

Maximizing the Life of Your Legacy Control System

There are many benefits of upgrading a legacy control system, however, most facilities do not have unlimited cash flow and all too often upper management deprioritizes projects that may not generate revenue right away. In truth, upgrading control systems doesn't always guarantee that your company is going to make more money in the process. What it will do is prevent a costly downtime incident in your plant when an obsolete component goes belly up and nobody can find a reliable replacement. So the risk equation has to be balanced between the cost of upgrades and the cost of lost production.

Routine Maintenance

Keeping the terminals on your system tight and clean is necessary, especially if you have engineers constantly looking for wires and lost neutrals. Of course, maintenance hardly matters if your system hasn't seen the yellow glow of the high bays in a generation or two, but if you have a system that is just a few years old, then it is time to start maintaining that system now.

Do your research by reading the manuals and looking up common cause failures. Perhaps you can catch something well before it becomes a problem and get a few more years out of your legacy system.

Change Control Process

Pharmaceutical, complex chemical, and regulated food and beverage facilities all typically have a good process in place—change control. These industries use change control to guarantee that the system has not changed and the previous certifications and/or validations are still accurate.

Why not do something similar to make your legacy control system last longer? Instead of letting any maintenance guy with a hot stick get into your control system, create a process for maintenance that only allows qualified engineers to touch the components. This one change alone will gain you so much favor with EHS that your future hot work permits will be signed in hours, not days.

Always have at least two engineers working together and use your 3rd party controls integrator if you are unsure of what to do. Most control integrators have

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support plans that guarantee fast “call-backs” just to talk you through different scenarios without having to come to the site.

Perhaps it makes sense to sit down with that same controls integrator and ask for support in developing a maintenance plan around the control system that will be the most gradual, and start to develop professional best practices through those that you trust.

Environment

This means factoring in temperature, humidity, and dust. Controlling the temperature and humidity around the components in the control system is critical. The higher the temperature in the cabinet (above a threshold temperature), the shorter the life of the components inside. This applies to computers as well. Most computers are designed to operate at an ambient temperature of no more than 80 degrees F. As you go above that temperature, there is not enough physical cooling capacity to keep the components below the design temperature, which will lead to failures. Depending on your plant environment, components in the panel, and the amount of air flow, systems can vary drastically in lifespan.

So you saved \$30 on a power supply only to find out that it puts off heat 25 degrees higher than the more expensive version. Who cares? Well, you should, because that change can cost you years relative to your controller life. Use a temperature rise calculator (most manufacturers have a free version) and figure out how hard your system is actually working.

The same issues can occur with dust accumulation, as dust can act as an insulator, keeping the cooling air from properly removing heat. Some things you can do to prevent these issues include:

- Ensure enough space for adequate airflow for PCs.
- Ensure that the server cabinets have enough air flow and are in environmentally controlled rooms. Humidity should also be controlled as well (this may require external cooling such as fans or an air conditioner).

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- Proper control cabinet design with recommended spacing for components (this includes duct spacing around components) and heat dissipation (this may require external cooling such as fans or an air conditioner).
- Keep components free of dust and dirt – the use of good filters and a preventative maintenance schedule to replace filters is a must.

Control System Power

Good, reliable, and clean power is a must. This is essential to maintain longevity. Nothing stresses power supplies more than brownouts which lead to premature failure of components. Power surges are another big power supply killer. It's always a recommendation to install an Uninterruptible Power System (UPS) and run the critical components from that.

Network

The backbone of your control system is your network. This is often the most crucial and most often overlooked portion of the system. The data has to make it from the processors to the server/HMI so it can be controlled. More and more systems are adopting Ethernet as the go-to choice for control of distributed components. VFD's, valve banks, remote I/O, etc., are all reliant on a solid network. In most cases, it makes sense to make this as robust as possible. You should explore layout topologies, distributing loads, and fault tolerance using multiple links and switches.

Virtualization

One indication that you are in jeopardy is if you're buying hardware off of Ebay. All control system vendors have a product life-cycle model which defines a phased approach for support of their hardware/software. If you don't know what the lifecycle is of your current systems or if you don't know where you're at in the life cycle, then you are already behind the curve.

Several years prior to when a control system is set to be discontinued, you should begin the process of planning your next steps to ensure you minimize the potential for production outages. Most vendors offer migration paths for nearly every system. Some migrate effortlessly while others are much more involved, requiring a rewrite of the code for the new controller. It often depends on where you are in your

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lifecycle and tools that are offered by the vendor to determine how difficult the upgrade process will be.

Looking into the future, it's hard to predict what will happen with computers, operating systems, hardware, and networking components. Virtualization is a great way to maximize the life of your overall system, opening up the door for added flexibility. You are able to move your virtualized machines from one piece of hardware to the next with reduced effort or downtime.

One major technological advancement that has emerged in the PC market has been the server/thin client model of delivering information or content to remote terminal stations. With thin client architecture with a central server (or redundant servers), you can make application or graphics changes at just one location: the server. This saves a lot of time and bookkeeping for the engineer and IT department and assures that all active users will be on the same version with the same set of graphics.

There are additional products (such as ACP's Thin Manager) that add a lot of flexibility for managing thin client systems, but the end result is that the system is far easier to maintain. One of the greatest benefits of this type of thin client architecture is manifested when there is a failure of a thin client machine. Using thin-clients is also a great way to help minimize the impact of hardware replaced because these are operating system independent. A very efficient approach to lifecycle management is to couple virtualization of the operating system along with thin-client technology for operator workstations.

First, this is a popular choice that decouples the control system from the computer operating system so you are not chasing software compatibility like the IT departments. Second, the thin-clients allow for easy replacement with small costs compared to replacement of actual computers and time needed to reinstall the software. If a thin client fails during operation, simply pull a new thin client (any model will typically work as long as it has PXI boot capability) from the storeroom and plug it into the Ethernet cable. In a matter of seconds, the server will recognize that there is a new thin client on the network and that an old one is missing. It will

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assign a new IP address to this unit and will cache the preprogrammed screens onto the new unit. You are now up and running in less than five minutes and your operation can continue where it left off with minimal disruption.

Phased Replacement

This often consists of updating the HMI software to a package that works with your existing and new hardware, such as using PCS7 APACS OS where you still have your old ACM's but need a new HMI to replace Process Suite. Another example would be upgrading RSView32 to FactoryTalk View SE while continuing to run your SLC's. Now you can replace hardware as part of a phased approach, running the new and old systems side-by-side on the new HMI software until the upgrade is complete and you have all new hardware. This removes the vulnerability of the old outdated computer hardware running legacy operating systems. Take a look at our technical guide: A Phased Migration from Siemens APACS to Siemens PCS 7 to see how a phased migration can lower risk.

Extending the lifecycle of your control system requires proper maintenance but, just as important, it requires lifecycle management practices. You have to have good preventative maintenance plans, but you also need a plan for managing the dependence on aging components and software, which are essential to operation. Keeping up with control system releases and properly maintaining it over the entire lifecycle is essential to ensuring the reliability and continuous operation of a system. This means knowing where you are in your hardware/software lifecycle and having a plan to minimize production outages to allow the assets to continue to meet production schedules.

Taking advantage of good maintenance practices and proven technology like virtualization can extend the life of your system, decrease disaster recovery time, lower the overall total cost of ownership, and ultimately reduce the risk of unexpected downtime.