CENTRALIZE AND MANAGE PROCESS CONTROL WITH REMOTE DESKTOP INDUSTRIAL MONITORS

TECHNICAL WHITE PAPER

Remote desktop protocols make efficient use of the client-server architecture. A remote monitor is the only hardware required to interface with local and remote processes. The brains of the operation—the software—can be installed on a server either local to the facility or it can reside half way around the world. The client server model affords many obvious benefits but the largest of these benefits is the ease of maintenance and accessibility.

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PEPPERL+FUCHS
PROTECTING YOUR PROCESS

Thin client or remote desktop industrial monitors serve a growing need on the production floor. Industrial-grade products are a great choice in equipment for your production environment. These products share several characteristics.

- Sleek, compact, and lightweight Type 4/4X housings that are dust tight, washdown resistant, and space efficient for the production floor
- Serve a wide variety of applications in the food and beverage, life sciences, oil, gas, chemical, and paper industries
- Mounting options including pedestal, arm, or wall mounting for close proximity or machine mounting in the process
- Certifications for Class I, Division 2 and Class I, Division 1 operation

HISTORY

The trend towards the decentralization of monitoring and control tasks also aims to minimize equipment exposure to harsh environments and mitigates risk by making process control more accessible. Conventionally, to gain access to the control system programing or batch control, separate operator workstations were developed to mimic the control room "view" of the process. This local and remote access affords many plant productivity benefits, the largest being accessibility. For hazardous locations or industrial computers in production areas, additional protection methods are required to protect the interface from the caustic, dirty, and many times hazardous environments. Co-location of information has meant the PC and software were purchased and installed twice. There are a few proven technologies commonly employed to facilitate the remote workstation.

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Although it may seem like an emerging technology for the industrial sector, remote desktops have been in the office environment for many years. Remote desktop communications are built upon a Microsoft Windows backbone. Microsoft calls it Remote Desktop Protocol or RDP. In fact, the first version of RDP was introduced by Microsoft with "Terminal Services," as a part of their product Windows NT 4.0 Server, Terminal Server Edition that was released in 1996.

If you have ever turned control of your PC over to the tech staff at the manufacturer to fix a problem, it was probably executed through a software program utilizing RDP. If you have been part of a webinar where you took control of the presentation, you were using services from RDP.

Remote desktop protocols make efficient use of the client-server architecture. At the client level, minimal hardware is required to have access to software running on the server. A monitor, keyboard, and thin-client are the only pieces of hardware required to interface with local and remote processes. The brains of the operation—the software—can be installed on a server either local to the facility or it can reside half way around the world. The client server model affords many obvious benefits but the largest of these benefits is the ease of maintenance and accessibility.

CONSIDERATIONS

Many alternative technologies exist. Several factors that must be considered might drive a user to a certain configuration:

- **Company policy:** Your company may have a policy requiring the use of KVM, thin client, or PC topography. For very short distances (~100 feet/30.5 meters), a direct monitor may be the best and most cost-effective solution.
- **Distance:** Over a few hundred meters, KVM technology becomes difficult unless one goes to single-mode fiber or KVM over Ethernet. Both technologies become comparatively expensive.
- **Multiple applications:** You might need to perform multiple applications (e.g., MES, ERP, etc.) from a single hardware platform.
- **Interfacing with standard protocol:** It might be necessary to interface using standard protocol. For instance, Ethernet via switches and routers from building-to-building or control room to outdoors.

Essentially, the choices come down to putting a PC out on the production floor and connecting it using KVMs or via remote monitor/thin client.

KVMs are a great plug-and-play alternative to locating a fully enclosed industrial PC solution in the process area. KVMs are easy to implement. A KVM (keyboard, video, mouse) extender effectively transfers touchscreen and mouse clicks to a computer in a less environmentally strenuous area, alleviating the need for an industrial or hazardous location computer.

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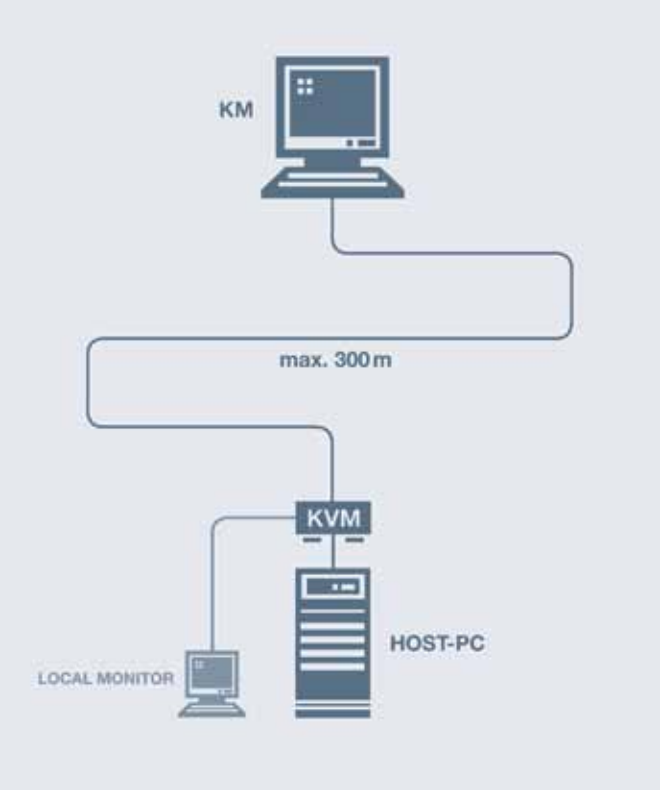
Another is to use a thin client or a remote desktop. There are many articles written on the advantages of thin client architecture. The reasons for using thin clients are well documented and substantiated, and it is not important to go over them again. However, all the thin client advantages that are typically touted are really not that important in an industrial setting. For instance, thin client cost-savings are usually hyped as the major advantage of implementing this technology. Not necessarily true. The reality is that an industrial thin client solution manufactured for industrial environments is probably going to be more expensive than an off-the-shelf, general-purpose "thin client." If you choose to put that solution into an enclosure with monitor and keyboard, you suffer the pains of custom design, time, and cost associated with a one-off product.

ADVANTAGES OF INDUSTRIAL THIN CLIENTS AND REMOTE MONITORS

Accessibility

Thin clients and remote monitors communicate with a server via standard Ethernet network protocols. Data is



A KVM extender transfers touchscreen and mouse clicks to a computer in a less environmentally strenuous area, alleviating the need for an industrial or hazardous location computer.

directed using standard network devices such as routers and switches. This means you can start and stop a process or execute recipes changes anywhere in the world from a single location.

From an industrial standpoint that means applications can run in plants not necessarily co-located with the servers. They don't need to be in the same building; they don't even need to be in the same facility, state, or country. For instance, multiple facilities may operate a manufacturing recipe in Europe or South America that is being supplied from servers in the USA.

Because standard network interfaces are used, access from remote devices is enhanced from a productivity standpoint; visualization is available on a variety of devices, from thin clients, to regular PCs, even mobile computing devices such as iPhones® and iPads®. Provided there is a program or app to access the desktop, the choice of device is practically "limitless."

With the proper interfaces, the information may be available from a variety of locations even mobile platforms using wireless 3G/4G or 802.11 technologies.

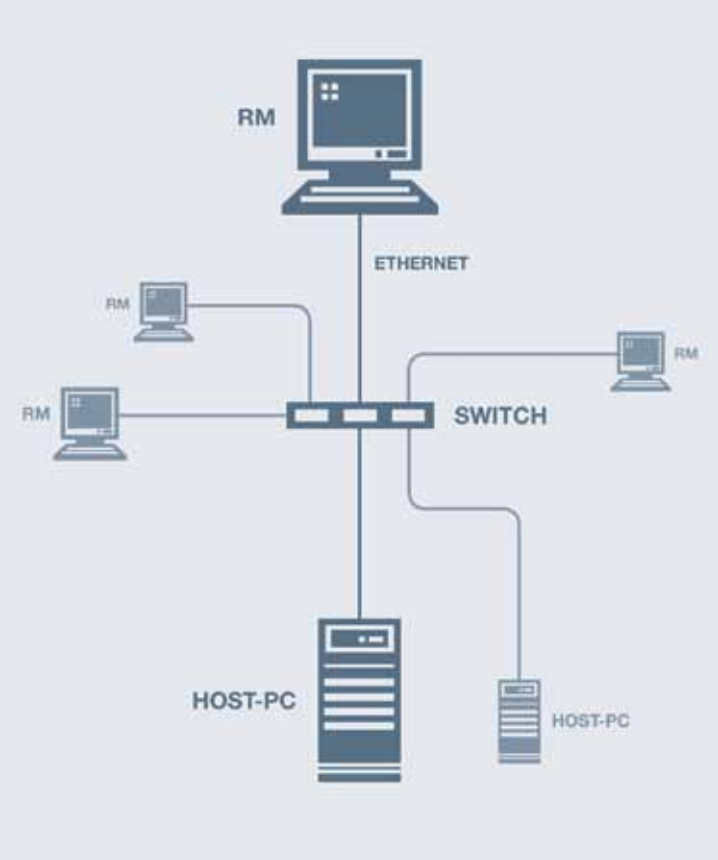
Security

The benefit of operating from a centralized location is security.

Since nothing actually resides on the client—all data is stored on the central servers—manufacturers don't have to worry about theft of their processes or data. Effectively, risk of theft is eliminated by storing all permanent data securely at the server location.

In the event of a remote client failure, all data remains secure. Having all the data in one location also facilitates easier data backups should process traceability be important for the manufactured product.

Each remote monitor automatically conects to its own session on the terminal server (HOST-PC).



Maintenance, Repair, and Replacement
As mentioned above, programs and data reside on a central server and not on the remote monitor/ thin client, so the remote terminal never needs updating; that means relatively easy updates when new revisions or recipe modifications are rolled out. They are accomplished in one place, not in many locations in different facilities, cities, or countries. Gone are phased rolled outs of new software revisions and the significant orchestration of managing and planning these rollouts. The larger the installation base, the more this benefit increases in value.

If not operating under a thin client/ remote desktop architecture the always-present need to upgrade programs becomes a scheduling fiasco, especially for large installations. This results in no clean cutover to the software updates. As the administrator delivers new versions to the facilities, different facilities will run a variety of versions as the update is rolled out over days or weeks depending on how quickly it can be accomplished.

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Finally, most thin client managers have provision to automatically switch to a backup server in the event of a hardware failure. This keeps the processes running while the main equipment is serviced. Once back in operation, the clients are seamlessly switched to the primary server.

Environment
Thin clients and remote desktops, like the family of PC-based products they are based on, share common manufacturing methods and components that depart significantly from commercial-grade products.

The operating environment of a factory floor may not be as equipment friendly as an office. Vibration, interference, and temperature cause issues for equipment if they aren't considered in the product design. While a commercial thin client brick computer may function perfectly strapped on the back of a commercial monitor in an office environment, packaging it in a stainless-steel enclosure that is washdown suitable and fan-free will likely result in performance degadation, for instance, on a hot summer day operating adjacent to heat sources encountered in a food processing situation. Unless the installation provides a method of heat extraction, such as air circulation, refrigeration or vortex cooling, the unit will likely overheat and shut down in real-life applications.

- **Processing power**

The high availability of a thin client is achieved by using an economical and high-performance processor like the Intel® Atom™ N270 processor. The Atom processor provides high performance at a low thermal design power (TDP) of 2.5 watts. This offers many possibilities to end users and OEMs because of its low power requirements, minimal heat dissipation, and small profile. In the industrial segment, most operator workstations are only required to run one or two applications at a time, making the Atom processors an ideal fit. The critical processing power resides at the server, where it is needed most. The Atom processor does not require a large motherboard; therefore, smaller and slimmer mechanical packages are possible, without the concern of overheating. Because it's an Intel product, you still have the benefits of the Enhanced Intel SpeedStep® and Hyper-Threading technologies, thermal monitoring, and dual LAN ports for redundancy.

- **Vibration**

Vibration is another reality in the industrial environment. The units must be specifically designed for rugged manufacturing environments that require high resistance to shock and vibrations. This may result in a design that has an isolated LCD mounting, solid-state drive if so equipped, etc.

- **Washdown/ GMP standards**

Units with washdown protection offer additional challenges. For some environments, aggressive cleaning agents suitable only for certain materials may be needed. Keyboards and touchscreens may need to meet international GMP standards. Keyboards that are easily cleaned and sanitized and resistant to microbial growth play an important factor in deciding which product is required in a given situation.

- **Hazardous locations**

Hazardous location deployment of thin clients and remote monitors goes well beyond the computing concerns alone. Division 2 installations are obviously easier to manage than installations in Division 1; however, even Division 2 or Zone situations need an in-depth understanding of the standards and directives as they relate to meeting safety concerns of the products and the installations.

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- **Certifications**

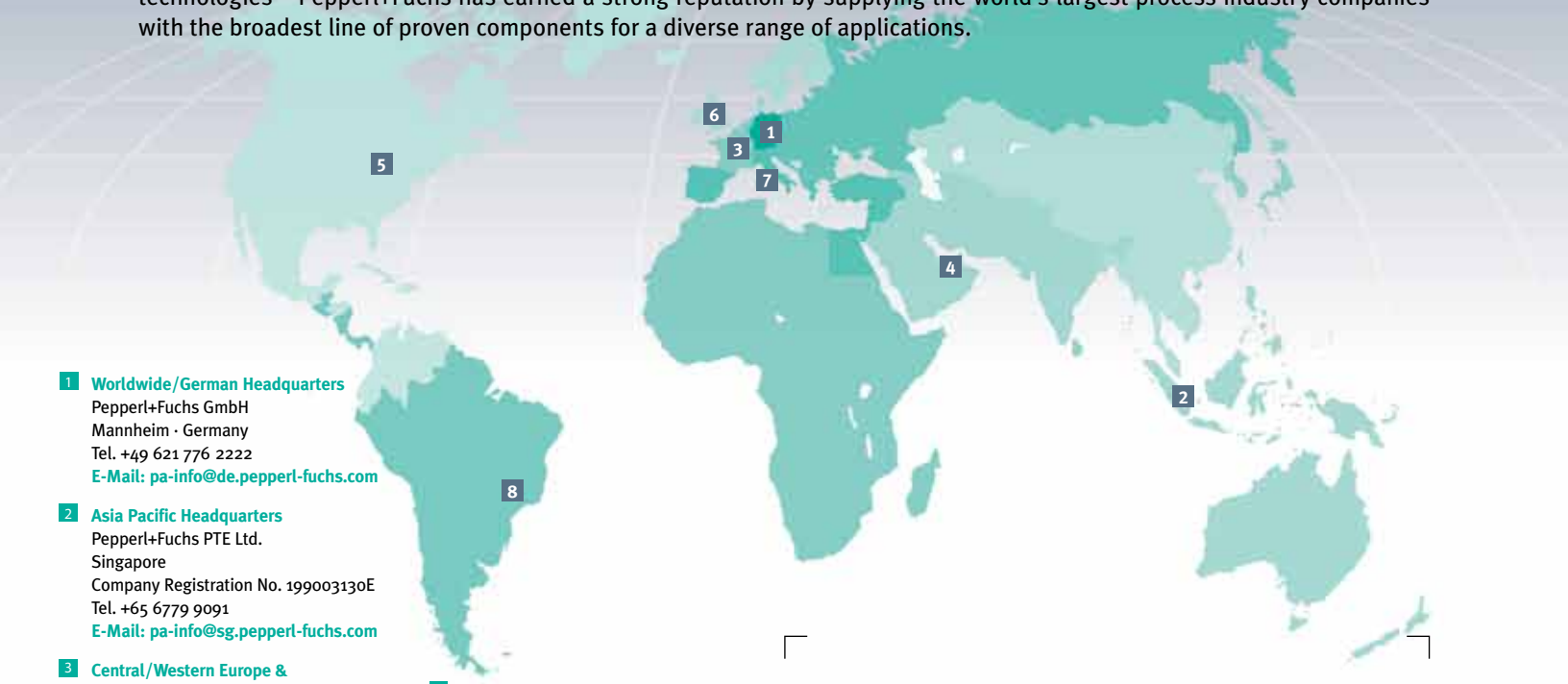
OEM situations that require dual certification to both North American and ATEX standards and directives offer solutions that carry both certifications from a third party. The additional requirements for ATEX compliance by a notified body compounds getting the certifications and directives in order. Selecting the correct third party to provide both of the requirements saves time and cost when considering the length of time it takes to complete both gas and dust product testing.

SUMMARY

The challenges to installing a robust thin client or remote monitor today are manyfold. Find a vendor that specializes in high-performance visualization systems and components that have been specifically designed to withstand the dirty, dusty, grimy conditions in hazardous and nonhazardous areas. It will save you time and money in the long run!

PROCESS AUTOMATION – PROTECTING YOUR PROCESS

For over a half century, Pepperl+Fuchs has provided new concepts for the world of process automation. Our company sets standards in quality and innovative technology. We develop, produce and distribute electronic interface modules, Human-Machine Interfaces and hazardous location protection equipment on a global scale, meeting the most demanding needs of industry. Resulting from our world-wide presence and our high flexibility in production and customer service, we are able to offer complete individual solutions – wherever and whenever you need us. We are the recognized experts in our technologies – Pepperl+Fuchs has earned a strong reputation by supplying the world's largest process industry companies with the broadest line of proven components for a diverse range of applications.



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