



— SYSTEM DESIGN FOR HOW YOU WORK... AND WHERE YOU WORK

One of Sealevel's earliest products was a rugged, two-port serial card developed to link computers to textile looms. Our commitment to delivering rugged, reliable hardware and software solutions has not wavered. Our team leverages existing IP, reference circuits, computer-on-module, and system-on-module designs to create high-reliability electronics systems for our standard product catalog of COTS solutions, OEMs, and industry leaders.

Using a design for certification approach, our team begins with the end in mind, carefully evaluating the applications for our products across industries to ensure we meet all I/O, processing, environmental, safety, and security requirements. Sealevel's team has direct experience meeting – and exceeding – many military and commercial standards, including:

- MIL-STD-810
- MIL-STD-461
- MIL-STD-1472
- MIL-STD-901
- MIL-STD-464
- MIL-STD-167-1
- EMC (FCC, CE)
- EFT
- IEC/EN
- IP (Ingress Protection)
- NEMA
- ATEX
- IECEx
- Class I, Division 1
- Class I, Division 2

Thermal Management

Challenge

Design and manufacture an industrial computer to withstand operating temperatures of -40° to $+70^{\circ}\text{C}$.

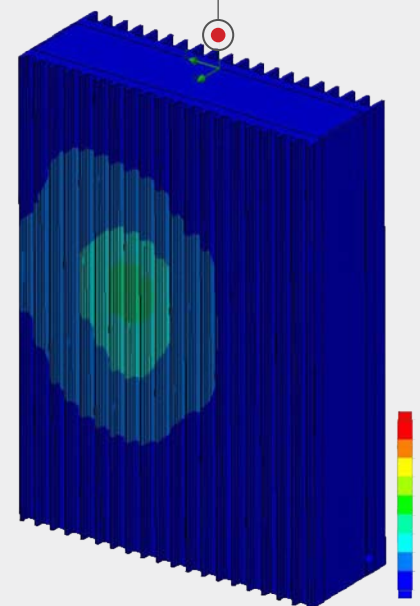
Sealevel Solution

Our engineering team was able to achieve an operating temperature range of -40° to $+71^{\circ}\text{C}$ through:

- Intentional component selection and placement
- System component power estimation
- Thermal simulation
- Heatsinking high power components

Simulating Environmental Extremes

Through simulation, we replicate the conditions that are likely to occur in the product's deployment environment. The resulting imagery indicates the temperatures within the unit based on those environmental factors.



On-Site Environmental Chambers

Our manufacturing facility includes a complete line of test equipment including thermal chambers. These in-house capabilities allow us to pre-qualify products throughout prototyping prior to official certification.

Shock & Vibration

Challenge

Engineer and produce a computer that can withstand shock and vibrations at levels that nearly double those specified by MIL-STD-810.

Sealevel Solution

Our mechanical and electrical engineers worked closely to develop a highly integrated enclosure and carrier board selection. The teams carefully selected components that meet the most demanding electrical and physical requirements, including:

- Low-profile surface mount designs
- Rugged high retention connectors
- Locking fasteners with thread-locking adhesives
- 6063-T5 aluminum extruded



Hazardous Location

Challenge

Create next generation industrial touch panel PCs for use in hazardous environments, subject to various environmental stressors – and areas conducive to explosions.

Sealevel Solution

Following testing for endurance, impact resistance, ingress protection, and thermal shock, the system achieved:

- NEMA 4/IP64
- EMC: FCC/ISED Class A, CE
- Class I, Division 2 Groups A, B, C, D, T4
- ATEX/IECEx: 3 G Ex ic ec IIC T4 Gc
- Wide temperature operation of -40°C to +60°C



SWaP-C² Optimization

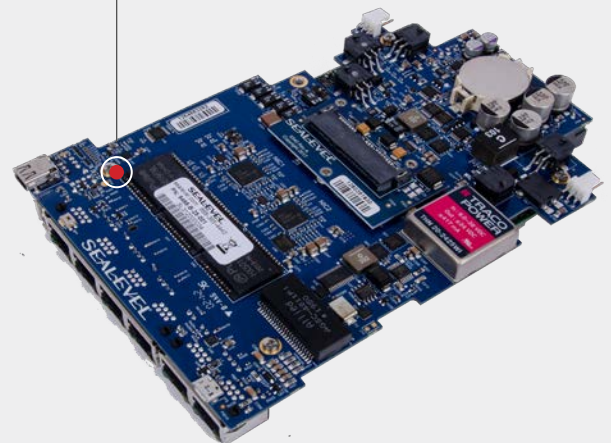
Challenge

Engineer and build a tactical communications carrier solution with a very small footprint, combined with high-performance requirements, high-speed I/O, and wide operating temperature range.

Sealevel Solution

We have developed a variety of multi-board carrier solutions with high-speed signals efficiently routed in very small form factors that continue to operate under less-than-ideal power conditions. These designs have incorporated:

- COM Express Type 6
- COM Express Type 7
- Video: Mini DisplayPort, HDMI
- -40°C to +85°C operating temperature range
- I/O: 10 Gigabit Ethernet, Gigabit Ethernet, USB 2.0, USB 3.0, SATA II, SATA III
- IPMI 2.0





● — STANDARD-SETTING ENGINEERING EXPERTISE



With over 35 years of IP and more than 350 standard products, our engineers are equipped to develop application-specific I/O and meet rugged, embedded computing specifications.

Electrical

- COM Baseboard Design
 - COM Express® Type 6
 - COM Express® Type 7
 - COM Express® Type 10
 - SMARC®
 - Qseven®
- x86 Architecture
- RISC Single Board Computer Design
- PCIe/104
- 8, 16, and 32-bit Microcontroller-Based CPUs
- Serial I/O
 - Asynchronous
 - Synchronous
- 10 Gigabit Ethernet
- USB 3.2, 2.0, 1.1, 1.0
- CAN Bus
- Wi-Fi
- Analog
 - A/D
 - D/A
 - Audio
- MIL-STD-1553
- High Density/BGA
- PCB Layout
- PCB Simulation Software
- Embedded Logic
 - FPGA
 - UART
 - RISC
- Component Power Estimation
- Thermal Modeling
- Functional Density
- SWaP-C²

Mechanical

- SolidWorks

- Simulation
- Design Reviews & Manufacturability
- Thermal Modeling
- Heat Sinking
- High-Power Components
- High Retention & Locking Connectors/Fasteners

Compliance & Test

- MIL-STD-810
- MIL-STD-461
- MIL-STD-1472
- MIL-STD-901
- MIL-STD-464
- MIL-STD-167-1
- EMC (FCC, CE)
- EFT
- IEC/EN
- IP (Ingress Protection)
- NEMA
- ATEX
- IECEx
- CID1 and CID2
- Thermal Shock
- Environmental Stress
- Radiated Emissions
- Endurance Testing
- Impact Resistance

Software

- Device Drivers
 - Windows®
 - Windows® Embedded
 - Linux®
- Embedded Firmware
- C/C++, C# and .NET
- Hardware Interface
- Cloud Software

- Device Management Software
- Alerting & Response Mechanisms
- RESTful Web Services
- Manufacturing Test
- GUIs for Command & Control Applications

System Design

- Application Design, Documentation, and Implementation
- Analysis of System Functional Requirements
- Hardware/Software Compatibility
- 3D CAD/CAM
- Embedded Logic & Signal Processing Board Design
 - SOM
 - RISC Microprocessors & Controllers
 - ARM
 - DSP
 - FPGA
- LCD & Touch Screen Integration
- Enclosure Design
 - Machined
 - Cast
 - Metal
 - Molded
- BSPs for Development/Porting of Device Drivers for Peripherals
- Operating Systems
 - Windows®
 - Windows® Embedded
 - Linux®
 - BSPs