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Aerodynamic performance of racing bicycles and practical considerations for CFD workflows

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Presented at the STAR Global Conference 2012

As CFD is being embraced by the frame, wheel and component manufacturers in the cycling industry, some practical challenges are quickly emerging. Discussions and concerns regarding the scope and resources required to conduct CFD studies, as well as their relevance, are quickly evolving - a phenomenon which is not unique to the cycling community.

In this presentation we will outline a process, that can effectively help to manage CFD in the overall design process by directly addressing data management and workflow issues. Particularly we see a tremendous opportunity for cycling manufacturers, their CFD teams and ultimately cyclists to benefit by sharing our direct experience in developing a practical and highly productive CFD workflow.

The overall power requirements for a full production level bike frame will be presented. The frame is fitted with Zipp 808 Firecrest wheels, the ?fastest spoked aero wheel of all times' (Tour Magazin, Germany) and winner of the prestigious Tour Milestone Award 2011.

We will show how STAR-CCM+ result files can be reduced in size by nearly two orders of magnitude while still retaining full numerical fidelity in a completely automated process that generates extract database (XDB) files. Furthermore we will illustrate how transient data can be managed in a way that permits full interactivity.

We expect that all STAR-CCM+ users will be able to apply these processes to get more useful information from their simulations. Finally, we believe that these workflow advances will be absolutely critical as the cycling manufacturers continue to gain CFD maturity and improve their products.

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