

>>> Case Study



Mobile Microgrids and the Rugged Edge: Ensuring Power Reliability Everywhere

How turnkey power and fuel solutions leverage industrial computing and AI to boost grid efficiency when and where needed



The Challenge

- Increase reliability of energy transmission through highperformance mobile microgrid trailers
- Capitalize on flexible microgrid capabilities for a broad range of customer demands
- Reduce costs for power operators with closer insight into energy consumption rates, equipment performance, and more
- Move away from consumer-grade compute solutions to ensure rugged, reliable performance
- Overcome supply chain roadblocks inherent to today's incredible demand for embedded computing hardware





The Solution

- Turnkey, intelligent systems implemented onboard trailer-mounted processing centers deployed as mobile microgrids
- Modular functionality with Premio's RCO-6000-CML rugged edge system featuring high-performance processing, storage, and connectivity
- Integrated with Premio's EDGEBoost Nodes, operating as performance-driven building blocks for custom configuration with powerful hardware acceleration with GPUs
- Tap into GPU performance acceleration to access parallel processing necessary to handle cloud data, machine learning, and artificial intelligence
- Integrate high-performing NVIDIA A2, a Tensor Core GPU, with system validated to environmental extremes





The Benefit

- Rugged edge capabilities enable 'go anywhere' modular power solutions and services
- Systems tested and validated to ensure reliable performance amid deployments in the harshest environmental settings
- Improved reliability in wider temperatures (-25C to 70C), wider input voltages (9-48VDC), and tolerance to shock (20G) and vibration (3GRMS)
- Modernized offerings with Premio's ultra-rugged PC architecture with an NVIDIA GPU running complex algorithms at the edge
- Zero defects to date in real-world deployments for mobile microgrid trailers
- Expert supply chain management keeps production on schedule for customer go-to-market scale



The AI Edge Inference Computers support modular add-on nodes through a two-piece modular design that allows the EDGEBoost Nodes to easily attach to the lower portion of the RCD-6000-(CFL/CML/ADL) for more performance accelerators



Model	PCIe/PCI	SATA Boost	NVMe Boost	GPU Boost
RCO-6000-CML	2C	2C-4B7M	2E-4N (7mm)	2C-2PWR
		2C-2B15M	4NS (15mm)	20-2060S
Comet Lake S			4NH (15mm)	2N-2060S
			8NS (7mm)	4N-2060S

Model	PCIe/PCI	NVMe Boost	GPU Boost
RCO-6000-CFL Coffee Lake R	2C	2E-4N (7mm)	2C-2PWR
		4NS (15mm)	2N-2060S
		4NH (15mm)	4N-2060S
		8NS (7mm)	



The Company

From California to the East Coast, power grid outages have become all too common. Excessive demand, extreme weather events, cyber attacks, and more have made today's power grid less than reliable. And resulting power interruptions can lead to everything from mere inconvenience to business losses, and even life-and-death situations. One company specializing in power and fuel solutions for remote and



grid-paralleling applications is looking to change that. With its mandate to transform the energy landscape, this company's small-scale, self-contained microgrid trailers operate independently of major power grids or in tandem with other microgrids to fill grid gaps and keep life running smoothly. Deployed when and where needed, these modular energy resources improve power quality, integrate on-site generation resources, reduce peak demand charges, and provide standby (emergency) power generation.

According to the National Renewable Energy Laboratory (NREL), a national laboratory of the U.S. Department of Energy, "A microgrid is a group of interconnected loads and distributed energy resources that acts as a single controllable entity with respect to the grid. It can connect and disconnect from the grid to operate in grid-connected or island mode. Microgrids can improve customer reliability and resilience to grid disturbances."

www.nrel.gov/grid/microgrids.html

With an array of power solutions, this company offers an advanced energy management and generation platform via an intuitive software portal. Power operators can access power services, insight on emissions reductions, and energy storage for the pressure pumping, remote mining, utility, and distributed generation industries. By incorporating artificial intelligence (AI), the platform

manages live emissions tracking, asset carbon intensity, automated backoffice management, and environmental, social, and governance (ESG) reporting on a centralized database.

The portal also offers real-time insights into operations, with the ability to view equipment conditions, analyze energy consumption rates, project costs for the rest of the month, approve invoices, and purchase carbon credits to offset emissions.

"Mobile microgrids are where rugged edge computing can really excel – blending performance and reliability in uniquely demanding environments, both in terms of data handling and physical setting," said the company's Senior Manager of Network and Communication. "A solution of this magnitude calls for substantial compute power. And its deployment in wide temperature ranges meant we were looking for a robust industrial-grade hardware solution built for next-generation computing anywhere."





The Challenge

To deliver the near-real-time access to critical operational data necessary for reliable microgrid performance, the platform leverages the cloud, machine learning, and AI. Like many AI-centric startups, this power solutions company started out using consumer-grade computers to run its algorithms. While the strategy worked early on, technological advances and growth objectives clearly dictated significant hardware improvements. Compute power, ruggedness, component availability, and scalability were top considerations.

In tackling the compute challenge, this team knew their new hardware system would need to incorporate GPU processing. Long used in graphics and gaming, GPUs are particularly well-suited to AI, machine learning, and deep learning applications due to their massive number of cores that can simultaneously perform complex calculations that CPUs find difficult to execute. A GPU essentially serves as a performance accelerator, offloading the CPU's workload for faster and more efficient processing, a key requirement in edge computing models.



The search for the optimal GPU led the company to the NVIDIA

A2, a Tensor Core GPU that provides edge computing inference by incorporating low power and high performance in a small footprint,. But, to take full advantage of NVIDIA AI at the edge, its consumer-grade computers would have to go. Painfully insufficient – lacking the compute power and ruggedness required for this type of mission-critical deployment – existing desktop systems were simply incompatible with the GPU's extensive list of capabilities. The company needed a significant hardware upgrade to improve its offering and develop a truly portable, scalable, and affordable remote microgrid power solution. The required industrial solution must not only accommodate the NVIDIA GPU but also meet environmental challenges such as wide

temperature ranges and shock and vibration situations.

While a pretty straightforward assignment, this could prove difficult, particularly in light of supply chain issues largely brought on by the COVID-19 pandemic – and largely remaining today. In fact, according to a new report from KPMG, "Disruptions to supply chain operations are set to stay in 2023, whether they be related to existing or new geopolitical conflicts, inflationary pressures and the recessionary environment, climate change weather events, or other issues yet to emerge. They can all impact access to goods and how they flow to their final destination, create port holdups, reduce container and ocean freight availability, and surge prices, among other concerns." The company would need a solution provider who expertly checked the boxes for technology expertise as well as those related to supply chain management and strategy.





The Solution

In investigating its options, the team met with Premio, a leader in rugged edge and embedded computing technology. After learning about the power solutions company's business, its goals for the new platform, and its intent to leverage an industrial computing solution with NVIDIA A2 GPUs, Premio got to work designing the optimal system for the job.



It was clear from the get-go that the platform's extensive AI capabilities and harsh environment deployments dictated a robust, rugged edge solution.

Premio turned to the RCO-6000-CML AI Edge Inference Computer for its rugged and high-performance sockettype processor design. These units are extremely modular and include Premio EDGEBoost Nodes that serve as performance-driven building blocks for custom configurations that require hardware acceleration. This approach ensures improved reliability in wider temperatures (-25C to 70C), wider input voltages (9-48VDC), and tolerance to shock (50G) and vibrations (5GRMS). Tested and validated to ensure reliable performance amid deployments in the harshest environmental settings, Premio then set out to integrate the NVIDIA GPU. Premio's engineers

worked closely with NVIDIA and the customer to combine Premio's ultra-rugged PC architecture with NVIDIA's powerful capabilities in running complex algorithms at the edge.

Unlike current CPUs, GPUs consist of thousands of cores, making them capable of calculating the linear algebra commonly used in AI models. With pure compute power and environmental issues addressed from an industrial computer standpoint, there was next concern regarding the amount of heat being generated. Premio recommended and designed-in a custom airflow chamber that would alleviate the potential for excessive heat and its related problems due to NVIDIA's A2 passively cooled design.



The Benefits

By working with Premio, this customer has modernized its offerings in ways it couldn't have imagined. Integration of the NVIDIA A2 GPU within the Premio RCO-6000-CML AI edge inference computer now enables the platform to run complex algorithms for its edge compute offering. Through low-latency data processing, organizations that leverage mobile microgrids have at their fingertips mission-critical business insights, based on actionable intelligence that allows them to better respond to situational data.





Premio assembled a team of experts in account management,

engineering, and supply chain management to work hand in hand with the customer to ensure all questions and concerns were properly addressed and resolved. When the first batch of RCO-6000-CML AI edge inference computers was assembled, the customer's lead engineer on the project traveled to Premio's manufacturing facility in Southern California to observe production and take delivery. This simple gesture gave the customer added confidence in the units and their vendor selection. Premio's sales and fulfillment teams also kept the customer closely apprised of the forecast and delivery schedule, further assuring that defined deadlines would be met.

By leveraging Premio's engineering and supply chain expertise, this customer has saved significantly on development costs – measured in both time and money. Also, with a consistent configuration, re-engineering and testing new platforms is a thing of the past. Zero defects on all Premio computers have been reported to date, allowing this company the ability to better use its resources for servicing customers and growing its platform and program for mobile microgrids.

"Premio's partnership in product design and manufacturing has been a game changer for us. Knowing that we are receiving quality products that have met all of our timelines, we can focus our attention elsewhere," added the customer's Senior Manager of Network and Communication. "Whether that means growing the program, engaging more closely with our customers, or developing new products or ideas, we can comfortably leave the computing system to the rugged edge hardware experts."

This customer has found a true partner in Premio – one that understands its challenges and needs, and works together closely as a team to come up with innovative solutions that pioneer new opportunities in the market.



Premio's Manufacturing Facility in Los Angeles, California.

Contact Us Now

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NEW



RCO-6000-CML GPU SERIES



RC0-6000-CML-2060S



RCO-6000-CML-4N-2060S



Processor	Support 10th Gen Intel [®] CML S Processor (LGA 1200, 65W/35W TDP) or Optional Intel XEON-W Processors		
Memory	2x 260-Pin DDR4 2666 /2933MHz SODIMM. Max. up to 64GB (ECC and Non-ECC)		
GPU	RTX 2060S		
Display	3x DisplayPort, 1x DVI-I, 1x DVI-D, 1x HDMI		
SATA Storage	2x External SIM socket (Mini PCIE attached) 1x Internal 2.5" SATA/SSD HDD Bay (support H=9mm) 2x Removable 2.5" SATA HDD Bay (support H=7mm, Hot-swappable) Support RAID 0, 1, 5, 10		
NVMe Storage	-	1x Removable Module with 2.5" 4 Bay U.2 NVMe SSD (7mm) *Patented NVMe drives trays are tooless and hot-swappable	1x Removable Module with 2.5" 2 Bay U.2 NVMe SSD (15mm) *Patented NVMe drives trays are tooless and hot-swappable
Internal Expansion Slot	2x Full-size Mini PCIe, 1x PCIe x16 (occupied by GPU) 2x Full-size mini-PCIe (1 shared by 1x mSATA), 1x M.2 E Key		
I/O	6x USB 3.2 Gen 2 (10 Gbps), 3x USB 3.2 Gen 1 (5 Gbps, 1x Internal), 2x USB 2.0 header (internal), 8x RS-232/422/485 (6x internal), 16x isolated digital I/O, 2x GbE RJ45 (Support Wake-on-LAN and PXE)		
Power	9 to 48 VDC and 12~48VDC for GPU/Card Expansion, AT/ATX Select, 5-pin Terminal Block, 4-pin Terminal Block for GPU Expansion Expansion		
Operating Temperature	-25°C to 60°C (35W/65W CPU)		
Certification		CE, FCC Class A	

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NEW



RCO-6000-CML NVMe series



RCO-6000-CML-8NS

RCO-6000-CML-4NS



RCO-6000-CML-4NH

Processor	Support 10th Gen Intel [®] CML S Processor (LGA 1200, 65W/35W TDP) or Optional Intel XEON-W Processors		
Memory	2x 260-Pin DDR4 2666 /2933MHz SODIMM. Max. up to 64GB (ECC and Non-ECC)		
Display	1x DVI-I, 2x DisplayPort		
SATA Storage	2x External SIM socket (Mini PCIE attached) 1x Internal 2.5" SATA/SSD HDD Bay (support H=9mm) 2x Removable 2.5" SATA HDD Bay (support H=7mm, Hot-swappable) Support RAID 0, 1, 5, 10		
NVMe Storage	2x Removable 4 Bay NVMe SSD Module (7mm) with RAID 0, 1, 5, 10 support2x Removable 2 Bay NVMe SSD Module (15mm) with RAID 0, 1, 5, 10 support *Patented NVMe drives trays are tooless and hot-swappable2x Removable 2 Bay NVMe SSD Module with Hardware RAID 0, 1, 5, 6, 10 support *Patented NVMe drives trays are tooless and hot-swappable2x Removable 2 Bay NVMe SSD Module with Hardware RAID 0, 1, 5, 6, 10 support *Patented NVMe drives trays are tooless and 		
Internal Expansion Slot	2x Full-size mini-PCIe (1 shared by 1x mSATA), 1x M.2 E Key		
I/O	6x USB 3.2 Gen 2 (10 Gbps), 3x USB 3.2 Gen 1 (5 Gbps, 1x Internal), 2x USB 2.0 header (internal), 8x RS-232/422/485 (6x internal), 16x isolated digital I/O, 2x GbE RJ45 (Support Wake-on-LAN and PXE)		
Power	9 to 48 VDC, AT/ATX Select, 5-pin Terminal Block, 4-pin Terminal Block for Storage (12V requires 4-pin terminal block)		
Operating Temperature	-25°C to 60°C (35W/65W CPU)		
Certification	CE, FCC Class A		

WE DESIGN, MANUFACTURE, AND SERVICE CUSTOMERS AROUND THE WORLD

NEW

RCO-6000-CML SATA SERIES







RCO-6000-CML-2C-4B7M



3 I W/A

RC0-6000-CML-2C-2B15M

Processor	Support 10th Gen Intel [®] CML S Processor (LGA 1200, 65W/35W TDP) or Optional Intel XEON-W Processors			
Memory	2x 260-Pin DDR4 2666 /2933MHz SODIMM. Max. up to 64GB (ECC and Non-ECC)			
Display	1x DVI-I, 2x DisplayPort			
SATA Storage	2x External SIM socket (Mini PCIE attached) 1x Internal 2.5" SATA/SSD HDD Bay (support H=9mm) 2x Removable 2.5" SATA HDD Bay (support H=7mm, Hot-swappable) Support RAID 0, 1, 5, 10	2x External SIM socket (Mini PCIE attached) 1x Internal 2.5" SATA/SSD HDD Bay (support H=9mm) 6x Removable 2.5" SATA HDD Bay (support H=7mm, Hot-swappable) Support RAID 0, 1, 5, 10	2x External SIM socket (Mini PCIE attached) 1x Internal 2.5" SATA/SSD HDD Bay (support H=9mm) 2x 7mm, 2x 15mm Hot-swappable 2.5" SATA HDD/SSD Bay, Support RAID 0, 1, 5, 10	
Internal Expansion Slot	2x Full-size Mini PCle2x Full-size Mini PCle, 1x PCl and 1x PCle2x Full-size Mini PCleoptional:2x PCl (Model 2I), 2x PCle x16 (8-lane) (Model 2E)			
I/O	6x USB 3.2 Gen 2 (10 Gbps), 3x USB 3.2 Gen 1 (5 Gbps, 1x Internal), 2x USB 2.0 header (internal), 8x RS-232/422/485 (6x internal), 16x isolated digital I/O, 2x GbE RJ45 (Support Wake-on-LAN and PXE)			
Power	9 to 48 VDC, AT/ATX Select, 5-pin Terminal Block 9 to 48 VDC, AT/ATX Select, 5-pin Terminal Block			
Operating Temperature	-25°C to 70°C (35W/65W CPU)			
Certification	CE, FCC Class A			