DATREND Systems Inc.

Principles of Medical Device Maintenance Automation

Mark Miller, M.A.Sc, P.Eng.

1. The need for automation

Regulations issued in 2013 by the Centers for Medicare and Medicaid Services (CMS) have had a significant impact on maintenance practice in US hospitals. As an alternative to manufacturers' maintenance procedures and frequencies, under certain conditions hospitals are permitted to use their own procedures and schedules, or those of a contracted service provider. For critical devices, however, there remains an expectation of 100% on-time completion for preventive maintenance activities. At the same time, a significant portion of technical professionals who do the work are reporting excessive workloads, a feeling which is supported to some extent by peer-reviewed literature.

According to past standards of practice, to maintain the current inventory of devices would require the workforce to double in size. Since that is not likely to happen in the current economic environment, ways of assisting technical staff to work more efficiently must be found.

2. Benefits of maintenance automation

A computerized maintenance management system (CMMS) provides an inventory database and automates planning and reporting of maintenance activity. A CMMS is essential to efficient prioritization of maintenance schedules and requests for corrective maintenance, but may not help much in performing the day-to-day work of inspection and testing.

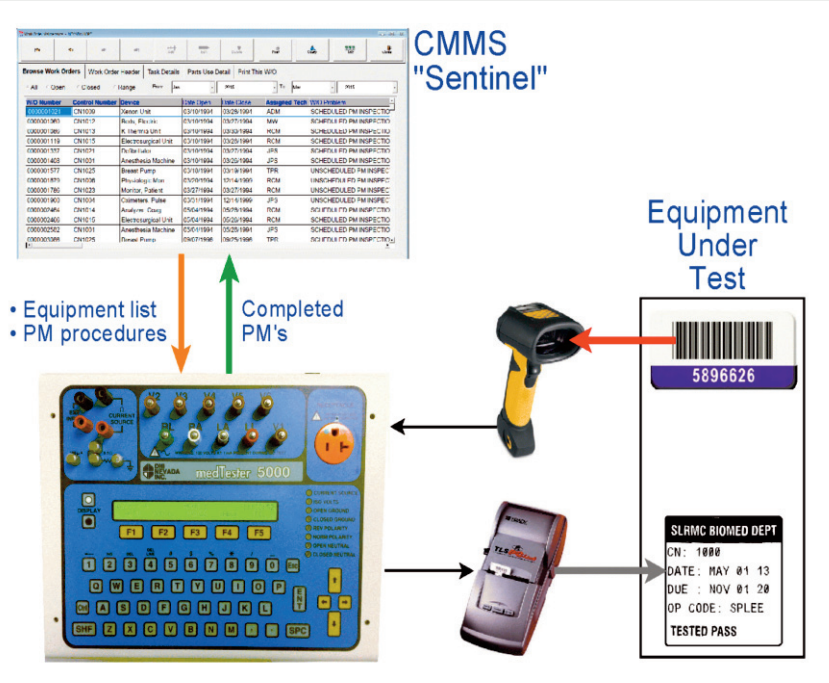
In a system that provides task-level automation, the maintenance procedure, checklist and service report are implemented electronically and are then integrated. This increases productivity by eliminating overhead associated with paperwork: printing work instructions, filling in forms, and entering results from service reports into the CMMS.

Task automation achieves consistency of work completed since the electronic checklist directs all technicians to follow exactly the same steps, in the same order. Since there is less reliance on memory and experience with automated procedures, junior technical staff can be assigned routine maintenance tasks with less direct supervision, enabling senior staff to focus on more complex jobs and team leadership.

3. PM automation, circa 1990

A system of automation was developed in the 1990's that was targeted at preventive maintenance (PM) of medical equipment. The system relied on an early CMMS program, but was unique in that the automation encompassed all aspects of the maintenance process ranging from management tasks, such as planning and reporting, down to the level of individual inspection and test steps that had been defined in the CMMS for each device in the inventory, on a make and model basis.

Continued on page 2...



Critical to the success of this maintenance system was a mobile computer called a "medTester", or medical device tester. By download from the CMMS, the tester could be given a list of scheduled equipment and their corresponding maintenance procedures or checklists, sufficient to cover several days to weeks of PM work. Once loaded with the equipment information and checklists, the tester went with the technician on PM rounds in the hospital. When a piece of equipment was located and a barcode on the equipment scanned, the tester automatically selected the checklist assigned to the equipment control number. A technician worked through the checklist one step at a time, responding to prompts and entering data when requested by the tester. When required by a PM, the tester could run automated sequences of performance test measurements and electrical safety tests. On completion of the PM, a service record was stored in the tester and an inspection label was then printed for application to the equipment. Once all equipment on the current schedule had been serviced, the technician returned from rounds and connected the tester to the CMMS. Service records were uploaded from the tester, causing the CMMS to automatically close open work orders, update service histories, and add new equipment to the inventory that had been discovered during rounds.

Over time, various CMMS providers developed support for the medical device tester in their respective systems, along the lines of the original CMMS which was called "Sentinel". During the 1990's, medTester-based maintenance systems became widely used by hospitals and independent service organizations in the US. Although use of the medTester may not be so widespread as it once was, the infrastructure to support it remains a part of many CMMS systems.

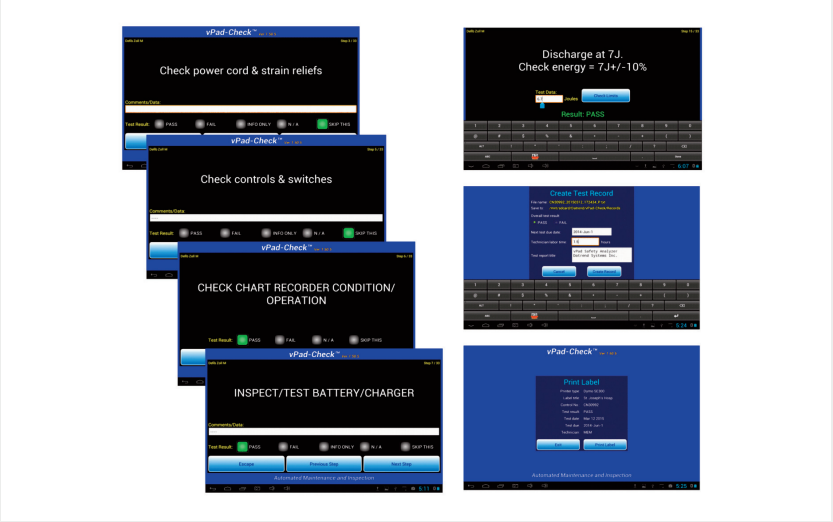
4. PM automation today

A modern system of PM automation has been developed which is compatible with the data representation and protocols of the original medical device tester, and which is supported by CMMS currently in use. This enables the new system to work with many existing CMMS and piggyback on some of the key benefits of the older technology, such as: task-level automation with procedural checklists; automatic selection of maintenance procedure following a barcode scan of control number; automatic completion of service report documentation concurrently with the PM procedure; and full automation of work order closure and service history update at the CMMS.

Continued on page 3...

This new "medTester-like" system has been developed by Datrend Systems Inc. and is referred to by the company as Vision Pad Technology™, or vPad. Based on a mobile computing device such as a tablet, vPad extends the capability of the original medTester with various options for wireless interface with a CMMS, including the ability to interface with certain CMMS directly through the Internet.

Existing medTester checklists from a CMMS can be executed by the tablet, or, new and more elaborate inspection procedures including service manual excerpts and video may be created and deployed to tablets using an integrated development environment (IDE). IDE procedures stored on the tablet can be launched by medTester checklists created within a CMMS. Optional security software on the tablet acts as a locked door through which users must pass to gain access to apps and functions, preventing unauthorized changes to procedures and service records stored on the tablet. In addition to automated PM inspection, vPad incorporates test automation which is based on a open system architecture that can interface with test equipment supplied by different manufacturers.



To find out more about the vPad system, go to
www.datrend.com/products/vpad-products

or contact us at
customerservice@datrend.com

DATREND Systems Inc.
130 - 4020 Viking Way, Richmond BC V6V 2L4
Phone: 604.291.7747 • Fax: 604.294.2355
Toll-free (North America only): 800.667.6557
Email: customerservice@datrend.com