

Technological developments are only given lip service in traditional sports like soccer, despite the gains that can be made from technology. The Dutch champions PSV realised this and together with TNO Science and Industry, among others, set up the Field Lab, a training facilitator that would be constantly able to monitor the players' progress.



Technology: key player in 'Training of the Future'

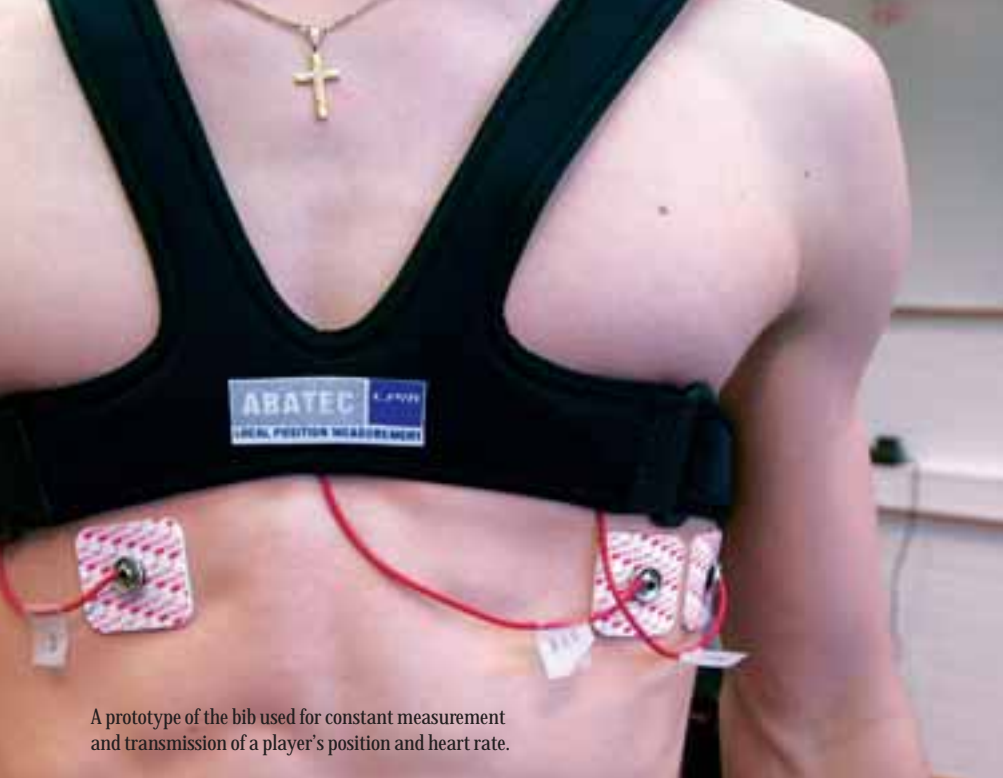
At De Herdgang, the training complex of PSV in Eindhoven, a youth team can be seen regularly wearing special bibs with a transponder, a transmitter that communicates with a number of electronic beacons positioned around the periphery of the pitch. Since the communication involves several of these beacons, the computer can calculate the position of the players to an accuracy of five centimetres. With each point measured being coupled to a point in time, the system can easily and automatically determine the speed and even the acceleration of the players. This kind of technology has already been applied by TNO to the training sessions

of the top Dutch speed-skaters at the Thialf speed-skating arena in the northern Dutch city of Heerenveen.

Individualised adjustment

A new feature of this Field Lab at PSV is the bib that enables heart rates to be monitored in real time. Previously this data could only be read after the training session. It allows Luc van Agt, PSV's physiologist, to adjust the physical exertion training programme to the individual. It's all a matter of cutting the programme to the strain a particular person can accommodate. It helps reduce injury due to overexertion.

By being able to determine the position, clear tactical skills can be imparted to the players retrospectively. Project leader Frans Lefeber of TNO Science and Industry: 'It makes things that much clearer. If a player has been instructed by the coach to mark an opponent closely, it can now be revealed indisputably when the striker gets too much space.' And since all the data are stored digitally, the video images being made continually from the side of the pitch can be cleverly processed afterwards. 'If you want to see how the situation would have been if the defender was within four metres of the striker, then this can now be done quite simply.'



A prototype of the bib used for constant measurement and transmission of a player's position and heart rate.



One of the beacons that are placed around the PSV training pitch to determine the players' positions.

Apart from the players' positions on the pitch, shoulder posture and thus where the player is looking – a vital factor in soccer – can now also be recorded. The coach can see whether the players are tactically on the ball even when they don't have it. Doctoral research is currently being done on this aspect at the Vrije University in Amsterdam and the University of Groningen. The research is investigating how top soccer players use their eyes, and it has become clear that the talent that younger soccer players possess can be revealed to a large extent to where they look during the game. Lefebber: 'This could result in being able to recognise talent that much more quickly. PSV expects these advances to help the club's youth development players make the move to the first team more quickly, and then the investments will be rewarded.'

Europe

The developments with and for PSV have not gone unnoticed in the rest of Europe. Other top European clubs like AC Milan, Chelsea and Werder Bremen have shown interest in TNO. 'It won't be detrimental to PSV if we start to do something with these clubs. Other clubs will want to impose their own wishes on the software,' Lefebber says. 'The fact that PSV is ahead with this technology contributes to the standing of the club in Europe.'

But it's not just the clubs but UEFA, Europe's soccer organisation, that is keeping tabs on this high-tech coaching. On 10 May Lefebber presented the Field Lab to UEFA's medical committee and a group of soccer education specialists at the PSV training complex.

The 'Training of the Future' has now been running for a year. In that period hardware and software have been implemented. Lefebber will be streamlining the software so that the whole stream of data now available is cut back to the few parameters that are of interest to the respective coach – after all, a coach of young players is likely to want to know different things than the coach of the top professional.

Media

Monitoring player performance is one thing, but the technique goes a step further. Lefebber and his colleagues have been putting the tactile bibs through their paces. These bibs contain a number of tiny vibrators that enable the coach to send signals from the touchline to the player. With a vibrator left and right, a signal from the side can indicate movement left or right. 'Guus Hiddink, PSV's coach until recently, asked how he might be able to give his players a "kick up the backside" from

pitchside. Using a bib like this, the coach is able to instruct his player to mark more closely, or to take up a position a couple of metres more to the left,' Lefebber says.

The potential applications of real-time positioning and heart-rate reading go beyond cleverer training and improved soccer schooling. There's something for the media, too. Lefebber: 'Maybe in the future television viewers will be able to see the match through the eyes of a top striker like Ruud van Nistelrooy or Thierry Henry. Who knows, maybe it's fascinating to know what the players' heart rates are during a match, for instance when taking a penalty. You can see who the fittest are. You could also see the line of a player's run after a great attacking move. Increasingly more objective data is becoming available that will, hopefully, enhance the discussion of the pundits.'

Info: frans.lefeber@tno.nl

Business world

One outcome of the project has been the establishing of Inmotio BV by TNO and the Austrian company Abatec, supplier of the hardware for position metering. This new company sells the hardware and software developed in the project.

The Field Lab is a cooperative venture between the business world and knowledge institutes for the benefit of top sportsmen

and women who drive the demand. All three parties have something to gain from this triangular arrangement. The soccer player trains with greater awareness and thus improves, companies will sell more of their high-tech products and knowledge institutes gain the research attentions of PhD students.

Info: www.inmotio.nl