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Quality improvement from the viewpoint of statistical method

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Preface

This research was instigated by Ronald Does and Kit Roes. Under its original title 'Variation Reducing Strategies' its intended subject-matter comprised a study of the strategies with which methods as experimentation, statistical process control, the Shainin System and Taguchi's methods are applied. The research ought to result in a framework that enables a comparison and a classification of the various approaches for variation reduction.

During the research the insight grew that the stated problem covered in addition to statistical topics also many methodological ones. Thus, I started to explore the literature on methodology and — eventually — philosophy of science and combined the literature in these fields with mathematical statistics to form the basis of this research. In my view, industrial statistics — the discipline to which this research belongs — is multidisciplinary in nature and incorporates subjects from at least mathematical statistics, methodology and economics. For this reason, many topics in industrial statistics cannot be studied from the viewpoint of mathematical statistics alone, but require an integration of ideas from various disciplines. In this thesis the disciplines of methodology and mathematical statistics play complementary roles, where mathematical statistics offers the techniques which are the tools in the inquirer's hands, while methodology places these techniques in a coherent unity.

The research for this thesis necessarily involved a thorough study of the work of Walter A. Shewhart, by many considered to be the founding father of industrial statistics. Studying his books more and more thoroughly, I realised how much my research links on to his line of thought, for example in modelling quality control as scientific inquiry (cf. section 1.7). I also found myself to follow his seeking guidance from the literature on a wide range of disciplines; see his bibliography in Shewhart (1931, appendix III), which lists tens of books on diverse subjects such as physics, mathematical statistics, economics, logic and philosophy of science.

This thesis has profited from the discussions I had with my colleagues Søren Bisgaard, Edwin van den Heuvel, Chris Klaassen and Wessel van Wieringen. The comments of Ronald Does, Frans de Mast, Kit Roes and Albert Trip on draft versions of the manuscript have greatly enhanced the final version. Ronald deserves special credits for creating an environment in which statistical consultancy work is fruitfully combined with scientific research. Finally, in the organisations where I have worked as a consultant I wish to thank the persons with whom I have co-operated in improvement projects.

Jeroen de Mast
Amsterdam, February 2002

