## L5. Analytical Process Control and Optimization

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The main concept of multivariate statistical process control (MSPC) is application of historical instrumental X-data for construction of a linear model, which explains how the final results (i.e. quality, y) depend on the X-variables. Apparently, studding this model, it is possible to work out a program of actions that could improve the process performance in general. However, this is a *post factum* optimization, while the most important issue in production is an *in situ* optimization, which prescribes immediate actions in the course of production in order to correct its current state and to improve the future. The optimization methods are based on the PLS block modeling as well as on the Simple Interval Calculation methods of interval prediction and object status classification. It is proposed to employ the series of expanding PLS/SIC models in order to support the on-line process improvements. This method helps to predict the effect of planned actions on the product quality, and thus enables passive quality control. We have also considered an optimization approach that proposes the correcting actions for the quality improvement in the course of production. The latter is an active quality optimization, which takes into account the actual history of the process. The advocate approach is allied to the conventional method of multivariate statistical process control (MSPC) as it also employs the historical process data as a basis for modeling. On the other hand, the presented concept aims more at the process optimization than at the process control. Therefore, it is proposed to call such an approach as *multivariate statistical process optimization* (MSPO). Methods of process control and optimization are illustrated with a real world example.

1. Pomerantsev, O. Rodionova, A. Höskuldsson "Process Control and Optimization with Simple Interval Calculation Method", Chemom. Intell. Lab.Syst., in print (2006)