Tripling the acceptance testing rate of millimeter-wave products

About QuinStar Technology

QuinStar Technology is a leading supplier in millimeter-wave products, microelectronic assembly, rapid prototyping, and mass customization for commercial, scientific, and defense arenas. QuinStar's products span the globe and are used by major research institutes, high-reliability spaceflight payloads, and volume production of military hardware. QuinStar is certified to ISO9001:2015 / AS9100D and is headquartered in Torrance, CA.

Executive Summary

QuinStar's production backlog was growing rapidly and acceptance testing was becoming a bottleneck. Rather than hire more workers and run the risk of overstaffing, they decided to investigate test automation solutions. QuinStar needed an automation solution provider that understood the nuances of millimeter-wave testing, which is why they chose TeraSys Technologies.

Results at a glance

- 300% increase in testing rate
- 6 weeks from inception to delivery of capability
- Investment break-even after testing 120 units

THE CHALLENGE: PRODUCT ORDERS ARE INCREASING; DO WE HIRE OR INVEST IN AUTOMATION?

QuinStar was facing the problem most businesses want to solve: product orders were increasing beyond what their production team could support.

QuinStar's customer requirements impose a high degree of per-unit acceptance testing including long-duration tests over different temperature ranges. At one point, the test backlog was so deep that technicians were on call nights and weekends to monitor test progress. QuinStar's CEO, Leo Fong, knew this was unsustainable.

And so, the discussion began for how to best support this growth in orders. Hire more workers? Maybe, but what if the growth doesn't continue? QuinStar prides itself on providing a stable work environment, so they are cautious about hiring during production spikes. At the same time, QuinStar also strives to provide its workers with work-life balance—requiring 24/7 availability was not an option.

What about investing in test automation technology? Leo could immediately see the long-term payoff of test automation but needed help to make it happen.

THE SOLUTION: TURNKEY TEST AUTOMATION WITH LABVIEW

Dr. Cheng Pao, production test manager, had one major requirement for the automation solution: It had to be fully turnkey. Once a technician started the test, he wanted every step to be 100% automatic including the creation of the test report document. To make this happen, QuinStar knew they wanted a solution provider that understood the nuances of RF and millimeter-wave testing, something that an application-agnostic supplier couldn't offer.

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"We chose TeraSys because we worked together on projects before, so we knew that they intrinsically understood our needs and would come up with the right solution faster than someone who has never calibrated a network analyzer before."

Within **6 weeks**, we went from initial requirements definition to a fully functioning automated station. We built an automation routine to calibrate the test setup, then cycle through a sequence of temperature, RF power levels, and frequencies. Given a typical test sequence often amounted to over 150 test points, the automation dramatically sped up testing - and eliminated human error.
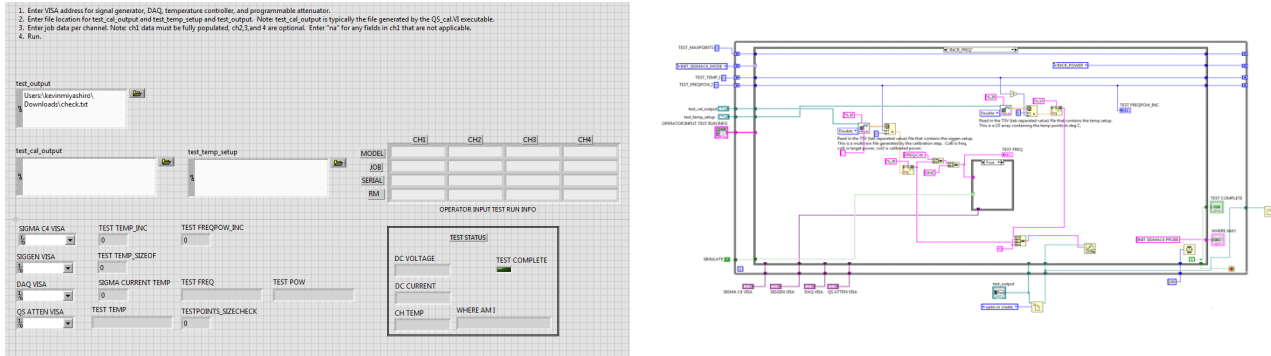

Figure 1: Labview front end and back end implementation

We also wrote a custom ActiveX data translation module to transpose the data onto MS Excel spreadsheets and format them to the exact specifications for each of QuinStar's customers. By adding the final step of test data file creation, we met Dr. Pao's goal of turnkey operation.

THE RESULT: TRIPLE THE THROUGHPUT, NO MORE NIGHTS AND WEEKENDS

QuinStar's new automation solution has been operating for a few months now and has tripled the test station's throughput capacity. Just as important, the night and weekend shifts are no longer necessary. Test runs during normal business hours readily meet production schedules.

From a financial perspective, QuinStar will rapidly achieve a positive return-on-investment from their automation solution. Due to the increased throughput, QuinStar's investment will pay for itself after testing its 120th unit—a milestone they will likely meet in the next quarter.

> "We're big believers in working smarter rather than harder. Investing in software automation is a clear way to increase value to our customers by freeing up our employees to focus their energy on high value activities rather than mundane ones." – Leo Fong, QuinStar CEO

Based on the success of this program, QuinStar is considering additional candidates for test automation.

About TeraSys Technologies

We create wireless solutions at the speed of software. Digital signal processing, artificial intelligence, and software abstractions are now available for RF hardware, shrinking delivery schedules to weeks and months versus quarters and years. We have a proud history of exceeding customer expectations resulting in over 70% of our business coming from repeat customers and referrals. TeraSys Technologies was founded in 2007 in Honolulu, HI and is currently headquartered in Sacramento, CA.
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