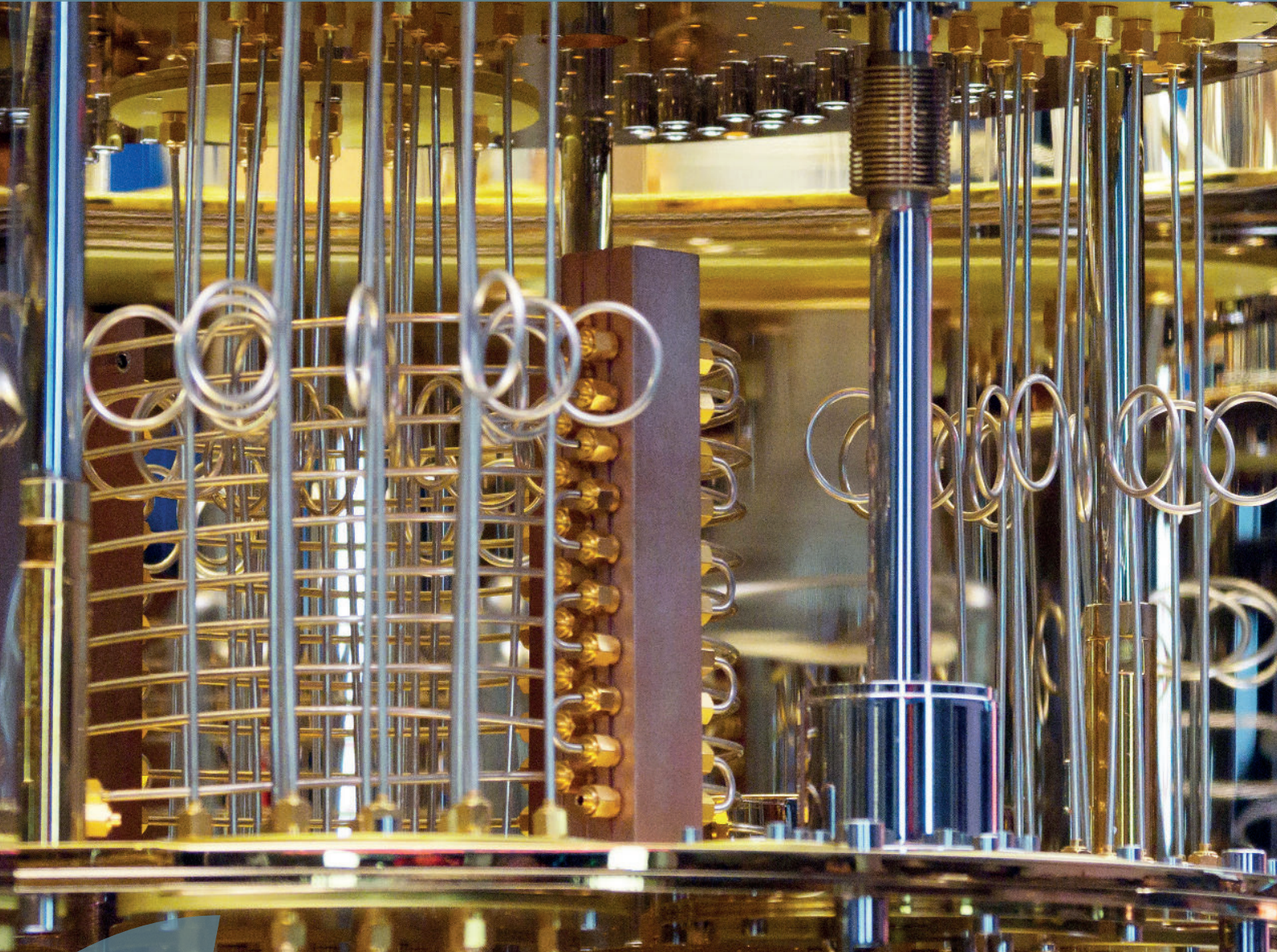


JANUARY 2024

# Advanced and Reliable Computer Solutions for Research, Big Science & Quantum Computing



Serving World-Leading Clients and Institutions



**BLUE LINE**  
IT for Demanding Environments



# How can Blue Line support you?

Design state-of-the-art computer systems, retrofit existing installations, and elevate performance and user satisfaction with our extensive experience and knowledge gained from numerous computer system installations in advanced processing sites, cleanrooms, and pharmaceutical manufacturing sites worldwide.

## WE UNDERSTAND YOUR ENVIRONMENT

Blue Line has been a global supplier of highly reliable IT solutions for demanding environments for more than 35 years. Our DNA is customer focus in all phases of the co-operation. In surveys, the majority of our costumers emphasised Blue Line's ability to listen and to create solutions in close co-operation with our dedicated team.

## HIGHER PRODUCTIVITY AND USER SATISFACTION

Benefit from our range of commercial off-the-shelf (COTS) products designed to deliver cutting-edge performance and functionality for typical installations used within Research, Big Science, and Quantum Computing.

## QUALITY AND RELIABILITY

All our systems and products are engineered for 24/7 uptime, with minimal power consumption, passive cooling, and no moving parts to ensure maximum operational reliability. Our company adheres to strict quality standards, holding ISO 9001:2015 certification and an AAA credit rating. Committed to environmental and safety concerns, Blue Line is actively involved in various industry-serving associations, including EHEDG (European Hygienic & Design Group), VITA, and PICMG.



## A partnership with Blue Line equals



## Reliable Solutions for Research, Big Science & Quantum Computing

Are you looking for Industrial IT Hardware to help you break the current limits?

Take advantage of Blue Line's competencies within Industrial IT for EDGE/GPU/AI & Research to achieve your goal. Together with world-leading partners, we enable the hardware setup that makes it possible to achieve the utmost potential. Benefit from the latest AI technology and let Blue Line help you unleash the potential

of your application. Our partnership with NVIDIA ensures access to the most powerful technology.

Empower Research, Scientific, and Big Science applications with Blue Line's competencies and large partner network. Get access to the most optimized hardware platforms, system solutions, and COTS products, enabling the most powerful and flexible system solutions to be designed.



## Customized Solutions (Modular Design - Built to your needs)

From controlling accelerators to conducting research at the atomic level, and participating in quantum computer experiments, Blue Line's control systems are essential for research into the future. With extensive experience in this field, we develop systems and solutions for the most demanding applications, allowing scientists to focus on their research.

When the research community designs control system solu-

tions for conducting experiments, Blue Line can transition system prototypes into validated series production.

Our experienced staff have many years of expertise in established standards such as the MicroTCA platform, CompactPCI platform, and other widely used standard platforms at major scientific institutions like MaxIV and the European Spallation Source.

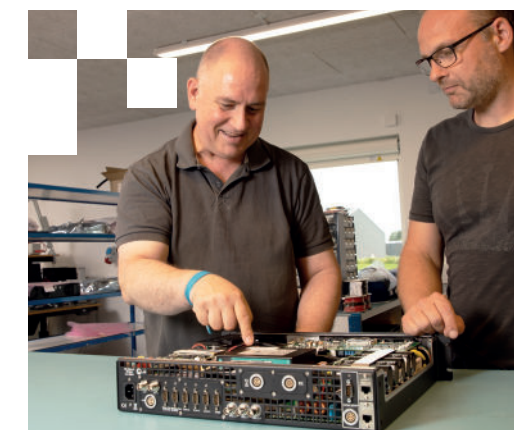


## Processes & Quality Management

At Blue Line, we utilize modern, digitally-based Quality Management Systems and tools for all our Development and Delivery Processes.

Our use of PLM (Product Lifecycle Management) ensures full tracking of document versions and a comprehensive system delivery history.

Both our Development and Delivery Processes are open for validation by our clients, and upon request, we can provide the latest external audit for your validation.





# Products & COTS

## - "Commercial Off The Shelf"

The high-energy physics community has widely embraced the MicroTCA (mTCA) architecture, particularly MicroTCA.4, for various particle physics applications in research institutions, laboratories, and educational organizations around the globe. High energy physics applications, in particular, require high-speed, modularity, and high-density data acquisition, transmission, and storage.

A key objective for high-energy physics users is achieving interoperability between labs and a commercially feasible upgrade path to higher performance and enhanced functionality. The MicroTCA architecture not only meets these criteria but also allows researchers to utilize a single design across multiple applications and labs, providing a fault-tolerant and redundant platform where necessary, including remote firmware upgrades, health management, and a dedicated layer for triggering and timing.

### TYPICAL SYSTEMS AND COMPONENTS FOR RESEARCH/PHYSICS SYSTEM INSTALLATIONS INCLUDE:

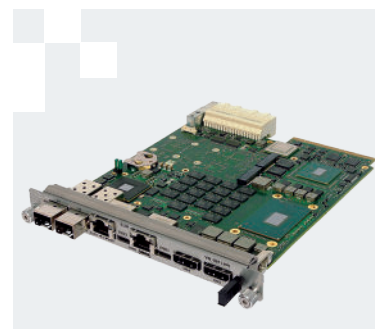
- MicroTCA Systems - single/double width mTCA 19" systems
- CompactPCI systems - 3U/6U CompactPCI 19" systems
- CPU control & payload modules
- High-speed networking & triggering modules
- High-speed ADC/DAC modules
- Storage, SAS/SATA RAID controllers
- FPGA ultrascale dual FMC carrier boards

Chose amongst Blue Line's MicroTCA and other popular standardized architectures and technologies for your next Research Application

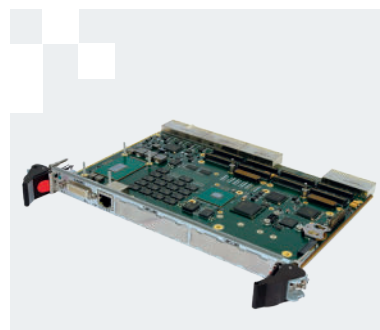
mTCA System



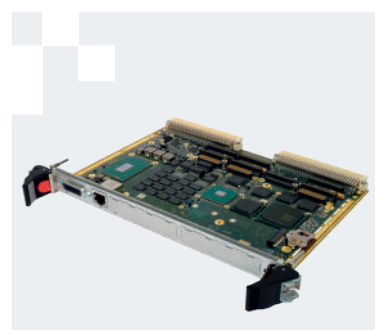
mTCA CPU Board



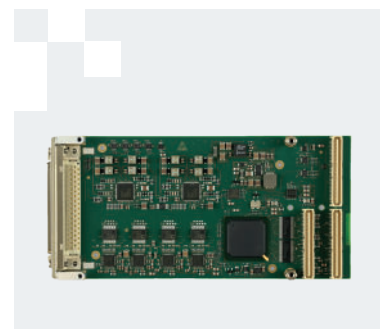
cPCI and PXIe



VMEbus



Modular IO



IOxOS Digitizer



# Example Applications

Blue Line's MicroTCA computing building blocks are widely used within Research and are ideal for a range of high speed, high density data acquisition applications in high energy physics.

For these applications Blue Line offers embedded computer systems based on CPUs, GPUs and FPGA technologies, as well interoperable I/O building blocks.

Control Systems



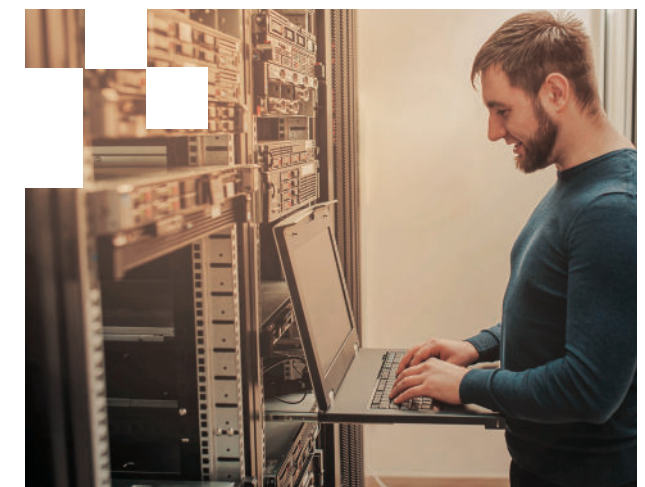
Image Processing



Medical Tech



Test & Measurement



# Open Standards we use

To secure interoperability and second-sourcing, Blue Line are supporting the idea of working primarily with defined, controlled and active Open Standards:



## MICROTCA

MicroTCA defines a compact backplane-based computer system that is built on AdvancedMC (AMC) modules. These systems find applications in various industries such as research, medical technology, transportation, defense, telecommunications, and networking. MicroTCA systems are employed when there is a need to process a large amount of real-time data, such as analog or digital data, for instance, by FPGAs. One example of this application is in Software Defined Radio (SDR) systems.



## PXI

PXIe stands for "PCI Express eXtension for Instrumentation" and represents a modular computer system specifically designed for measurement and automation technology. It is built on the PCI Express bus, providing high bandwidth and fast data transfer rates. PXIe serves as a flexible and powerful platform for developing and integrating test and measurement systems.



## COM EXPRESS

COM Express is a specification of the PICMG for x86-based Computer-on-Modules. These modules integrate the core functionality of a bootable PC such as: CPU, graphics processor, main memory and standard interfaces on one board, which is connected via tw connectors to a specific carrier board.



## CPCI / CPCI-S

CompactPCI is an American industrial bus system with single or double-Europe card format and is normally used with passive backplanes. CompactPCI Serial is the further development of the CompactPCI standard. In contrast to CPCI, CPCI-S uses serial point-to-point connections and supports the PCIebus.



## HPC

High Performance Computing describes high performance systems, which represent what is technically possible. Usually these are equipped with PCIe slots and allow the use of the newest GPUs and CPUs. The preferred use of these systems are image and AI applications.



## VMEBUS

The VMEbus is a multiprocessor bus system. This means that several CPU Boards can be connected to each other or with several I/O boards. VMEbus systems have up to 20 slots. VME64 systems have 64-bit bus width for data and addresses. All common processor types can be used on VMEbus cards. Today VMEbus systems can be found at countless applications in industry, research, medical technology, aerospace and defense.



## VPX (VITA 46)

The VPX standard (Virtual Path Cross-Connect) consists of a range of norms that define a bus system with computer boards in 3U and 6U sizes. The communication takes place via serial highspeed connections on passive or switched-fabric backplanes. VPX is mainly used for rugged highperformance applications, like mission computers in defense applications.



## OPENVPX (VITA 65)

Based on VPX, OpenVPX standardize more stringent system architectures in 3U or 6U format. OpenVPX enables the compatibility of products from different manufacturers. Especially it defines the architecture of the highspeed interfaces between payload, switches, backplanes and chassis.



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