

The hunt for Olympic gold involves the painstaking appliance of science, writes John Goodbody

The struggle for medals in 2012 will become increasingly intense over the next three years as Britain aims to emulate the fourth place in the Olympic table achieved in Beijing, its best performance since the Chariots of Fire Games in 1924.

The tiniest margin will make the difference between winning and losing, which is why the opening of a £15m sports technology institute at Loughborough University last year could prove so important in developing ways to aid athletes for 2012.

About 50 researchers are employed in the institute's two laboratories, which cover 2,500 square metres. This number of employees is likely to rise to 100 by the time of the London Games. They are already working on projects to ensure that British sportsmen and women have the best possible chances in 2012.

Dr Mike Caine, the director of the institute, says: "In the past, technology has been a neglected area in sport. This has changed. There is now a huge demand for advanced training aids and personalised equipment and there is a finite pool of cash."

The institute is working closely with UK Sport, the quango financed with taxpayers' money, which is overseeing the preparation of Britain's team for 2012 and concentrating on the priority activities. Those are the sports Britain has excelled at, such as rowing, sailing and cycling; and those which, UK Sport believes, have the potential to yield more medals in 2012, such as athletics, swimming, boxing, judo and tae-kwon-do.

The institute combines with organisations such as BAE Systems, other universities and industry to help competitors reach a higher standard. So, in swimming, researchers will be using underwater cameras to examine the angle both of the dive of competitors into the water and the glide when they push off from the edge of the pool.

They are questioning what is the best angle for these actions and looking at the angle of the roll of swimmers' bodies as they turn to breathe during the freestyle or front crawl stroke. Information is then conveyed to a screen on the side of the pool so that the coach can decide whether any adjustment should be made and act before the session ends.

"The sooner you can correct any action the better," Caine says.

In athletics, much work is being done on individual footwear and deciding what the best mechanical properties for a particular athlete are. Scientists are looking at factors such as the level of stiffness in footwear while still trying to mini-

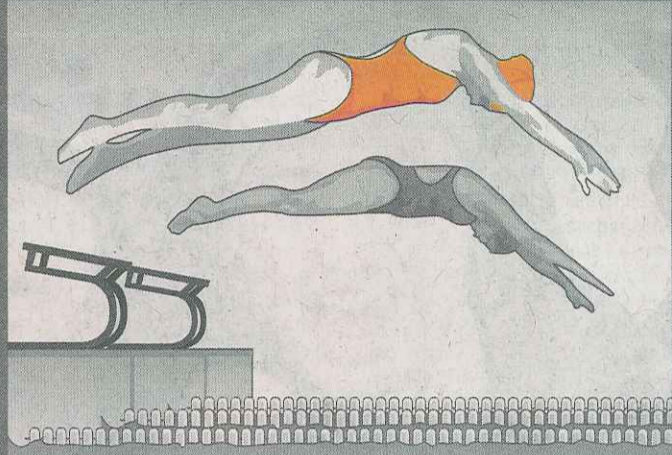
JASON REED



Quest for gold: Every millisecond counts for swimmers such as Rebecca Adlington

How Britain is looking for its edge

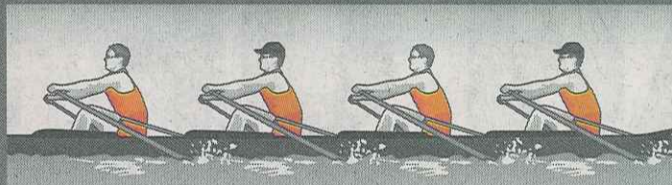
1 The difference between a swimming gold and silver can be fractions of a second. Just changing the angle at which a swimmer lifts his or her head out of the pool to grab a breath can make a difference. Cameras will also be used to examine the angle both of the dive of competitors into the water and the glide when they push off from the edge of the pool in a bid to cut down times



2 Sprinters need flexibility in their shoes but cannot afford energy loss as they hurtle down the track. The spiked shoes for 2012 will be biomechanically tuned to optimise the force production - as they land their foot on the track and then press down on their toes for the next stride - and therefore the speed of the runner



3 Any Olympian involved in aquatics wants to be able to glide through the water. The Sports Institute at Loughborough will hope to produce teflon-like coverings to repel the water from boats in rowing, canoeing and sailing. We can also expect more research into the controversial issue of swimsuits



The hi-tech heroes

mise the energy loss that comes from the flexibility of the shoe as the sprinter hurtles down the track.

The spiked shoes for 2012 will be biomechanically tuned to optimise the force production

and therefore the speed of the runner.

In tae-kwon-do, where competitors wear foam chest protectors to reduce the impact from being punched or kicked, the institute wants to tailor-make

this equipment, which is currently standardised.

"Athletes have different body shapes and some are therefore less protected than others and also lose some freedom of movement, which affects their

flexibility when delivering their own attacks," Caine says.

Other projects likely to be funded centre on the key element of reducing drag from air and water. Caine predicts that, in 2012, swimsuits will once again be a focus of controversy, as they were in Beijing, with manufacturers trying to outdo each other.

The institute is going to work on producing the best coverings to repel the water from boats in rowing, canoeing and sailing. In rowing, there are also plans to insert tiny computers at the end of blades, which will provide information to coaches on the physical properties of the person pulling on the oar.

"What we are doing is asking coaches what they want to know and then finding out a

“ WE ASK WHAT COACHES WANT TO KNOW AND THEN FIND A WAY TO HELP

way of supplying that information in a non-invasive way to the athlete," Caine says. Last month, the institute and UK Sport launched two

competitions to challenge the nation's entrepreneurs to find the most innovative ideas help them in their work towards 2012. Grants, one £25,000 and others of £10,000 are being offered to those who come up with ideas for new sports clothing, footwear or equipment at any stage of development. The award winner will then work with the institute to develop them.

"What the elite athlete going to use over the next few years will eventually become product for ordinary people, giving them extra pleasure from their training," Caine says.

"In sport, most advances in high street products stem from funding secured due to the desire to provide the elite with the best possible equipment."

Milestones in the technical revolution

THE FOSBURY FLOP

Few outside of the US had heard of Dick Fosbury or had seen his distinctive high jump style. But everyone stood up and took notice when he took gold and set a new Olympic record at the Games in 1968. Now it is the most popular technique

THE SWIFT SUIT

Cathy Freeman only decided shortly before her 400m Olympic final in front of her home crowd in 2000 to wear the Nike 'swift suit', which covered her whole body. But it paid off, as she claimed gold. The suit was designed to lower air resistance

LZR SWIMSUIT

The effect of this new line from Speedo was dramatic in 2008. More than 50 world records fell to those using the suit, many of them at the Olympics, including Rebecca Adlington. The manufacturers claim it took four years to develop and reduces 'drag'