STATISTICS SEMINAR

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Two control charting schemes for monitoring multivariate processes

Statistical Process Control (SPC) is a collection of statistical methods aimed at monitoring and controlling the variability of quality characteristics in a process/service. Key tools used in SPC include control charts. The increasing availability of online sensors and automatic data-collection in manufacturing processes/service delivery has made possible the contemporary surveillance of several related quality characteristics. In this seminar some recent advances about the following two control charts are discussed:

- The adaptive Hotelling's T2 control chart with run rules ;
- The control chart monitoring the ratio of two normal correlated variables.

The computation of the statistical metrics of performance for the adaptive control charts with run rules calls for representing the sequence of points plotted on the chart as a stochastic process modeled by means of Discrete Time Markov Chains. During the seminar, the Markov Chain modelisation is discussed for these charts and the statistical properties of the adaptive Hotelling's T2 control chart with run rules are computed and compared with those of other control charting schemes. Control charts monitoring the ratio Z of two normal variables X and Y have surprisingly received too little attention in the quality control literature. Several potential applications dealing with monitoring the ratio Z can be found in the industrial sector, when quality control of products consisting of several raw materials calls for monitoring the stability of the proportions (ratios) of different components within a product. In this seminar the statistical performances of Phase II Shewhart control charts for individual observations monitoring the ratio of two normal variables are discussed. Several tables and figures are provided for uncorrelated and positively correlated variables to show how these charts react to process shifts in the mean and / or the standard deviation of one or both the variables X and Y. An illustrative example from the food industry is detailed to show the implementation of these control charts.

Friday, January 25, 2013 - 14h30 - Room 0/33 (Building B37)
Rue Grande Traverse 12, 4000 Liege (Parking P32-33)

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Short biography

Giovanni Celano holds a PhD in Manufacturing Engineering from the University of Palermo (Italy). Currently, he is assistant professor at the University of Catania (Italy), where he teaches Fundamentals of Manufacturing and Quality Management. His research is focused on statistical quality control, production scheduling and operations management applied to both the industrial and service sector. He has authored / co-authored about 100 papers in international journals and in proceedings of national and international conferences. He is Associate Editor of the journal Quality Technology and Quantitative Management and the Journal of Industrial Engineering. He is member of the ENBIS (European Network for Business and Industrial Statistics) and the AITeM (Associazione Italiana Tecnologia Meccanica).

http://www.diim.unict.it/users/gcelano/