Custom Matrix Switcher and Unique Optics Provide CCTV Training Solution for Dental School

By Alan Jelley

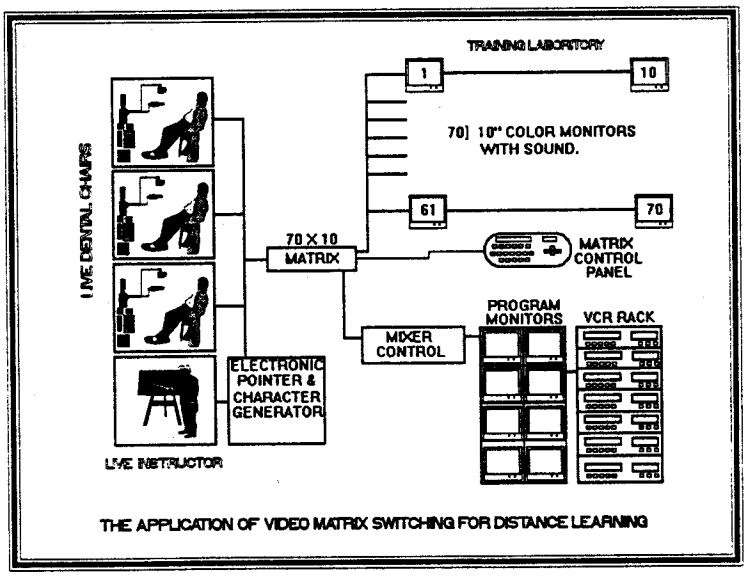
Medunsa University is situated in Boputhatswana, a small country in Southern Africa. Here, dedicated medical experts are training the next generation of doctors and dentists. The univeristy's dental faculty asked Rediffusion, a Johannesburg CCTV and audio installation company to perform tests of color cameras in an effort to provide a solution to the following set of conditions.

1. There were 70 student places in the training laboratory and an assortment of second- to fifth-year students. Each student was to have an 8-inch color monitor and earphones, a plaster "head" complete with teeth and an array of alarming looking dental tools.

2. There were 10 video sources and six multi-standard 1/2-inch videocassette recorders. Training programs were in color in PAL, NTSC and SECAM TV formats. Three "live" dental chairs were used by professors to record practical dental demonstrations and to provide real-time programming, and a fourth camera was used to cover demonstrations of bridge work techniques. The system had to be able to record these demos for later transmission, as required.

The question was, could we, a CCTV company, provide a camera optics solution for the dental chairs and a switching matrix for the audio/video distribution to multi-standard requirements?

We had already developed a matrix switcher with 68 inputs by 16 outputs for medium-sized casinos, but this situation required a switcher with 10 inputs and more than 70 outputs, not a normal configuration. We went back to the drawing boards to rework the hardware, software and "set-up" scenarios required for each teaching day to enable nontechnical people to operate the system and provide the correct mix of canned and live programs to a constantly changing group of students. This was all programmed into the matrix software, and an 80-way relay board was grafted onto the switcher to allow the sound channels to track the video channels. Control was via a custom keyboard and key switch lockout for 10 full function set-ups.



THE APPLICATION OF VIDEO MATRIX SWITCHING FOR DISTANCE LEARNING

The main requirement for dental chair video was to fill the monitor screen with one tooth without limiting the practicing dentist. Color pictures were required with 320-line resolution. A 50-500, 35mm format manual zoom lens with macro capability was fitted with a "C" mount and attached to a Panasonic 1/2-inch color camera. This assembly was then installed on the dental arm (the arm is used to carry dental drills and lights) using a second dental arm light attachment. A volunteer was placed in the dental chair. The arm was set in position and the local color monitor was used to set up the camera/lens combination, with the lens in the macro format. The lens performed well, and we could fill the screen with a tooth from 2 meters (about 6 feet) away, but the focal length was too limited. We then increased the power and performance of the dental overhead light and, at about 4,000 lux, obtained a depth of field of +/-10 cm (6 inches) after stopping down the lens two F-stops. The system was then approved and put out to bid.

Six months later, the facility was completed together with our "new" matrix and multi-standard equipment. The solution was a real mix of professional video and CCTV technologies and was largely Panasonic-based with the exception of the matrix switcher.

The results today are rewarding. One or two trained people can now perform the dental training to a multi-level student body. The training sessions may be recorded and reused, and imported material from many countries can be added to the mix, providing a well-rounded education to the next generation of tooth mechanics.

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