Choosing the Optimum Operator Interface — Dedicated, Open, or a Mix of Both?

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Ask any computer savvy consumer which is better — an open computer system or a closed one — and without hesitation 9 out of 10 will say "open." This response is the result of nearly 30 years of PC development during which the hardware has been open and the various Microsoft operating systems have been de-facto open. The open system has created high performance, relatively low-cost hardware, and masses of third-party software running on Microsoft operating systems.

Most people tend to take the "open system is good" attitude with them to work. When their work involves manufacturing or processing, consumer-side assumptions should stop at the entrance of the plant. Once across that threshold, openness equates to general purpose, and closed — dedicated — means lowest lifecycle cost and highest performance.

To understand the reasons for this shift in the relative merits of open versus closed, it is important to first of all describe the technical differences in today's industrial operator interface products. Then it will be easier to determine which operator interface products are right for an application on a machine, line, plant, or for the enterprise.

Operator Interface — Dedicated, IPC, and CE

The dedicated operator interface (OI) is designed for specific functions:

- Local machine control, fault detection, change over, recipe download, help screens
- Line management for lot and batch tracking and tracing, stock tracking and usage, production details
- Local data acquisition and management

The industrial personal computer (IPC) is a PC hardened for plant-floor environments and run by a Microsoft operating system — typically Windows 2000 or XP. The IPC does not have a specific function until third-party software is installed.

An automotive analogy can help make the operational difference clear between the two. The IPC is the family minivan — an all-round vehicle for going to work, shopping, or taking the kids to school. The dedicated OI can be designed to be a rugged pick-up truck used day and night for hauling heavy loads or as a sports car with all the necessary characteristics required for speed, agility, and high performance.

In other words, the IPC is general purpose and the dedicated OI is optimized for the function. Plus, the dedicated OI will have a longer life and fewer performance issues because:

- It is solid state — no fans or hard-drive maintenance issues
- It is not susceptible to Malware (viruses)
- It does not require frequent operating system updates
- It does not have third-party software conflicts

An operator interface with a "CE" designation is generally considered a PC because the CE indicates a stripped down Microsoft operating system. In reality, the CE "box" is a hybrid of a dedicated OI and an IPC. In the case of a CE operator interface, the unit does not have a fan or hard drive, the manufacturer pre-defines many of the functions, and the

unit is also open to third-party software. This sounds like a winner until one considers the relatively short lifecycle of PC-based hardware and Microsoft operating systems.

Key considerations in selecting the optimum operator interface

- Sharing factory floor information throughout the enterprise
  - Today both the IPC and the dedicated OI perform data acquisition and monitoring functions exceptionally well. The IPC solution involves purchasing one of the more popular SCADA software packages from such suppliers as Wonderware or Intellution. These packages share data between other SCADA licensed PC nodes on the network. The dedicated OI offers lower cost, yet just as extensive software connectivity, using OPC, DDE, DLL, and SQL server functions. When investigating both operator interface options for sharing factory floor information, most people are surprised to find that the dedicated OI offers similar supervisory advantages at a lower lifecycle cost. The point is to look at the supervisory control and data acquisition needs and find the highest performance solution for the operation at the lowest lifecycle cost.

- Third-party software required on the machine or process
  - If third-party software must be installed locally on a machine or integrated into a section of the line, then the IPC solution is almost always optimum. (Finding the right software that works with CE and the chosen processor often presents its own challenges.) Make sure that the software is absolutely necessary — it may not be.
  - Dedicated OIs today can perform a wide range of functions such as data logging and recipe management with software utilities provided by the manufacturer. Some IPC solutions need additional software (OPC servers, for example) at an additional cost just to communicate to PLCs.

- Hardware connected directly to the operator interface
  - Bar code readers, motion controllers, PLCs, drives, and other devices are all typical connections for a machine-based operator interface. It is important to determine which components are directly supported by the unit and which require additional software or I/O hardware. After this analysis, it will become clear which solution — IPC, CE, or dedicated OI — is most cost effective.

- Longevity
  - If machine life is short, less than three years, then an IPC or CE unit may be a good fit in terms of cost. If machine, line, or plant needs to be supported more than 5 years, then the dedicated OI will be the lower total-cost-of-ownership solution because it will not have all of the software upgrade or potential maintenance issues. Product migration is another important longevity issue to discuss with suppliers. Review the supplier's track record in terms of backward compatibility and other migration concerns.

- Environment
  - Does the operating environment have significant shock, vibration, or airborne contaminants present? If so, then the optimum operator interface needs to be solid state — no fans or hard drives.

- Viruses, worms, and other Malware
  - Microsoft operating systems are susceptible to Malware. Dedicated OIs are not. Where downtime is unacceptable, remove IPCs and CE units from all potential critical points.

Summarizing the key points

Because dedicated OIs are optimized for various functions and are fully solid state, units generally offer better performance, higher reliability, and greater longevity in the plant than either the IPC or CE unit. Dedicated OIs offer similar data gathering and monitoring functionality at a lower cost than IPCs or CE units when the cost of third-party software is taken into account. Dedicated OIs typically have a higher purchase price than IPCs or CE units, but have overall lower total lifecycle advantages. When it is essential that third party software be used, then apply it to a minimum number of IPCs and CE units and interface those units to dedicated OIs using standard communication protocols. Minimizing the number of IPCs and CE units to only essential functions requiring third-party software will provide the best of both the dedicated and open worlds of operator interface.

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