



High-Tech Healthcare Operating Room Deploys DisplayPort Active Optical Cables to Assist in Surgery Guided by Robotics

CHALLENGE

In today's healthcare, streamlining device and information use in the operating room is crucial to positive patient outcomes before, during, and after surgery. George Tingwald, MD, director of medical planning, who is both a surgeon and an architect for the Stanford Hospital, brings a unique perspective to planning surgical suites. He said, "Traditional operating rooms are giving way to interventional platforms that can support new surgical techniques and technologies."¹ This means introducing more robotics into the operating room (OR) for enhanced micro-medicine.

In the practice of micro-medicine, surgeons are assisted by robots for increased precision and accuracy that removes the human error component. Surgeons monitor the operation through a camera installed in the robot arm. The surgeon visualizes the operation through a medical visualization system.

In this new micro-medicine environment, a digital OR customer faced the challenge of connecting a camera over the distance to the medical visualization system, which is a special video system that displays multiple camera images on multiple screens. Inside and outside the operating room, the surgeon simply touches the screens to select and display camera feeds from the robot. When lives are on the line, these operations need to be 100% accurate to avoid OR mistakes. This means the solution has to be transparent to the system, provide optimum video quality for precise visualization by the doctors, and not impede the system's performance nor create any obstacles to safe and proper functioning.

The High-Tech Healthcare Operating Room customer approached the Black Box team of experts for help with this challenge. The customer used analog modular extenders in the past, but modern digital OR tools are now equipped with DisplayPort video interfaces. Technology moves on and digital is now state-of-the-art. The customer needed a reliable, high-end solution that matches the high-tech performance of their machines.

SOLUTION

The customer first considered digital modular extender solutions. Black Box offered DisplayPort KVM Extenders that would have worked well, but also suggested DisplayPort Active Optical Cables (AOCs) as an alternative and a solution the customer hadn't considered at all before. The AOC transmitters and receivers are small, so they fit in the housing of the connector and therefore seem to be "invisible," where classical extenders are much bigger.

Also, video performance using AOCs is superior, as AOCs do not compress or alter the video in any way, where most extenders do some changes, mostly unrecognizable, but nevertheless they do change. To top it all off, AOCs need no power supplies, so they are easy to install in tight spaces that have no power outlets.

Testing AOCs, the customer was quickly convinced that this alternative solution would suit their application, but the standard length of the AOC cables didn't exactly match their requirements to cover the distance between the medical robots and the visualization system. However, Black Box could assist by manufacturing the cables in the exact required length.



SOLUTION (CONTINUED)

The custom-length AOC cables solved the customer's problem of extending the distance between the OR cameras and the doctors' visualization system. The all-in-one cable/transceiver solution eliminated the bulk of separate transceivers and cables, and delivered superior image quality in real-time, unmatched by a separate transceiver/cable solution. Transparent to the user, the AOC solution assured the doctors that the system did not create any obstacles to superior patient care and would safely function while providing the desired results. As a bonus, the customer also saved money: the cost of the AOCs was less than the cost of cable-transceiver solutions.

RESULTS

More than 400 DisplayPort Active Optical Cables have been installed by now. The customer as well as the medical teams are very satisfied with this solution, as the AOCs eliminate signal delays transporting video signals in real-time, plus equally important, there is not the slightest change or color reduction from the image coming from the camera – something they experienced with legacy AV extenders. Medical staff are confident that the superior resolution and precision will enable them to make critical decisions before, during, and after surgery to optimize patient outcomes.

The AOC solution also reduces installation clutter in the OR, because just one small all-in-one cable replaces all the single components of a modular extender solution (a typical solution consists of a transmitter unit and video connection cable at the robot side, and a receiver with connecting video cable at the video system, along with the required power connections). The AOC option creates a better working environment for staff with neater processes and improved workflows.

The customer previously used EMI/RFI-immune fiber optic cables that provided extra security to link the TX and RX units. Active Optical Cables transport the video signals over fiber too, and thus offer the same interference immunity for optimum security, but with an even better image quality to help doctors more effectively monitor surgical procedures performed by robots.

Another result from the AOC solution was that the customer noticed great costs savings. AOCs have not only a lower purchase price compared to AV extenders, but they also eliminate the need and costs for the custom-made fiber cables that connected the extender units in the past. The customer already notified Black Box of a follow-up order, using AOCs as their favorite solution for this application type.