Ain Shams University
Faculty of Engineering

COMPUTER AIDED QUALITY SYSTEMS

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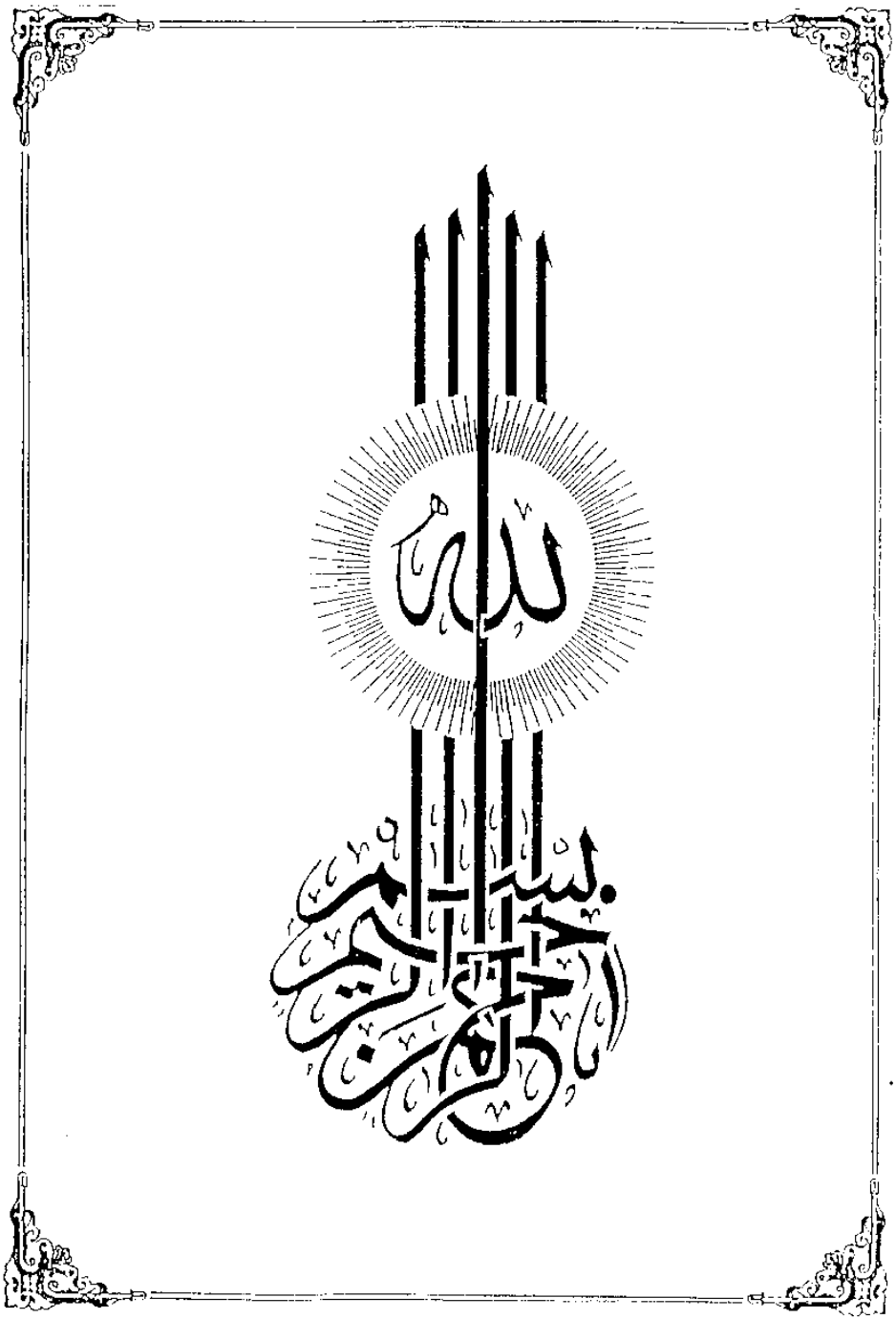

STATEMENT

This dissertion is submitted to Ain Shams University in partial fulfilment for the degree of Master of Science in Mechanical Engineering.

The work included in this thesis was carried out by the author in the department of Design and Production Engineering, Ain Shams University from December, 1991 to December, 1995.

No part of this thesis has been submitted for a degree or a qualification at any other University or Institution.

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ABSTRACT

The rapid advance in computer capabilities, beside the desire of manufacturers to gain increase in profit through high productivity and efficiency, enforced the use of computers in approximately all the manufacturing fields specially in quality control.

In this study, implementation of the different phases of computer applications is introduced. These applications started with customer developed programs, then multipurpose packages and ended with the specialized packages. The applications demonstrated in this thesis included different techniques of data presentation, control charts, sampling plans and quality improvement through experimental design.

KEY WORDS

Quality
Quality control
Quality systems
Computer aided quality
Computerized quality systems
Computers and quality
Statistical quality control
Statistical process control

SUMMARY
COMPUTER AIDED QUALITY SYSTEMS

Engineering applications using computers are grawing faster than any other traditional applications. Computers are widely used in areas concerning all production processes. This extensive use is due to the increasing complexity of the products, improvement required in quality, cost, productivity and national and international competition in the market place.

In this study we introduce three different phases of computer capabilities that are applicable in engineering applications, specially quality control. The three phases, respectively, started with the customer developed programs that are designed by a qualified programmer. These programs are usually written in computer languages such as the basic, fortran, C-language, ... etc. The second phase is the multi-purpose packages. These are ready-made packages that can be adapted to be used in more than one field of application according to the needs of the user. An example of such packages used in this thesis is the statistical package for social sciences; SPSS/PC+. The last phase demonstrated here is that dealing with the specialized packages. These packages are very easy to use and they does not need a highly skilled user. The QC-PROG is a specialized package that deals with statistical quality control techniques.

The objective of this study is to demonstrate the above mentioned computer capabilities that are used to achieve stable manufacturing processes. This implies that the output product will meet the required level of quality. Statistical quality control is the most

powerful subject used to assure process stability.

The objective of the thesis is achieved through six chapters, the introduction, the conclusion and recommendations.

The first chapter: **Quality Data and Information Systems**, is concerned with explaining the meaning and use of quality data and what are the steps followed to plan and design a well-built quality information system. Steps of planning a computerized QIS are also introduced.

Chapter two; **Computers and Quality Control**; identifies the quality needs served by computers, and how to choose the suitable computer capability for the type of work that we are dealing with.

Chapter three which is titled; **Presentation of Quality Data Through the Use of Computers**; illustrates the different tools used to present data through the various available computer capabilities.

The fourth chapter, **Computer-Aided Construction and Use of Control Charts;** discusses the different types of control charts, and how computers are used to construct these charts.

Chpater five: **Computer-Aided Selection and Design of Sampling Plans;** deals with some sampling techniques through the use of computer applications. Single, double and sequential sampling plans are some types that are discussed in this thesis.

The last chapter named **Computer Facilities in Quality**