The science behind a comfortable night's sleep

Don't think of it as a bed any more, it's a body-suspension system. The low-tech bed — whose basic principles have changed little since the Egyptians abandoned sleeping on the floor 5,000 or so years ago — is being revolutionised.

Not since the coiled spring bounced on to the scene a century-and-a-half ago has the bed world been so shaken and stirred by technological transformations. Spurred by increasing consumer demand for gadgetry, as well as the growing number of people with back problems seeking better-designed beds, and increasing competition for a share of the market, bed designers have never been more innovative.

There are memory-shape mattresses for healthy backs and necks, which mould themselves to your body, inbuilt air-conditioning, humidifiers, and temperature controls (see facing page) for restful sleep, bed-bug excluders, air filters to screen out allergens, variable-pressure mattresses, and surface gels to protect the neck, and electrical gadgets that do just about anything from a stress-and-pain-easing massage to pointing the bed at the TV.

A MEMORY-SHAPE MATTRESS MOULDS TO BODY POSITIONS

Every year in the UK, about six million beds are sold and mostly we pay scant attention to what's on offer or what we are buying. Although a third of our life, about 25 years, is spent in bed, we spend only a few minutes choosing one and rarely go beyond what's known in the trade as the Goldilocks test, prodding mattresses for hardness.

But that's all changing; beds are becoming more functional, more healthy and more comfortable. And, like most domestic revolutions, changes are being pioneered at the top end of the market where a body-suspension system can cost more than a family car. "The bed had hardly changed down the centuries and we decided that we wanted to design something completely different. We came up with a new concept that does not even have a mattress," says Marlene Greenhalgh, the managing director of Ammique, whose bed sells for about £14,000.

A MULTIMEDIA BED PHONES A FRIEND IF YOU'RE ILL OR DEAD

The idea behind the bed, which has about 20,000 components, including 8,000 small plastic-domed caps on the surface, is that it gives maximum support to the body whatever its position during sleep. It has tension springs that mould to the body, as well as the caps, which are mounted on individual rods, which are loosely linked and can move independently to adapt to the changing profile and the weight of the body. It offers maximum support while adapting to the shapes of different parts of the body, from the wider hips and shoulders to the narrower waist and legs. The lack of a conventional mattress and the ability of air to flow freely through the structure means that it is kept at the optimum temperature, and so doesn't get sweaty.

A key aim of much of the latest technology is to provide more sophisticated and healthy choices for people with back problems and those trying to avoid them. While some of the innovative beds use new-generation springs and rods, others are opting for shape-memory materials. Tempur, a material originally invented for Nasa to ease the pressure of G-forces on pilots during take-off, has been one of the successes in the high-tech bed world. The pressure-relieving material instantly adapts to body curves and angles, filling in hollows in the neck and lumbar area of the lower back for support, while at the same time easing the pressure on other contact points, such as the shoulders, hips, buttocks, elbows and heels.

Its makers say that the design and permanent memory of the material eliminates the need to turn the mattress. The Tempur mattress, which also has zip-on allergy and mite-resistant covers, comes in a number of forms, including the top of the range CelebrityBed, which is available in twin queen, king, and, of course, California king size.

As with increasing numbers of other high-spec beds, it has an inbuilt massage function that includes variable speeds of rhythmic waves which the makers say "provides the enjoyment of an entire body massage from head to foot". It also has a whisper-quiet, low-voltage lift system that will lift your head, or feet, through 60 degrees.

According to its designers, a bed-based massage unit, especially one operated remotely by an infra-red controller, is the ultimate stress reliever. It is also claimed to help ease the pain of chronic conditions, such as arthritis and muscular problems. Depending on the technology used, the massage action can be confined to one painful area, such as the back, neck or shoulders, or the unit can be programmed to generate a gentle all-over wave motion for insomniacs.

Dunlopillo has been in the vanguard of the power-bed movement, and one bed in seven of those it sells is now adjustable. One of the functions its beds have is the ability to elevate the feet and legs to ease aches and pains. "Design and technical innovation have ensured that adjustable beds have come a long way from the days when they were seen as something that only the frail or elderly would buy. The days of trying to get comfortable while reading a book in bed have been left far behind, and the mountain of pillows for watching late-night TV has been swapped for a button," says Shane Harding, the marketing director at Dunlopillo.

The rush to embrace new technology shows no sign of slowing down. Refinements already being looked at include a wired-up bed, which is able to detect the failure of vital signs in elderly or sick people, and automatically transmit that data via a telephone line to care workers. Hospital beds with inbuilt weighing scales for better monitoring of patients have also been designed and may soon find their way on to the domestic market.

In America, the Massachusetts Institute of Technology is already working on plans for the future with the Multimedia bed. While lying down, the sleeper looks up at a ceiling that is actually a large computer screen that can show e-mail, the morning news, or play music to encourage sleep or to wake you up. The Multimedia bed tracks body signs and can tell when you are asleep, or about to wake, and turn itself off or on. It can also detect the sleeper's breathing rate and other vital signs. As well as having the ability to phone a friend if it detects signs that suggest you are unwell, it will, comfortingly, raise the alarm if it believes that you have died.