

High Throughput Security Tape Reclamation System

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Category

Aerospace/Defense

Products Used

National Instruments LabVIEW 6.1
3 National Instruments GPIB interfaces
2 National Instruments Serial interfaces
Sony DMS8800 Tape Library
Sony DMS 24 Tape Library
2 Sony DIR 1000 Recorders
1 Sony DIR 1000H Recorder
3 Bitalyzers

The Challenge

The US Government makes use of a large numbers of 19mm SD1 cassette tapes to archive sensitive information for national security purposes. Once data contained on these tapes is removed, the tapes may be reused if cleaned and verified operational by bit pattern write and read procedures and error analysis.

The Solution

Data Science Automation upgraded the existing DMS 24 system which processed 24 tapes and expanded its capabilities significantly to integrate multiple bit analyzers, Sony DIR-1000 recording systems and the new Sony DMS-8800 tape transport system using NI LabVIEW, serial and GPIB control. The resulting system will test up to 87 tapes simultaneously using the Sony DMS8800 tape library, resulting in a cost savings of more than \$3MM/year.

Abstract

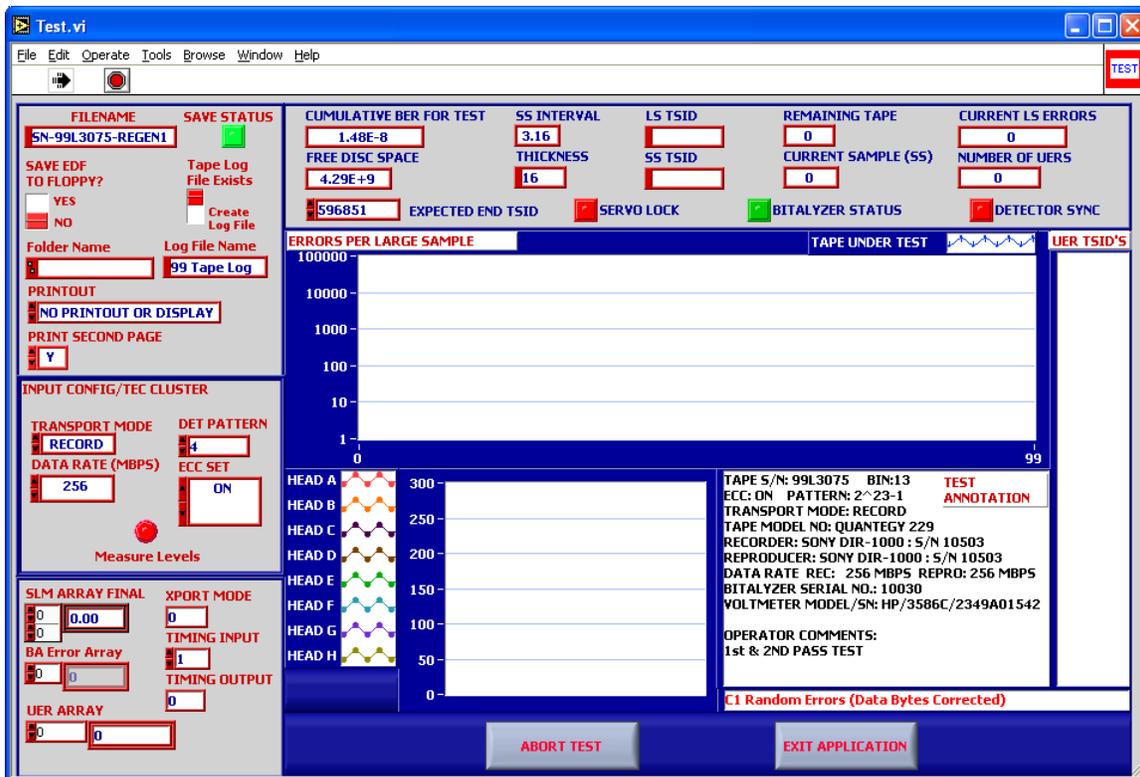
The purpose of this system is to increase the efficiency of the tape testing process for this organization. The current DMS-24 is using a 24-cassette library and is saving \$1 million per year from tape reuse. The goal is to triplicate the system to meet the volume demands for tape reuse and to increase costs savings.

The Tape Testing Process

The process that is currently implemented when testing the validity of each tape is designed to simulate actual use of tapes. This testing process consists of a time-consuming pre-testing process which will rewind each tape. This period of time will allow the stress on the tape to settle. Once each tape has been pre-tested, the primary testing process will begin in pre-testing order.

When a tape is tested that tape will be written to and read from. The testing process will use a recorder and a bitalyzer. A bitalyzer is a device that creates an arbitrary binary pattern for each track of the tape being tested. This arbitrary binary pattern is then sent to the DIR 1000 recorder device which will then write this pattern to each track. Once a track is written the recorder will simultaneously read each track and compare it with the pattern written, while writing the new track. This comparison is done for eight different heads of the tape. This comparison will produce output voltage levels and error information per track, identified by track set id's (TSIDS). Potentially a track can have thousands of errors, but a fail determination is assigned if more than 2 TSID errors occur per tape. The test screen is shown in Figure 1.

Figure 1 - Main Testing Window



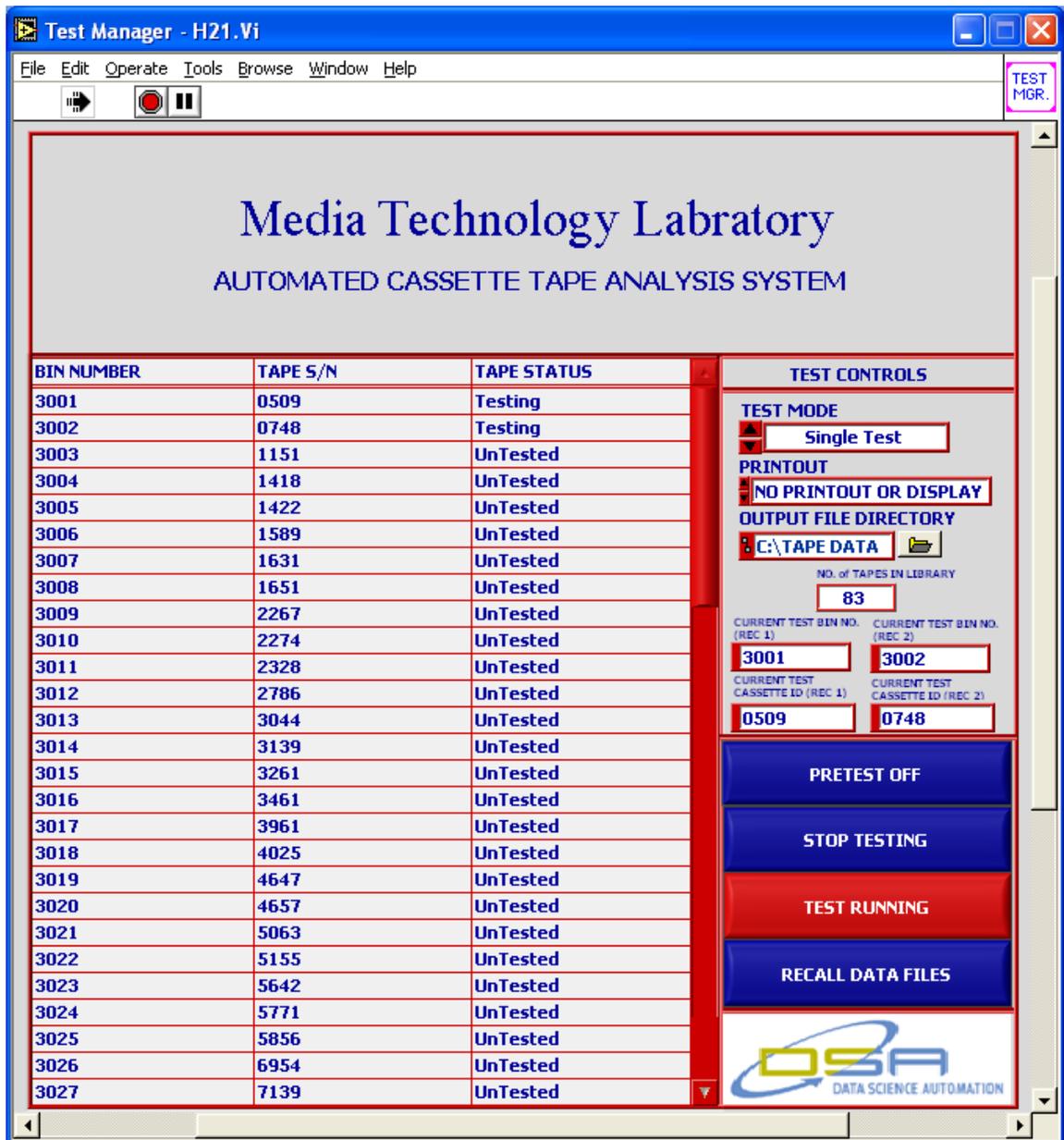
Communication with Devices

Both bitalyzer and recorder devices communicate over the same GPIB bus. The DMS8800 system uses a serial connection to monitor the DIR1000 recorders. This serial connection is the backbone of the dms8800 system.

Test Manager (Processing Solution)

The test manager is the top level application that controls the sequencing of tapes and manages all tapes in the library. The test manager also gives the user the ability to specify when to print the results. The “PRINTOUT” control on the front panel of the test manager allows the user to specify to print on fail, display, always print, or do not print or display. The Test Manager screen is shown in Figure 2.

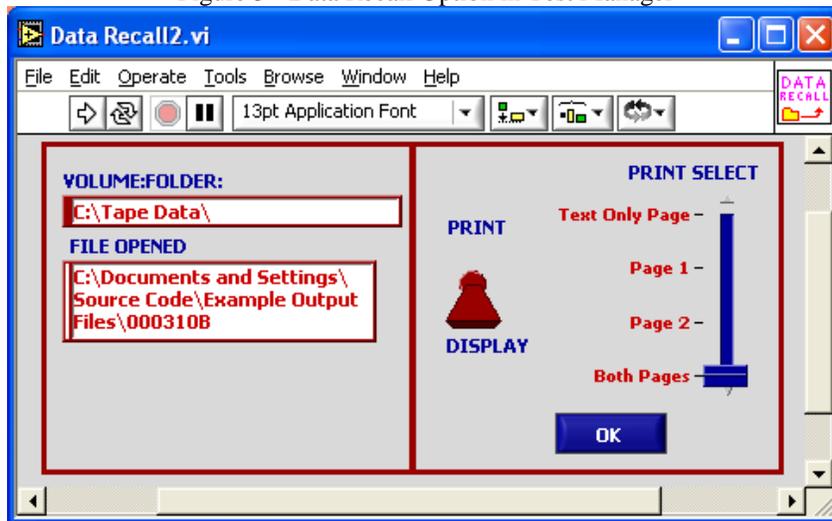
Figure 2 – Test Manger



The test manager will display all tapes currently in the library and will handle any new tapes inserted or tapes that have been exported. The tape bin array contains the bin number, the tape serial number, and the status of the selected tape. There are 13 possibilities for tape status. “UnPreTested”, “PreTesting”, “PreTested”, “UnTested”, “Testing”, “Test Passed”, “Test Failed”, “ReTesting”, “ReTest Passed”, “ReTest Failed”, “2nd ReTest Passed”, and “2nd Retest Failed”. Once each of the tapes in the library has been processed, the system will continuously poll the library and look for any new tapes imported or any tapes exported.

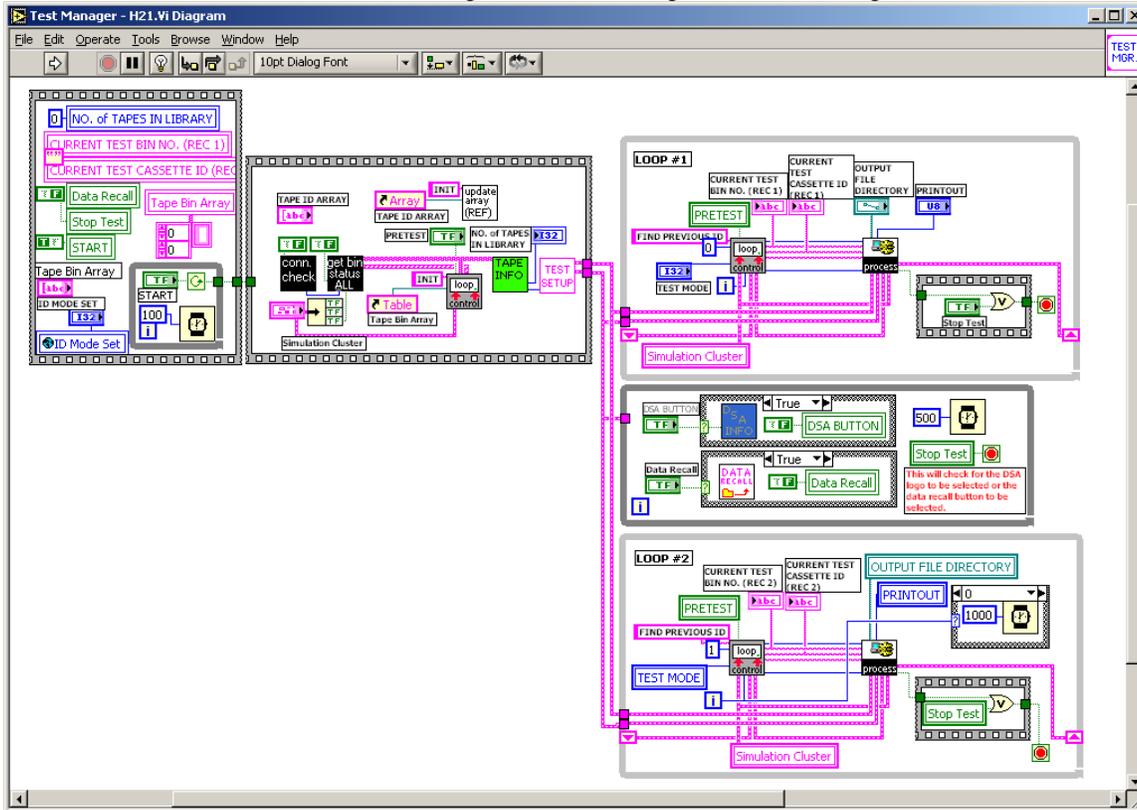
A companion software package provided by Sony with the DMS8800 system is used to move the tapes in and out of the library. This application is able to run simultaneously with the test manager. The test manager also creates test result files and can recall files for display or printing. This is shown in Figure 3.

Figure 3 - Data Recall Option in Test Manager



A process loop controller was developed to handle each of these statuses and process them accordingly in each processing loop. Figure 4 shows the block diagram for this application. You will see two processing loops labeled accordingly. These loops run independently, processing tapes, and do not interfere with each other. A third processing loop will be added to accommodate a third recorder in the future.

Figure 4 – Block Diagram of Test Manager



Hardware

Some of the hardware components used in this solution are shown in Figures 5-7. In Figure 5 the SONY DMS8800 tape bin library is shown. Currently the system that is being used is only capable of 94 tapes. Expansion bays can be purchased to accommodate more throughput. This library can contain up to three recorders and three bitalyzers.

In Figure 6 the SONY DIR1000H is shown. This is the multi-functional high speed recorder used inside the DMS24 and DSM8800 systems. This recorder has two interfaces to communicate with the tape library and the computer that is running the application. The first is a GPIB interface which is directly connected to the computer. This interface is used to send VISA commands to the recorder. Examples of these commands are “stop”, “record”, etc. The second interface used is a serial interface that queries the recorder for a status. This status is then passed into the DMS8800 system.

A second version of recorder is the SONY DIR 1000. This recorder is not pictured. This recorder is a low speed recorder that has multi-functional capabilities.

Figure 7 is an example of the legacy DMS 24 system. This system can contain one recorder and one bitalyzer to 24 tapes at a time. This system is responsible for saving approximately 1\$ million dollars per year.

Figure 5

**SONY
DMS8800**



Figure 6

**SONY
DIR1000H**



Figure 7

**SONY
DMS24**



Conclusion

The use of National Instrument products such as NI GPIB, NI SERIAL, and NI LabVIEW 6.1 has enable Data Science Automation to find a cost efficient, and effective solution to testing tapes for reuse. This solution has help our customer improve productivity and increase there return on investment three fold.