



Web Based Vibration Analysis Programs

Alan Friedman - DLI Engineering Corp.

Introduction

A number of changes are occurring in the Condition Based Maintenance (CBM) market and in the realm of communications, Internet and database technologies that are resulting in the adoption of Internet based monitoring programs. The following paper will describe the technologies involved as well as the current market climate that is driving this change. This paper will focus on vibration analysis in particular, however, the forces involved are just as applicable to other CBM technologies and Maintenance planning packages.

The Market

A number of things are happening in today's business climate that are forcing changes in the way Maintenance is managed. Some of the main contributors are the loss of talented analysts, the desire to consolidate expertise within an Enterprise, the desire to downsize and the desire to outsource technical functions. These are all related in that they require individuals to become more productive and often these individuals will be responsible for monitoring sites that are distant from each other. Additionally, Enterprise managers are beginning to see the value in monitoring their plant assets in the context of knowing whether or not they can meet production demands. In other words, information about plant processes and machinery condition are no longer the sole property of the maintenance department, they are instead being seen as essential input into production decisions.

The Technologies

Online Monitoring

One of the solutions to meet market demands is online monitoring of critical assets. Instead of hiring people to collect data, sensors are being permanently installed and data is being fed into centralized systems. In the case of vibration analysis, expert systems can automatically analyze the vibration data and present detailed fault diagnosis and repair recommendations to interested parties. The continuing reduction in sensor prices is helping to make online monitoring a more viable option for a wider array of industries.

Database Replication

Database replication allows two or more databases to be synchronized automatically via the Internet. This means that remote sites can collect data with a walk

around data collector or online system and that data can automatically be updated in a central office. Conversely, database changes made in the office will appear at the remote sites. These might include test configurations, alarm criteria or even edited reports. Database replication allows information to be managed from afar.

The database replication network is set up like a secure and encrypted mailbox located on an FTP site on the Internet. Databases periodically check in to see if there have been changes made in other databases that they need to update in their own, they also leave messages containing changes made in their database. After everyone has checked in, all of the databases become synchronized. Databases can be configured to automatically check in as often as is deemed necessary. Replication is achieved via the transfer of small files and does not require a great deal of bandwidth.

Active Web Servers

Today's Web based systems have advanced far beyond the days of static HTML pages. Now, one can serve up an entire database (or parts of it) on the web. Firewalls and encryption technology can make the sites as secure as necessary, down to the point where they can only be accessed by 1 or more particular computers. This makes it much easier for a wider array of people to access important information without having to purchase or learn to use proprietary software. This information can obviously be accessed from anywhere the user can get on the Internet.

A Case Study

Here is an example of how a large ship owning enterprise is managing their vibration analysis program. The ship owner has headquarters on both coasts that are responsible for all the ships as well as local offices on the east and west coasts of the United States, which are responsible for fleet ships in the Atlantic and Pacific respectively. These sites wish to have access to machine condition information so they can better plan their operations, help acquire parts and plan work packages when the ships are in port. They may or may not be interested in doing data analysis or managing their databases in the future.

DLI Engineering has a master database that contains information from all of the ships. This is particularly useful since many of the ships have the same equipment and therefore vibration signatures can be compared between like units on different ships. This entire database replicates with the Headquarters on both coasts as they also wish to have information on all of the ships. Additionally, this database replicates with the two local offices, but only with information from the ships in their respective fleets. Finally, each ship has a copy of its own replicating database containing only information specific to the ship.

The master database at DLI is also securely served up on the Internet and contains the latest vibration information, fault diagnosis and recommendations where they can be accessed by anyone with the appropriate authority and passwords. These pages also contain the complete machine history, notes, comments, recommendations and whatever other information is stored in the database. This allows a large number of authorized



people to view the information they need without having to purchase or learn new software.

Once this network has been configured, there are a number of ways in which it can be used depending upon the wishes of the shipping company. Since any changes to any database will appear in all the other databases, potentially, any site can adopt any level of control over the system. The way it is configured today, DLI is responsible for configuring and maintaining the databases for each ship. This includes doing the analysis work, setting up alarms and baseline criteria and entering edited reports and recommendations in the database, which are then immediately made available on the Internet and replicate out to the other sites. The ships are currently only tasked to collect data and add appropriate notes to the machines. They have no other access control over their databases. The headquarters and other offices also only wish to have read access to their databases at this time.

At any time in the future however, the local offices or headquarters or even individual ships could take on as much responsibility as desired for the program and DLI would simply facilitate the exchange of information via replication and the active web site. DLI could also limit its own access to the information contained in the databases if this were the client's wish.

Another Case Study

A large aircraft manufacturer in the Pacific Northwest is also using this technology, but in a slightly different fashion. The aircraft manufacturer has an internal technical group that is responsible for monitoring the machinery in 5 plants in various locations. The members of this technical group each have PC based walk around data collectors with which they collect data and replicate the information back to their central office. After data is reviewed in the central office, the reports and recommendations are served up on the Web for their "clients" to see.

This technology has allowed this company to consolidate their technical expertise in a central site and get information out to those who need it in a very efficient manner.

Conclusion

Web based monitoring and reporting systems have made it easier for Enterprises to consolidate technical expertise and get important information into the hands of those who need it more efficiently. Please log on to <http://demo.dliengineering.com/> to access a demonstration vibration database on the Web.

About the author:

In eleven years at DLI Engineering, Alan Friedman has worked in software development, expert system development, data analysis, training, and installation of predictive maintenance programs. He is a graduate of Tufts University with a B.S. in mechanical engineering.