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A Proactive Approach to Managing Test System Obsolescence

The Problem

Managing automated test equipment (ATE) obsolescence is a common and persistent challenge in the railway industry. With locomotive and railcar lifespans exceeding 25 years, the equipment used to test and maintain critical components must keep pace. But how do you accomplish this when the service life of most test and measurement equipment is typically less than 10 years? A recent review of one transit authority ATE revealed that 80 percent of the system components were at or nearing end of life after nine years in service.

Unplanned downtime of testing assets can significantly impact a transit authority or supplier's ability to carry out proper testing and maintenance of critical rail components. When a test system fails, the length of downtime can vary from hours to months depending on several factors including the availability of replacement hardware.

Where fit, form and function replacements are no longer available, getting a system up and running may require significant design changes. Additionally, systems that use proprietary hardware or communication protocols may require the support of the original equipment manufacturer (OEM) or reverse engineering if a company is no longer in business.

In this article, we will explore proactive strategies to extend the lifespan of ATE and ensure uninterrupted test coverage throughout the lifespan of the programme.

ATE in the Mass Transit Industry

ATE in the transit industry is often referred to as BTE, which is short for bench test equipment. These systems are used by maintenance personnel to perform full functional testing and troubleshoot problems. For complex electronic devices such as brake controllers, BTE systems often allow technicians to diagnose problems to the lowest line replaceable unit (LLRU). A typical BTE consists of test and measurement (T&M) instruments such as digital multimeters, oscilloscopes and function generators as well as hardware needed to communicate with the device under test (DUT). Of course, software is the glue that holds everything together.

Designing for Obsolescence

Proper planning for test equipment obsolescence begins in the early stages of design. The use of commercial-off-the-shelf (COTS) hardware is a proven strategy for minimising risks. Choosing hardware from vendors with a track record of product quality helps customers overcome obsolescence. Leading T&M companies have defined lifecycle policies and offer services to extend the lifespan of instruments.

Another strategy is to select modular hardware that can

be sourced from multiple vendors. PXI (PC eXtensions for Instrumentation) is a common form factor. A PXI-based system consists of a chassis, controller and modular instruments. PXI has been an industry standard for more than 20 years and it continues to grow.

The choice of software platform is also an important consideration for managing BTE obsolescence. Choosing an industry standard software platform with a large install base will ensure that the test software can be upgraded for many years to come. National Instruments LabVIEW, Microsoft .NET and Keysight's PathWave Test Automation are good examples.

Regardless of the development environment, it is best to choose an integrator with experience developing modular and scalable software architectures. A modular approach and coding techniques such as hardware abstraction will allow instruments to be replaced or upgraded with minimal changes to the software. Also, it is a good idea to ask your integrator about options for upgrading the system software in the future.

Developing an Obsolescence Plan

In addition to selecting the right hardware and software, developing an obsolescence plan allows you to proactively manage risks rather than reacting to failures. The obsolescence plan identifies at-risk components and outlines actions to be taken based on the consequences of a failure. Risk increases with age and the plan should be updated regularly based on the current lifecycle status of system hardware.

System Upgrades

Waiting until a failure occurs is not an effective strategy for managing obsolescence and proactive planning is the key to minimising downtime. Performing incremental upgrades over time, rather than a complete refresh, puts you in control, reduces downtime and facilitates budget planning.

Periodic and scheduled upgrades also provide opportunities to insert new technologies or add new features. This is important if your testing needs change. It is also a good time to consider whether it makes sense to consolidate test equipment. For example, can the system be upgraded to test additional products?

Call to Action

If your organisation relies on test equipment that is more than five years old, now is the time to act. The first step is to determine the lifecycle status of critical T&M hardware. The system provider can help and you can also contact the instrument manufacturers for the current lifecycle status, last time buy dates, and recommended replacements.

Keep in mind that hardware changes may also require software and electrical design changes. While the upgrade costs may be significant, the cost of an unplanned failure and extended downtime may be far greater.

Contact a professional system integrator if you are unsure of how to assess the risk and develop a plan to overcome obsolescence challenges. Companies like ORBIS, an engineering solutions company and BTE provider, will provide a free obsolescence analysis.

Visit **orbisinc.net/masstransit** to learn more.

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BENCH TEST EQUIPMENT
ORBIS develops bench test equipment for ensuring critical assets are in a good state of repair.

R&D TEST STANDS
ORBIS helps Tier 1 and Tier 2 suppliers bring products to market faster by providing automated test systems for product verification and validation.

ENGINEERING SERVICES
ORBIS provides reverse engineering and design services to help organizations overcome obsolescence challenges and extend program lifecycles.

CUSTOMIZED BENCH TEST EQUIPMENT (BTE) SOLUTIONS FROM ORBIS

Building on a scalable hardware and software platform, ORBIS Flexible BTE solutions are fully customized for each Line Replaceable Unit (LRU) or Circuit Card Assembly (CCA). Our guided setup and diagnostics reduce or eliminate the need for external documentation and enable technicians to repair units in the field and lower maintenance costs.

SOLUTION BENEFITS:

- Test multiple LRUs and CCAs on a single tester
- Easy-to-use with guided troubleshooting and repair
- Add or modify tests without programming
- Connectivity with enterprise databases and asset management software

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