

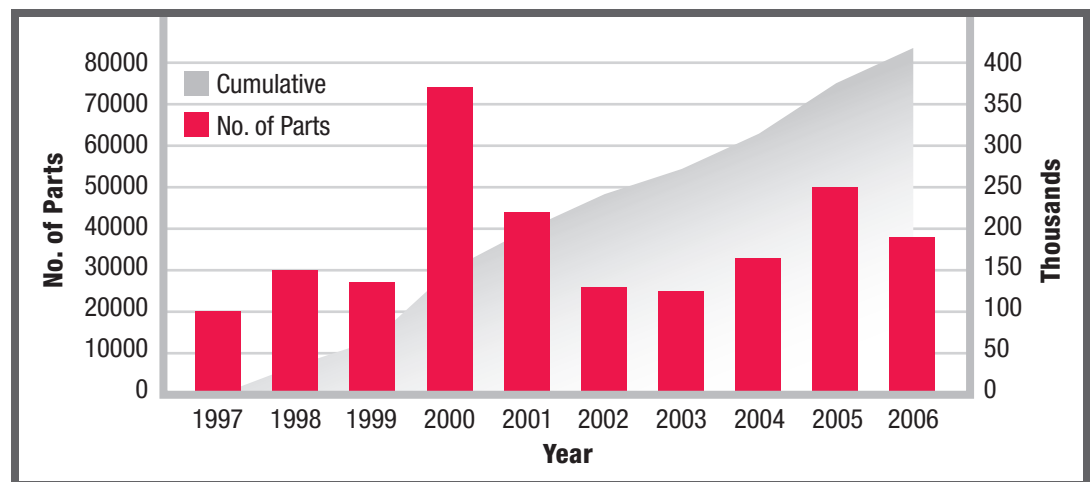
The Best Defense Is a Good Offense

Authorized Component Distributors Help Military/Aerospace OEMs Plan for Obsolescence

Summary

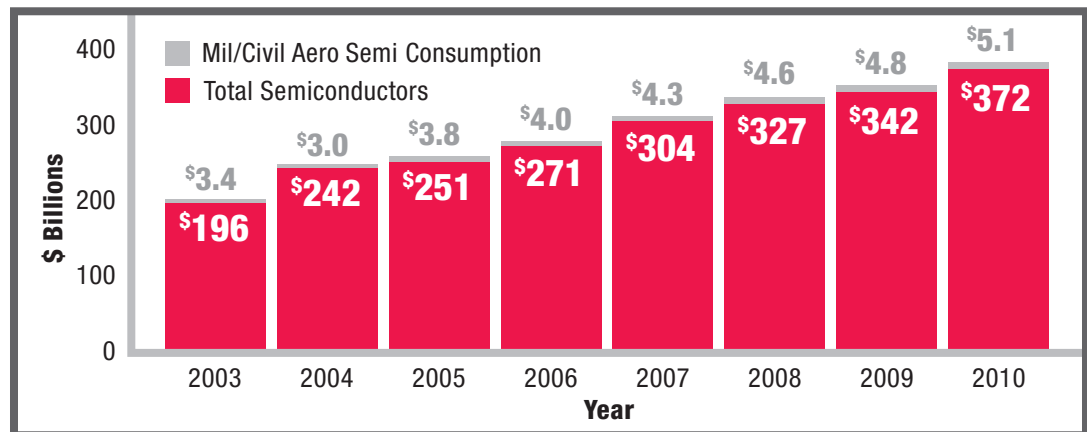
With systems life cycles ranging from 20 to 50 years, component obsolescence – or Diminishing Manufacturing Sources and Material Shortages (DMSMS) – has been a fact of life for military equipment and avionics manufacturers since the first electronic device made its way onto a military/aerospace bill of materials (BOM). In recent years, however, the obsolescence issue has reached a fevered pitch as the number of suppliers offering long-term support for high reliability components has dwindled, while at the same time the disconnect between the life cycles of typical commercial off-the-shelf (COTS) components and the life expectancy of most standard military/aerospace systems using these components has grown exponentially. These realities combined with the recent spate of end-of-life (EOL) notices resulting from the wide-spread RoHS conversion has put pressure on military/aerospace OEMs to rethink their reactive approach to obsolescence management. Aided by invaluable market intelligence and broad resources of authorized component distribution partners, military/aerospace OEMs have adopted a more proactive BOM management practices that mitigate the negative impact of an EOL event on sustainment-dominated long field life (LFL) systems.

FIGURE 1. DMSMS PART NUMBER COUNTS



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FIGURE 2. THE SITUATION AT HAND – Not a market driver, a market participant



Source: iSuppli AMFT (6/30/06)

Background

When the very first electronic transistors were introduced to the market in 1947, not only did they usher in a new era of technological innovation, but also laid the ground work for the electronic supply chain's ongoing conflict with the challenges of component obsolescence.¹ It was another 11 years before Jack Kilby would provide the industry with its next technological leap by introducing the first integrated circuit in 1958. But, like a snowball rolling down hill, the technology momentum continued to accelerate. Today, the life cycle of the industry's most sophisticated System-on-Chip (SOC) devices – which incorporate memory, microprocessors, peripheral interfaces, input/output logic control, data converters, and other components into one single chip – is said to be under 18 months. It is estimated that every month, three percent of the global pool of electronic components goes obsolete.²

For a growing portion of the contemporary electronics supply chain, now dominated by consumer-based applications, the rapid increase in technology turnover has been paralleled by an

equally rapid decrease in systems' life cycles, making component obsolescence an almost moot issue. There is, however, one small, yet critical, market segment for which DMSMS is an ever-present challenge: military/aerospace.

Despite the critical role played in homeland security, military weapons systems, space exploration and commercial aviation, the military/aerospace sector has become a barely perceptible blip on the semiconductor manufacturers' radar. Industry statistics vary somewhat, placing the military/aerospace sector at a range from 1.6%³ to less than .1 percent of the total semiconductor market in 2007. The dramatic decrease in market share opportunity over the past 15 years has prompted many of the leading microprocessor suppliers, including Intel, Motorola, Advanced Micro Devices and Philips, to exit the military market.⁴ Though the Federal Acquisition Streamlining Act of 1994 allowed for use of COTS components in military-grade systems, the initiative proved to be a double-edged sword for makers of sustainment-dominated

¹ The History of the Integrated Circuit, www.nobleprize.org

² QinetiQ Technology Extension Corp. (QTEC)

³ "Q2 2007 Semiconductor Device Data by application," iSuppli Corp., El Segundo, Calif.

⁴ Gale Bradley, "Military Maneuvers: Boeing buying McD; Intel, Philips retreat," *Electronic News*, (Dec. 1996).

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LFL electronic systems. The initiative opened up a wealth of sources for these OEMs. However, the rapid pace of technology upgrades in the COTS environment has compounded the obsolescence challenge for OEMs whose systems have a field life that is typically measured in decades rather than months. Illustrating the extent of the burden faced by the military/aerospace sector, a study published by the Air Force Science and Technology Board and sponsored by the National Research Council (NRC) reported that by the time the first production of the Air Force F-22 Raptor goes through production, its avionics systems will have undergone four technology refresh cycles.⁵

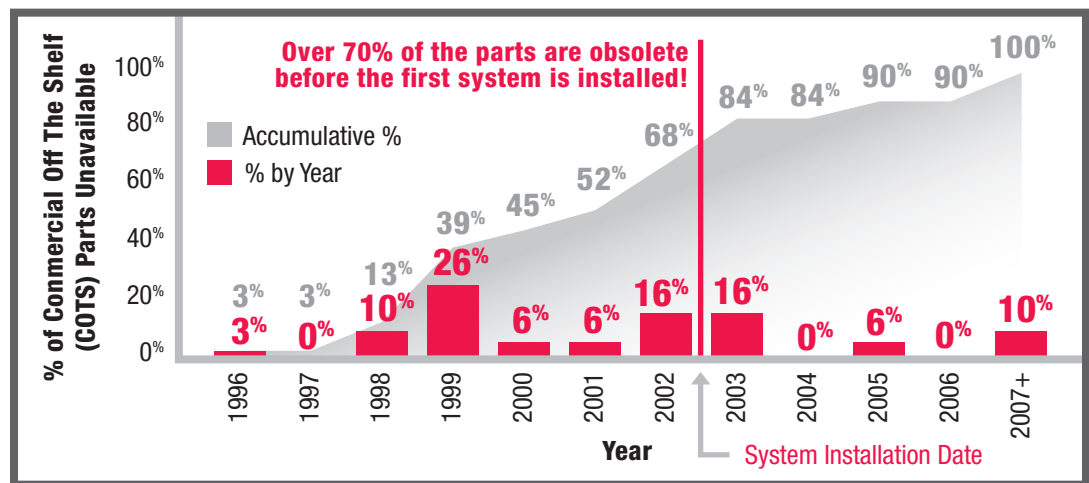
In this environment, a “reactive” approach to obsolescence, i.e. waiting for an EOL notice to be issued, and then scrambling for residual parts from whatever source possible, at whatever price necessary, in order to secure the needed supply to sustain a system throughout its predicted life cycle has become too costly and too risky. Today, tighter forecasting and manufacturers’ just-in-time

inventory practices often mean there are many fewer left over parts available for a lifetime buy. In addition, many OEMs report that going outside the authorized channel for excess inventory is becoming a less-viable option since the risk of sourcing counterfeit or substandard electronic components has become greater as counterfeiters become bolder and their techniques more sophisticated.⁶ Lloyd Condra, Technical Fellow, Advanced Platform Systems, Boeing Phantom Works, Seattle says that the threat of counterfeit parts is forcing the manufacturer’s attention on the risks of going through the unauthorized channels. While Condra admits that most manufacturers are forced at some point in time to use non-authorized sources, it is a practice that is now being strongly discouraged.

Reactive vs. Proactive

To avoid these pitfalls, OEMs are turning to their authorized distribution partners for the resources and market intelligence to make more informed and proactive sourcing decisions in the very early stages

FIGURE 3. Percent of Commercial Off The Shelf (COTS) parts that are out of production (un-procurable) versus the first 10 years of a surface ship sonar system’s lifecycle.



Courtesy of NAVSURFWARCENDIV Crane

⁵ Roxana Tiron, “Aging Avionics Spell Doom For Air Force, Study Warns,” *National Defense Magazine*, (2001).

⁶ Bill Scofield, Associate Technical Fellow, Advanced Platform Systems, Boeing Phantom Works, Seattle.

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of a new product design. Without a disciplined process to identify, react to and resolve component events, Jim Brown, vice president and service director, global product innovation and engineering, Aberdeen Group, Boston says that EOLs are “like little bombs waiting to blow up the product lifecycle (or at least the P&L).”⁷

The value of proactive versus reactive obsolescence management, as presented by Doug Fuller, Mentor Protege Program Manager of Lockheed Martin Missiles & Fire Control, *proceedings of the 2002 DMSMS Conference*, are listed below:

Benefits of *Proactive* Obsolescence Management

- Extended Design Life
- Reduced Redesign Effort
- Reduced Fabrication Costs
- Less Testing and Design Verification
- Reduced Re-Qualification Effort
- Higher Overall Performance

Risks Of *Reactive* Obsolescence Management

- Escalating design, production and after-market operational costs
- Production Delays
- Cost Overruns
- Delays In Time To Market For New Products
- Excess Inventory Buildup

Information Is Power

Distributors, like Avnet Inc., Phoenix, offer a host of tools and services that enable customers to

take steps to position their supply chain to handle an obsolescence event – often before the device manufacturer even makes the decision to discontinue a particular component, says David Moore, director of business development for Avnet Electronics Marketing (EM) Americas Defense Aerospace Business unit, Phoenix. Avnet, for example, maintains a team of market analysts whose sole purpose is to follow technology trends and communicate regularly with component manufacturers about upcoming component transitions. The analysts also track the usage trends on the hundreds of thousands of components that flow through Avnet’s worldwide facilities. This data reveals when sales on a device begin to decline, indicating that the product may be entering into a high-risk phase. When Avnet suspects a component commonly used by a number of its customers may be at risk, the distributor will make proactive purchases and keep the product on the shelves, so that when the EOL notice is issued, there is enough stock available to give customers the time to make good decisions. The goal, says Bryan Brady, vice president, director Avnet EM Americas Defense Aerospace Business Unit, is to assure Avnet’s customers have the information and time they need to make sourcing decisions that maximize the sustainability of their systems, instead of reacting to an EOL notification and making choices out of desperation.

Avnet has also partnered with one of the largest providers of component technical information and decision-support tools and services, IHS Inc., Englewood, Co. Through Avnet’s *Prémire* subscription service, customers can access IHS’ wealth of component knowledge, including the Parts Universe and BOM Optimizer. Parts Universe is an industry-leading database that offers a single point of reference for millions of electronic components from over 500 global manufacturers in

⁷ Jim Brown, “Living with the Dynamics of Electronic Components,” *TechClarity*, 2003.

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370 categories. With the BOM Optimizer, customers can “cleanse” their bill of materials (BOM), verify part numbers, identify obsolete components and flag parts with less than two years before their predicted EOL.⁸ This information gives the OEM a number of options: source parts that are in the earlier stages of their life cycle, modify the design using alternate parts before the system goes to production, or proceed with the current part selection, with defined technology refresh points before the component becomes obsolete.

Supporting Avnet’s “first to know, first to react” approach, once a customer’s BOM is entered into the BOM Optimizer, the system automatically monitors the list and alerts customers via email if an EOL notice or product change notice is issued for any part on the BOM. This gives OEMs the maximum time possible to make provisions for systems already in production – either lifetime buy, reclaim or salvage parts from other products, redesign using different components, select alternate components that satisfy the form, fit and function of the current design, or seek an after-market provider who is authorized to remanufacture the part using the original manufacturer’s die.⁹ Brady estimates Avnet relays between 300 and 500 manufacturer EOL notices to its customers each month, which include the customers’ internal part numbers.

Identifying Alternate Sources

Once an EOL alert is issued, distributors can provide crucial technical support should the customer determine that they must replace the part in question. Avnet’s team of 200 field application engineers (FAEs) can help customers identify a solution that meets customer’s design requirements, project cost restrictions and time-to-market demands.

For example, when Avnet customer Lockheed Martin Co. was notified that a key programmable array logic (PAL) device in use on its M299 Launcher program was going EOL, the manufacturer contemplated two options: sourcing from the aftermarket provider that bought the device maker’s remaining stock and wafers, or select another technology to satisfy the system’s requirements. Though costly, the lifetime buy can sometimes be the most expedient way to resolve an EOL dilemma. In this case, however, the aftermarket distributor who purchased the manufacturer’s residual supply was selling the devices – originally priced at \$8 a piece – for as much as \$200 each.

Lockheed turned to Avnet for help. Avnet’s FAEs conferred with Lockheed’s materials, design and component engineers to understand the full parameters of the project. The FAEs determined generic array logic devices (GALs) from Lattice Semiconductor would provide the identical form, fit, function and performance of the current PAL devices. Avnet sampled five complete sets of parts, programmed the devices at one of its programming centers and within two weeks presented Lockheed Martin with the prints and CD with software used to program the parts. Lockheed installed the complete set of devices on five circuit boards and all were approved as direct replacements. Not only did Avnet provide this technical service quickly, but the distributor succeeded in putting together a solution that actually cost the customer less than the original devices.

The Aftermarket

Regardless of how well an OEM may forecast or plan ahead, the technology industry can be fickle and unpredictable and in the end the mil/aero

⁸ IHS Inc., Englewood, Co., www.ihs.com.

⁹ “Solving the Parts Obsolescence Dilemma,” IHS Inc., white paper, www.ihs.com.

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sector is dependent upon a supply chain over which it wields very little influence or control, says Boeing's Condra. In those circumstances in which the OEM is unable to execute a lifetime buy from the original manufacturer or find an acceptable form, fit and function (FFF) alternative part, aftermarket IC manufacturing has emerged as a workable response to the obsolescence problem. Original component manufacturer-authorized aftermarket providers purchase the marketing rights as well as manufacturing dies, masks, process recipes and tooling of a discontinued product line directly from the original device maker. Sourcing authorized aftermarket ICs can cost up to 80 percent less than board-level redesign, according to industry estimates.¹⁰

To assure customers have access to quality and reliable aftermarket supply, Avnet has partnered with a number of pedigree aftermarket manufacturers, including Lansdale Semiconductor Inc., Twilight Technology Inc., Tekmos, and Integra Technologies. Avnet also has an exclusive partnership with Rochester Electronics Inc. in North America. Kevin Tzitson, sales director for Rochester, Newburyport, Ma. says partnerships with qualified aftermarket suppliers like Rochester are an integral part of the distributor's value proposition.

Tzitson explains that since the OEM is highly dependent upon distributors to provide them with a complete solution for their bill of materials, if the distributor comes back with a 'no-bid,' the customer must then go out themselves and find a device that fits requirements of their original projection. If desperate enough, Tzitson notes, the customer will be more likely to source from an unauthorized supplier whose product is unlikely to operate as genuine parts. In many cases, by the time the user

has identified that there is a problem, the source of the device has vanished or is untraceable.

This scenario is not likely to arise for Avnet customers, Tzitson says, because when Avnet processes quotations, they check their own global stock, as well as Rochester's inventory of more than 500 million devices. So, the only time Avnet will return a 'no-bid' to a customer is if Rochester doesn't have the desired component in its inventory. But in those cases, Rochester can recreate the part with the original manufacturer's permission. Currently, more than thirty original device makers, including AMD, Analog Devices, Intel, Texas Instruments and Cypress Semiconductor, have authorized Rochester to manufacture their discontinued devices. This service provides the customer with the assurance that all product sourced through Avnet and Rochester is 100 percent factory-direct and completely traceable. This traceability is key in the military/aerospace market where counterfeit product represents not just potential economic loss, but a substantial danger to public safety.

Conclusion

Obsolescence is not a problem that can be solved. But, it is one that can be managed with the right combination of information, tools and experience. With the support of authorized distribution partners, OEMs can apply advance market intelligence to the new product design process and plan for the inevitability of obsolescence for both new and fielded product, thereby minimizing disruption, added costs and production delays typically associated with component obsolescence.

