Year 2030 – End of the Line for America's FPGA Superiority

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THE YEAR IS 2030. YOU MAY READ IN an industry newsletter an announcement that summarizes the following scenario: "Ninety-percent of aerospace and defense grade Field Programmable Gate Arrays (FPGA) with solder columns are unavailable, due to decisions made in the early part of the decade by civilians in the industrial base. The shortage of defense grade FPGA devices was caused by an unexpected shutdown of America's sole-source subcontractor of solder columns without alternative vendors qualified in the supply chain. Fortunately, a few FPGA devices with solder columns are still being shipped from a dwindling stockpile of finished goods inventory."

Lack of a Robust and Sustainable Supply Chain

The story continues: "Defense contractors are unable to provide timely delivery of black box control systems to downstream customers in the supply chain due the lack of FPGA devices with solder columns. The industry now relies on the application of FPGA devices without solder columns, known as Land Grid Array (LGA) which has limited reliability and usefulness in some defense systems. The defense industry now lacks a reliable supply of ruggedized FPGA devices with solder columns that provide a robust and extended life for critical missions. Blame, finger pointing and posturing within the nation's defense industry has been going on for a while."

It's a sad day for a once invincible industry.

Warning Signs Ignored

Warning signs for the potential for an outage were in plain sight back in the early 2020s. In the preceding decade, a handful of decision makers, mostly civilian engineering managers, placed a high-stakes bet that the availability of solder columns would continue forever. They presumed that the then sole-source provider of column attachment services for defense-grade FPGA devices would always be available. They maintained that financial budgets were not available in their department to invest in qualifying alternative suppliers of solder columns.

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FPGA device makers missed a strategic window of opportunity to qualify alternative suppliers of solder columns as a pro-active action to mitigate a future catastrophic occurrence should the then sole-subcontractor stop providing column attachment services. In late 2029 the industrial base initiated action to qualify additional suppliers of solder columns, but only after it was too late to do so.

Postmortem Investigation

Congress plans to hold subcommittee meetings to investigate how America's defense base arrived at this point. C-level executives of the nation's defense manufacturers are prepared to receive subpoenas to 'explain the unexplainable' to Congress.

Testimony reveals that it was financially too difficult in the 2020s for the supply base to justify investing money in a tiny market – consisting of less than 100,000 FPGA devices per year – to support the defense industry to keep warfighters flying and rockets launching.

Along the way, the Department of Defense, including the Defense Logistic Agency (DLA), did not offer incentives to encourage the private sector to qualify alternative makers of solder columns.

The defense establishment did not push the industrial base to broaden their reliance beyond the single source subcontractor who was providing solder column attachment services at the time.

Only an incredibly small number of employees within the U.S. Government were aware that 90% of the supply chain of defense and aerospace grade FPGA devices depended on a single source subcontractor to attach solder columns. They also did not know that ruggedized FPGA would not perform reliably unless solder columns were attached to the FPGA package. No champion advocated for an industry-wide Plan "B" solution to supplement the FPGA industry in the event of a loss of a key and critical supplier.

Conclusion

By 2030, America's self reliance on defense grade FPGA components has been downgraded. The industry is required to outsource column attachment services to trusted suppliers in other countries, since onshore capability is severely constrained. Defense grade FPGA chips, including devices with sensitive Intellectual Property (IP) must be shipped to foreign countries in the form of LGA packages for column attachment services, and then returned home for installation in sensitive U.S. defense systems. This results in significant cost increases with inherent delays. FPGA chips are processed through rigorous trust and security methodologies to ensure that sensitive IP is not compromised and that no tampering has occurred.

America has lost control of her homeland IP superiority in defense-grade FPGA devices. America will find ways to adjust, but it is the end of the line for a once venerable onshore industry. ◆