

Programmable Controllers MELSEC Mitsubishi Electric

Top 10 reasons why you still need a PLC

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There was a time, not so long ago, when the PLC stood as the only viable option for control in industrial automation applications.

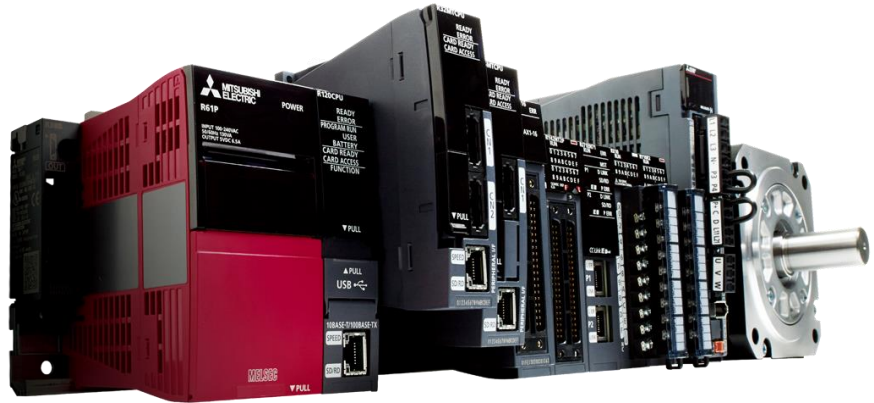
Today, engineers have more choice in the form of industrial PCs, soft PLCs and panel PCs that ape the functionality of the PLC/HMI combination. Engineers could even, if they felt so inclined, build their own custom controller around a Raspberry Pi board.

Despite the emergence of these new control options, there are still many compelling reasons to use a PLC. Here are just ten of them.

1. Peace of mind

Both PLCs and PCs have come a long way since their humble beginnings but there is a big difference in how these distinct control options continue to evolve and this has significant implications for long term support. The managed evolution of the PLC means that vendors can and do support their products over long periods of time, both in terms of hardware and software. That means, with Mitsubishi for example, that we could take the application program for example, from a 20 year old FX PLC and import it straight into a brand new FX5U. A user could install the very latest controller

and have the application back up and running almost immediately. How would you even contemplate doing the same with a PC based solution? There are many industries where that level of support is not simply desirable but actually a baseline requirement. There is talk in the water industry, for example, of framework suppliers having to be able to assure support of control systems for up to 20 years. Of course the control hardware will change over that time but PLC users have the peace of mind of knowing that the software will always port to the latest controller.



MELSEC iQ-R Series

2. Inherently robust and reliable

The modern industrial PC provides a stable computing platform and it would be unfair to suggest that it locked-up and crashed with the unerring regularity of a desktop PC. However, it is not on equal terms with a PLC. The real time operating system that runs alongside Windows on a typical industrial PC has been designed to try to provide the same level of robustness as you get from a PLC CPU.

If a PC operated in complete isolation, perhaps that would be the end of the reliability debate. However, no controller does; there are peripherals to connect, I/O to network and other components to talk to, each requiring their own drivers to be loaded into the PC. Will the drivers for all of these products have been tested in combination and thoroughly proved? It seems unlikely. Clashes can and do occur and problems can be exacerbated every time those drivers are updated.

It is almost inevitable, then, that an industrial PC will crash and what might that mean for the control process? By contrast, when did you last hear of anyone needing to reboot a PLC after a software crash – probably never...

3. Scalability

The biggest selling PLCs by volume covering the largest spread of applications are those offering 40 I/O or less. In such applications, the PLC represents a highly affordable solution, much more so than an equivalent PC-based system. However, the same essential platform is also scalable to tens of thousands of I/O, with users able to port control programs to bigger PLCs, benefit from the same programming environment and take advantage of completely modular hardware. The customization potential of the PLC is enormous, with numerous ways to expand the functionality but all without ever leaving a common platform.



GX-Works – a clear and intuitive software for PLC

4. Programming

Even today, for every engineer coming out of university who is fluent in structured text programming and for every engineer who is comfortable working in C or C++, there are probably ten more who only want to use ladder logic, particularly at the lower I/O end of the application spectrum.

In between, there are those applications that might start small, perhaps written in ladder but then grow as the application evolves – taking advantage of the scalability of the PLC platform – benefiting from the ability to write the control program in

structured text and to drag and drop software function blocks that will take away much of the configuration effort.

Mitsubishi offers a C++ programming option for PLCs, so it marries a flexible hardware platform to high level language programming capability. Of course these same programming options are available on a PC platform, but the levels of modularity and scalability that PLC software tools offer – in much the same way as with the hardware – simply aren't there.

5. Integration of other automation equipment

For many automation engineers, there is never any need to move outside the product portfolio of a single vendor, with suppliers such as Mitsubishi able to address every requirement from HMIs, drives, servos, motion control, safety and robotics to low voltage power distribution products, power management meters and CNC systems. As all of these components have been designed to work together, engineers benefit from 'plug and work' integration.

There are some automation vendors that sell industrial PCs who can claim to offer a broadly similar product portfolio but certainly not many. However, the real challenge comes when engineers need to look outside of a single brand and integrate third party components.

With the modern PLC, integration of third party hardware is a breeze, can the same

be said for integration on a PC platform? Are the drivers for those third party modules guaranteed to work? How much configuration effort will be required? Perhaps more importantly, will there be the same assurance of ongoing compatibility through the operational lifespan of the control platform?



MELSEC iQ-F Series

6. Performance

In terms of power and performance, Moore's law of computational capability is just as applicable to PLCs as it is to PCs – indeed many people forget that the modern PLC is a powerful computer in its own right. The latest incarnation of the Mitsubishi FX PLC, for example, is 150 times faster than the original.

Just how powerful the modern PLC is only really becomes apparent when you look at the speed of execution of instructions, with the latest designs offering sub-nanosecond performance. You might be able to 'pimp' a PC to offer similar performance but the PLC offers you that straight out of the box.

Then there is the increased bus speed and the ability to synchronise multiple I/O in a high speed system, delivering a much more responsive control system. Again, this is much more difficult to achieve outside of the PLC environment.



Mitsubishi Electric's PLC dedicated for different industrial sectors

7. Security

The arrival of high profile viruses such as stuxnet have made us all realise that automation systems have become targets, as malicious hackers look to cripple the operations of big companies or vital utilities. With its familiar operating system and inherent network vulnerabilities, the PC can represent the soft underbelly of the control system for anyone trying to break in.

The operating systems of PLCs, by contrast, are much less visible to the outside world and this has traditionally offered a layer of insulation against malicious intent. This does not mean, however, that PLC manufacturers take security for granted. Mitsubishi, for example, enables programs to be password protected, with different levels of access granted to different levels of user.

Further remote access preferences can be set such as access only being granted to specific IP addresses, protecting PLC software and the wider automation system even in heavily networked applications.

8. Intellectual property

Extending the security argument, a concern for companies with global development teams or where the end system will be installed overseas is that the control software will be copied by unscrupulous third parties and all too quickly developed as a competitive, lower cost product.

Where this is a valid concern across all control platform options, the PLC manufacturers have taken significant steps to address the problem. With Mitsubishi products, encrypted code embedded in hardware and software can be set to execute at a given time. That might mean that the system is open to developers and installers right through to the end of commissioning of the application, but then switches on to protect the system from further interaction.

9. Maintenance

Every automation system, regardless of platform, needs routine maintenance; perhaps to manage hardware or software upgrades, as part of scaling up the system as the application evolves, or, to swap out faulty components. The ease with which this can be accomplished is a major attraction of the PLC. Programs and configuration settings for just about any connected component can be stored to SD card via a slot in the PLC CPU, simplifying any maintenance requirements.

Indeed, even if the PLC CPU itself were to fail, a new unit could be snapped onto the backplane and the original program loaded direct from a bootable backup on the SD card, getting the system back up and running straight away.

At the same time, there are none of the requirements for ongoing firmware updates that



plague PC-based systems, with the constant worry that any one of these will clash with another and bring the system to its knees. The very fact that the PC is a multi-purpose system is one of its greatest weaknesses in the automation environment.

10. Reduced IT requirements

One of the questions in any automation system, even more so as integration between the plant floor and higher level systems comes into the equation, is the allocation of responsibility between the automation engineering team and the IT team. This can be a source of friction but perhaps more importantly there is the almost inevitable lack of understanding from each about the requirements of the other.

With PLC-based automation, the demarcation between engineering and IT is clear, with little or no need for the IT team to have to get involved on the plant floor. Further, with products such as Mitsubishi's MES module – which plugs into the PLC backplane and provides direct connection with higher level databases – whole layers of PC products can be eliminated from the automation system altogether, making the demarcation between automation and IT even clearer.

We can see, then, that there are many good reasons why the PLC will continue as the mainstay of automation system control and that's before we've even considered issues such as redundancy, safety and more, plus the capability of the modern PLC to perform many of the complex maths functions that could once have only been performed in a PC-based system.

Of course the requirements of every automation system should lead to the selection of the appropriate control solution on merit but the PLC offers many reasons to be the platform of choice.

Watch our film ["10 reasons why you still need a PLC"](#)

