A Pack is Born

It was joyous and emotional, but not all plain sailing. Judy Armstrong talked to the proud parents of Lowe Alpine's Airzone range

What do you have in common with Italian alpinist Simone Moro, mountaineer Gavin Bate and the walker on the cover of this magazine? Well for a start, you all carry a rucksack.

It's the defining *accoutrement* of the outdoors. Without a pack, you're simply going for a stroll. With one, you can head for the hills for a day, a week, a month. A rucksack is key to your identity as a walker, and to your comfort in the hills. Packs are also a crucial piece of safety equipment: you can't afford a strap to break or any part of the rucksack to fail. At best, gear failure is inconvenient; at worst, it's life or death.

As a walker, you know that fit and function are vital: a hipbelt should sit snugly, shoulder straps should curve to your body, the back system must support the load. It sounds simple and mostly self-evident, but even so, pack designs have taken a century to evolve and are still constantly changing. From exterior metal frames to interior struts, from suspension backs to limpet-like systems that hug the body, frames that form X or Y or inverted V – nothing is standard.

One relatively recent innovation that has proved a runaway winner is the back system with an air gap. It has plenty of labels – suspension, mesh, ventilated. One of the most successful, although not the first, was the AirZone from Lowe Alpine. Part of the reason for its success is that the company, which has been making rucksacks since 1967, is now the only international pack brand with the facility to design, build and field test prototypes in Britain.

I decided to find out how a rucksack is made: from concept, through design, testing, prototype and production, to the finished article in the shop. I specifically chose the AirZone: with more than 150,000 out there, on hills from Korea to South America, Eastern Europe to Greenland, it has to be doing something right.

The AirZone, as you'll have worked out, didn't just 'happen'. During an eye-opening day at Lowe Alpine's UK headquarters in Kendal, Martyn Hurn, mountain instructor and Head of Pack Design, showed me how AirZone was born.

With around 100 different styles in the rucksack range, Martyn's team focuses on a different part of the line-up each year. Once in the range, the pack must last for three to four years without major design alterations, so it's crucial to get it right. It takes a team of eight people more than two years from inception of a pack to its arrival on the shop floor, so for the AirZone to be launched in early 2008, its spark needed to be ignited in 2005.

Digging in

The problem was, in 2005 other brands already had breathable suspended back systems: Lowe Alpine had left it late. They looked at the existing packs to find out where they were weak and realised that, despite the suspended systems being mesh, they still covered 50 percent of the walker's back, so breathability – the point of the system – was reduced. And, because of the way these packs were made, most dug into the top of the walker's gluteus muscles, which was uncomfortable.

At this stage, a pack called Pure Air was already in Lowe Alpine's system. It had no mesh at all, relying instead on two supporting pads, top and bottom. Pure Air was, unquestionably, the most breathable back system available. "We were really excited: this was true innovation. We even patented the design," says Martyn. But, it didn't sell. "People couldn't see there was an air gap, so while it worked, it looked too standard; walkers didn't believe it would breathe," says Martyn. "It was also expensive – we were using tent pole material for the frame, for example – and it had a narrow fit range. All this was easy to understand in retrospect, but not so obvious when we were launching the pack. But, we learnt from the experience, so when we started with AirZone, we had a point of reference."

So, back to 2005: The AirZone process started in October, when Martyn and his team sat down with the brand's biggest markets – UK and Ireland, Italy, Germany, France, Netherlands, USA – to discuss what their customers wanted. By December a design brief, based on who they expected to use the pack, was written. "This sets key functions but won't define how they are achieved," Martyn explains. "This allows the designer freedom to innovate, which is important."

The brief also comments on where the market is, and tries to divine where it will be in two years' time. This is tricky, because it's trying to anticipate trends. Will walkers still want 'lightweight'? Will air backs still be popular? Will pale blue be the next big colour?

Market research came next, mostly through retailers but sometimes through internet surveys directly with walkers. "When we were assessing key elements of the women's range, for example, 2000 women responded on-line, which gave valuable insight and affected how the packs were made," says Martyn.

Comfort is the key

So, by the start of 2006 the designers knew who they were making the pack for. Based on what they already knew about suspended backs, they focussed first on comfort. Research showed that lower pads were uncomfortable so Lowe Alpine added a secondary curve, reshaping the lumbar pads for anatomical support.

"Without a pack, you're simply going for a stroll. With one, you can head for the hills for a day, a week, a month."

They worked hard to minimise the amount of mesh while making the back supportive and, learning from Pure Air, with a visual gap. "We cut great chunks of mesh out, especially at the lower back and kidney area, for maximum breathability," says Martyn. Some styles were given an adjustable back length, to give a wide fit range. This incorporated Lowe's patented Centro Adjustment System, based on an internal webbing strip which adjusts the shoulder harness position: a simple, lightweight solution for packs under 45 litres.

Once they'd figured out how to increase comfort and reduce the mesh, they had to physically make the rucksack. The project, in sketch format, moved to pack technician Sorin in the sample room. Sorin took the sketches, created patterns, cut the fabric and put a prototype back system together, sewn onto a basic bag which could be loaded to test the structure.

"I think we may be unique in Europe in having a sample room in-house," says Martyn. "We can make factory-quality samples in just a few days, and be out testing them on the hills within a week of the sketch process.

At this stage, the testing was done in-house. Every member of the pack team is a keen walker, climber or mountaineer; between them, they have 134 years of experience in designing, constructing and analysing rucksacks. Sometimes sponsored climbers, such as Andy Cave, are involved in pack testing; later, the 30-strong test team includes retailers and their staff, walk leaders, guides and mountain instructors. The point is to test the carrying system, its strength and durability, and comfort in every day usage across a variety of body shapes and back lengths.

AirZone went through several prototypes before the team were happy with the suspended back. Now, in summer 2006, it was time to look at the body of the bag. Some walkers like simple packs, others want extra features; some walkers are tall, others short; some head out for day hikes, others tackle multi-day camping trips. Ice axes, walking poles, stuff pockets for hats and gloves… it all had to be considered.

In addition, the designers had to assess the anthropometric bulge. This sounds like a form of middle-aged spread – and in a way, it is. It is the study of human sizing, which charts how people are getting bigger, taller and broader. The anthropometric bulge is the mid percentile, where the majority of people fit. This is even more complex than it sounds for an international company: Far Eastern races tend to be

No need to tidy up on our account, we said…


Pack technologist Rob at work in the Kendal HQ


Pack technician Sorin, in Lowe's in-house sampling room


This one will save nine...


Martindale machine replicates abrasion by rock surfaces

smaller, Europeans and Americans are bigger, and the Dutch are like giraffes.

The end result was a range of 18 packs from 25 to 45 litres, for men and women, in a variety of styles and colours, with fixed or adjustable backs. Some were designed for four-season use, others for lightweight day walking. Some had zip-access to the main bodies, others had expanding front pockets or lid extensions.

The designers and testers looked at every angle. Zips near the base of a pack are awkward to use so they put them on the side instead. Walkers like quick external storage for wet stuff or waterproofs, so they built in roomy front pockets. Things were progressing well, and by the time of Europe's premier outdoor trade show in Germany in August, Martyn was ready to discuss innovations in foams, buckles and bits.

Testing Time

By September, it was time to test the fabrics and components for AirZone. Again, the in-house facility came into its own. A Martindale machine, which tests for abrasion by rotating two pads together, has been modified to reflect genuine outdoor use. A coarse pad, almost like sandpaper, rubs repeatedly against the chosen rucksack fabric and abrades it to destruction. "It's the closest we can get to rubbing a pack against a rock surface,' says Martyn. Apart, that is, from actually rubbing a pack against rock – which is where the end-user comes in.

Beside the Martindale sits a Gerber machine, used to digitise patterns, and plot them like a jigsaw for cutting in the most fabric-efficient way. Across the corridor are digital scales so sensitive they can weigh the coating on a piece of fabric to three decimal places. Beside it is the 'lab dip' VeriVide light box for colour analysis and matching; beside that are the bins of plastic balls for measuring internal pack volume, a process that Lowe Alpine helped write in 2001 to create the American Standard Test Method.

An external laboratory is used to test hydrostatic head (resistance to water), rapid ageing (UV rays), colour fastness and tear strength. "We do all this with every piece of material we use," says Martyn. "We have always taken a safe line, erring toward durability rather than lightness. As a brand, we feel that a pack with longevity is more environmentally friendly than a pack that breaks down and is repeatedly replaced."

With all this on the table, where are the packs actually made? For around 20 years, Lowe Alpine rucksacks were built in Ireland and USA, but commercial pressures took their toll and, like most packs, they are now made in Vietnam or China. Lowe Alpine has a permanent member of the pack team in Hong Kong, who ensures standards in the factories are maintained, in terms of workers' conditions and pack quality.

Production makes perfect

AirZone's first exposure in the Far East was in October 2006 for counter sampling, when the factories made their versions of Sorin's prototypes. As with most processes, it took several attempts to get it right. "The AirZone back system was not easy to make accurately, and we had to really challenge the production people to make it perfect," says Martyn. "The mesh had to be smooth, especially at the seam junction with the lumbar pads. It took very skilled sewing and pattern cutting to get it smooth all the way up to the shoulders. In the sample room we can spend half a day getting it right. In the factory, they have to do it in minutes, so we have to work closely with the factory to make the design production right."

Suddenly, rather late in the process, Martyn and his team had a brainwave. "I realised that we could improve fit by redesigning the hipbelt," he said. "I came up with the 'adaptive fit' principle, where the hipbelt is fixed at one end of the lower edge, leaving the upper edge floating. When you tighten it by connecting the central buckle, the bottom edge sits against the body and the top strap tightens, giving maximum support.

"I'd spent ages thinking about the hipbelt, separating the top edge where it sits on the iliac crest, from the bottom which stabilises and carries the load. So I did experiments with a piece of rope and plumber's insulation foam, making a loop around my waist and trying to make a pulley system. Finally I took the sketch to Sorin, who made it work with foams and fabrics. From the first crude ideas it became

Pack technologist Tanya, with the Gerber machine

Product manager Roger measures volume using plastic balls

a team effort and the Adaptive Fit hipbelt was the result.

"No-one else had this kind of self-adjustment, so we patented it. The problem was we were now running late so we did rapid field testing and incorporated Adaptive Fit into the range. But we managed it, which shows how important it is to keep creative minds open right to the last minute. And the reason we can do that, is the in-house sampling. It took Sorin a day to make, we tested it next day, revised and adapted it, tested again. With brands developing in the Far East, it takes four weeks just to ship a sample there and back. Our Kendal facility is, quite literally, priceless."

In December 2006 the team finally approved the counter samples from the factories. By May 2007 samples were delivered to the sales teams worldwide, and the selling process to the shops began. Despite packs being physically in the salesmen's hands, the Kendal team still had work to do: inspection of pre-production samples (PPS). The detail was intricate: individual stitches were measured, seams analysed under microscopes, webbing tested for cutting methods. Now the time for changes had passed and the factory prepared a Bill of Materials, a list of every single item in the rucksack. For AirZone, it numbered between 400 and 500 individual pieces per pack. For some backpacking sacks, that number can exceed 600.

Infinite possibilities

In the autumn, full production finally began and in January 2008 the first AirZones arrived. To the team's relief, they were an instant hit and are now Lowe Alpine's biggest selling range. For Spring 2010 there are colour and fabric changes, but the basic structure will remain the same until 2012. "It's been hugely successful," says Martyn, running his hand over a pack fresh off the production line. "We keep breathing air into the product, and consumers and retailers love it: it carries well and it looks good. AirZone has challenged the established brands in this area, all over the world.

"Our innovation and development is unsurpassed," he adds. "No-one else is doing it to this level. Cosmetic upgrades can be done on paper, or even by phone. But real changes are only possible in-house. It's time consuming, some might say cumbersome: we're very exact about what we want. To truly innovate takes time, effort, ideas and mistakes. It also takes people: you need a team."

So, what's next? Have Martyn and his team run out of ideas yet? "Not yet – a pack has infinite possibilities. We are constantly improving the carrying system; what and how people carry is always changing; fit issues are changing and being improved," says Martyn. "Adaptive shoulder straps are in the pipeline. Next would be devising a pack that automatically adjusts to back length and body shape. It's possible, I'm sure."

I leave Martyn and his team in their light, bright, white office, surrounded by healthy plants and posters of inspirational mountains. AirZones are stacked on the floor, alongside a mystery rucksack with labels zip-tied to the webbing. Automatic pack adjustment? Maybe… and if it works, remember: you read it here first.