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USB 3.Optical™ Cable by Corning Use Cases: Where Long Length Is Important

Over the 10 years that the Universal Serial Bus (USB) standard has been in use, it has gained widespread acceptance across industries for many applications. The initial intended use was connecting personal computers to peripherals that would be placed within a 5-m radius of the host computer. However, since its introduction, USB has found many other uses that require cables of greater length. To serve this market, various USB extender or repeater solutions have been developed to overcome length limits. These after-market solutions can be cumbersome to set up and maintain.

Length limitations continue to pose a problem when USB cabling is used to implement a host of commercial applications. This white paper explores some applications that would benefit from the 3.Optical™ Cable by Corning family of USB solutions.

USB 3.Optical cables are a much more cost-effective solution over the various USB extender technologies being marketed today.

Digital Signage Interactive Touch Displays

Increasingly, today's customers shop competitively across brick-and-mortar and online stores. Retailers recognizing this trend are implementing interactive digital signage in their stores to deliver significant benefits to customers by providing much more content on demand.

At the same time, the store can acquire improved metrics on the messaging and content that are effective in communicating product benefits.

- Retail storefronts: Can feature products that are in stock and on promotion. They can show related products and services to offer a more complete solution to the customer.
- Hotels: Can present their patrons with recommendations on local venues, earn revenue from interactive advertising, and offer concierge-like services.
- Sports stadiums: Fans can order food and drinks quickly and get back to their seats faster by interacting with a digital sign that displays the menu choices.
- Banks: Can offer self-service kiosks with general information about account types and services, which frees up staff to focus on higher-value services.
- Educational institutions: Can keep students, faculty, and visitors up to date with easy-to-find maps, directory assistance, class catalogs, schedules, and instructor bios.

For interactive signage to work, three technical requirements must be met:

- Visual content to be displayed must be sent from a server computer to the individual panels.
- Touch-activated signaling from the panel needs to be communicated back to the server in order to create an interactive experience.
- The display signaling can be delivered over a USB cable or an HDMI cable. However, the interactivity is achieved by having a USB cable run from the panel to the controlling server.

In most installations, the server will feed multiple panels located in a high-traffic area, positioned for ease of access and conforming to the store's aesthetics. The server, on the other hand, is typically located in a utility closet where it can be secured and serviced, as needed. The cables running between the locations are much longer than 5-m (~15 ft), the limit for traditional copper cable and USB extender or repeater solutions that are typically employed. Corning's USB 3.Optical™ cable is an ideal interconnect cable for this application, as it can span long distances with a thin, yet rugged cable.

Machine Vision

Machine vision is a broad category of usage applications that automate inspection and analysis for such applications as automotive, electronic, and semiconductor manufacturing; food, beverage, and pharmaceutical inspection; high-speed paper production and printing automation. In machine vision applications, a high-frame-rate digital camera is wired over long runs of cabling to command and control computer systems that actively monitor the production flow and take appropriate action based on image analysis.

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An example of machine vision application is its use for sorting letters and packages at a mail distribution center. This application uses optical character recognition (OCR) of the address label or image capture of the bar code on packages flowing down conveyer belts destined for different parts of the globe.

The cameras are set up at strategic control points and cabled to centralized control computer systems. As the package goes by, an image is captured and sent to the host. The host analyzes the image within seconds and takes action by activating gates and latches. These route the packages into the appropriate mail stream and eventually into bins that will be shipped to the distribution center nearest the addressee.

Another common use is in the beverage bottling industry where machine vision cameras inspect each bottle as it goes down a conveyer belt to ensure that the bottle is filled to the proper level, rejecting those that are not within specified parameters. Further down the line, cameras are again used to ensure the bottle is capped properly so the product will be protected during shipment.

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In the past, a handful of competing interface standards have been used to interconnect cameras with host computers, including protocols such as FireWire, GigE, CoaXPress, Camera Link, etc. One of the most promising protocols today is the USB3 Vision standard.

The USB3 Vision standard leverages USB 3.0 computer ports found on most modern computers that can provide data transfer rates up to 5 Gbps. USB Implementers Forum, Inc. (USB-IF) has announced plans for a USB 3.1 revision that will further increase transfer rates to 10 Gbps. This wide availability of USB on commonly available PC hardware combined with the promise of higher data transfer rates in the near future is fueling growing adoption of the USB3 Vision standard in the machine vision market.

One of the challenges facing installation of machine vision systems is the long runs of cables required to connect multiple cameras at various locations on the production line. These cables connect the system that does the image analysis and operates the automated levers, gates, and air jets used to maneuver the products being monitored.

USB 3.Optical™ Cable by Corning can overcome this challenge by offering a very rugged, yet light cable that can be run over long lengths to interconnect the machine vision cameras with host systems. The host systems can analyze the high-resolution imagery and use control signaling on the wire to make intelligent decisions.

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Point of Sale System

Retail establishments use point of sale (POS) automation systems to deliver a high degree of personalized and prompt service to their customers. For example, in a sit-down restaurant, servers may take your order on a traditional paper pad and quickly walk to the order entry station to input your order. The system will then split the food and beverage orders and send them to the kitchen or bar for preparation. A USB-equipped kitchen printer will print out the food ticket for the kitchen staff to prepare and track to completion.

Larger establishments may have multiple order entry stations networked to a centralized computer that queues up and sends orders to the preparation areas, and informs the server when the order is ready for pickup.

Typically there is a hostess/cashier system that generates the final bill and takes cash, as well as various electronic forms of payment from patrons. The systems cover the entirety of the value delivery chain for management, allowing them to set metrics and track the performance of every employee; optimize supply chain logistics; and manage the business.

Zero-Client Computing

Zero-client computing refers to a single, relatively powerful PC that is set up as a server using MS Windows Multipoint Server 2011. This single computer can be connected to as many as 20 workstations or seats. Each connected workstation consists of a keyboard, video monitor, and mouse (KVM). This type of KVM setup is significantly less expensive than purchasing a fully loaded computer for every user.

Each user has an individualized PC experience, as if she were on a dedicated computer with personal storage space. Implemented properly, this user would not feel as if she is sharing a single computer with other users.

Zero-client computing makes a lot of sense in emerging markets, where the goal is to get the maximum number of seats into a classroom at the lowest possible cost per seat.

These seats are going to be spread throughout the classroom, requiring long runs of USB cables from the workstations back to the main computer. To have a clean and tidy installation, these cables are routed through ceiling rafters or through raised access floors. This means a properly routed cable will be far longer than a straight line from the computer to the seat.

Even in developed economies, zero-client computing solutions make sense for installation in libraries, call centers, retail environments, and as kiosks in public places where the workstation is used for simple tasks, such as catalog searches, information lookup, or data entry.

Not only do zero clients lower the cost per seat, they lower IT maintenance costs as well. IT departments only need to maintain a single server computer as opposed to overseeing a number of scattered computers. This centralized, controlled server computer is also more secure from tampering and data theft, as it can be situated in a locked utility closet.

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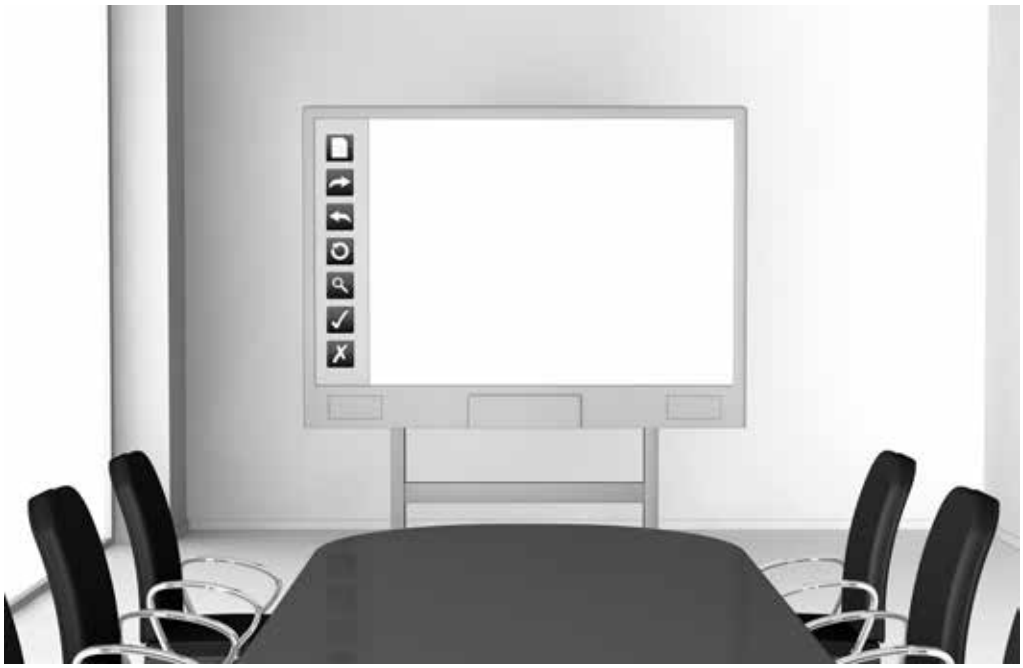
Smartboards

Many modern classrooms are replacing the traditional blackboard/whiteboard with interactive electronic whiteboards, also called "smartboards." These boards allow teachers and students to present and interact with information in a collaborative fashion. The smartboards typically have the ability to record, print, and archive whatever is written or drawn on the whiteboard. Some allow up to four students to be at the board writing simultaneously (multitouch) and encourage competition. The teacher has the capability to project images and videos from various sources to augment the learning experience.



As these boards are mounted in the front of the classroom, they need to be cabled to a host of other accessories via USB cable runs. One of the alternative input devices might be a slate, which would be located at the teacher's podium. There are also connections to a central computer in the classroom, a video projector, a printer and, occasionally, USB speakers. Having long-reach USB 3.Optical™ Cable gives classroom designers maximum flexibility to place the equipment for the most effective utilization of space.

Professional Digital Photography

Over the years digital photography has slowly supplanted film, even with the most ardent film photographers. One of the enabling technologies that has brought about conversion into the digital realm is the development of digital camera backs that attach to film cameras in place of a film holder. Digital camera backs have state-of-the-art electronic image sensors enabling very high resolution, in many cases as high as 80 megapixel (MP) sensors. In contrast to typical point-and-shoot cameras (12-16 MP) or mid-range digital SLR cameras (16-36 MP), the digital files outputted by digital backs can be approximately 80 MB in 80 megapixel, RAW file compression, and will quickly fill up a camera's memory cards. That's why these camera backs support fast-tethered capture control which allows files to be immediately transferred over a USB 3.0 cable to a PC running image processing software applications. The fast tethering also enables "live view" which allows photographers or editors to preview the image that would be captured for perfect framing, focus, and lighting when the shutter is released.

This ability to be tethered (constantly connected) to a PC system to view and capture images as they are shot is a huge time-saver on location sets where crew and model time is at a premium.

Remote Consoles

In a typical desktop PC application, the keyboard, video, and mouse (KVM) console is located just a few ft away from the CPU. However, there are many applications where it is desirable to have the CPU located in one location and to have the KVM console located some distance away from the CPU. The user of the remote KVM console can still control the computer as if it were right next to the unit.

Similarly, remote KVM solutions are used in secure installation settings where it is important to keep the computer hardware with its hard drive out of reach. With a KVM-based installation, the central computer can be physically locked in a secured room and accessed by authorized users through a KVM console some distance away.

Often in industrial automation settings, the computer is located on the shop floor in a noisy or dangerous environment. With a KVM, the console operator can be situated in a more comfortable control room from which he can monitor and operate the machinery remotely.

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Conclusion

Compatible with USB 3.0 and 2.1 protocols, USB 3.Optical™ Cable by Corning enables you to take advantage of the highest data transfer speeds available. They can be up to 10 times longer than equivalent copper cables and twice as strong, while being 50 percent smaller and 80 percent lighter. It's that simple: a cable that works on your terms.

Corning Optical Communications LLC • PO Box 489 • Hickory, NC 28603-0489 USA
800-743-2675 • www.OpticalCablesByCorning.com