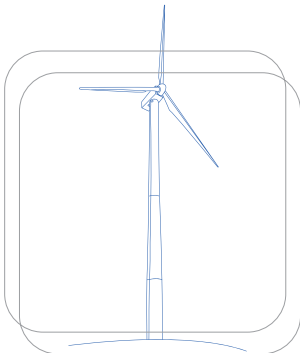
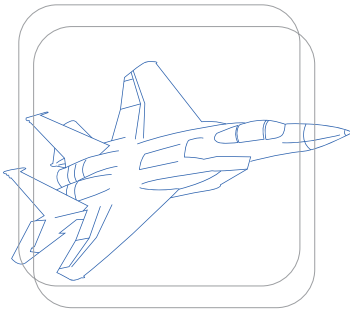
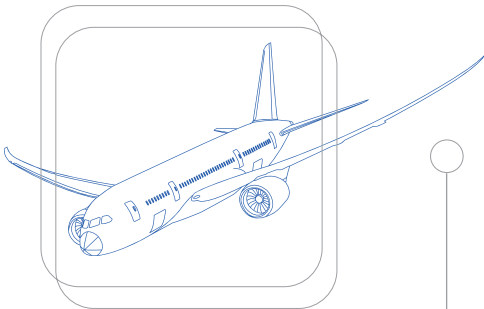


# COTSWORKS®

## RUGGED OPTICS TRANSCIVERS, CONVERTERS, CABLING FOR HARSH ENVIRONMENTS



COTSWORKS, LLC is a manufacturer of rugged optical components for harsh environments. Founded in 2006, COTSWORKS provides transceivers, cables, and integration services to companies in the commercial aerospace, military, oil and gas, and other industrial markets. The Company is located in Northeast Ohio with local support in Germany and representatives in the Nordics, Israel, Japan, and other regions. Our main facility has 20,000 square feet of secure and monitored administrative, design, and manufacturing areas. ISO 9001 registered, ATEX-certified, and focused on quality design, manufacture, and customer support, COTSWORKS services the avionics and rugged electronics network communication needs of today and tomorrow.

Our expertise starts with extensive product knowledge in optics for communication: lasers, cables, and connectors. We understand how semiconductor lasers operate over time and temperature so our products use only the highest quality product, directly from the wafer, with the best optical alignment. We connect them with rigid and rigid-flex board designs that operate over Industrial or Military temperature specifications. We design our metal housings to perform well even in noisy environments like aircraft flight decks, core communications, ground/air/sea/subsea data links,

and industrial applications for rail, factory floor, or oil and gas networks. COTSWORKS builds most of our own test fixtures and performs Parylene deposition coatings in house.

COTSWORKS is positioned to support the toughest of rugged network needs while maintaining a Commercial Off The Shelf cost structure. We produce thousands of parts per month and growth in both actives and passives as today's airframe, avionics, and rugged electronics OEMs look to make their products smarter and more sophisticated.

## COTSWORKS' optical transceivers come in four form factors:

RJ, RCP, LAC and SFF.

All offer benefits to OEMs who need operational data rate links in extreme shock and vibration environments. -40 to 85C operation is standard with wider temperatures available. All four can be conformally coated and ruggedized to prevent corrosion and enable outdoor use.



## QUALITY FIRST

Our production facility was built expressly for the assembly of precise optical components, both active and passive, into optical transceivers, assemblies, and cabling. The entire area is ESD safe with redundancy in all processes and multiple test stations including the highest quality oscilloscopes, BERTs, and optical test equipment all connected to temperature chambers for fast, accurate, and comprehensive parametric testing.

### RJ

The RJ operates with LED, VCSEL, FP or DFB lasers. Multimode or single mode cable networks will benefit from the miniature form factor and surface mount leads with screws to secure the module mid or edge of board. A 1x12 connector connects to an i2C bus for above industry standard accurate Built-In-Test. The RJ has metal LC receptacles.

### RCP & RCP+

The RCP™ and RCP+ offer 5 and 10Gbps performance on multimode cabling with extra output power and wider operating temperatures. A single mode version supports CWDM wavelengths at 3 Gbps and 10 Gbps at 1310nm with an APD option. The RCP is a pluggable transceiver via a recessed electrical connector and screw mounts. Optically, the RCP leverages ARINC 801 standard receptacles for locking termini.

### LAC: LRU ACTIVE CABLE

The LAC™ offers the most flexible way to add optical connectivity to a Line Replaceable Unit (LRU). It requires the least amount of PCB space (just the electrical connector/mount), offers excellent thermal management by maximizing airflow, and has a built-in separable fiber cable makes repair easier and enables the use of passive and industry standard box level connectors instead of expensive/EMI susceptible Active Connectors. The copper flex interface supports appropriate pluggable, surface mount, or thru-hole electrical connectors.

### SFF

The SFF or Small Form Factor is a ruggedized industry standard form factor. The electrical connection is two rows of thru-hole headers with five pins for data and power and an additional two on each row for built-in test features. The unique case design helps with EMI performance and thermal management. A screw mount holds the optics in place in metal LC receptacles.

### CABLE ASSEMBLIES

COTSWORKS specializes in securing fiber cables to transceivers inside of LRUs. These assemblies are easier to order, more reliable, and offer better optical performance. Many termini and cabling options are available, as well as consulting, to help OEMs find the right solution. Our unique termini and accessories such as the LC801- which converts LC receptacles to ARINC 801, the LC-R - which locks LCs in place with a screw, or the TAO - which makes ARINC 801s push-pull style, make the silicon to glass interfaces of transceivers more reliable as well as separable.

### MEDIA CONVERTERS

A network extension of the RJ or SFF (SFPs as well), the Lightning Stick™ (LS) is an in-line Ethernet media converter with 10/100/1000BaseT to 100/1000 BaseX fiber support. Software included makes the LS into a test device with logging, scripting, and TDR features. The internal assembly can be added into an LRU with industrial temperature support. A quad port version is available, as well as custom optical and electrical I/O.



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