NASA Space Shuttle Simulations Use Scan Converter for Realistic Images

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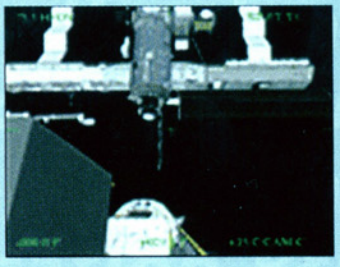
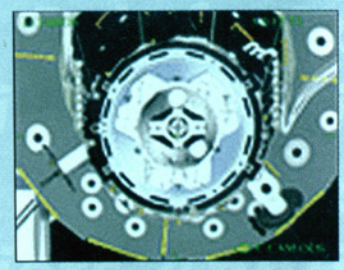

One of the core components in NASA Johnson Space Center's (Houston, TX) shuttle crew training is a series of simulators in the Systems Engineering Simulator (SES) laboratory. NASA contracted with Lockheed Martin Corporation's Space Operations Company headquartered in Houston to design, manufacture, and maintain these leading-edge space shuttle mission simulators.

Regina Tobias, electronics engineer for the Lockheed Martin Science, Engineering, Analysis, and Test (SEAT) division's Space Operations Company, stated, "A critical issue in the simulator was the conversion and distribution of high-resolution images from the SpaceCraft Dynamics Simulations (SCDS) image generators to the aft station CCTV (closed-circuit television) CRTs (cathode-ray tubes). Since the simulation exercises rely heavily on visual cues and overlays as pilots maneuver with the docking target, the converted images had to be very high quality, with sharp, fine graphics."

The RGB/VideoLink® 1690 scan converter from RGB Spectrum transforms computer signals to broadcast-standard video in real time. Computer-generated images can then be recorded, broadcast, displayed, or transmitted over video codecs. NASA currently uses a total of eight scan converters in the simulators' two aft cockpit stations and Robotic Workstations (RWS), which are used for docking and robot arm control. The images consist of high-resolution graphical reproductions of the space shuttle vehicle, the shuttle robot arm, the space station, and terrestrial and space out-the-window (OTW) panoramas.

The 1690s convert the images to NTSC composite signals and feed them to each of the aft stations' two Sony 9-inch high-resolution CCTV monitors, which are mounted near the two windows in the shuttle exterior. The two rear windows in the shuttle depict faithful, realistic OTW vistas that would be viewed by shuttle crew in-flight. The CCTVs provide the crew with detailed, selectable video images of camera views of activity or objects outside the shuttle.

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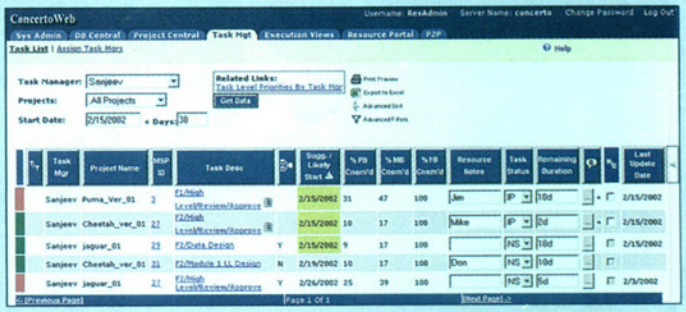

NASA's Systems Analysis Branch conducts multidisciplinary studies and analyses of advanced vehicles and integrated air traffic systems. Their goals include identifying high-potential future concepts, carrying out analyses in support of major research programs and program planning, providing assessment of aerospace technology enterprise pillars, and developing advanced systems analysis methods. Towards its mission, the branch undertakes approximately 20 projects at any given time. Projects typically range from three to 12 months and can be highly uncertain.

While traditional project management software considers time and resource constraints, it fails to address the effects caused by uncertainties. William Kemmel from NASA Langley, point person for finding new project management software, stated, "We had too many projects on hand and less resources. The staff were overburdened and there was a dire need to help schedule work or risk losing the resource itself." To help solve this problem, NASA adopted the next generation of project management, called Critical Chain, using Concerto software from Realization Technologies.

Concerto software runs on the Theory of Constraints. Rather than critical path, it is based on a critical chain engine that adapts to uncertainties by inserting "uncertainty buffers" in the right places of each project. The buffers absorb and lessen the shock of uncertainties — as uncertainties create delays in execution, a buffer gets used. The critical chain engine then calculates how much of the unscheduled time is still available for future uncertainties, and sets forward-looking priorities for everyone involved in the project.

With the new software, the branch is finding that it is able to do more projects with the same resources. Project cycle times have dropped as low as 30%. Kemmel added, "We have had excellent improvements in the project scheduling and people morale."

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