

OR Visualization

What are the most important features of a surgical video and visualization system for the OR? How have these features improved the surgical process?

Joshua Talbert, CEO

As a surgical video equipment designer, the most important features of accurate visualization are high-resolution sensors, defect-free optics, ergonomic design and cost containment.

High-resolution sensors are critical to accurate representation of patient anatomy. Color reproduction and the ability to see intricate detail at the surgical site are conducive to patient safety and proper surgical performance.

Defect-free optics are also essential. Regardless of how clear or robust the video system is, if your optics are scratched, cloudy or broken, they can seriously handicap the attached camera system and surgeon from properly treating the patient.

Equipment size, shape and weight are an important factor as well. Fatigue can set in while holding a camera steady for extended surgical procedure times. The weight of the camera can be detrimental—it should

be ergonomic, easy to grip and able to hold at a steady angle for the entirety of a surgical case.

Cost-containment of the visualization system is also important for the surgical process. If price prevents surgeons from obtaining the best performing camera systems, surgery success and patient recovery may be compromised. These failures may result in even higher health-care costs and lack of efficiency in the surgical process.

The technological advances in surgical video and visualization have improved the overall surgical process by adding detailed clarity, reducing visual defects and creating a more comfortable experience for the OR staff.



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When considering the features of a surgical video and visualization system, it's important to remember there are a number of critical elements that impact the overall quality of the video equipment chain. From the endoscopic camera or other source, through the various levels of distribution and processing equipment, and onto your display, surgical imagery must be captured and reproduced accurately and consistently.

As we transition to a fully digital world, there are still many pieces of analog equipment in use. This means each device in the video chain must be compatible and allow the system to handle high-definition (HD) and standard-definition (SD) signals, in both analog and digital formats. By choosing equipment based on modular design to maximize format and signal flexibility, an OR can build in the appropriate amount of future-proofing according to its needs.

Clinically accurate and relevant images, delivering a high benchmark of color, contrast and brightness, can enhance a surgeon's ability to perform a procedure, as well as recognize tissue abnormalities and make the right decisions in real time. With advances in surgery techniques allowing for an increasing number of minimally-invasive procedures, surgical staff will rely more and more on the quality of the visualization system.

Access to multiple sources of imagery is also of key importance for the modern OR. Scans, ultrasounds, x-rays and other patient data may be required during certain procedures, giving the surgeon a more complete picture. But bringing all of this imagery into the field of view instantly can be challenging. The OR video equipment chain must be able to provide picture-in-picture, split-screen imagery, format conversion and scaling, as well as display different video formats on the same screen (Multi-Modality Imaging).

In previous years, ORs were cluttered with numerous pieces of video processing equipment to make this happen. The future trend is toward consolidation of myriad processing tasks into more advanced, compact, multi-purpose platforms designed to deliver lots of processing capabilities while saving valuable space.

Another technology advancement seeing rapid adoption is wireless video in the OR. By switching to HD wireless video transmission, today's modern OR can see a dramatic reduction in cables and wires. Removing video cables from the floor alleviates tripping hazards, reduces cleaning time between procedures, and makes the OR more streamlined and efficient. Wireless video transmission gives the surgical staff tremendous flexibility as to where they place a monitor and allows for quick adjustment or maneuvering of displays on booms and stands even during procedures.

By taking an integrated approach to video equipment planning and upgrading, ORs can at last get rid of those oversized, obsolete A/V racks, eliminate cables and wires, and consolidate older equipment into more energy-efficient space-saving devices. The result is HD-quality images distributed from compact integration appliances and a safer, more efficient OR for both patient and surgical staff.



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BRAINSTORM: VISUALIZATION

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The increase in robotic, image-guided, and minimally invasive procedures has driven today's surgeons to rely on technology to visualize and make treatment decisions. For this reason, there can be no compromise in image quality or ease of use in their integrated video systems.

The integrated video system within the OR should display the highest quality image possible. Not unlike wearing a pair of corrective lenses, viewing video at the highest resolution maximizes the amount of detail the surgeon can see. Logically, the more detail a surgeon can see, the more informed his treatment decisions will be—and the more the patient will benefit.

High image quality must be achieved by preserving the integrity of the video signal from the point it reaches the system—signal mismanagement can degrade the quality of surgical video and impair the surgeon's ability to visualize during the procedure. Proper digital signal conversion, cabling and advanced video processing play key roles in the quality of the image produced by the video system during the procedure.

However, the video quality of an integrated system is of little worth if the system is impossible to effectively control. An easy-to-use video system ensures that the surgeon's focus remains on achieving superior clinical outcomes and patient care, not debugging confusing, unreliable technology.

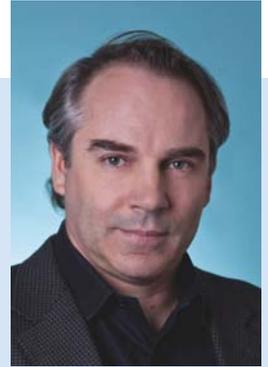
One way to simplify video system control is to equip the integrated video system with an intuitive touch panel control interface. With the touch of a few buttons on the interface, the surgeon should be able to

easily view and route different video sources, create recordings, capture surgical images, and stream or conference from the OR for teaching and collaboration. A video system with easy-to-use, centralized control is a complement to every procedure, enhancing the surgical team's visualization, communication and efficiency.

The surgical team similarly benefits from the ease of plug-and-play and set-and-walk-away systems that are designed and programmed to function fully from the moment they are connected.

Beginning with the first procedure of the day, full attention remains on treating the patient, not the video system.

When choosing an integrated video system provider, it is important to do your homework. Thoroughly research the image quality and ease of use for each offering and how these features are executed. How does the system manage the video signal, and what is its maximum resolution? What does the user interface look like, and how does it operate? How much preparation does the system require before daily use? Because many providers claim to offer the "best" solution, a live, side-by-side comparison is an easy and effective way to quickly distinguish which system is strongest in these areas and will aid your staff most in achieving positive clinical outcomes.



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Jim Dietz, Special Account Manager

Today's modern operating room is filled with image-generating devices. These devices bring with them a vast array of video display requirements. Some need a high definition wide-screen display. Some need special color calibration. There are a multitude of video signal formats to consider, and if there happens to be some older devices being used in the OR, then standard definition analog signals must somehow be displayed.

Compatibility

Compatibility with multiple image sources and modalities is the important key feature of an effective OR video system. This means different resolutions and sizes of video images are properly displayed for accuracy. Compatibility ensures that doctors and other OR professionals can see exactly what is going on. As more OR rooms are being used for different types of procedures, there has been an increase in the variety of video sources needed in one room during the course of a day. It is extremely important that medical-grade display systems are designed for multiple source compatibility. This makes it easier for multiple-vendor imaging equipment to utilize the same display.

High Definition

High-definition (HD) technology has increased picture performance for better diagnosis not seen before. However, this has brought a challenge to the OR environment that also has legacy equipment that generates a standard definition signal. With HD flat panel displays mostly in "wide format", it is important to

display high definition and standard definition in proper native formats, along with color and gray-scale accuracy. Choosing display monitors and routing equipment that are able to do this with high performance processors and electronics is crucial. This technology is designed to handle the accuracy needed in the OR and assures the staff that they are viewing the most accurate image possible.

Wireless

A wireless video system can greatly increase the efficiency in the OR when it comes to cable management, mobility of equipment, the cost of wiring or upgrading an OR to HD. When upgrading an older OR room, it can be costly to retrofit the integrated wiring to HD, not to mention the increased down time due to installation.

A wireless system that is quick to install and does not need to have new wires pulled through walls is much more cost effective. It is important that a wireless system utilize true uncompressed HD or SD video. By not compressing the image or introducing artifacts like IP(Ethernet), then video performance will be at its best. A good wireless system can reduce the time needed to connect and disconnect hard-wired cables. Wireless video's benefits of high picture quality, compatibility and mobility have increased OR efficiency, helped patient care, and lowered OR costs. ^{SP}



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