

Design of Experiments in the Motorsports Industry

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EXTENDED ABSTRACT

Currently, there is a need for more effective ways to integrate statistical methodologies such as Design of Experiments (DOE) into the engineering curriculum. Aptitude with statistical methodologies such as DOE was identified from conversations with our Industrial Review Board as an essential skill for engineers and one that we had not been adequately addressing. Faculty discussions identified that this requires not only knowledge of statistical concepts related to DOE, but also the ability to integrate this methodology with fundamental engineering principles toward designing and understanding experiments. As a result our DOE lab course was created. The final project is meant to combine classroom knowledge with the individual creative design of full factorial studies of the students choosing. The final projects of the students are quite imaginative. One in particular that will be discussed deals with the motorsports industry. The student consults in the motorsports industry and in the classroom recognized immediately that the concepts of DOE and factorial design could be powerful tools. To be able to determine a problem and solve the problem the problem quickly and accurately produces a definite competitive advantage in the motorsports industry.

In the motorsports industry testing is at a premium. It represents an increased need for funding and stress on the staff. So to generate functions or procedures to reduce this is of great value. Tire testing is one of the most difficult forms of automotive testing which is accelerated in motorsports. To reduce the uncertainties in tire testing and to accomplish the above concepts would yield a definite advantage. What follows is a report of test that accomplished all of this by utilizing a Design of Experiments.

The problem or the experiment/test was already present we simply created the solution to the problem by using a software application (Minitab) and procedures outlined in a Design of Experiments. The DOE provided the test staff with away to rigorously and systematically approach the solution. It provided the run order sequence for the test plan and facilitated the systematic recording of data.

These concepts were applied for a Grand-Am Rolex series tire test. The test was held to evaluate the implementation of a new Pirelli® tire. Specifically this report was generated from the test that was completed in evaluating the rear tire wear for a Porsche 997 GT3 vehicle. The test process was greatly reduced by the use of Minitab and the DOE.