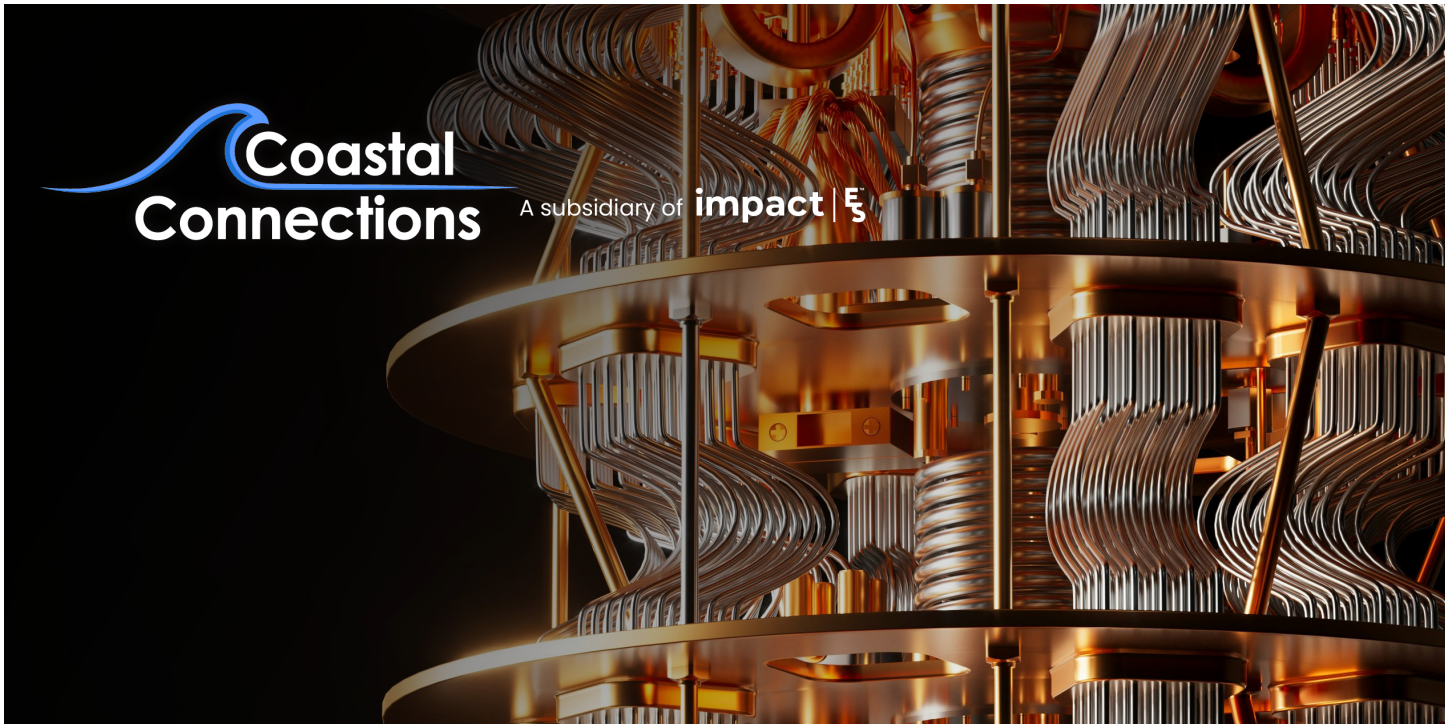


Fiber Optic Assemblies for Quantum Computing

Precision optical fiber solutions for photonic and cryogenic quantum systems

Coastal Connections is one of the top specialized fiber-optic suppliers in the United States supporting quantum technology infrastructure. We collaborate with multiple companies among the world's leading quantum computing developers, designing and manufacturing precision optical fiber assemblies for photonic and cryogenic quantum systems.

Supported fiber types

Fiber types	
Single-mode (SM)	Standard SMF-28E, SMF-Ultra, and specialty single-mode fibers for quantum control and readout
Polarization-maintaining (PM)	PANDA-style and other PM fiber types; stress rod alignment capability for interferometric and QKD applications
Large mode area (LMA)	For high-power optical delivery in quantum optical trapping and laser applications
Photonic crystal fiber (PCF)	Specialty holey fiber for nonlinear optical applications in quantum photonics
Mid-infrared (mid-IR)	For molecular spectroscopy, quantum sensing, and long-wavelength quantum optical applications
Polyimide-coated fibers	Stripping and termination capability for cryogenic-compatible fiber assemblies

Connector selection directly affects optical performance, mechanical reliability, and compatibility with your system architecture. Coastal Connections terminates a wide range of commercial and defense-grade connectors and manufactures custom ferrule assemblies—including multi-fiber and vacuum feedthrough configurations that very few suppliers in the world can produce.

Connector and ferrule options

Connectors	
FC, APC FC	Standard and angled physical contact; high return loss for quantum optical systems
LC, SC, SMA, E-2000	Commercial single-fiber connectors for benchtop and system-level quantum hardware
Custom ferrules	1.25mm, 1.6mm, 2.0mm, 2.5mm, 3.2mm OD in stainless steel and ceramic for custom optical architectures
Multi-fiber ferrules	Multiple fibers in a single ferrule, including PM fiber alignment to each other
Multi-core fiber ferrules	Precision alignment of multi-core fibers with low insertion loss
Vacuum feedthroughs	Single and multi-channel; PM fiber capability in single feedthrough—possibly unique globally
Fiber end-caps	Anti-reflection coated glass end-caps installed without optical quality degradation; thousands built annually

Quantum optical systems have no tolerance for performance ambiguity. Every assembly Coastal Connections ships is characterized to precise, documented specifications—insertion loss, return loss, polarization extinction ratio, and optical path length—using calibrated test equipment and traceable measurement procedures. The specifications below reflect what we routinely achieve and measure in production.

Performance specifications

Optical performance	
Insertion loss	Ultra-low; custom-engineered to minimize loss at each junction for quantum photonic fidelity
Return loss	High return loss with APC geometry; 0° to 50° polish angle capability
Polarization extinction ratio (PER)	Measured at 405, 488, 640, 780, 980, 1060, 1310, 1550nm; methods: polarization analyzer, PER meter, cross polarizers
Matched optical path length	Matched to +/-20ps time delay; cables to +/-5mm (0.1% + 1.5mm)
Fiber alignment accuracy	Beam pointing angle measured to 1/100th of a degree in production
Fiber eccentricity	0.2 to 10µm core eccentricity measurement

Fiber optic assemblies in cryogenic quantum systems must survive repeated thermal excursions from room temperature to millikelvin operating conditions without degradation in optical or mechanical performance. Coastal Connections has extensive experience selecting fiber coatings, adhesive systems, and cabling materials that are proven in these environments—and the in-house thermal cycling capability to validate assemblies before they reach your system.

Cryogenic compatibility

Optical performance	
Operating temperature range	Assemblies designed for operation from room temperature through millikelvin cryogenic environments
Thermal cycling (in-house)	-65°C to +150°C; automated PER measurement over temperature
Extreme environments	Extended range testing via Experior Labs (local environmental testing specialist)
Coating options	Polyimide, silicone, high-temp acrylate for cryogenic and vacuum applications
Adhesive systems	Evaluated and selected for cryogenic thermal cycling durability
Vacuum compatibility	Vacuum-compatible materials; hermetic vacuum feedthrough assemblies available

Measurement is not a final step—it is built into every stage of our manufacturing process. Coastal Connections operates a comprehensive suite of optical test equipment in-house, covering insertion loss, return loss, PER, interferometric end-face inspection, and beam profile analysis across a wide range of wavelengths. For programs requiring environmental testing beyond our in-house range, we work with Experior Labs, a specialist fiber optic environmental test facility.

Analysis and testing capabilities

Test capabilities	
SM lasers available	405, 488, 640, 780, 980, 1060, 1310, 1550nm
SM return loss range	-10 to -80dB at 1310 and 1550nm
MM return loss range	-10 to -58dB at 850 and 1300nm
Interferometric imaging	Almost any fiber or connector geometry; APC and UPC configurations
Beam profile	NA, ellipticity
Visual inspection	Up to 1,000X magnification
Fiber end-face	APC: E-2000, FC, LC, SC; UPC: 1.25mm and 2.5mm ferrules, FC, LC, SC, ST
Thermal cycling monitoring	Automated recording of PER over time and temperature

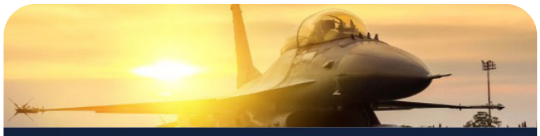
Quantum computing encompasses a wide range of hardware architectures—each with distinct optical fiber requirements. Coastal Connections has active programs across all of the major quantum technology platforms and understands the specific performance, material, and environmental demands of each. Whether your application is a superconducting qubit system, a photonic quantum processor, or a quantum networking deployment, we have relevant experience to bring to your program.

Quantum computing applications supported

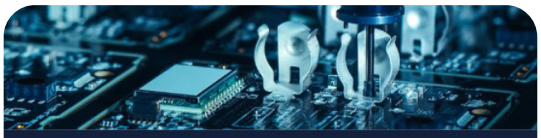
Test capabilities	
Superconducting qubit systems	Photonic links from room-temperature electronics to cryogenic quantum circuits
Photonic quantum computers	Precision fiber architectures for photon-based qubit routing, manipulation, and detection
Trapped ion quantum computers	Optical delivery and collection for laser-based qubit control and readout
Quantum key distribution (QKD)	PM fiber assemblies for polarization-encoded secure quantum communication
Quantum networking	Fiber connections for entanglement distribution and quantum repeater systems
Quantum sensing	Precision assemblies for atomic clocks, gravimeters, magnetometers, and atom interferometers

Fiber optic engineering for quantum systems requires a partner who understands both the physics and the manufacturing discipline to execute at the precision your platform demands. Coastal Connections has built that expertise through years of active programs with leading quantum technology developers. If you are designing a new system or qualifying a supplier for production, we would welcome the opportunity to discuss your requirements in detail.

Contact our engineers
sales@coastalcon.com

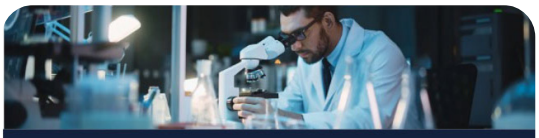


Aerospace

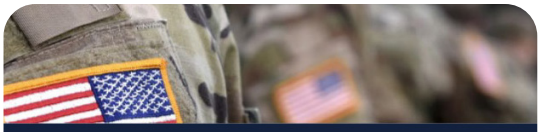


Autonomous & Robotics

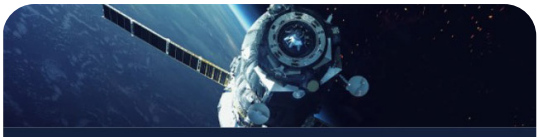
Commercial & Industrial



Medical & Life Sciences



Military & Defense



Space

Industries We Serve

At Impact Electronic Solutions, we offer cutting-edge prototype and full-turnkey production services, providing unparalleled innovation and seamless solutions to meet your needs.

Our expertise spans highly regulated and mission-critical environments. We deliver complex electronic, fiber optic, and electromechanical products with exceptional quality and reliability. From product development to full-scale manufacturing, we prioritize customer-centric solutions and support groundbreaking innovations.

With extensive experience, we ensure success across diverse industries by consistently meeting rigorous standards and exceeding expectations.

About Us

We are a dynamic team dedicated to delivering innovative electronic design and manufacturing services that consistently outperform industry standards.

Our headquarters are in the Pacific Northwest, and the Impact ES network spans five key locations across the U.S.:

- Clearwater, Florida
- Cranston, Rhode Island
- Grants Pass, Oregon
- Vancouver, Washington
- Ventura, California

Our facilities have been recognized for excellence by numerous corporations, organizations, and publications, showcasing our commitment to quality, precision, and customer satisfaction nationwide.

Fiber Optic Cables and Assemblies Certifications

ISO 9001:2015

ITAR Registered International Traffic in Arms Regulations

NASA 8739.5

We design and build products that matter.

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