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Carl Faux, Chief Designer
Triple Eight Race Engineering

HEEDS MDO Helps Triple Eight Race Engineering Achieve Early BTCC Success

Triple Eight Race Engineering was founded in late 1996 and is based in the UK near the Silverstone Grand Prix circuit. The company is best known for its motor race exploits, most notably in the British Touring Car Championship (BTCC). Triple Eight Race Engineering is proud of its record as the most successful team ever to compete in the BTCC. To date the team has won over 100 races and 22 titles including Champion Driver (5 times) and Champion Manufacturer (6 times).

New Team, New Vehicle, Very Little Time

According to Carl Faux, Chief Designer at Triple Eight Race Engineering, "Going into a program to design and manufacture a contender for the BTCC season in the timescales we had was an unbelievable challenge. At the very least we would require 6 months design time and many days circuit testing in normal circumstances."

"Our priorities were reliability and finishing races; however, the performance we were able to extract from the car on what was essentially day 2 of testing for us was beyond all expectations and is due in no small part to the effort and direction that Zouch Dynamics and Red Cedar Technology have provided. From getting the first validations on Saturday this allowed us to make some changes overnight that we had confidence in and they proved that right from the start we were in the game."

How HEEDS MDO Contributes to Triple Eight's Success

The key to Triple Eight's success has been enlisting the help of consultants at Zouch Dynamics Ltd. (ZDL) who used VI-Motorsport vehicle simulation software, developed by VI-grade, to create an accurate model of the MG6 BTCC car, which could be used to predict the vehicle dynamics of the actual MG6.

This model was used in conjunction with HEEDS®MDO design optimization software to evaluate the performance of the MG6 BTCC car and find the setup that gave the shortest lap time. This setup helped MG KX Momentum driver, Jason Plato, place fourth and third in early races, and then finish first in the final race of the weekend.

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"One of the reasons the car has been so fast, so quickly, and with such limited testing is the setup direction the team received from the HEEDS MDO/ VI-Motorsport optimization."

David Ewbank
Zouch Dynamics Ltd.

Specific Problems Triple Eight Has Solved with HEEDS

Brands Hatch Race Setup Optimization

The first event on the BTCC 2012 schedule was Brands Hatch on April 3. Following some direction from Triple Eight, ZDL provided guidance regarding springs and anti-roll bars. A HEEDS model was implemented to call VI-Motorsport to adjust front and rear springs to the available rates, and to adjust the anti-roll bar options, with a single objective for lowest lap time around the Brands Hatch race track. Although ZDL was missing data for damper performance, final drive ratio, engine torque curve, and jounce stopper clearance and rates, they were still able to run the optimization. The results for springs and anti-roll bars proved to be robust and insensitive to unknowns, so ZDL passed these results to the team just before the Brands Hatch race.

For the first race of the day, the Triple Eight team went with their qualifying (not optimized) setup, and achieved a better than expected finish. They implemented the optimized setup for the second race, and the car's balance improved considerably, resulting in a third place. They were then able to do some fine tuning on other settings, and used the HEEDS/VI-Motorsport setting for the final race, and achieved the unexpected first place.

Donington Race Setup Optimization

Following the highly successful Brands Hatch race, the VI-MotorSport model was populated with the available design data, and refinements were made to the model to bring it closer to the physical vehicle. There was minimal opportunity for any correlation exercise and no time to explore major setup changes.

HEEDS MDO was set up to vary the spring rates, anti-roll bar settings, tire pressures and bump stops, and to optimize the car setup to achieve the minimum lap time around the circuit. Approximately 250 iterations were used to find the final optimum lap time. The base setup was found within 75 iterations, the remaining iterations were for fine tuning, looking for gains on the order of a few hundredths of a second.

The HEEDS-optimized setup was used for qualifying, and Jason Plato put his MG KX Momentum Racing car on pole position for the race despite carrying the maximum ballast of 45kg. In the final race, the car started from 17th place; however, Plato was able to use the car's speed advantage through the corners to achieve an excellent 2nd place.

Thruxton Race Setup Optimization

The build-up to Thruxton allowed time to look at the fundamental characteristics of the car and to address some of the shortcomings with the

suspension design. With the aid of simulation, the team was able to make several significant gains in the suspension performance and create a more linear operating condition.

The team also started looking ahead to identify further aspects of the design that could be improved. The improvements were included in the HEEDS optimization model and the optimization was run again, varying the usual parameters, plus several additional ones to find the best setup for optimal lap time around Thruxton. As part of TOCA's rules to prevent one team from maintaining a performance advantage over the other teams, competitors' cars were awarded a power boost for Thruxton. So, finding the optimal setup to maximize vehicle speed through the high-speed turns around BTCC's fastest track was all the more important. Weather also played an important factor in the race weekend, with rain and high winds forecast. Without access to appropriate tire data for the BTCC wet tires, the team stayed with the "dry" setup for optimization.

Overall, 500 iterations were used to identify the optimal setup, although the base setup parameters were found after 140 iterations, with the remainder really looking at fine tuning. However, the data from all these iterations will be useful in further understanding the behavior of the car and the interaction among different parameters on the overall performance.

In the first race, Plato was able to finish 3rd, but not able to catch the cars in front in the very wet conditions. The second race was not as wet, and Plato managed to finish 2nd. In the final race of the day, Plato finished 4th, despite having a faster car than the one in 3rd.