WOLF Advanced Technology

IN SAFE HANDS: THE WILD DOGS, DEVELOPING SAFETY-CERTIFIABLE AND MISSION CRITICAL SOLUTIONS FOR AEROSPACE AND DEFENSE

– WHITEPAPER

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INTRODUCTION

In aviation, gravity is constant, but certainty is engineered. Every aircraft that leaves the ground carries with it an invisible architecture of trust: trust in the flight controls, the avionics and the mission-systems responding to the crew's inputs, responding automatically and safely to the sensed environment and processing data in real time during all phases of the flight.

That trust is built through disciplined development—from validated requirements and documented design intent to traceable implementation, rigorous testing and demonstrable environmental resilience. In aerospace, safety and reliability are not assumed; they are proven.

As systems grow more computationally sophisticated—integrating high-bandwidth sensors, video processing pipelines, AI-enabled analytics and distributed compute nodes—the challenge of certifying them as "safe" and "reliable" grows with them. Regulators such as the Federal Aviation Administration, Transport Canada and the European Union Aviation Safety Agency do not ask only whether a system is powerful. They ask whether it is reliable, safe and predictable, and whether its development process can withstand scrutiny equal to the consequences of its failure. This is the domain of the Wild Dogs.

Within WOLF's broader ecosystem of innovation-focused teams, the Wild Dogs occupy a distinct and deliberate position. They are not defined by experimental prototypes or exploratory architectures, but by structured engineering discipline. Their mandate is to design and deliver safety-certifiable mission computers and video processing systems capable of being integrated into defense and aerospace environments where safety, reliability and availability are critical.

Where others ask what is possible, the Wild Dogs ask what is demonstrably provable. They operate at the intersection of performance and compliance, where high-throughput embedded computing must coexist with governing standards, developmental rigor, independent review, audit and certification.

In aerospace, innovation that cannot be certified does not fly. The Wild Dogs help ensure that advanced embedded systems are not only capable, but credibly safe and reliable.

REGULATORY FRAMEWORK: DO-178C, DO-254 AND DO-160

Understanding the Wild Dogs' contribution requires clarity on the certification ecosystem within which they operate.

DO-178C governs airborne software development. It establishes objectives for requirements traceability, architecture, documentation, verification rigor, configuration management and quality assurance.

DO-254 provides equivalent guidance for airborne electronic hardware. It applies to complex hardware components such as FPGAs, ASICs and embedded mission computers.

In both cases, development and verification rigor are scaled according to the hazard classification allocated to the hardware or software through the safety assessment process.

DO-160 addresses environmental qualification. It provides standard test procedures used to demonstrate that airborne equipment can withstand shock, vibration, temperature extremes, electromagnetic interference, lightning, humidity, altitude and other aerospace environmental stresses.

Together, these standards form a tripartite framework: environmental resilience, hardware assurance and software assurance. Certification demands coherence across all three. Certification focused development must be treated as an engineering discipline, not a marketing claim.

DESIGN ASSURANCE LEVELS: ENGINEERING RIGOR SCALED TO RISK

Safety criticality is initially determined through a comprehensive platform-level Functional Hazard Assessment (FHA). As the platform design matures and is decomposed into increasingly granular elements, a Development Assurance Level or Design Assurance Level (DAL) is allocated to each element. This allocation reflects the safety criticality of the element and its contribution to platform-level hazards.

Design Assurance Levels exist to impose order on consequence. In aviation, the failure of a flight control computer is not equivalent to the failure of a cabin indicator light, and engineering discipline must reflect that reality. The DAL framework formalizes a graduated scale of risk, from DAL A, associated with catastrophic failure conditions, through DAL B and DAL C, where the severity of the associated failure conditions is progressively lower, to DAL D and DAL E, where the effect is minor or has no impact on operational capability or safety.

This stratification serves a critical purpose: it ensures that the rigor of design, verification, independence and documentation scales with the severity of potential harm. Without such categorization, certification would either become indiscriminately burdensome or dangerously insufficient. The DAL construct preserves both safety and proportionality.

CERTIFICATION IN PRACTICE: WOLF-3184 IN MERCURY'S ROCK3 PLATFORM

The value of this approach becomes tangible in the WOLF-3184-DAL-C, an XMC module integrated into Mercury Systems' ROCK3 mission computer. ROCK3 is a safety-certifiable, SOSA aligned 3U OpenVPX platform designed for military and advanced mobility aircraft. Its open, modular architecture supports applications such as mission management, sensor fusion, surveillance and avionics processing, including mixed safety-domain workloads.

Within this platform, the WOLF-3184 provides real-time video capture and processing capabilities that support situational awareness and advanced sensor integration. Developed to align with DO-254 processes, the module provides safety-certifiable video input and output functionality that can be incorporated into a broader system-level certification framework.

This integration demonstrates the role modular, certifiable components can play in reducing program risk. Rather than treating each subsystem as an isolated certification challenge, system integrators can build upon hardware supported by disciplined requirements management, verification and documentation. The result is a clearer path to integrating advanced video processing into cohesive, safety-certifiable mission systems without adding unnecessary complexity.

TECHNICAL ARCHITECTURE: CERTIFIABLE MISSION COMPUTING

Wild Dogs systems are architected around determinism, traceability and environmental resilience.

Their rugged IGX-based and XMC mission computers are engineered to provide predictable compute behaviour suitable for integration into certified avionics ecosystems. Architectural decisions prioritize controlled interfaces, deterministic data flow and modular validation boundaries—attributes essential when supporting DO-254 evidence packages at the higher DAL levels.

Video processing platforms developed by the Wild Dogs integrate high-bandwidth sensor input using structured hardware verification and validation processes. In applications where video feeds contribute to navigation, targeting or pilot situational awareness, the reliability of that data path becomes integral to overall system safety or mission success.

Software and firmware executing on Wild Dogs platforms may be developed under DO-178C processes by customers or integration partners. WOLF's strategic posture remains hardware-centric: the company provides reliable and certifiable compute infrastructure while maintaining compatibility with a broad range of software ecosystems. This approach allows aerospace primes to retain control of proprietary avionics software while leveraging WOLF's structured hardware assurance processes.

The architecture is therefore both disciplined and adaptable, capable of supporting certification without constraining integrator autonomy.

RUGGEDIZATION AND ENVIRONMENTAL QUALIFICATION

Wild Dogs solutions undergo environmental qualification in alignment with DO-160 standards. Testing addresses shock, vibration, thermal cycling, electromagnetic interference (EMI), altitude and electrical transient conditions, including lightning susceptibility where applicable. Mechanical enclosure design, component screening and power integrity strategies are implemented to support operational stability under aerospace stressors.

Where mission profiles demand it, architectures may incorporate redundancy strategies to support fail-operational or fail-safe behaviour. Deterministic startup sequencing, controlled fault handling and defined recovery mechanisms can contribute to system-level reliability objectives.

Environmental resilience and certification discipline are treated not as parallel activities, but as integrated design imperatives.

SAFETY-CERTIFIABLE INNOVATION

Innovation in regulated environments must be disciplined. The Wild Dogs advance capability while respecting certification constraints.

One area of strategic focus is the development of safety-certifiable, mission critical, high-performance compute platforms capable of supporting AI-enabled processing. As systems increasingly incorporate sensor fusion and onboard inference, reconciling advanced GPU architectures with certifiable hardware processes becomes a defining challenge.

The Wild Dogs are working toward making IGX-based mission computers compatible with formal certification pathways. This requires decomposing high-performance architectures into verifiable hardware elements, managing lifecycle documentation rigorously and ensuring deterministic behaviour where safety boundaries demand it.

Future initiatives include hybrid FPGA and GPU architectures designed to balance flexibility with certification traceability. The long-term objective is clear: enable advanced compute without compromising regulatory credibility.

APPLICATIONS

Wild Dogs systems are suited to applications where computing intersects directly with safety and mission criticality considerations.

In commercial avionics, they support subsystems requiring structured DO-254 compliance. In defence aviation, they enable mission processors and video systems where disciplined hardware assurance strengthens program reliability, even when civil certification is not formally required.

Unmanned aerial vehicles represent another relevant domain. As UAV flight-control systems incorporate increasingly sophisticated onboard compute and sensor processing, safety-certifiable architectures become increasingly important for airspace integration and regulatory acceptance.

Cockpit systems, sensor fusion platforms and ISR compute nodes further illustrate the breadth of application. In each case, the system's contribution to situational awareness, flight stability or mission execution places it within a safety-sensitive operational envelope. The Wild Dogs design for these environments deliberately.

STRATEGIC ROADMAP

Looking ahead, the Wild Dogs are advancing along three parallel vectors: certification depth, architectural evolution and autonomous-system readiness.

Next-generation initiatives include safety-certifiable, AI-capable platforms; hybrid FPGA–GPU systems engineered for traceability; and structured expansion toward higher DAL levels where justified by program requirements and economics. Increased formalization of certification workflows will further support aerospace primes seeking streamlined hardware assurance pathways.

As autonomy expands in both civil and defence aviation, the convergence of high-performance computing and safety certification will help define the next decade of embedded aerospace systems. The Wild Dogs are positioning WOLF to participate credibly in that convergence.

CONCLUSION

In aerospace, safety and reliability must be demonstrable. Safety-certifiable embedded systems demand not only rugged engineering, but disciplined process adherence aligned with standards such as DO-254, DO-178C and DO-160.

The Wild Dogs provide safety-certifiable mission computers and video processing platforms engineered for this reality. By delivering DO-254 DAL-C hardware today—and maintaining a pathway toward higher assurance levels when program requirements warrant—they offer aerospace primes a foundation of structured compliance, environmental resilience and technical integrity. As aviation systems evolve toward greater autonomy and onboard intelligence, certification will remain the gatekeeper of deployment. In that environment, performance without proof is insufficient. The Wild Dogs design for both.

The Wild Dogs—taming the wild to keep missions safe.

To learn more about WOLF's cutting-edge solutions,
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