Kú Cycle

Kú Cycle utilizes MSC Apex & MSC Nastran to design triathlon bikes and performance solutions that will change the sport forever

MSC Apex is a next-generation CAE platform, giving rapid simulation turnaround that far exceeds the capabilities of other toolsets. MSC Apex is our 'go to' simulation platform. We can now develop both detailed and idealized geometry without having to use a traditional CAD tool, as well as generate simulation models."

Richard McAinsh,
Kú Cycle Technical Director

Kú Cycle used MSC Apex while developing a Formula 1-inspired triathlon bike, where the front of the vehicle is critical to airflow. When the time came to verify concepts, MSC Apex was used to provide them with the confidence they needed to commit to the expensive tooling required for prototyping and manufacturing of key structural components.

Challenge

Modern triathlon is a sport which is heavily reliant on the efficient aerodynamic performance of both the bicycle and rider. Formula 1 cars are designed so that they manipulate airflow to follow a path beneficial to the driver. In the same manor, Kú Cycle's goal is to manufacture a bicycle that directs the airflow around the bike and rider.

This task required Kú Cycle to completely redesign the bicycle's frame, fork, and handlebar so that the components located near the front of the bicycle actively manipulate airflow for the benefit of the rider.

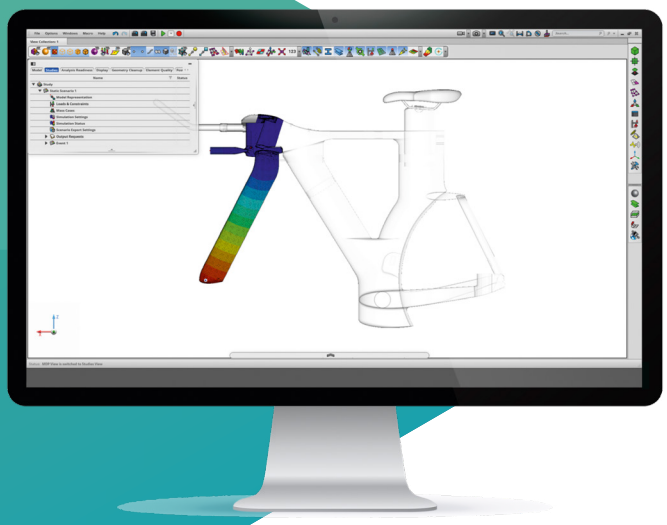
Virtual prototyping using FEA is a technique that is used across many industries. In Kú's case, this allowed the structure to be optimised before any physical manufacture. MSC Apex and MSC Nastran were used to build and solve FEA models using linear static and dynamic analysis solution sequences.

Solution/Validation

One of the key elements to Kú Cycle success has been their decision to leverage FEA and explore design modifications in near-real-time using MSC Apex prior to investing in production equipment. The FEA provided Kú Cycle with predictions on how the design structure would respond to relevant ISO structural tests and made known the critical locations throughout the model.

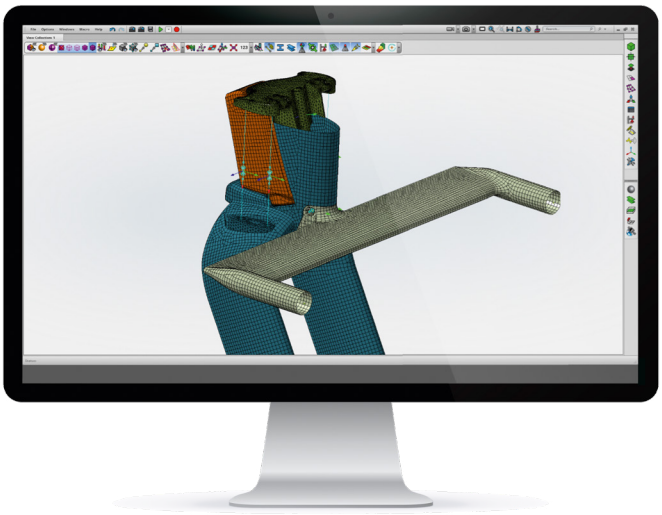
The FEA analysis on the original model indicated an area of concern at the handlebar/pivot box interface, which resulted in various iterations to be assessed. The incorporation of disk brakes into the design (without the need for rim caliper brake mounts) meant that the Steer Pivot Box, SPB could be positioned strategically in between the arms of a cyclist.

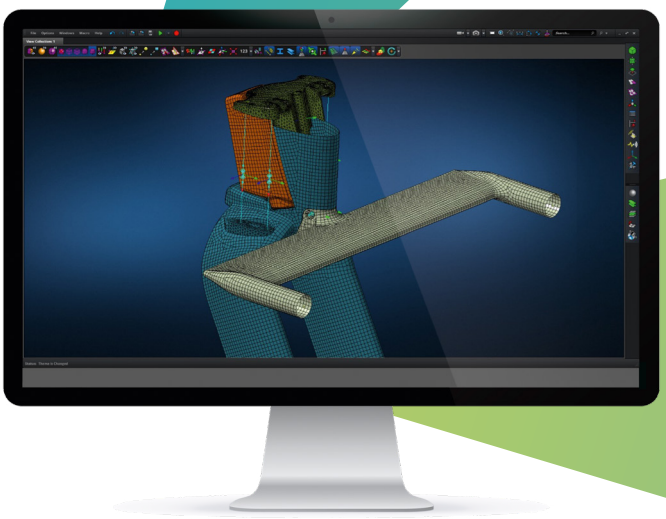
The model was then solved using MSC Nastran to evaluate static, fatigue and impact load cases. In completion of this assessment, Kú Cycle was able to patent a tall bicycle fork using Fork Airstream Technology (FAST) eliminating the need for a traditional fork steer and frame head tube.



We were introduced to MSC Apex approximately 4 years ago and within hours we were building models far more quickly and efficiently than legacy toolsets."

Dr. Steffan Evans, Evotech CAE Ltd,
FEA software and consultancy services provider for Kú Cycle





Results

Previous development methods, based solely on physical test, are often inadequate in ensuring that the structure will not fail.

In many scenarios, companies are required to invest in expensive prototypes with little guarantee that their design will suffice. An MSC Apex-focused strategy gives companies the means to assess a virtual structure, well in advance of any manufacture.

Kú Cycle now produces a new bike that has been designed and engineered specifically for Triathlon competition. The Kú TF1 offers various related performance solutions by embracing CAE technology and Formula 1 practices to create an aerodynamic and structurally efficient vehicle.

Key highlights
Product: MSC Apex, MSC Nastran
Industry: Consumer Goods
Benefits: • Rapid design trade-off studies enabled design modifications in near-real-time using MSC Apex • Static, fatigue, and impact load cases were all evaluated quickly using MSC Nastran

About Kú Cycle

Kú Cycle is a Dutch based company with a mission to design bikes and performance solutions that will change the sport forever – the perfect fit between body and machine. We believe a rider's position should be established independent of the bike and will therefore reposition bike fitting services from a post-purchase service to a pre-purchase service. A new production process (built-to-order) and a completely different sales model are introduced with a single objective: athlete performance delivered.

About Evotech

Evotech Computer-Aided Engineering Ltd is an Engineering Consultancy and MSC Apex Elite Partner based in the UK, specializing in Product Development, Technical Sales and Training in advanced Finite Element Analysis (FEA). With a background predominately in the Aerospace industry, Evotech CAE are expert in multi-scale model development, analysis and structural optimization.

HEXAGON

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