PC TIMS: A SAS® Software Integrated System for Technical Information Management

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ABSTRACT

This paper describes a menu driven technical information system developed at Roy F. Weston Inc. (WESTON) using and integrating SAS® macros and the following PC SAS® Release 6.03 products: SAS/AF®, SAS/BASE®, SAS/FSP®, SAS/GRAPH®, and SAS/STAT®. The application combines data base management, data entry, statistical analysis, reporting tools and high resolution graphics into one system. By using PC SAS® as the sole host software package we were able to maximize system performance.

INTRODUCTION

Technical Information Management Systems (TIMS) has been developing at WESTON for years. TIMS was initiated to develop a problem solving computerized methodologies and software for application to meet the environmental objective of conduction site-oriented, multidisciplinary characterization and analyses. It is a computerized system that uses fourth generation mainframe computer hardware and software and includes the application of current technologies for modeling and graphics. It allows hands-on use by engineers and scientist, providing a direct interface to computer models which support environmental site investigations. At present, TIMS is available in two mainframe configurations. Each configuration utilizes highly effective software packages as major components of design that are all interlinked within one system (Table 1). A new "Product Development" practice has been initiated to develop a PC TIMS. The key issues of the adaptation of a TIMS applications on the micro environment are the selection of a host language package, size of the application and system performance.

The SAS System has been the software of choice for statistical computing power, and now more types of PC SAS software are available, such as: SAS/AF, SAS/FSP, SAS/GRAPH and SAS/STAT, which makes a strong case that the PC SAS System is "the" choice of application host language.

SYSTEM REQUIREMENTS

TIMS is required to be a "user friendly" menu driven system. From simple data entry to complicated graphic presentations users can generate a

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Table 1 WESTON MAINFRAME TIMS SYSTEM CONFIGURATION
A variety of reports, data analysis outputs and graphics with just a few keystrokes. Users should not be required to know SAS in order to use the system. An on-line help facility should be made available to users. TIMS also requires a limit on the number of computing environments and software packages (from different vendors) installed so as to reduce as much as possible both capital and technical skill investments. The system should be flexible so that developers are able to modify the system to meet different needs.

**SAS TIMS SYSTEMS DESIGN**

An information management system emulates the information flow process through application oriented, problem solving capabilities that deliver technical and managerial summaries from the data collected during environmental site investigations. Figure 1 represents the information flow process and functionality of modules.

SAS TIMS utilizes SAS/AF and SAS/FSP as a data base manager to organize the technical data base. Relationships among data files are designed to optimize data storage, retrieval, analysis and reporting. User interfaces established within the system permits access to and manipulation of the data to complement technical evaluations by scientists and engineers. The corresponding automated link between data and the data base is the data entry screen (Figure 2). These menu driven screens closely resemble the formats of data collection forms. Data is simply entered into the system through the corresponding data entry screens.

A major transition exists within the system as data moves from the data base into analysis, allowing output of data in the form of tables and plots summarizing the data collected into comprehensive information. The capabilities of Screen Control Language (SCL) in SAS/FSP and SAS macros allow the design of a system capable of multiscreen parameter passing which

![Figure 1 PC TIMS FUNCTIONALITY FLOW CHART](image-url)
results in the reduction of TIMS program size and gains a substantial degree of flexibility and user friendliness. As a result, the same functionality modules share the same screen of selection. The easiness of use exists through the system, in the form of prompts, instructions, error messages, formatted screens, selection of arrays, menus, help screens, etc. The well defined functionality modules handle the data in three major categories: a graphical and numerical system for the production of graphical presentations, an analytical system consisting of specially prepared subroutines that perform calculations by data type to produce report quality tables, and a program or model utility that routes the formats required to specific procedures.

The SAS TIMS System consists of five key functional modules:

1. **DATA ENTRY/MAINTENANCE**
   This module allows the user to access a menu from which a particular type of data can be selected to add, delete, update or review. The centralized data entry links directly to standard data collection methods and formats. It is a well defined efficient and flexible data base structure to contain data and permit effective data management.

2. **DATA REPORTING**
   This module allows access to the report menu from which the user can select a certain report to be generated. It provides flexible methods for displaying or reporting information.

3. **DATA ANALYSIS**
   This module allows access to the data analysis menu from which the user can select a particular type of analysis that the user wants done on specific data type. It is a library of customized statistical and analytical programs.

4. **GRAPHICS**
   This module allows the user to choose high resolution displays of contour, three dimensional, and bar charts on a specific data type. It is a versatile graphics system for generating a variety of graphics and analysis results.

5. **VALID VALUE LIST**
   This module allows users to browse a list of valid values for specific variables.

Figure 3 and Figure 4 show the examples of functional selection screens and data subset selection screens. Figure 5 shows the examples of outputs from the system.
Figure 3 EXAMPLES OF SELECTION SCREEN

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Figure 4  EXAMPLES OF SELECTION SCREEN
Figure 5 EXAMPLES OF SYSTEM OUTPUT
CONCLUSIONS

A technical information system has been developed at WESTON using and integrating PC SAS Release 6.03. The benefits that have been demonstrated by the TIMS and PC SAS System to an information management system are:

- Provides a simplified computing environment that all data transit between different functionality modules are in the same SAS System so as to reduce as much as possible both capital and technical skills investments.

- Reduces the size of application software and be able to implement it on a microcomputer.

- Provides a centralized and structured data base for all relevant information and rapid, cost-effective information reporting, analysis or graphic presentations of data to guide the design and implementation of data validation.

- Provides a flexible application system that can be customized to meet the different needs and requirements.

ACKNOWLEDGMENTS

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