

# WINMATE



## HOW VEHICLE MOUNTED COMPUTERS ENABLE MOBILE COMMAND CENTERS

Rugged, EMI-Resilient Platforms for Mission-Critical Ground Operations

Winmate – Your Best-Mate in Rugged Solutions

# MODERNIZING TACTICAL VEHICLE INFRASTRUCTURE

Global defense spending in 2025 reached a record high of approximately 2.63 trillion USD (IISS, 2026). This investment is driving a shift, with tactical vehicles evolving from simple transport platforms into mobile command centers, packed with more electronics than ever before.

However, such a digital transformation brings a massive challenge. Hardware now needs to process large streams of real-time data all while surviving environments that destroy standard computers. Inside a tactical vehicle, hardware is subject to constant voltage spikes, vibration and heavy electromagnetic interference from nearby equipment. In these conditions the stakes are high because if the computer fails, the mission stops.

This gap in reliability has created a demand for a new category of hardware, the Vehicle Mount Computer (VMC). Industry leaders are shifting away from modular, handheld devices that are prone to loss and damage, moving instead toward a permanent solution that ensures a vehicle is mission-ready the moment the engine starts. It integrates complex communication, navigation, and diagnostic tools into a single, high-performance platform that remains stable under extreme stress.



**FM14AD-V 14" Windows Vehicle  
Computer with Intel® Processor**



# COMPLIANCE & STANDARDS

All electronic systems must be built and tested according to defense standards MIL-STD 461 and MIL-STD 810. These standards ensure reliable operation within the demanding conditions of military ground vehicles.

**MIL-STD 461G** is essential for ensuring that complex electronic systems can coexist on a single vehicle platform without interference. Hardware designed to this spec features advanced shielding to manage radiated and conducted emissions, while including updated protections. This ensures the computer remains operational even when surrounded by high-powered radar or radio equipment.



**MIL-STD 461F** is the testing specification required to control electromagnetic interference (EMI) across military systems. By satisfying the requirements for both emissions (keeping the vehicle's electronic signature low) and susceptibility (protecting against external noise), it ensures that vehicle computing solutions do not compromise secure communications or sensitive navigation equipment during active operations.

**MIL-STD 810H** is the latest revision of the military's most recognized environmental standard, which incorporates the newest lessons from field experience and technological shifts. Hardware certified to this standard is built to survive the extreme rigors of the modern battlefield, including high-intensity vibration, mechanical shock, and rapid temperature fluctuations. By meeting these updated criteria, devices can ensure maximum uptime for mission-critical vehicle systems.



**MIL-STD 810G** provides the established framework for validating the resilience of tactical hardware across a wide spectrum of environmental stressors. Adherence to these protocols ensures that computing systems maintain reliable performance in challenging climates and high-stress conditions.

# CRITICAL RISKS TO VEHICLE-MOUNTED SYSTEMS

## Harsh Environments

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Military vehicles often operate in unforgiving climates. Intense heat or freezing temperatures can cause standard computer components to expand, contract and eventually crack or overheat, leading to system failure.

## Unstable Power Supplies

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Sudden voltage spikes and drops from vehicle engines can cause standard electronics to reboot or suffer permanent hardware damage during critical missions.

## Electromagnetic Interference

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Radios, radar systems, UAV links, and electronic-warfare equipment generate substantial EMI around the vehicle.



## Constant Vibration and Heavy Shock

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Off road missions make for a high vibration environment. Over time, constant vibration will loosen internal cables and joints and sudden shocks can shatter screens.

## Visibility and User Interface

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High-glare sunlight often washes out standard displays, making screens unreadable and creating a large potential for error. Operators often need to interact with the screen while wearing heavy combat gloves or in rainy conditions, which typical touchscreens cannot handle.

## Latency

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Even slight delays in data transmission can impact decision-making and reduce mission effectiveness.



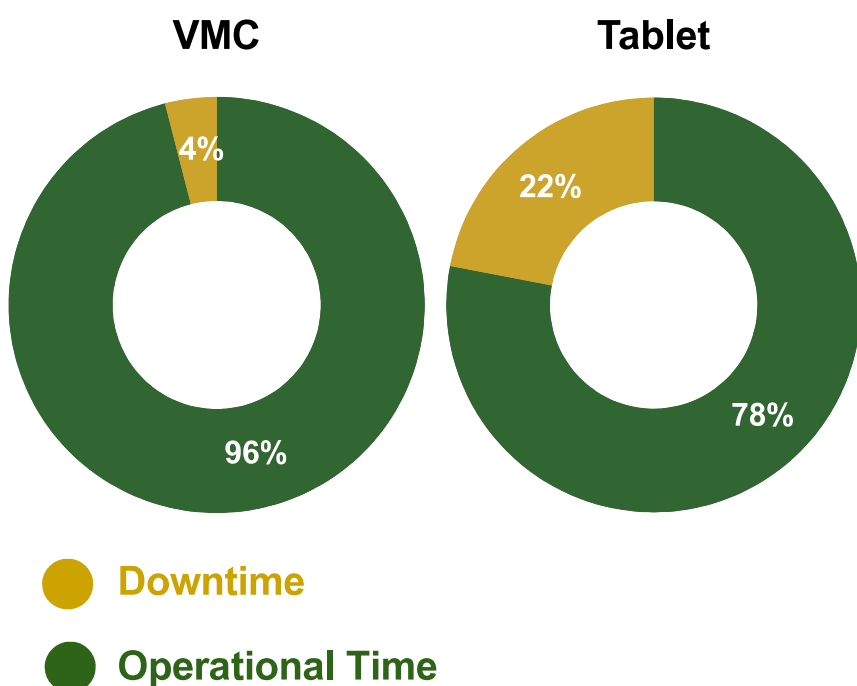
# CHOOSING THE RIGHT TOOL FOR THE JOB

## VMC vs Tablet

When selecting mission-critical technology for military vehicles, the decision lies between a fixed Vehicle Mounted Computer (VMC) and a portable Rugged Tablet. While the lower initial cost of a rugged tablet can be budget-attractive, a Total Cost of Ownership analysis reveals a snowball effect of hidden expenses through higher failure rates and frequent replacement cycles. Portability often introduces significant risk as a tablet can be easily dropped, lost or even stolen, which can compromise secure data. Many organizations end up asking for “locking docks” to keep the tablets permanently in place. At that point, the advantage of portability is gone, but you’re still left with a device that wasn’t built for the vehicles power and vibration needs. These frequent failures create a continuous financial drain, as the cost of specialized labor, spare parts, and shipping quickly surpasses the original purchase price of the device.

Winmate’s VMCs are engineered for the vehicle’s entire service life, offering a lower repair and replacement cost by eliminating the durability gaps inherent in portable hardware. By integrating directly with vehicle power and using vibration proof connectors, these units ensure fewer mission interruptions caused by battery degradation or signal loss. For long-term fixed vehicle deployment, the VMC is the more sustainable TCO model, by providing a stable, 24/7 ready platform that outlasts multiple generations of consumer-grade alternatives.

### Survival Rate of Devices in High-Vibration Military Environments Over 5 years



While tablets are a strong choice for mobile flexibility, they are often the weak link when it comes to permanent vehicle terminals. Independent industry research indicates that purpose-built vehicle mounted computers maintain a 96% reliability rate over a 5-year lifecycle, significantly outperforming mobile tablets which face higher failure rates due to battery degradation and port wear in high vibration environments (VDC Research, 2021).

# THE WINMATE VMC SERIES

Modern vehicle operations don't follow a "one size fits all" approach. To ensure seamless integration into any defense infrastructure, Winmate's VMC series is divided into two primary ecosystems:

## Windows Vehicle Mounted Computers

Designed for complex multitasking and deep integration with existing defense and enterprise systems.

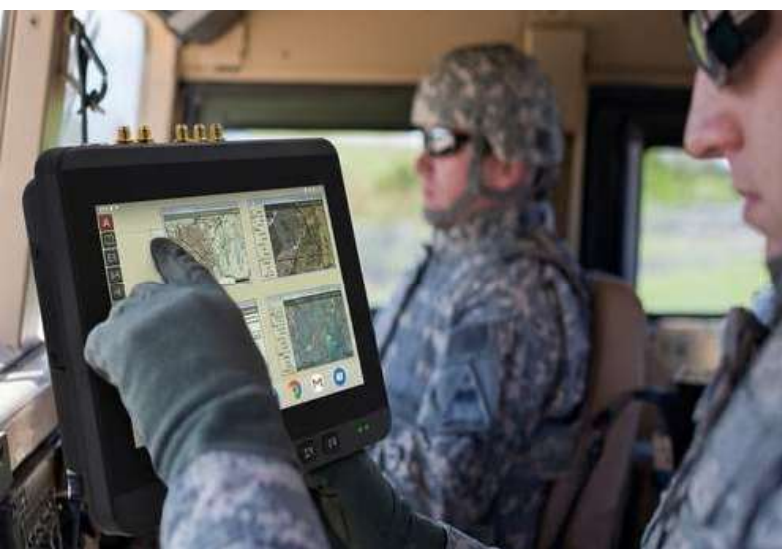
- Full support for Windows 10/11 IoT Enterprise, allowing for seamless deployment of desktop-grade software.
- High-performance architecture capable of handling resource-heavy reconnaissance and command-and-control applications.
- Available in sizes ranging from 7" to 10.4" to fit diverse needs.

## Android Vehicle Mounted Computers

Designed for the next generation of "mobile-first" operations and rapid user adoption.

- Optimized for smooth graphics and high-speed processing with the Qualcomm® Snapdragon™ 660 platform.
- An open, customizable OS that supports the latest mission-critical apps and provides a tablet-like user experience.
- Equipped with a one-click top latch dock, allowing the VMC to transition instantly from a vehicle-mount to a handheld device.

**Winmate offers over 20+ specialized configurations across Windows and Android lines**



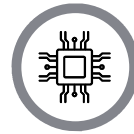
Choosing the right OS is only the first step. Turn to the next page to see the mission-critical features that make Winmate the industry standard for rugged vehicle computing.

# VMC KEY FEATURES



## Ruggedness and Durability

Purpose-built to withstand challenging environments, Winmate devices use durable materials engineered to resist drops, vibrations, water, and extreme temperatures. This robust construction minimizes downtime and protects against data loss in industries like manufacturing and public safety.



## High Performance CPU

Wimate's FM series is equipped with Intel processors, designed to support the next generation of IoT edge devices. These processors deliver enhanced CPU and graphics performance along with integrated IoT features, real-time performance, manageability, security, and functional safety.



## Sealed and Waterproof Designs

With an IP65 rating or higher, these devices are completely sealed against dust, rain, and humidity, promoting sustained performance. Professionals can work confidently in the harshest conditions, knowing their equipment is fully protected from contaminants.



## Connectivity

These devices feature lightweight construction and seamless wireless options including WLAN, BT, and cellular networks. This ensures real-time communication and remote collaboration from any location.



## Outdoor-Readable Displays

Featuring high brightness levels of up to 800 nits and anti-glare coatings, these screens ensure visibility in bright sunlight or low-light scenarios. This allows for accurate data entry and readability regardless of the external environment.



## Extended Battery Life

Engineered for long-term field use, our devices provide the battery life necessary for full shifts in remote areas. This eliminates the need for frequent recharging and keeps operations running uninterrupted throughout the workday.



## Permanent Docking Solutions

Created for high-vibration environments, our VMC docking solutions provide a permanent, ultra-stable mounting interface. This reduces risk of device removal, damage, loss, or data exposure.



## Industrial Metal Housing

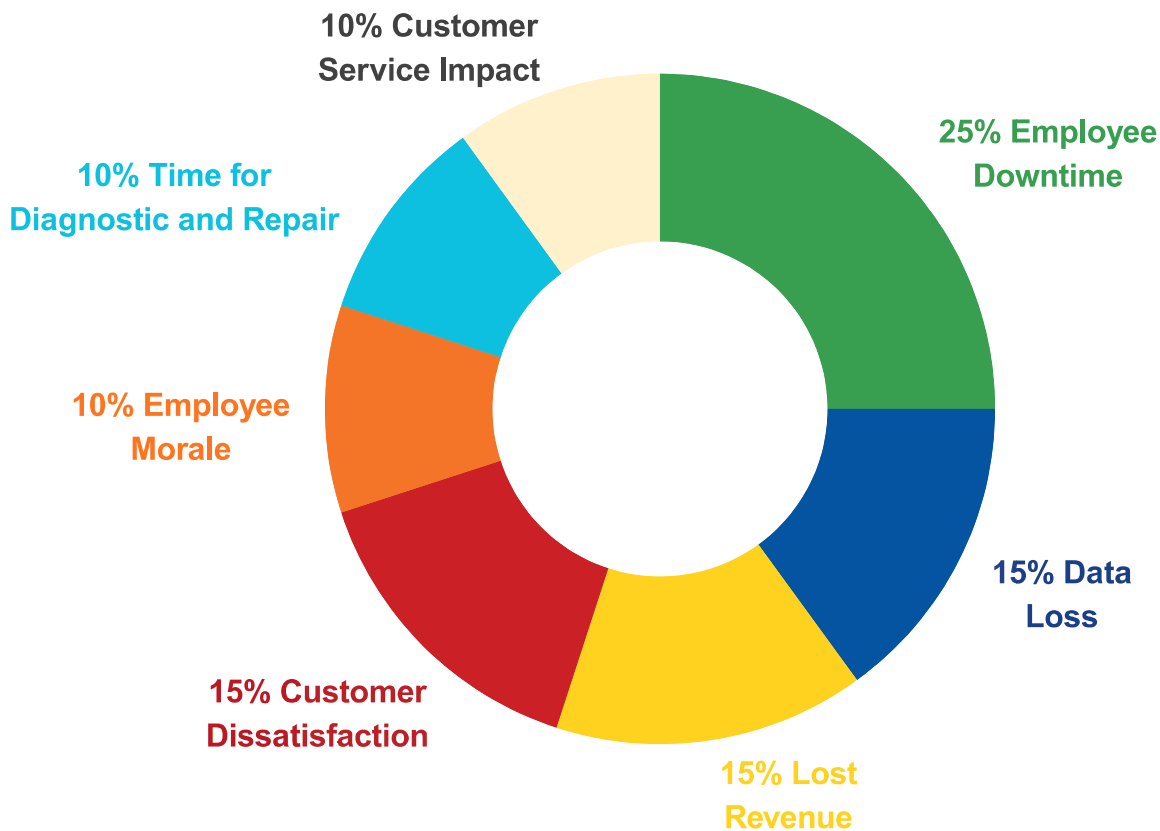
Engineered with a high-strength magnesium alloy enclosure, Winmate VMCs provide structural integrity. This lightweight, rugged construction is built to withstand the intense vibrations and impacts of demanding environments.

# THE COST OF SUBSTANDARD HARDWARE

As established, the lower upfront price of a rugged tablet is deceiving when compared to a purposed-built Vehicle Mounted Computer. To understand the true value of a VMC, we need to look at Total Cost of Ownership.

According to research from Danakas, while initial savings seem attractive, the chart below illustrates the massive financial and operational ripple effects that occur when a device fails to meet the extreme power and vibration demands of a military vehicle. These risks are indirect costs that aren't found on a purchase order, such as mission interruptions and employee downtime. By prioritizing a better fit for long term fixed vehicle deployment, Winmate VMCs ensure higher fleet readiness through lower failure rates and reduced repair and replacement costs.

## Costs When a Device Gets Damaged



## Product Longevity Program (PLP)

To further eliminate the hidden costs of forced hardware upgrades, Winmate offers a Product Longevity Program (PLP). This program ensures a stable supply of key products and spare parts for at least five years, minimizing disruptions to operations and ensuring higher fleet readiness. It is designed specifically to assist enterprises facing challenges with component shortages and the need for long-term production planning.

# WINMATE VMC ENGINEERING

**Durable Material Selection:** By utilizing industrial-grade, non-corrosive alloys and military-grade internal components, Winmate ensures the device can withstand chemical exposure and extreme temperature shifts without degradation.

**Anti-Vibration and Anti-Shock Design:** These systems are built to MIL-STD 810H standards to prevent internal joints or cables from loosening, ensuring fewer mission interruptions due to hardware fatigue.

**Locking or Reinforced I/O Connectors:** Specially designed connectors physically cannot vibrate loose on rough terrain, providing improved deployment stability and constant network connectivity during high-speed tactical operations.

**Wide-Voltage and Ignition-Control Support:** Built-in protection survives the sudden voltage spikes and drops of vehicle engines, ensuring the system is mission-ready the moment the engine starts without risk of reboot or damage.

**Reinforced Enclosure Architecture:** A completely sealed, IP65-rated housing acts as a physical barrier against dust and pressurized water, ensuring that internal electronics remain isolated from the external environment during high-intensity operations.

**Rugged Mechanical Housing:** By utilizing industrial-grade materials and a reinforced enclosure architecture, Winmate ensures high-intensity vibration resistance which directly results in higher vehicle uptime during off-road maneuvers.

**Fanless Thermal Design:** This engineering choice eliminates mechanical fans, which are a common point of failure, enabling silent, reliable operation in extreme temperatures and contributing to stronger long-term fleet readiness.

**Long Lifecycle and Long-Term Deployment Readiness:** Through a dedicated long-lifecycle program, Winmate guarantees a stable supply of parts for at least five years, protecting budgets from forced upgrades and ensuring long-term fleet sustainability.



# THE FUTURE OF MILITARY VMCs

As military operations continue to evolve, so does the technology that supports them. Winmate continues to push the boundaries of what vehicle mounted technology can achieve.

- Advancements in ruggedization are expected, with efforts to ensure durability and resilience in diverse operational environments.
- Winmate is developing VMC platforms that incorporate 5G, satellite communication and mesh networks. This will facilitate seamless data exchange between VMCs, command center, and field units.



- VMC's are evolving from passive displays into active intelligence hubs. By integrating AI, our future systems will be capable of enhanced decision-making, autonomous operation, and predictive analytics. AI algorithms will analyze sensor data, detect patterns, and provide actionable insights to optimize mission planning and execution.

The shift toward smarter, more connected hardware is about keeping pace with the speed of modern operations. By focusing on better connectivity and real-time data, these future platforms will ensure that teams stay informed and coordinated, no matter how unpredictable the environment gets.

# SUCCESS STORIES

## Transforming Armored Defense Vehicles

### Background

In the realm of armored defense vehicles, where reliability, performance, and ruggedness are paramount, Winmate's innovative vehicle computing solutions have emerged as a game-changer. Traditional computing systems used in these vehicles often lacked the performance, reliability, and flexibility needed to meet the demands of modern warfare scenarios. For a Northern European tank force, this led to the integration of Winmate's FM14E-V and FM10AD-V.

### The Solution

To address these challenges, the agency deployed the FM14E-V (a 14" Windows Vehicle Computer with Intel® Elkhart Lake x6425E) and the FM10AD-V (a 10.4" Vehicle Mount Terminal with Intel® Alder Lake). These solutions provide military-grade durability and high-performance processing power tailored for automotive applications. Winmate's ability to customize specialized software and mounting configurations ensures the hardware integrates seamlessly into existing armored vehicle infrastructure.

### The Impact

By integrating the FM14 and FM10 series, tank crews can now identify threats and process complex battlefield data from multiple sensors and cameras simultaneously. This real-time processing capability allows operators to maintain a clear picture of their surroundings during high-stakes maneuvers without the lag associated with older systems.

The shift to high-performance architecture gives commanders actionable insights on the fly, supporting complex mission planning and allowing units to respond to evolving warfare landscapes much quicker than before.

Most importantly, this ensures that onboard systems stay functional despite conditions and extreme environmental stress. This eliminates the risk of system failure during critical moments, guaranteeing operational readiness and minimizing the hidden costs of downtime.



# SUCCESS STORIES

## Empowering Northern European Tank Forces

### Background

Northern Europe's military operations often unfold in challenging environments characterized by rugged terrains, harsh weather conditions, and dynamic battlefield scenarios. Tank fleets play a crucial role in these operations, requiring advanced technological solutions to navigate the complexities of modern warfare effectively. Recognizing the need for innovation, the Northern European armed forces sought to enhance the capabilities of their tank divisions through the integration of cutting-edge industrial edge AI computers.

### Main Challenges

The Northern European armed forces integrated the Winmate Military VMC + WNAI-E800, a ruggedized industrial Edge AI system. Built with Intel 12th/14th Gen processors and NVIDIA RTX GPUs, this solution was customized to fit existing tank infrastructure. It provides the heavy-duty computational power needed to run AI-driven algorithms for predictive analysis, route planning, and real-time target identification, all while withstanding the harshest environmental physical stress.

### The Impact

Tank crews can now identify threats and navigate complex landscapes even in adverse weather, thanks to real-time data processing. The AI integration gives commanders actionable insights on the fly, allowing them to formulate strategies and respond to threats much quicker than before. The ruggedized design ensures that onboard systems stay functional despite extreme shocks and temperatures, guaranteeing operational readiness and minimizing system downtime during critical missions.



# ACHIEVING MISSION-READY RELIABILITY



As global defense spending hits record highs, the “digital backbone” of the modern land force has never been more critical. The transition of tactical vehicles from simple transport platforms to high performance command centers requires a level of durability that commercial-grade technology cannot provide.

While the initial lower cost of a rugged tablet may seem appealing, the hidden costs create risks that can jeopardize a mission. Winmate’s VMCs, certified to the most rigorous MIL-STD-461 and 810 standards, are engineered to decrease these risks and provide a product you can truly trust.

The future of the battlefield is defined by connectivity and intelligence. Winmate is already leading this evolution by integrating 5G, satellite mesh networks and Edge AI into our next-gen platforms.

In an environment where a computer failure means a mission stops, reliability is not a luxury, it is a necessity. By choosing Winmate, defense organizations are eliminating the hidden costs of failure. When you prioritize purpose-built durability, you can ensure your platform stays operational, your data secure and your budget protected from the high price of downtime.

## WINMATE’S FM SERIES

10.4"



### FM10AD-V

Vehicle Mount Terminal with Intel® Processor

12.1"



### FM12E-V

Vehicle Computer with Intel® Elkhart lake x6413E

10.4"



### FM10MG-V

Android Vehicle Computers with Genio 510 A78 + A55 CPU

12.1"



### FM12Q-V

12.1inch Android Vehicle Computer with Qualcomm Snapdragon™ 660

Achieve ultimate operational efficiency with the rugged durability and elite processing power of Winmate’s FM10 and FM12 Vehicle Mounted Computers.



## About Us

With over 30 years of industry experience, Winmate is a global leader in rugged computing and intelligent edge solutions. From rugged tablets and rugged laptops to panel PCs, industrial displays, Edge AI systems, and robotic controllers, our products are built to support demanding environments across industries. We specialize in providing tailored solutions and hardware customizations to meet the unique needs of customers in sectors such as industrial automation, defense, logistics, automotive, and more. Backed by in-house testing laboratories and a strong global distribution network, Winmate ensures reliable performance, long-term support, and proven durability.

For more information about Winmate, please visit our website: [www.winmate.com](http://www.winmate.com)

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