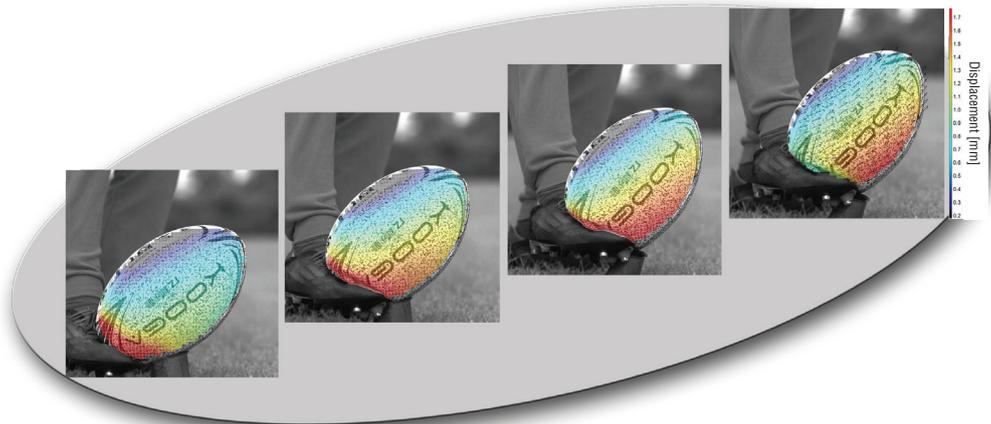




Measurements in Sports Testing

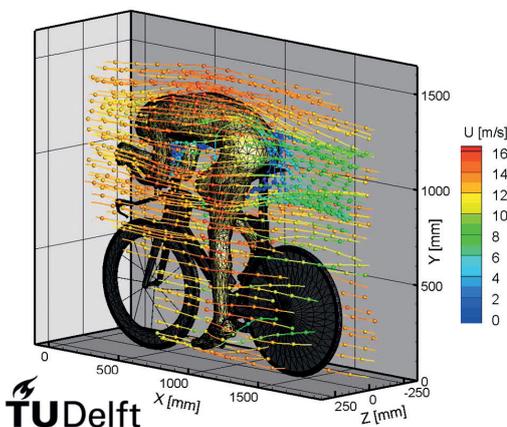
High-speed rugby ball deformation and velocity measurements using StrainMaster DIC

LaVision has a wide range of systems applicable to the testing of equipment, vehicles, and components used in sports. Particle Image Velocimetry (PIV) and Shake-the-Box (STB) can be used to calculate the aerodynamic behaviour, and digital image correlation (DIC) can be used to calculate material deformation. The two can be combined to investigate fluid-structure interaction (FSI) phenomena.



In the world of sports the ability of the athlete to achieve the best performance possible is the main goal. LaVision systems incorporate the latest imaging technology in systems enabling measurements such as:

Full volume flow field mapping around a cyclist using MiniShaker and STB



TU Delft
Experiments were conducted by TU Delft

- ▶ flow mapping around a cyclist in a wind tunnel to understand the effects on drag
- ▶ the deformation of a rugby ball as it is kicked and the subsequent flight of that ball
- ▶ understanding the effect of the panel and seam layout on a football, and the way that the wake is modified when it has spin
- ▶ the effect on the flow due to the clothes materials and seams and the drag profile
- ▶ measurements of baseball flight and the effect of early boundary layer separation causing the wake to tilt and resultant direction changes

Protection of sportsmen and women is of the utmost importance and significant research goes into this topic. Many sports require protective equipment, and the ability of this equipment to survive impact and protect the person on the inside can be analyzed using DIC.

- ▶ cricket helmets that protect the player from the impact of the high velocity cricket ball
- ▶ hockey suits which need to protect the player from the impact against other players and the hockey stick
- ▶ cyclist helmets which need to be both protective and aerodynamic
- ▶ football shin pads

Header image: PIV measurement around a baseball
Courtesy of Utah State University

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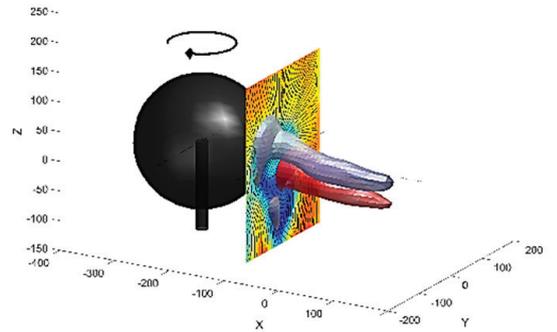
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The effects on football wakes measured by using Tomo-PIV

Many tests have to be carried out in controlled environments such as wind tunnels, however the wind tunnel cannot recreate the exact conditions in the field. This is where the Ring-Of-Fire measurements play an important role. It is possible to set up a PIV or STB measurement volume outdoors and make measurements on the real athletes or the ball that they kick. These Ring-Of-Fire measurements could include:



Experiments were conducted by Loughborough University Sports Technology Institute

- ▶ measurements of ice-skaters on a rink to measure their wake, and the effect on following skaters
- ▶ cyclists on a track or in a velodrome to assess the aerodynamic performance
- ▶ a football or rugby ball being kicked and the measurement of the spin and resultant wake

Ring-of-Fire PIV measurements of the flow around speed skaters



Experiments were conducted by TU Delft

With LaVision intelligent imaging systems you have the possibility to have a set up tailored to your exact needs. The DaVis software platform combined with PTU are at the heart and control all of the connected devices such as pulsed LED illumination, translation stages, lasers, robotic arms and cameras operating at kHz rates. The systems are completely modular and the capabilities can be built over time. We also offer contract measurement and rental solutions.

Please contact LaVision today to learn how we can optimize your sport related measurements.

Data provided by LaVision are believed to be true. However, no responsibility is assumed for possible inaccuracies or omissions. All data are subject to change without notice.

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