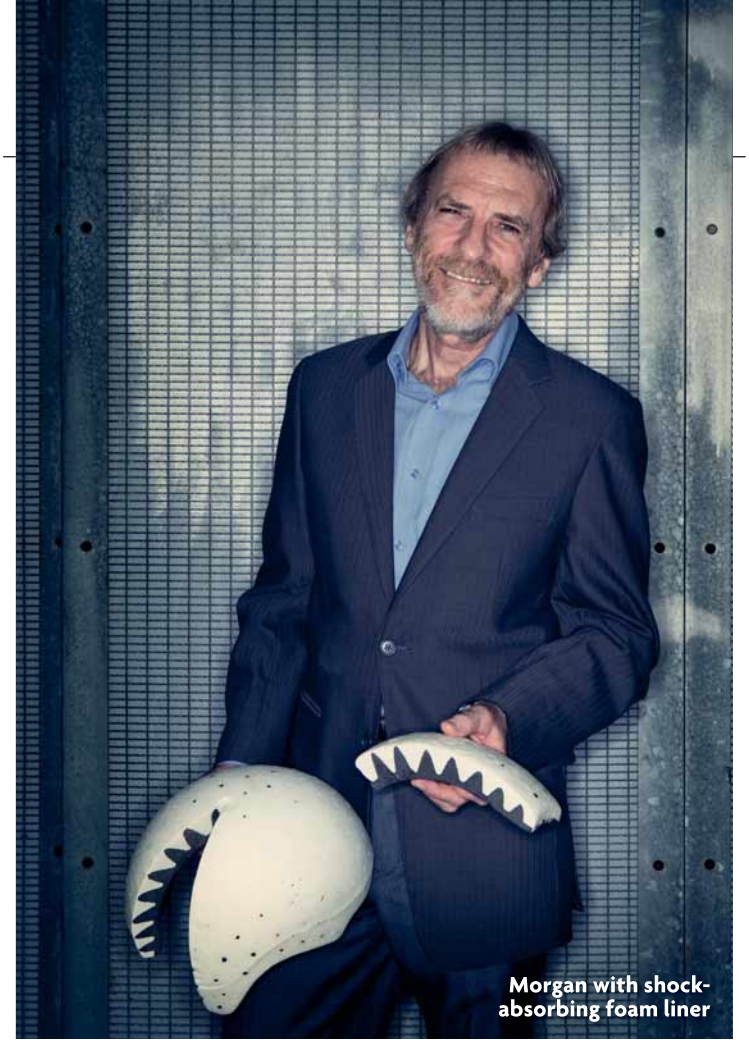
Keep your head

Don Morgan's innovative Conehead safety helmet significantly reduces the risk of head injury in collisions.

Don Morgan with the Conehead liner and a Kali helmet

"AND THE WINNER IS DON MORGAN AND CONEHEAD!"

After these words, a persistent inventor from Queensland claimed the 2007 New Inventor of the Year prize on Australia's ABC-TV. Don Morgan had finally put his Conehead helmet liner design in the national spotlight after 15 years of toil and knockbacks. Not only could the idea be adapted to motorcycle, bicycle, ski and other helmet types, but Morgan had patents to integrate the Conehead concept with automobile applications. The question, though, remained: could the biggest breakthrough in helmet safety since the launch of the full-face helmet more than 40 years ago be brought to market successfully? ›



Morgan with shock-absorbing foam liner

Next month, American company Kali launches its Naza motorbike helmet and Prana mountain bike/motocross helmet in Australia and New Zealand. Both helmets incorporate Morgan's crumple-zone Conehead design. Kali says it reduces impact energy by up to 20 per cent, a significant increase in a rider's chance of avoiding death and serious head injury.

The inventor's journey began in the mid-1980s when Morgan was a member of a research project (investigating the effectiveness of motorcycle and bicycle helmets) conducted at the Queensland Institute of Technology. Studying helmets that had been involved in fatal crashes, the team noted that the foam liner showed little or no evidence of crushing, which led them to conclude that the liners in helmets were too stiff and should be made from low-density foam.

"In the early 1990s, my eldest daughter, who was about five, was learning to ride a bicycle," Morgan remembers. "When I looked at her helmet and pressed my thumb up against the foam liner I was shocked that it was hard as a brick. That went against every bit of research I had been doing, which was to make the foam softer."

Morgan got the cone idea watching waves hit the wall of a research water tank at an angle, then noticing how the energy of the waves dissipated laterally away from the point of contact. "I tried to visualise how [this] could be applied to the foam liner of a helmet. That's when I thought of embedding low-density foam with the thickness of high-density foam, initially with square-based pyramids. Then I realised cones would work even better because they have a unique property: they initially compress or crush, but as you continue to apply force, they become harder to compress or crush." A key feature of the

"The team noted that the foam liner showed little or no evidence of crushing

Conehead design is that it has five different zones – each featuring cones with different densities to better protect different parts of the skull – based on Morgan's extensive research findings.

It was his dream for Conehead to be established in Australia, but the idea never got traction with local private investors or government. Morgan is the first to admit that Conehead, while it is conceptually brilliant, lacks the visual wow factor of trendy gadgets. "The difficult thing presenting Conehead to investors was that it was just a piece of foam sitting on a table, and they were trying to envisage how it [would] work inside the helmet. It wasn't a whizz-bang phone or iPod."

MORGAN SAYS CREDIT for bringing the idea to fruition must go to Doctor Philip Cheng and his son, Norman, of Strategic Sports Limited, one of the world's largest helmet manufacturers. Frustrated with the lack of response in Australia to bring Conehead to market, he sent the Chengs an email outlining his idea and research credentials. Within 30 minutes he had a reply. "That was the start of Conehead becoming a reality, thanks to the innovative mindset of the Chengs. They deserve much of the credit for helping me develop it. I eventually signed a licence agreement with them."

The Hong Kong connection ultimately led to Brad Waldron, founder of US helmet brand, Kali. "I met Brad at a dinner hosted by the Chengs and explained the Conehead idea. He was immediately interested, challenging me on various aspects of the concept. After that, I was confident I would have a relationship with Brad and Kali."

"Our move Down Under is in no small part due to Don," says Waldron, who spent nine years in the US aerospace industry in the area of composites, most notably on the F/A-18 [jet fighter] when it was decided to convert the tail from aluminium to carbon fibre. "We found Don's invention to be a great addition to our own technology. The combination of Conehead in our Composite Fusion design reduces the G-forces experienced during impact."

To design, test and bring a helmet to market normally costs around $US500,000. According to Waldron, Naza nudged $US1m in developing the Conehead, due to the extra experimentation it required. "We are hoping to get that number down, as we work on the next generation, but knowing Don and I, we'll try to make it even better and therefore more costly."

Kali is not the only brand that Strategic Sports Limited is making Coneheads for – SMS, Motovan Zox, No Fear and a number of bicycle and ski-gear companies have also incorporated the technology into their helmets. Morgan says the next step is adapting the idea to automotive applications such as baby capsules, interior pillars and a helmet for vehicle occupants, all of which he has patents for.