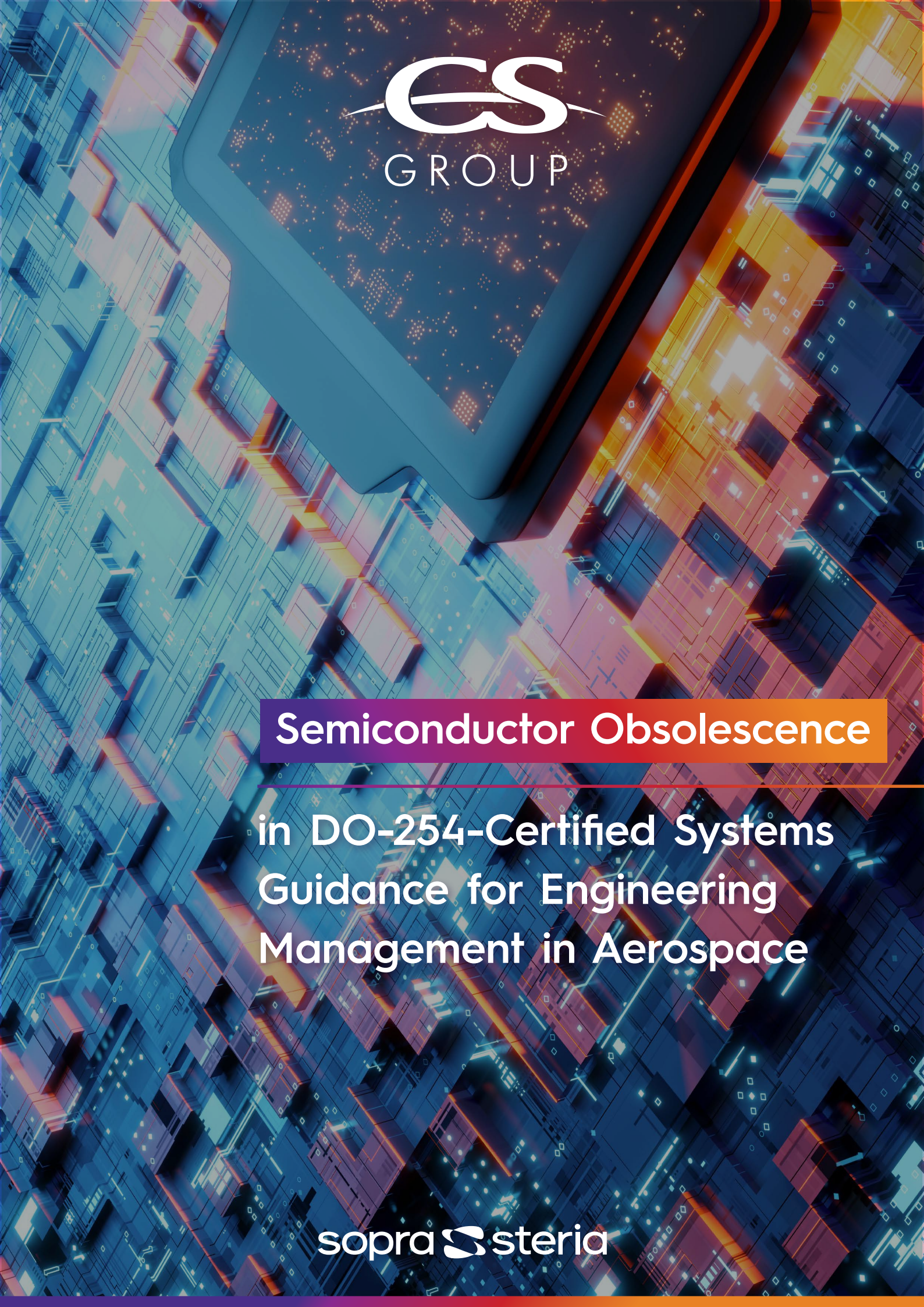

GROUP
Semiconductor Obsolescence
in DO-254-Certified Systems
Guidance for Engineering
Management in Aerospace
sopra steria

Exemple of aircraft subject to obsolescence: A Canadian CF-18, entered into service around 1982-88.
https://volaria.ca/cf-18/

Aligning Lifecycle Strategy with Certification Demands

The DO-254 guidance governs the development of airborne electronic hardware (AEH) and applies stringent requirements across the full hardware lifecycle. While originally derived from DO-178A for software, DO-254 was formally recognized by FAA AC20-152 in 2005 to address the specific rigor needed in hardware design assurance. Currently the FAA and EASA call out AC20-152A/AMC20-152A respectively.

One of the emerging challenges faced by engineering teams—particularly in commercial aviation and rotorcraft systems—is the impact of semiconductor obsolescence on long-lifecycle programs. Rapidly evolving electronic components, often with lifespans measured in years, are fundamentally misaligned with systems designed to operate for decades. This mismatch can disrupt certification pathways, affect project schedules, and inflate redesign costs.

An MPC561 microprocessor, part of a family widely used in aerospace

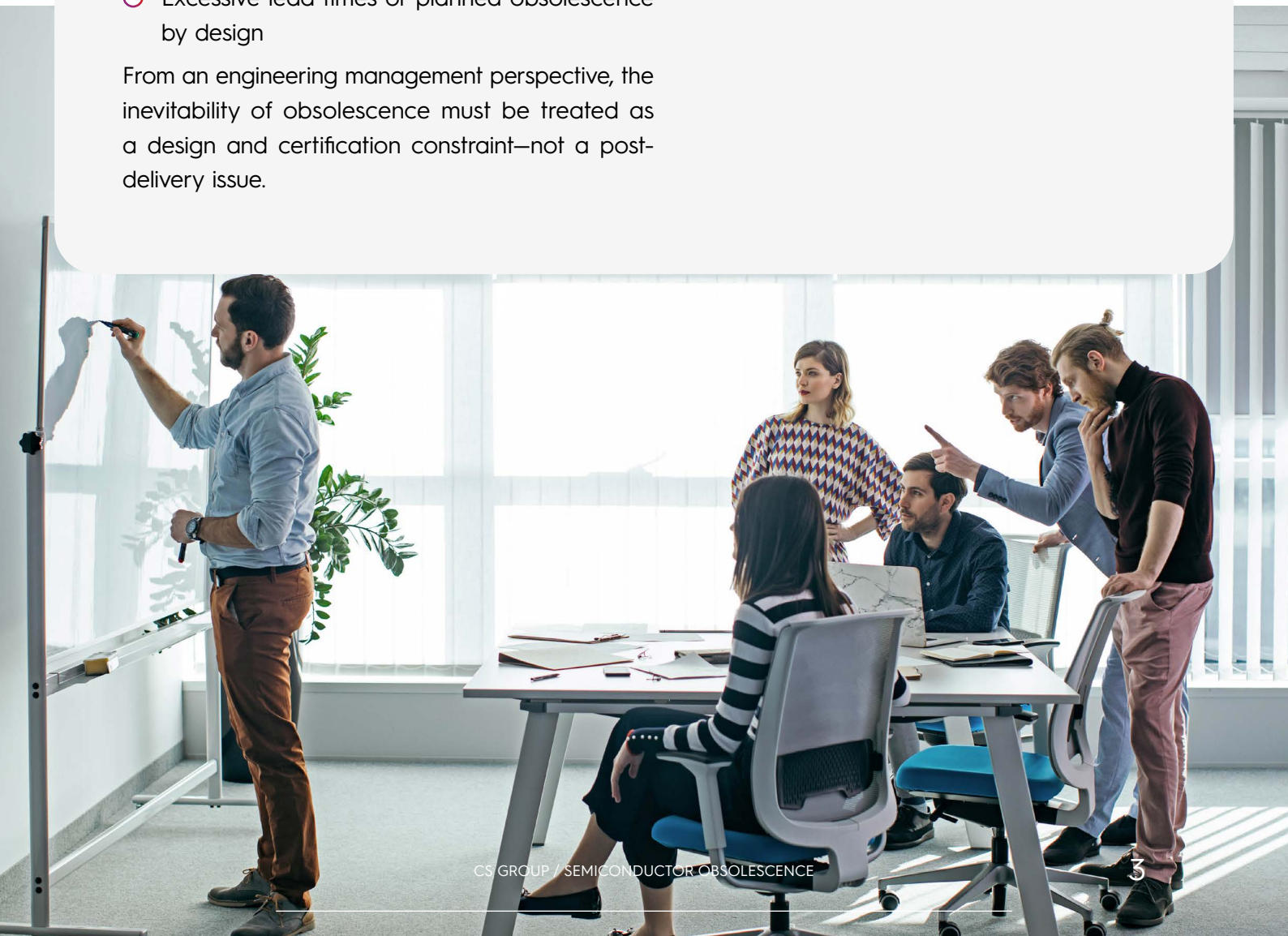
Understanding Obsolescence

Obsolescence refers to the point at which a component, material, or technology becomes unavailable from the original manufacturer or supplier. It typically results from:

- End of production due to low demand or market shift
- Introduction of upgraded or incompatible parts
- Technology being phased out
- Environnemental compliance restrictions (e.g., RoHS)
- Excessive lead times or planned obsolescence by design

From an engineering management perspective, the inevitability of obsolescence must be treated as a design and certification constraint—not a post-delivery issue.

An archaic microprocessor (not aerospace though)



Lifecycle Mismatch: Components vs. Aerospace Systems

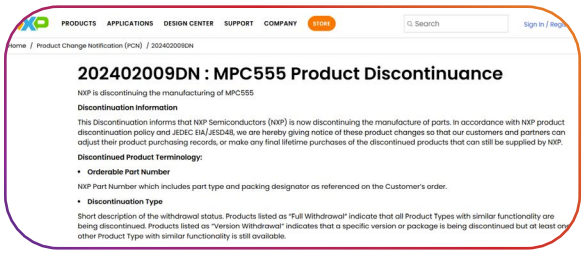
Aerospace systems—particularly those in commercial and military platforms—are expected to remain operational and supportable for 20 to 40 years. In contrast, most semiconductor components have a lifecycle of 5 to 10 years.

Understanding the typical lifecycle of electronic parts is critical:

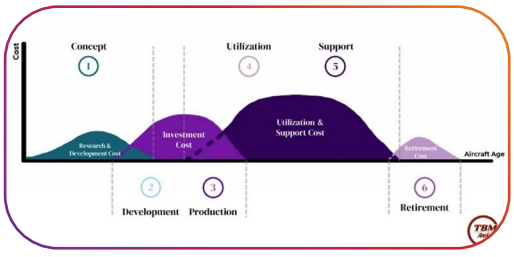
Phase	Characteristics
Introduction	Limited availability, higher cost, evolving specifications
Growth	Increasing demand and availability, reduced unit cost
Maturity	Stable production and supply; ideal for sourcing
Decline	Falling demand, reduced support, potential discontinuance
Phase-Out	Manufacturer announces end-of-life (EOL); last time buy windows open
Obsolescence	Part no longer available; sourcing relies on alternatives or redesign

Engineering Management Takeaway:

Lifecycle forecasting and obsolescence risk analysis should be integrated early in the product definition and maintained throughout the system lifecycle.



Example of MPC processor (widely use in aerospace) end of life



Typical avionics system life-cycle

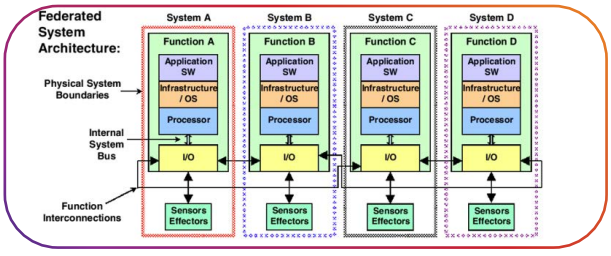
Obsolescence Management within DO-254 Programs

For airborne systems, a change in hardware triggered by part obsolescence has the potential to affect the system's certification baseline. Depending on the nature of the change and the criticality of the hardware function involved, the impact may vary significantly.

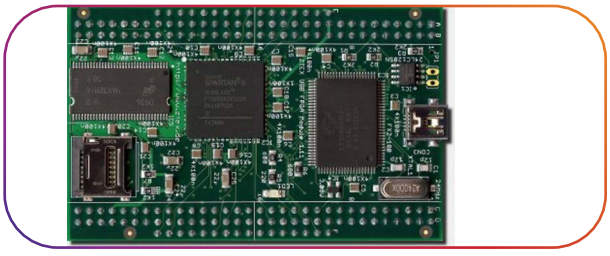
Scenario	Certification Impact	Recommended Action
Aftermarket replica with identical characteristics	Minimal	Confirm manufacturing/ test equivalency and document
Form-Fit-Function (FFF) equivalent	Moderate	Perform impact analysis, verification updates
Technologically different or non-equivalent part	High	Redesign, re-verification, possible re-certification

Engineering Management Takeaway:

Establish a structured process to assess the certification impact of part substitution. Use decision trees or internal guidelines to accelerate response time and limit disruption.



A typical ARINC 653 RTOS architecture: common avionics RTOS (Real-time operating system). When time comes to replace a microprocessor, manufacturer are often considering RTOS. While it might expand the flexibility and functionalities, it might also dramatically increases complexity.



FPGAs are a major concern in CEH (Complex Electronic Hardware)

Recommended Mitigation Strategies

An effective obsolescence management strategy encompasses technical, organizational, and procurement dimensions. Below are key approaches aligned with to minimize risks:

Forecasting and Planning

Use internal tools or databases to evaluate the lifecycle status of components during design.

Select parts with more than one alternate whenever possible and prioritize parts with longer lifecycles or known availability through qualified distributors. For example, AMD UltraScale+ devices provide production lifecycle through 2045 with capabilities to meet Aviation needs.

Sourcing and Inventory Management

Plan and negotiate Last Time Buys (LTBs) as soon as phase-out notices are issued.

Maintain a safety buffer stock for high-risk parts, proportionate to expected demand and certification constraints.

Design for Substitution

Where feasible, employ open architecture principles and modular designs to facilitate future replacements.

Maintain up-to-date alternate parts databases based on FFF equivalence criteria.

Aftermarket and Salvage Approaches

Validate and qualify authorized aftermarket suppliers for replica parts.

Consider controlled use of reclaimed components with stringent traceability and uprating if necessary.

Engineering Management Takeaway:

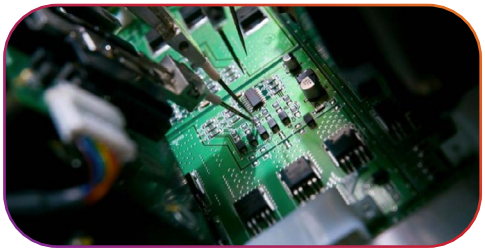
Align obsolescence planning with both product development and supply chain governance. Define clear responsibilities and metrics to monitor risk across programs.

Organizational Integration

Managing obsolescence effectively requires more than technical foresight—it demands organizational alignment and program-level ownership.

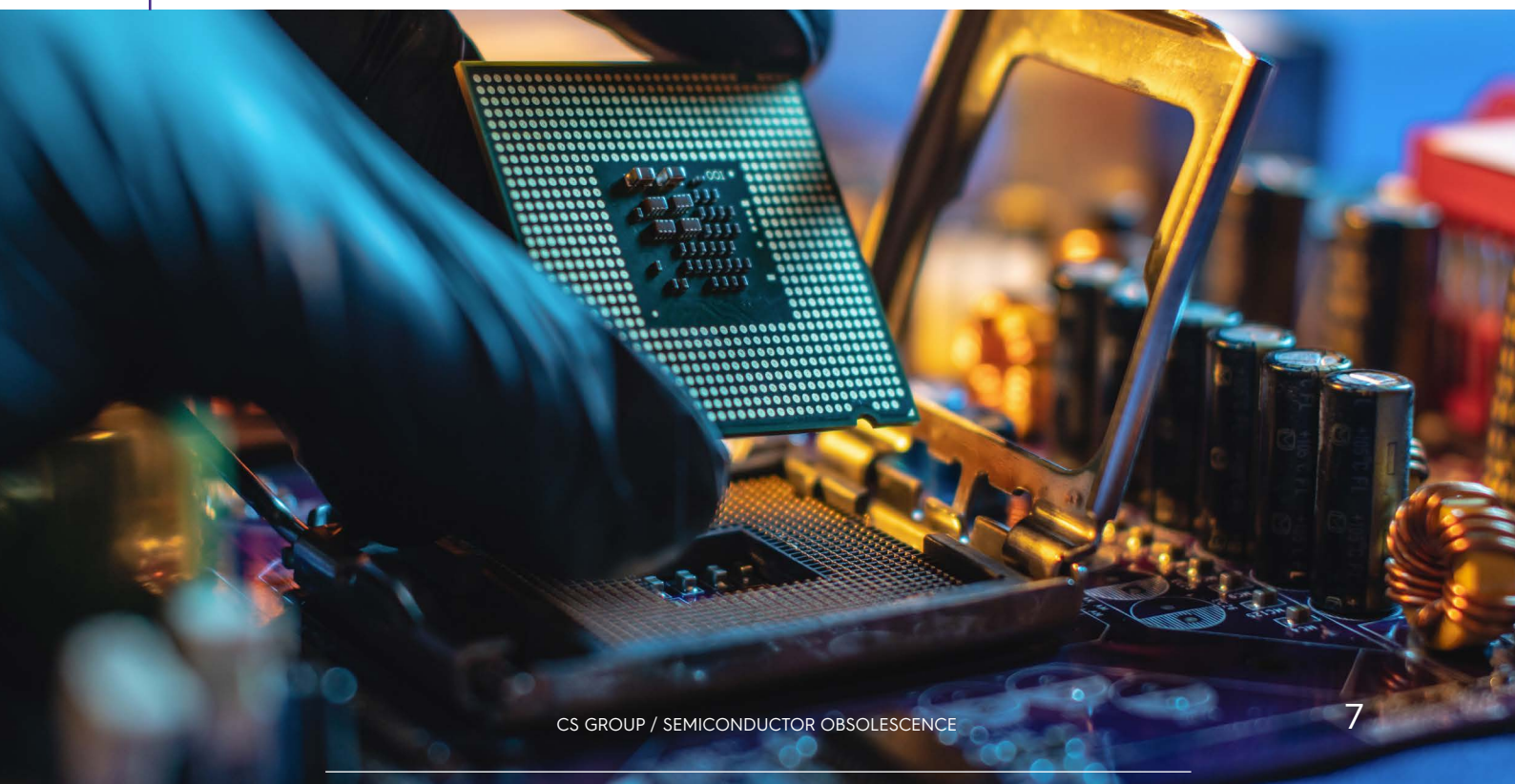
Engineering Management Actions:

- Assign responsibility for obsolescence oversight within programs or across portfolios.
- Integrate obsolescence tracking into product lifecycle management (PLM) and program dashboards.
- Include obsolescence considerations in system architecture reviews and design gates.
- Involve components engineering and procurement in the review



Aerospace-grade PCB: when dealing with obsolete hardware, goal is to "refresh" without breaking, balancing new technology/methods while reusing as much as possible.

Typical non electronic instruments, very common



CS Group Offer

CS Group provides end-to-end support for semiconductor obsolescence management in regulated aerospace environments. Our services cover the full spectrum of technical and certification challenges:

- Bill of Materials (BOM) and schematic analysis to identify obsolescence risks
- Replacement strategies based on form, fit, and function compatibility
- Impact assessment on hardware circuits, interface and board design
- Impact assessments on airborne software (DO-178C) when hardware changes affect software behavior
- Create a certification strategy to maintain compliance and minimize re-development and re-verification across the DO-254, DO-178, DO-160 domains.
- Turn-Key solution : CS Group can fully manage and monitor your obsolescence program, allowing your engineering teams to stay focused on their next-generation priorities.

CS Canada leadership team during an offsite.
LinkedIn CS Group – Canada page

We help our clients maintain compliance while optimizing cost, schedule, and technical integrity. Whether you are navigating a proactive part selection strategy or managing a critical last-minute redesign, our team is equipped to support your objectives. Should any re-verification or re-approval be necessary, CS Group will also be your partner of choice to address those, leveraging our deep expertise in critical embedded system certification.

Engineering Management Takeaway:

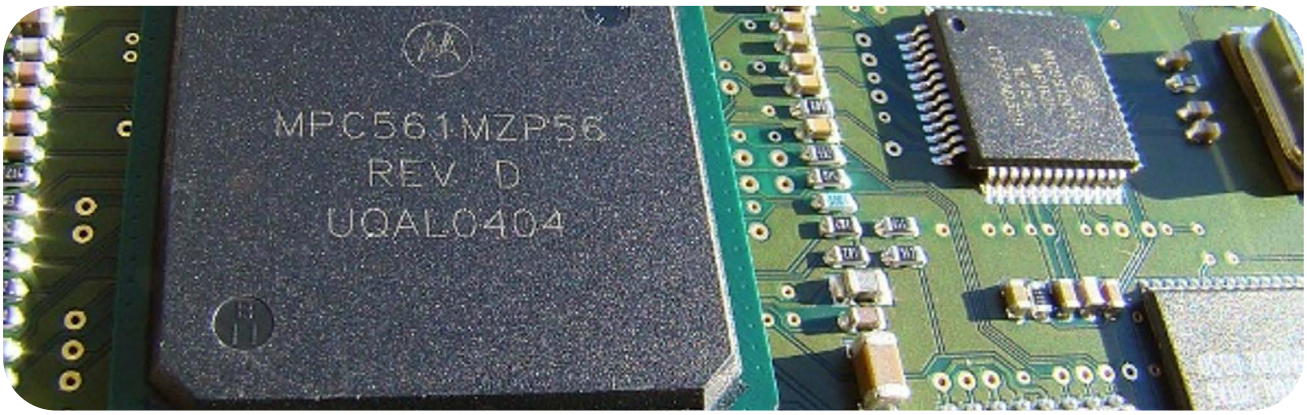
Contact us at info@cscanada.ca

Conclusion:
Strategic Outlook for Engineering Management

Semiconductor obsolescence in DO-254 programs is no longer an exception—it is a recurring reality. Forward-thinking OEMs and Tier 1 suppliers are embedding obsolescence awareness into their engineering and procurement functions from the earliest program phases.

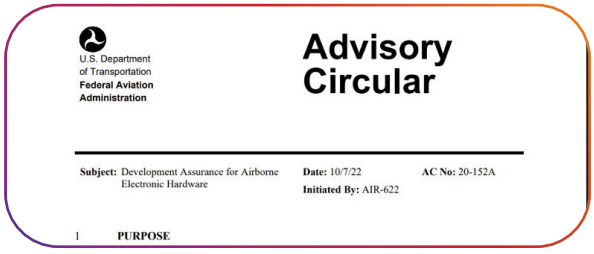
This enables:

- Faster response to obsolescence events
- Minimized certification disruption
- More predictable program execution
- Lower lifecycle cost



Engineering Management Takeaway:

Effective obsolescence planning and certification-aware design are now essential to success in aerospace development. Organizations that embrace this shift will safeguard both program integrity and long-term competitiveness.


U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Development Assurance for Airborne Electronic Hardware

Date: 10/7/22 **AC No:** 20-152A
Initiated By: AIR-622

1 **PURPOSE**

Advisory Circular AC 20-152A Development Assurance for Airborne Electronic Hardware

Modernized cockpits can potentially bring tremendous value. Obsolescence is an opportunity to consider major improvements.