Supervisor: Professor Viliam Makis makis@mie.utoronto.ca
Title: Minimization of a makespan for multiproject job scheduling
Description:

The objective of this thesis is to develop an operations research model and a computational algorithm for a multi-project job scheduling considering given arrival times, due dates, available resources and project job requirements. Other assumptions include job precedence, parallel processing, and various resource requirements. A feasible schedule should be found minimizing a makespan, first for a given, finite time horizon, then considering a re-scheduling upon new project arrival.

The project is suitable for one or several Industrial Engineering or Engineering Science students (UG thesis group project) who performed well in Probability, Statistics and OR courses. Computer programming will be required to find the optimal schedule and to perform sensitivity analysis in addition to an OR software with LP package.

Supervisor: Professor Viliam Makis makis@mie.utoronto.ca
Title: Application of SPC and DE in Automotive Industry
Description:

The objective of this thesis is to study to what extent the SPC tools and DE have been applied in the automotive industry for the statistical process control and for the process and quality improvement.
In the first phase of the thesis development, a thorough literature review will be done focusing mainly on the case studies dealing with the SPC implementation and application of DE in the automotive industry.

Two interesting case studies will be selected for a detailed study and analysis. Quality data will be analyzed using SPC and DE, focusing on achieving process stability and improving process capability. Minitab software will be used for data analysis.
The project is suitable for one or several Industrial Engineering or Mechanical Manufacturing students (UG thesis group project) who performed well in MIE364S.

Supervisor: Professor Viliam Makis makis@mie.utoronto.ca
Title: Development of a Stochastic Dynamic Model for a Make-to-Order Production System
Description:

The problem is described as follows. A limited number of expensive, high quality parts is required in a given time period with a strict deadline. No rework of a nonconforming part is possible. To meet the demand, and to avoid the penalty, batch production is considered. Batch sizes as well as the maximum number of batches which can be produced are limited. Examples include make-to-order military and aerospace industry contracts as well as just-in-time manufacturing orders. The problem will be formulated and solved using stochastic dynamic programming. The optimal production policy will be found and a numerical analysis will be performed to get insight into the structure of the optimal policy.

The project is suitable for one or several Industrial Engineering or Engineering Science students (UG thesis group project) who performed well in Probability, Statistics, OR and

Production courses. Computer programming will be required to find the optimal number of batches and batch sizes for each production run and to perform sensitivity analysis.

Supervisor: Professor Viliam Makis makis@mie.utoronto.ca
Title: Quality Control and Improvement Using Lean Six Sigma Approach
Description:

The objective of this thesis is to learn in depth lean six sigma approaches and methodologies for quality improvement in organizations. This would include the study from the books, thorough literature review in this area, and analysis of two interesting published case studies.

Quality data will be analyzed applying DMAIC which includes SPC tools, quality cost analysis, process capability analysis and DE. Minitab software and Matlab will be used for data analysis.

The project is suitable for one or several Industrial Engineering or Mechanical Manufacturing students (UG thesis group project) who performed well in MIE364S.

Supervisor: Professor Viliam Makis makis@mie.utoronto.ca
Title: Optimal scheduling of repairs for several production facilities considering a single repair crew
Description:

the following problem will be considered. There are several production facilities at different locations and a single repair crew located at a repair depot. When the first failure occurs, the repair crew is sent to that facility to fix the problem. When the repair is completed, the repair requests from other facilities are updated and it is necessary to decide to which facility the repair crew should be sent. If there are no failures upon a repair completion, the repair crew travels back to the repair depot awaiting further requests. It is assumed that the times to failure as well as the repair times are random variables with given distributions. The costs include the travel costs (dependent on the distance travelled), repair costs (both fixed costs and cost rates per unit time), and the facility downtime costs due to lost production. The objective is to find the optimal repair schedule minimizing the total expected cost over a planning horizon.

The project is suitable for one or several Industrial Engineering or Engineering Science students (UG thesis group project) who performed well in Probability, Statistics and OR courses. Computer programming will be required to find the optimal number of batches and batch sizes for each production run and to perform sensitivity analysis.

Note: In addition to the listed topics, topics in the areas of process/quality control and improvement, maintenance, reliability, production and inventory control, including theoretical problems in the stochastic OR area or engineering statistics for students considering graduate studies are possible. Interested students should contact Prof. Makis, e-mail: makis@mie.utoronto.ca.