# Computation of AOQL variables sampling plans

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# Summary

In the highly competitive markets, the entrepreneurs have to keep an eye on the quality of products and services they provide to the clients. At the same time, there is always a need to control the cost when running the business. So there is a requirement on both the quality of the product and a good management of cost. The goal of the quality control is to satisfy these requirements.

The statistics is one of the fields which have brought principal contributions to the quality control tools. The traditional tools of statistical quality control include a statistical process control and the acceptance sampling procedures.

This book deals with selected problems of statistical acceptance sampling, with a focus on the computational aspects and a discussion of the software tools available for solving the tasks related to the acceptance sampling. The AOQL acceptance sampling plans for sampling inspection by variables when the remainder of rejected lots is inspected which minimize the mean inspection cost per lot of process average quality (Klůfa, 1997 and 2008) are addressed. The AOQL sampling plans minimizing the mean inspection cost per lot of process average quality when the remainder of rejected lots is inspected were originally designed for the inspection by attributes (Dodge and Romig, 1998). The single sampling plans for the inspection by variables and for the inspection by variables and attributes (all items from the sample are inspected by variables, remainder of rejected lots is inspected by attributes) were then proposed. Under the same protection of consumer the AOQL plans for inspection by variables are in many situations more economical than the corresponding sampling plans for inspection by attributes. The book deals in detail with the software implementation of the methods for calculation and evaluation of the AOQL plans for variables in the software (Kaspříková, 2012) which has recently become available and with the economic characteristics of the AOQL plans for inspection by variables. We also show a measure which has been proposed for the purpose of an evaluation of a comparative efficiency of an AOQL sampling plan for inspection by variables and attributes.

The structure of this book is as follows: the introduction provides a brief overview and an explanation of some mathematical concepts and techniques used further in the book. A brief introduction to the acceptance sampling is included, followed by a short overview of some of the approaches to acceptance sampling. Motives for selected approaches to acceptance sampling are recalled and the situations in which the particular acceptance sampling procedures are applicable are described.

The AOQL plans for sampling inspection by variables when the remainder of rejected lots is inspected and methods for their calculation are described in more detail in chapters 2 and 3. With the tools available today (Kaspříková,

2012), the computation of the plans can be performed using the exact formula for the operating characteristic of the acceptance sampling plan and such plans have better characteristics compared to the plans computed using just the approximately valid formula for the operating characteristic, which used to be the usual practice before the tools for an efficient computation of the exact plans became available.

The references to relevant code in the R language for statistical computing (R Core Team, 2013) used for the computations discussed in this book are made throughout the book. Computation and analysis of the AOQL plans is performed using an extension package (Kaspříková, 2012) for the R computing environment, which is in more detail discussed in chapter 3 of this book. The R computing environment, in which methods for AOQL plans computation discussed in this book are implemented, is briefly introduced and a choice of R as an environment for the development of the tools designed and used in this book is explained. There is also a description of the functions used for calculation and evaluation of the plans included, with detailed description of all input parameters and output values of the functions.

Since there still seem to be possibilities for development of sampling plans which would allow further savings in the mean inspection cost per lot of process average quality, these are briefly outlined in chapter 4.