CASE STUDY: ADACEL SYSTEMS INC.

Panasonic Brightens The Future of Air Traffic Controller Training

Challenge
Real-world evaluation of perceived laser projector advantages over LCD and LED units currently providing multi-screen 325-degree and 360-degree simulation images in Adacel MaxSim installations in hundreds of FAA, Defense Department and overseas airport control centers.

Solution
Upgrading three FAA Academy Adacel simulators with 30 Panasonic PT-RZ570 5400 lumen Solid Shine™ WUXGA four-segment color-wheel laser projectors.

Result
Adacel reports “huge” improvement in color richness, sharpness and clarity.

In that moment when an arriving aircraft’s wheels first kiss—or bump—the runway (called a “touch down”), previously inactive passengers typically jolt into a flurry of thoughts, reaching for their phones to notify family members of a safe arrival, checking seat pockets to ensure glasses or a phone aren’t left behind, or awaking from a deep slumber. Odds are that no one is thinking about the Air Tower operators, who play an increasingly crucial role in ensuring the safety of nearly 2.2 million passengers on an average of 25,000+ daily U.S. commercial touch downs. But it is that thought, and the life-and-death implications frequently inherent in it, that remain front and center in the minds of the executives, system engineers, simulation designers and hardware architects for Orlando-based Adacel Systems Inc. For more than 25 years, Adacel is the world’s foremost manufacturer and vendor of high-fidelity, deeply immersive simulators for use in new and refresher training courses for Control Tower operators.
'Technologically, our projection system is pretty complicated,' Bill Skaggs, Adacel Director of Technology, says. "For the FAA systems, we use a vertically-mounted projector shining into a 45-degree mirror which fires into another mirror that delivers a flat image to one of the 10 screens. The last major refresh the FAA asked us for was back in 2009 and we came up with a very decent, very responsive system given the limits of last decade's technology.”

As the years since went by, however, parts for the non-Panasonic projectors became harder to get and complaints related to color fading and the need for constant lamp realignment began to multiply.

The Adacel system uses 100-percent, high-definition, airport-specific simulations to enable instructors to create real-time situations impossible to spontaneously “cut” into a scene based in-on filmed footage of actual airport operations.

Uniform ‘Sparkle-Free’ Images

According to Skaggs, using such extremely detailed and rapidly updating SIMS mandated projectors delivering maximum clarity and sharpness and minimal variation in color brightness, balance and saturation individually and across the ten-screen display.

“We started investigating new projector availabilities in late 2014-2015ish but ran into several problems,” Skaggs recalls, noting that Panasonic’s single-chip DLP-based imager, laser-light engine and superior optical light-path engineering – “produced consistent illumination levels and color values unmatched by any LCD projector we tested.” The RZ570 has two built-in uniformity correction functions, available via the user menu or via a PC. Both can be used to reduce or eliminate any brightness variations across the screen.

Other projectors vendors “had laser or LED units that were bright enough, but none of them were centerfire and we needed very bright, very uniform center-throw projectors to work with a simulator that relied on ten projectors, 20 mirrors and ten Draper Inc. screens to meet the FAA’s very stringent ‘realism’ requirements.”

A second issue that concerned Skaggs and the FAA was what they call "sparkle" – a single-chip Digital Light Processing (DLP) artifact known as the “rainbow effect” in the HDTV television world.

“The fact is that all the single-chip DLPs we looked at when we started staging shootouts of potential replacement projectors all had too much rainbow effect,” Skaggs says. "It didn’t matter if the light source was a laser, a LED array
or an LCD, the rainbow effect was there. You’d look at the screen and could see some pixels shifting on greens or deep blues or purples and once you’d seen it you could never not see it.”

According to Skaggs, the only single-chip DLP projector to overcome these concerns and meet their requirements was the Panasonic PT-RZ570.

“Frankly, the rainbow effect problem could have been solved somewhat sooner with three-chip DLP projectors but those were out of budget,” Skaggs noted. “So, practically speaking, there was no viable performance to price ratio solution until Panasonic’s PT-RZ570 came along. Even today, I still look at the images we’re getting and can’t believe they’re coming from a single-chip projector. I don’t know what the Panasonic engineers did to fundamentally change how the single-chip units perform, but it’s like they took a partially fulfilled promise and perfected it.”

Superior Technology = Sharper Details

Most importantly, in the world of simulations, achieving realistic images is the chief priority. Adacel creates its simulations by working with FAA experts (or, depending on the job, military or international airport authorities) and senior local air traffic controllers and supervisors to take voluminous quantities of digital pictures from virtually everywhere on and around the target airport, including the tower (or towers), runways, taxiways, docking slots, service vehicle parking areas and access roads, etc. These images are turned over to the company’s in-house 3D Modeling Team, which creates a virtual model of the airport that, combined with 3D-modeled images of numerous aircraft models, wheeled vehicles, static installations, even dropped or forgotten tools, can be projected as it would be seen from various points of view under virtually all light and weather conditions. And this is another area where the PT-RZ570 shines. The projector’s built-in feature, Detail Clarity Processor 3, sharpens fine details. This unique Panasonic circuit optimizes the sharpness of each image based on the super high, high, medium, and low frequency components of the extracted image information so that the resulting images are expressed with a natural realism.

In addition to the most realistic possible video representations of ongoing airport events, Adacel simulators are equipped with the company’s patented Lexix speech recognition technology, which can provide the trainee with audio information from nearby aircraft and develop simulations (and alterations to live simulations) based on voice commands.

“Instructors have a full command line interface that lets them do all kinds of things to gauge a student’s response to the unexpected,” Skaggs explained. “They can drop an aircraft into the scene from virtually nowhere, conjure up sudden storms or wind shears, even create a flock of birds at the end of a runway or toss a bunch of debris on the middle of it.” And the real-life implications of these hyper-realistic simulations is tangible: in instances like the November 2017 incident in New York where two aircraft clipped each other on the runway, Skaggs explains that the exact moment could be replicated in a simulation for further training.

With what Skaggs describes as their “huge improvement in the color richness, uniformity, sharpness and clarity” the Panasonic PT–RZ570 projector-equipped simulators are not only enhancing air tower controller education by increasing the realism and impact of the scenarios, they are also helping Adacel maintain its reputation as “industry visionaries who define the standard of existing technological needs and crystalize future technology trends.”

Stress-Free Service and Support

Finally, the bulb realignment and replacement issues of the previous, non-Panasonic model were non-existent with the Solid Shine™ laser PT-RZ570 projector. Also unlike the previous model, with Panasonic’s generous service model (parts assemblies available up to 8 years and component level up to 10 years, beginning after last factory production), Skaggs could rest easy knowing that servicing the projectors would be possible for years to come. To date, Adacel has had no technical issues with the projectors and has not required servicing.

“We have had continuous service and support issues with other major manufacturers’ projectors ... for eight, nine, ten years we’ve had unresponsive service and support personnel problems, difficult-to-impossible consumable availability situations, etc.,” Skaggs added. “With Panasonic I have no concerns about any of that.

“We have 30 PT-RZ570s in operation and none of them has ever required anything in the way of service, but I assume one of them eventually will. Fortunately, with Panasonic’s expert technicians and huge in-country parts inventory standing behind their projectors, I can think about a potential future failure without an uptick in my stress level.”