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Build Software
that Matters

CodeSonar®:

Helping Teams Ship Safer, Higher-Quality Code Faster

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Introduction

In safety-critical software development, the cost of a bug isn't measured in debugging hours. It's measured in terms of risk to human life. As software complexity grows across industries like automotive, aerospace, industrial, and medical devices, engineering teams face mounting pressure to deliver code that is not only functional but also provably safe and secure.

[CodeSonar®, AdaCore's advanced static analysis tool](#), gives engineering teams the visibility they need to catch critical defects before they reach production. Unlike traditional static analyzers that evaluate code module by module, CodeSonar performs a whole-program analysis, examining how components interact across the entire codebase to surface vulnerabilities that less sophisticated tools routinely miss. With deep support for C and C++, and compliance with standards such as MISRA, CodeSonar provides tools to shift-left compliance without disrupting developers' workflows.

For engineering managers and tech leads, CodeSonar offers something beyond defect detection: a clearer, more confident path from development to delivery by empowering developers to improve code in their day-to-day workflows.

The organizations featured here operate in very different environments, but they share a common challenge: software defects that reach production aren't just expensive to fix; they can be catastrophic. CodeSonar has enabled them to catch more defects, earlier in the software development lifecycle. How could that capability deliver value to your teams?

Stoneridge, Inc.: Raising the Bar for Vehicle Safety

[Stoneridge, Inc.](#), a global supplier of electrical and electronic components for commercial and passenger vehicles, turned to CodeSonar to strengthen software quality across its development teams. Their key requirements were a well-supported tool with strong C/C++ capabilities and solid compliance coverage for MISRA, CERT-C/C++, and ISO 26262, all of which CodeSonar delivered. The tool has since been integrated into two core development areas: MirrorEye®, their award-winning camera monitor system, and instrument clusters. Multiple teams run analysis jobs daily using Jenkins, Subversion, and Git workflows. Critically, CodeSonar's whole-program analysis gave Stoneridge a complete view of its software, not just individual modules. As Per-Erik Andersson, Chief Engineer Software and System Verification, put it: "CodeSonar offers a thorough analysis of the entire software solution, not just each module as a separate entity." The result is a development environment where engineers spend less time chasing defects and more time building innovative features for their customers.





Autoliv: Transforming Embedded Code Quality at Scale

Autoliv, a world leader in automotive safety systems, develops life-critical software for airbags, seatbelts, and steering wheels, applications where code quality is non-negotiable. Before CodeSonar, their teams struggled with fragmented static analysis: warnings and justifications were difficult to centralize, merge conflicts complicated reporting, and manual MISRA compliance tracking was slow and error-prone. After adopting CodeSonar, 60 developers across roughly twenty projects performed over 12,000 analyses, averaging approximately 150,000 lines of code per project, with results centralized and managed directly within the Eclipse IDE. CodeSonar's ability to detect complex vulnerabilities, particularly memory and buffer overruns, caught issues that previous tools had missed entirely. Compliance coverage for MISRA and cybersecurity standards was comprehensive, and reporting was streamlined through Power BI exports and custom Python scripts. "CodeSonar detects a significantly higher number of warnings than traditional static analysis tools," noted Mickael Pastor, Software Quality and Process. "It is a valuable asset for guaranteeing the quality and safety of our critical software."

Boston Scientific: Automating Safety-Critical Analysis for Medical Devices

Boston Scientific, one of the world's largest medical device companies, manufactures over 13,000 products worldwide, including implantable cardiac rhythm management devices, where firmware quality is literally a matter of life and death. While the company had long recognized the value of static analysis, many of its most important checks were still performed manually because no off-the-shelf tool offered the domain-specific analysis capabilities they needed. Rather than wait for the industry to catch up, Boston Scientific commissioned the development of custom extensions to CodeSonar, enabling them to automate their highest-priority analyses, including a meticulous Shared Data Analysis (SDA) of global data usage in their pre-emptive, multi-threaded operating environment. The impact was immediate: analyses that had previously taken person-weeks to complete now run in hours. "The automated analysis provides a huge amount of leverage in a cost-effective way," said Gerald Rigdon, Software Engineering Fellow. "It doesn't just free up engineers' time; it also means we can analyze our entire code base more often to ensure that our standards are continuously upheld."

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Gerald Rigdon
Software Engineering Fellow



eLeapPower: Shifting Left on Safety from Day One

[eLeapPower](#), an early-stage EV powertrain and charging technology company, took a proactive approach to software quality: before a single line of production code was written, they set out to find a static analysis solution that could keep pace with their fast-moving, lean development team. Their requirements were demanding, including out-of-the-box MISRA C, AUTOSAR C++, and CERT C compliance; ISO 26262 certification; Docker and GitLab integration; and flexible licensing that wouldn't penalize a small team. CodeSonar met every requirement. Integrated directly into eLeapPower's CI/CD pipeline, it provides real-time feedback on every developer change and new build, giving the team instant visibility into vulnerabilities without slowing down innovation. "The biggest challenges in the automotive industry are rigorous cybersecurity software standards, which we can easily meet with the help of CodeSonar," said Felix van Oost, Senior Software Engineer. "CodeSonar ended up at the top of our list," a tool that could grow alongside the company as it scales.

NASA: Quantifying the Value of Static Analysis at Mission-Critical Scale

[NASA's](#) Tracking and Data Relay Satellite System (TDRSS) is one of the most demanding software environments on earth, or above it. Controlling nine geosynchronous satellites and their associated ground stations through over eight million lines of software, the network must maintain 99.5% uptime every single month, supporting human spaceflight and once-in-a-lifetime scientific missions. When a formal

study found that 27% of lost network service time over a six-year period was caused by software defects, NASA turned to CodeSonar to evaluate whether static analysis could make a measurable difference. The results were striking: CodeSonar identified 585 defects across two high-priority software components, 59 of them urgent, with each defect identified in an average of just 15 minutes. NASA's subsequent ROI analysis concluded that correcting those urgent defects alone was expected to cut network downtime by more than half compared to the prior year, and that savings in operational costs alone justified the cost of the tool. "Beyond cost comparisons, CodeSonar provides a good value to the Space Network because a single critical error, latent in operations, puts at risk human life or once-in-a-lifetime scientific discovery," said Markland Benson, NASA Computer Systems Manager. NASA's final recommendation: any organization that depends on internally maintained software for mission-critical functions should strongly consider static analysis as a core part of its product lifecycle.

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Markland Benson

[NASA Computer Systems Manager](#)

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```

int main() {
    try {
        App app{"demo_resource"};
        std::vector<int> nums{1, 2, 3, 4};

        Status s = app.run(nums);
        if (s == Status::Ok) {
            std::cout << "square(5) = " << square(5) << '\n';
            return 0;
        } else {
            std::cerr << "No data provided.\n";
            return 1;
        }
    } catch (const std::exception& e) {
        std::cerr << "Unhandled exception: " << e.what() << '\n';
        return 2;
    }
}

```

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