

2016 Student Quality Showcase Event – Project Descriptions

The purpose of the Student Quality Showcase Event is to bring together SEPT faculty, staff, students, and the American Society of Quality (ASQ) Hamilton Section to learn how quality tools, ideas and expertise can be used to positively impact enterprises. The event provides a platform for selected Bachelor of Technology students to present their Design of Experiments (DOE) project and to compete for monetary awards graciously donated by the ASQ Hamilton Section. The event is also an opportunity for students to meet with quality professionals from a variety of industries in the Hamilton area. Members from the ASQ Hamilton Section will be judging.

This year's showcase was held Monday November 7th, 2016 at McMaster University. Fifteen members of the ASQ Hamilton section, three faculty members and a handful of BTech students attended.

Project description:

The Design of Experiments (DOE) project is an assessment component of the course on quality improvement and statistical methods in the Bachelor of Technology program. Students design, conduct, analyse and report on an experiment of their choice with three or more factors and at least one response. Proper design concepts must be considered including replication, randomization, blocking and choice of response(s). The data is analyzed using Minitab statistical software and includes ANOVA tables, effects plots (contours, if required), residual diagnostics, model selection, optimum settings and prediction. Confirmation runs of optimum settings are recommended.

Projects presented this year:

Trebuchet (Kern Lee, Sanjit Mann, Carlo Perrotta) {Winner = \$500}

The objective of this experiment was to determine the factors that affect the distance of an object thrown by a trebuchet. The trebuchet was designed by modelling software and manufactured by the team using milling, turning and 3-D printing as a requirement for another course, Manufacturing Processes and Systems. Four factors were analysed in a 2⁴ full factorial design: mass of counter weight, stopper distance on the trebuchet, style of projectile holder, and the type (shape) of projectile. Distance the projectile traveled was measured with the assistance of a slow motion camera.

GoKart Distance Times (Kyle Breukelman, Jeremy Bullen, and Nick Leahey) {Consolation prize = \$100}

The objective of this experiment was to determine the factors that affect the time it takes a GoKart to reach 50 meters in distance. Five factors were analyzed in a 2⁵⁻¹ fractional factorial design: tire pressure, launch throttle percentage, drive type, drag and driver weight. A stop watch was used to measure the time from start to 50 meters.

Rust Analysis (Jake Friday, Philip Maldonado, and Steven Pray) {Consolation prize = \$100}

The objective of this experiment was to determine factors that cause rust on the steel body structure of a vehicle. Four factors were analysed in a 2⁴ full factorial design: heat treatment, surface finish, solution and temperature. Samples of equal size steel were treated for each experimental combination and the amount of rust after three days was measured by a superimposed grid.

Paper Airplanes (Samaher Ramzan, Amjad Skeik, and Han Zhao) {Consolation prize = \$100}

The objective of this experiment was to optimize the maximum forward distance travelled by launching a paper airplane using an elastic band. Four factors were analysed in a 2⁴ full factorial design: type of paper, presence of winglets, applied force, and trajectory angle. The length of trajectory was measured from the point of launch to initial point of landing.

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