

# Automate the Processing and Analysis of Results of Parametric Measurements

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**Abstract:- Approach is proposed for automation of software development in Windows environment for fast compile of a specific software for processing and analysis of measurement data from the parametric measurement processes. Feature of the programming environment of Visual Basic for Applications is the ability to use existing controls from the Windows environment performing the program of Microsoft Office package. This feature allows user friendly interface output.**

**Keywords – VBA, processing, analysis, measurement and automation**

## I. INTRODUCTION

In any production or examination respecting the rules and standards enable the activity to be as effective as possible. This requires the establishment of protocols for the sequence of actions and their results. When the amount of the results is a large number automation of their processing and analysis is needed. To achieve this specialized software is used. The choice of specific software, programming languages and action sequence depends on the complexity of solving the specific task and the feasible resources for the activity. The main requirements usually are: to be as quickly as possible, easy to use, fast transmission, information is systematic and well-designed graphic shaped.

In small-volume projects, where appropriate systematic reports and records is needed, the resources for automation of the creation of documents have to be reduced to the minimum. One way to achieve the fastest and cheapest solutions is to use the software - Visual Basic for Applications (VBA) [1]. This is a micro version of Microsoft Visual Basic, which is used for programming of applications based on Microsoft Windows, and it has been included in several programs at Microsoft [3].

Visual Basic for Applications is the object - oriented development environment based on the programming language BASIC. This is the main environment of Microsoft programming. It allows quick development of applications with graphical interface for Windows OS. It delivers fast access to databases. It is based on ActiveX software components.

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As its name tells, VBA is closely related to Visual Basic, but the code can be run only by applications such as Microsoft Excel but not as a standalone application. However, it can be used to connect one application to another using OLE Automation [4]. For example, it is used to automatically create a Word report from Excel data, in turn automatically collected by Excel from polled observation sensors.

VBA code is stored by the hosting applications (Access, Excel, Word) as a separate stream in Structured storage files (e.g., .doc or .xls) independent of the document streams.

VBA is functionally rich and extremely flexible but it does have some important limitations, including limited support for function pointers which are used as callback functions in the Windows API.

VBA programs can be attached to a menu button, a macro, a keyboard shortcut, or an OLE/COM event, such as the opening of a document in the application. The language also provides a user interface in the form of UserForms, which can host ActiveX controls for added functionality.

For example: In Microsoft Access, users automatically have access to the Access library. References to the Excel, Word, and Microsoft Outlook libraries can also be created. This will allow creating an application that runs a query in Access, exports the results to Excel, formats the text, then writes a Mail merge document in Word that it automatically e-mails to each member of the original query through Outlook.

A demonstration of the options for establishing automated measurement reports are presented in the following examples.

### ***Protocol for automated processing and analysis of data from contact resistance measurement***

The task is to process the data and analyze the results after the measurements and to establish a report containing all the information about the study [2].

In this case Microsoft Excel can be used as basis for development. The reason for this choice is the existing matrix table and the possibility of drawing graphs.

The main idea is quick and easy to process and to establish an electronic report.

For this purpose the following simple and basic algorithm of transferring raw measurement data and its further processing as shown in Fig.1 is prepared.

Microsoft Excel is able to open text and data files and automatically convert them into .xls file. In this case the file data represents text .dat file in which measurements are separated by “,” Excel converts “,” into columns.

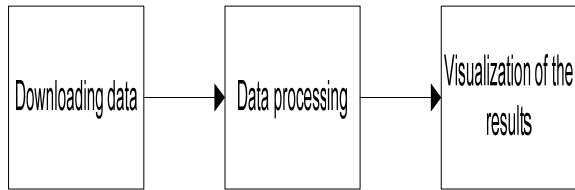


Fig.1 Algorithm of transferring raw measurement data and its subsequent processing.

Depending on the complexity, the calculations can be performed both by the formulas in the table in Excel and the VBA code. Since it is not known in advance how much and how many channels is used for the measurement, all calculations are made by the software.

The visualization of the results are arranged in tables. By an appropriate range of colours and frames is intuitive for most users. In predefined criteria an indication is received for not good contacts. There is an opportunity to graphically display the variation of the contact resistance over time as shown in Fig.2.

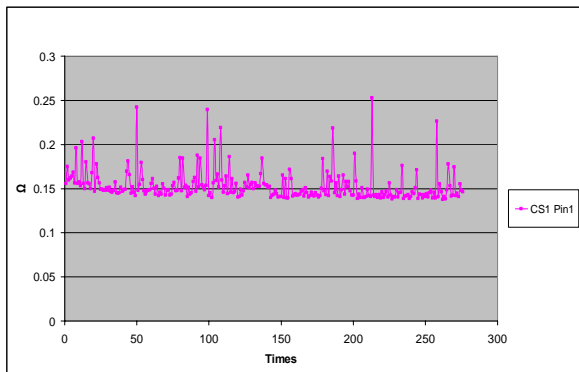


Fig.2 Graphical representation of the variation of the contact resistance over time.

The file contains all the measurement data, calculations and all necessary data for constructing the graph.

### Automatically created route map

Each product goes through many processes until it reaches the end user. The route, which the device passes, is described in the route map. Different products have their own characteristics and each has different manufacturing steps.

The task is for a group of similar devices to be prepared a paper and electronic route map quickly and easily.

For this purpose Excel is very suitable because VBA is able to automate the arrangement of the steps of the product route.

Implementation of the software constitutes complete modules with the steps through which the device passes and a table in which users write the unique features for the device. The documentation for the route of the testing devices and testing procedures required for each module are sheets in Excel document. It is possible to add new steps or eliminate existing.

To create a route map the unique features have to be defined, if there are any, and to choose the steps that device

passes. Then the software automatically assembles route map. An electronic format is created and the route map is prepared for printing on paper.

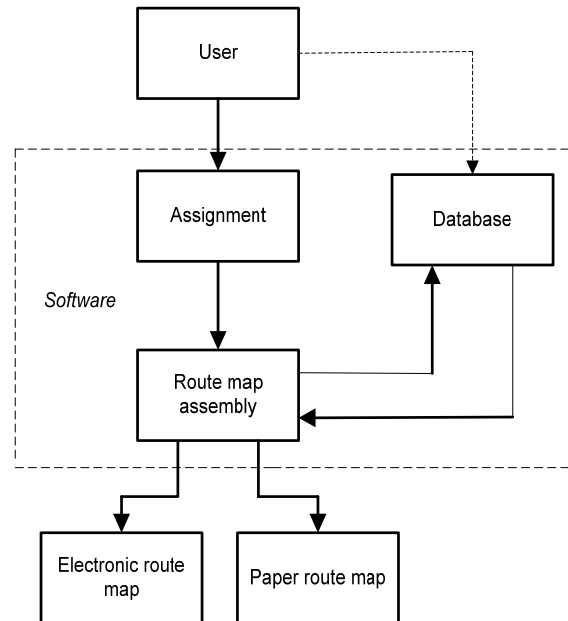


Fig.3 Algorithm of assembly of a route map.

### Automatic statistical parametric analyzer

When a product is produced in large quantities a group of devices is differentiated into a lot. Devices from one lot have the same span of time in the same way to reaching the end user.

The task is to facilitate the analysis, tracking of the failures and the deviation of the parameters of electronic devices in comparison with other lots.

Excel and VBA gives the opportunity for a quick decision.

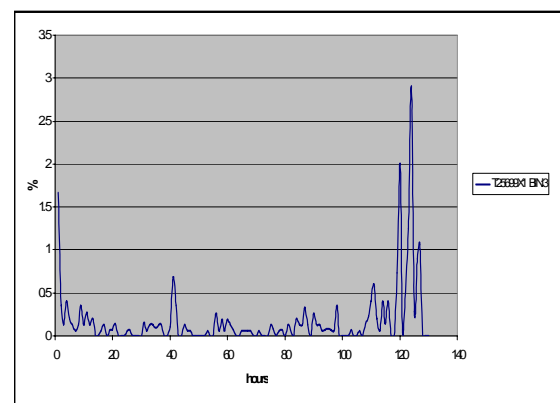


Fig.4 Graph of hourly monitoring of failures in category 3 in the diagnosis of devices.

The software collects all the necessary data from external files and gathers them in one place so for the user is the easy to trace and compare the results of the tested products.

The features of the software solution are:

- Tracing the number of failures and on a specific criteria an increased amount of failures is reported.

- Tracing deviations in the parameters of devices from different lots and at specific criteria abrupt change in values is reported.
- Graphic for hourly monitoring of the selected type category failures during the testing of products.

## II. CONCLUSION

Of those examples above can be concluded that VBA is very suitable for quick and inexpensive solutions for the automation of information processing.

VBA is flexible, easy programming and intuitive. Excel environment allows us a variety of layout and short development time of the projects. Users have the opportunity to adjust the interface and to add or change modules in the VBA code.

Disadvantages are that the code can not be run without the Microsoft Office package and no executable application is available.

## REFERENCES

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