



Groundbreaking TV production technology implemented by the German Armed Forces

Following a near three-month implementation, the first virtual reality studio of the German Armed Forces (Bundeswehr) was recently approved.

KST GmbH implemented a highly-automated, 4K-capable studio facility that supports both VR and AR environments at ZOpKomBw, the Bundeswehr's operational communications centre, located in the German town of Mayen.



Work in the studio began by setting up a green area measuring around 6 x 6 metres. Executed in the VR-studio colour RealGreen, the L-shaped cyclorama construction in combination with the extremely homogeneous lighting of KST's 5900k VR light set create the basis for establishing a successful VR workflow.

The control room area was situated directly next to this. Two 4.2-metre desks, also manufactured by KST, serve as the underpinning for setting up the four primary functional areas of operation - graphics, sound, image technology and mixing, and automation - with suitable operator, measurement and monitoring technology.

Besides equipping the entire studio, direction and server room, KST also installed all of the technology. This includes Zero Density's recently released version Reality 2.9 VR powered by Unreal Engine, that works on three high-end render channels. Undoubtedly the most technically advanced real-time VR system on the market today, the technology features exceptional photorealism and outstanding performance, particularly in UHD. The Reality system's revolutionary differentiated keying process ensures not only excellent keying results, but also maximum moderator interaction in terms of shadowing, reflection behaviour and situation-related colour grading. An additional high-end graphic workstation provides graphic support to the Unreal Engine-based workflow as well as controls on-air graphics and VR remote elements.

"In the run-up to the project, extensive tests with various VR studio technologies were carried out at the KST Innovation Center. We conducted an analysis with a wide array of end-users and project managers, whom had the opportunity to identify their ideal solution. A final test with the target configuration led to a clear decision for Zero Density's Reality Engine, among other things because of the RAW data compatibility between the selected camera, the Panasonic VariCam LT, and Reality", explains Felix Moschkau, VR product specialist at KST.

A total of three Panasonic VariCam LT 4K cinema cameras adjusted to the VR system's high quality level were used, with each mounted on KST UR10BC robotic arms. In the UHD workflow, the camera's RAW signal is directly received from the render engines and processed by the reality differential keyers, which ensures maximum production quality.

"In our quality tests, the VariCam LT clearly outperformed the classic comparison cameras. In addition to the pure image quality and the special cine-look, the technical connection to the reality render engines played a decisive role in the choice of camera. By transferring its V-Log 4K50P-RAW signal directly to Reality, an extremely clean, very low-noise image can be achieved, and as a result almost pixel-accurate differentiated keying is possible. This feature is the direct result of joint research undertaken between ZeroDensity and Panasonic," says Felix.

The modular KST-CamBot.system serves as the central control component, and safeguards the high level of automation of the camera workflow. The proven KST-CBR-RP1 remote panel and KST-CBR-Pro software with intuitive touchscreen operation serve as the operator interface. Effective human-machine cooperation in the area of TV production is provided through the KST-CamBot.system's multiple security levels beginning with the collaborative UR10 robots and concluding with the CamBot.collusion-detection module.

"By selecting KST-CamBot.system, the Bundeswehr, like various other studios, have chosen to provide a new level of efficiency within TV production. Thanks to the far-reaching automation, which, in the case of the Bundeswehr studio, applies to the robotic camera workflow, film and TV productions can be planned and reproduced in great detail and, in particular, motion sequences and processes can be made more precise", explains Axel Moschkau, [CEO KST Moschkau GmbH].



"The Bundeswehr can also benefit from an unexpected shift and concentration of personnel resources results as well. Fewer operators are able to carry out substantially more complex processes under considerably more relaxed conditions than in conventional studios. The UR10 robotic system fulfils particular security needs in that it will come to an emergency stop if unplanned contact occurs through the sophisticated collision-detection function of the CamBot.control software. For this reason, too, the CamBot.system is an ideal technological solution for VR and AR productions, where the direct interaction between people and technology is often very important due to the available space of a room", Axel concludes.

In addition to automating the robotic camera workflow, CamBot also ensures the proper routing of the UHD mixer and the 32x32 12G-SDI Kumo matrix from AJA through the switcher link protocol.

Live production mixing is handled using the Panasonic AV-HS6000 2ME live switcher. Among other features, the system's multi-image, preview and program image are displayed on three 50-type LCD displays and various program monitors in the area of direction.

"The HS6000 proved to be the ideal system in conjunction with the VR technology thanks to its high level of flexibility and broadcast-quality feature-set. We have already used this combination in our Innovation Center, and it works extremely well", Guido Murk, Head of the KST Professional Service Bundeswehr team, added.

Record, ingest and playout is handled through the Avid FastServe system, which enables four-channel recording and playback in UHD, and eight-channel in HD. The system, along with several media-composer, ProTool and PostPro work stations, is connected over 10 gigabits to the central NEXIS storage of the Avid Interplay Production Asset Manager (PAM) system.

A Midas M32R mixing console paired with a Shure ULX-D microphone system are used for audio. For recording and transmitting into and out of the Interplay PAM system, signals are embedded into and de-embedded out of the SDI stream using AJA HI5-12G and HA5-12G conversion.

All central components were integrated into the communications centre one floor below so noise and heat emissions could be kept to a minimum in the direction area. A multi-phase, uninterruptible power supply (UPS) system was installed to ensure operational reliability.

The system was transferred at the location and went into operation at the end of March 2020. Currently, training is being provided to operators and users at the KSTacademy and the KST Innovation Center.

The VR studio for ZOpKomBw in Mayen exemplifies successful cross-manufacturer cooperation. KST's very close cooperation with alliance partners such as Panasonic and Zero Density has played a significant role in the success of projects requiring such extensive development work as this one.

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