Polarization Maintaining Components

OZ Optics Limited

July 2020
Corporate Background

- Founded in 1985;
- Corporate headquarters located in Ottawa, Canada;
- Manufacturing facility in Ottawa/Canada, Izmir/Turkey and Jiaxing/China;
- Seven Product Groups: Laser-to-Fiber Delivery Systems, High Power Fiber Optic Components, Polarization Maintaining Products, Attenuators, Opto-Electronic Packaging, Fiber Optic Test Equipments, and Fiber Optic Sensor Systems;
- Sales offices in Canada, USA, Europe, Turkey, and China.
Corporate Statements and Quality Policy

Our Vision
· Be the preferred supplier of choice
· Capture and expand market share
· Maximize shareholder value

Our Mission
To become the leading provider of innovative optical products to telecom to non-telecom sectors

Our Core Value
· Leadership
· Teamwork
· Boldness
· Commitments
· Innovation
· Rewards

Our Quality Policy
Provide our Customers with a competitive advantage, leveraging performance, price and delivery, through a continuous process of Quality advancement in all areas of our Company.

Communicate effectively to our Customers, Suppliers and Shareholders our commitment to Quality, continuous improvement and to abide by any applicable requirements.

Promote opportunities of professional development for all members of our company through education, training and personal challenge.
Company Profile

Over 450 employees worldwide:

- **OZ Canada**: 250+ employees
- **OZ China**: 120+ employees
- **OZ Turkey**: 80+ employees
Company Profile

Advanced Proprietary Processing Technology

ISO9001:2015 Certified

Broad Patent Portfolio
Company Profile

*OZ Optics is lead by an experienced team:*

- Ömür Sezerman, Chairman, President & CEO
  - Founder and CEO since inception (35 years)
- Zahide Sezerman, VP of Human Resources
  - With OZ Optics since inception (35 years)
- Garland Best, VP of Components Division
  - 28 years at OZ Optics
- Gordon Youle, VP of Test Equipment Division
  - 21 years at OZ Optics
- Martin Powell, Operation Manager
  - 16 years at OZ Optics
- Metin Sezerman, General Manager of OZ Turkey
  - 19 years at OZ Optics
- Bing Li, General Manager of OZ Optics China
  - 16 years at OZ Optics
Company Profile

Experienced and well-trained staff in following fields:
- optical, mechanical, electronics & software

- CNC Machine Shop
- Femto-Second Laser Lab
- AR Coating
- Clean Room
- Laser Conditioning/Cleaving
Core Competencies

* Pioneer in Polarization Maintaining (PM) Components
* Leader in Wavelength Flattened, High Power & Low PDL Components
* Leader in High Power Fiber Optic Delivery Systems
* Custom Test Equipment, Including Polarization Test Equipment and FTTH Equipment
* Widest Range in Attenuator Product Offering
* Fiber Optic Distributed Strain and Temperature Sensors
* Complete product line for OCT applications & 2 Micron
* Now available: Bias Controllers, Spectrometers, Optical Noise Generators and Broadband Polarization-Entangled Photon Source,
Leading Technology

Three Product Groups
- Fiber Optic Components, 85%
- Optical Test Equipments, 10%
- Fiber Optic Sensor, 5%

Over 1,000 Products

Leading Edge R&D
Leading Technology

Featured Products
Leading Technology

Featured Products

Fiber Optic Attenuators for SM, PM, and MM Fibers

Fiber Optic Components for Optoelectronic Packaging

Laser & Laser Diode to Fiber Delivery Systems

Fiber Optic Test Equipment
Industry Standards

All products manufactured are in strict accordance with international industry standards:

- Qualified for F35 JSF and F18 Program
- Telecordia Compliance
- CE Compliance
- RoHS Compliance
- REACH Compliance
- ISO 9001:2015 Certified (Canada, China and Turkey)
- Controlled Goods Directorate Registered
Marketing Strategy

Application Market:

Using our strong direct sales and distributors, we address the following markets:
By leveraging the technology and expertise gained since its inception, OZ Optics has attracted a broad range of customers in the telecom / datacom, medical, military, security, industrial, construction, aerospace, power utilities, petrochemical and educational sectors.
## Marketing Strategy

### Global Sales Network

OZ Optics has resellers and distributors in over 30 Countries & Regions with over 10,000 customers worldwide:

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Marketing & Operation Strategy

- Competitive Advantage
  - Exceptional Quality And Service
  - Competitiveness Pricing
  - Extensive Experience In Fiber Optics Manufacturing
  - Global Presence
  - Superior Technology
  - Innovative Engineering
  - Success
Branch Network

OZ OPTICS CANADA
(Headquarters)

OZ OPTICS TR
(Turkey Factory)

OZ OPTICS CHINA
(Jiaxing Factory)
Branch Network

Facility - Ottawa Headquarters

- 60,000 sq ft. – Manufacturing and R&D Facilities
- 15,000 sq ft. – Admin, Sales and Marketing
- 15,000 sq ft. - Training and Fitness Facilities
Branch Network

Facility - Ottawa Headquarters

- Production Area
- Training Centre Building
- Meeting Room
- Swimming Pool
Branch Network

Facility - Turkey Factory

Izmir, Turkey

- Operational since 2000
- 33,000 sq ft. Manufacturing Facility
- Located in Free Trade Zone
- Low Tax Rates
- Sub Component Parts Manufacturing
- High Quality Labor
Branch Network

Facility - China Factory

Jiaxing, China

- Operational since June 2010
- Wholly Foreign Owned Enterprise
- Cost Effective Manufacturing
- High Quality Labor
- Supply Chain Integration
Branch Network

Facility - China Factory

Jiaxing, China

- Located in Economic Development Zone
- 4000+ sq meters - Total Area
  - 500 sq meters - Admin, Sales and Marketing
  - 3500 sq meters - Manufacturing Area
  - √ 500 sq meter - Class 10,000 Clean Room
  - √ 300 sq meter - ESD Working Area
Zhejiang OZ Optics Technologies Co., Ltd

- Operational since June 2010
- Wholly Foreign Owned Enterprise
- NPI & Production Line Setup
- On-site Training by OZ CND
- Began Mass Production in September 2010
- Completed Main Facility Expansion in 2019
Polarization Maintaining Components

OZ Optics is the pioneer in PM Fiber Optic Components. We offer the widest range of PM components and we were the first company in the world to manufacture PM fiber components and test equipment, starting in 1985.

Features:

* **High Power Handling Capability** (over to 5 Watts at 1550nm tested to over 50 Watts CW at 1064nm)

* **Better than 30dB Extinction Ratios** can be achieved

* **Wavelength Flattened Response for S, C & L Bands** (1470nm – 1620nm)

* **Complete Support For Non-telecom Wavelengths and Applications** (375-2100nm)
Polarization Maintaining Components

OZ Optics Offers:

* Patented Fiber Alignment Technology
* Low Cost, Superior Service & Exceptional Quality
* High Volume Manufacturing Capability
Polarization Maintaining Patchcords

- Up to 30dB Polarization Extinction Ratios
- <0.3dB Insertion Loss, Up to 60dB Backreflection
- Super, Ultra, Angled FC/PC, SC, AT&T-ST, LC, MU, E2000, DMI and Custom connectors
Polarization Maintaining Patchcords

* Up to 30dB Polarization Extinction Ratios
* < 0.3dB Insertion Loss,
  Better than 60dB Backreflection
* Super, Ultra, Angled
  FC/PC,
  SC, AT&T-ST, LC, MU,
  E2000, DMI and Custom connectors
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  SC, AT&T-ST, LC, MU,
  E2000, DMI and Custom connectors
Miniature PM Connectors and Patchcords

- PC Board Mountable
- Small form factor allows dense packing in small spaces
- Up to 30dB Polarization Extinction Ratios
- < 0.3dB Insertion Loss, Up to 60dB Backreflection
PM Hermetically Sealable Patchcords

- 20dB, 25dB
  Polarization Extinction Ratios
- Custom OEM Designs & Terminations
- Patchcord With Optical Tap is Available
PM Hermetically Sealable Patchcords

* 20dB, 25dB Polarization Extinction Ratios

* Custom OEM Designs & Terminations

* Ideal for Component Packaging
PM Hermetically Sealable Patchcords

- 20dB, 25dB Polarization Extinction Ratios
- Custom OEM Designs & Terminations
- Patchcord With Optical Tap is Available
Tapered PM Fibers

- Improves Coupling from Waveguides, Diodes
- As Small as 2 Micron Spot Sizes
- Circular & Oval Spot Profiles
PM Fiber Pigtailed V-Grooves

- 127, 250, 400 or 500 Micron Spacing
- Over 20dB Extinction Ratios
- Rods Aligned to Within 0.5 Degrees
PM Fiber Pigtailed V-Grooves

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- Over 20dB Extinction Ratios
- Polarization Axis Aligned to within 0.5 Degrees
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* 127, 250, 400 or 500 Micron Spacing
* Over 20dB Extinction Ratios
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PM Fiber Pigtailed Sources

- Up to 30dB Polarization Extinction Ratios
- > 80% Coupling for Lasers, 40% for Laser Diodes
- 375 nm to 2050 nm Wavelengths
PM Fiber Pigtailed Sources

* Up to 30dB Polarization Extinction Ratios
* > 80% Coupling for Lasers, 40% for Diodes
* 375nm to 2050 nm Wavelengths
Polarization Maintaining Sources

- Up to 40dB Polarization Extinction Ratios
- > 80% Coupling for Lasers, 40% for Diodes
- 375nm to 2050 nm Wavelengths
Polarization Entangled Photon Sources

* Quantum Computing and Network Applications
* Broad bandwidth covering C- and L- bands
* Compact
* Operates at Room Temperature
Polarization Maintaining Source Couplers

* Up to 30dB Polarization Extinction Ratios
* > 80% Coupling for Lasers, 40% for Diodes
* 375nm to 2050 nm Wavelengths
Polarization Maintaining Source Couplers

* Up to 30dB Polarization Extinction Ratios
* > 80% Coupling for Lasers, 40% for Diodes
* 375nm to 2050 nm Wavelengths
PM Fiber Variable Attenuator

* Up to 30dB Extinction Ratios, Up to 10 Watts CW Power
* 0.6dB to 80dB Attenuation, -40, -50, -60dB Backreflection
* Meets Telcordia Specifications
* MEMS Based Attenuators Available
PM Fiber Variable Attenuator

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Fiber Optic Fixed Filters

- 400nm to 2200nm Wavelengths, SMF, PMF & MMF
- -40dB, -50dB, -60dB Backreflection
- Filters Can Be Fixed or Removable
Fiber Optic Fixed Filters

- 400nm to 2200nm Wavelengths, SMF, PMF & MMF
- -40dB, -50dB, -60dB Backreflection
- Filters Can Be Fixed or Removable
Tunable Filters

* < 1.2nm Line Width, 0.1nm Resolution
* 50nm Tuning Range,
* Manual, Motor Driven and Digital Versions
Tunable Filters

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Tunable Filters

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* 50nm Tuning Range,
* Manual, Motor Driven and Digital Versions
Tunable Bandwidth Filters

- 1nm to 18nm FWHM
- Adjustable Line Width
- 45nm Tuning Range
- Flat Top Filter Shape
- Manual and electrically driven versions
Tunable Bandwidth Filters

* Polarization Insensitive
* High Out-of-Band Suppression
* Singlemode, Multimode and PM Versions
Polarization Rotators / Analyzers

* Greater than 30dB Extinction Ratios
* -40, -50, -60dB Backreflection Levels, 1dB IL
* Fiber-Fiber, Source-Fiber & Fiber-Photodiode Versions

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* Fiber-Fiber, Source-Fiber & Fiber-Photodiode Versions
Manually Adjustable Polarization Controllers

- Designed to Control Polarization State
- All Fiber Version – No Intrinsic Loss
- Pigtail and Receptacle Versions
Manually Adjustable Polarization Controllers

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Manually Adjustable Polarization Controllers

- Designed to Control Polarization State
- Wave plate Version
  - Has Angle Readouts, Repeatable Output
- Pigtail and Receptacle Versions
Manually Adjustable Polarization Controllers

- Designed to Control Polarization State
- Wave plate Version
  - Has Angle Readouts, Repeatable Output
- Pigtail and Receptacle Versions
Electrically Driven Polarization Controllers

* Continuous Control of Polarization
* No Insertion Losses or Return Losses
* > 100 Hz Response Speed
* New! High Speed Version, up to 30kHz response speed
High Speed Electrically Driven Polarization Controllers

* Continuous Control of Polarization
* Up to 30kHz Response Speed
* Negligible Insertion Losses, Return Losses, or PDL
* Compact and PCB Mountable
High Speed Electrically Driven Polarization Controllers

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* Up to 30kHz Response Speed
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* Compact and PCB Mountable
Fiber Pigtailed Polarizers

- Up to 30dB Extinction Ratios
- Based on Free Space Optics
- 0.6dB Insertion Loss, Low Cost, Compact
- -40, -50, -60dB Backreflection Levels
- 400-2050 nm wavelengths
Fiber Pigtailed Polarizers

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All-Fiber Polarizers

* >35dB (Up to 50 dB) Extinction Ratios possible
* <0.5dB Insertion Loss Achievable
* Low cost and compact size (3mm OD housing)
* Broad operating wavelength
* -70dB Backreflection Levels
Polarization Maintaining Splitters

- Splits Polarized Light into 2 PM or SM Fibers
- 0.6dB IL, -40, -50, -60dB Backreflection
- 1x2 & 2x2 Versions Available
- 350-2050 nm Versions
Polarization Maintaining Splitters

* Splits Polarized Light into 2 PM or SM Fibers
* 0.6dB IL, -40, -50, -60dB Backreflection
* 1x2 & 2x2 Versions Available
* 350-2050 nm Versions
Polarization Maintaining Fused Splitters

* Splits Polarized Light into 2 PM Fibers
* 50/50 to 95/5 Split Ratios, Polarizing Versions
* 1x2 & 2x2 Versions Available
* 633 – 2000nm Wavelengths
Polarizing Splitters / Combiners

- Splits Light into Two Polarizations
- 0.6dB IL, -40, -50, -60dB Backreflection
- 1x2 & 2x2 Versions Available
Polarizing Splitters / Combiners

- Splits Light into Two Polarizations
- 0.6dB IL, -40, -50, -60dB Backreflection
- 1x2 & 2x2 Versions Available
PM Planar Light Circuit (PLC) Splitters

- 1x2 to 1x32 Splitter Configurations
- C, L and S Band Operation
- Miniature Package Size
Evanescence Based Variable Split Ratio Fiber Splitter

* Splitting ratios tunable from 0% to 100%
* Low insertion loss
* PM fiber models are available
PM Fiber Optic Circulators

* 0.7dB Typical Insertion Loss
* 532 - 1550nm Wavelength Versions
* Up to 30dB Extinction Ratios
PM Fiber Optic Circulators

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- 532 - 1550nm Wavelength Versions
- Up to 30dB Extinction Ratios
**Fiber Pigtailed Isolators**

- $\leq 0.8\text{dB IL}$, As Much as 60dB Isolation
- -40dB, -50dB, -60dB Backreflection
- 532nm to 2050nm Wavelengths
- Singlemode or PM Fiber Versions
- Polarizing or Polarization Independent Versions
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Faraday Mirrors and Rotators

* Used in EDFA, Tunable Lasers, Etc.
* 0.7dB Typical Insertion Loss
* -40, -50, -60dB Backreflection
Polarization Maintaining Fiber Switch

* > 20 dB Polarization ER
* Latching and Non-Latching versions
* < 0.6 dB loss
* Now offering MEMS based 1 x N optical Switches (Non-Latching)
Variable Optical Delay Lines

* Motor Driven Version is Available
* Over 600ps Delay Range, < 1dB IL
* As Fine as 0.003ps Resolution
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Differential Polarization Delay Lines

- Varies the Delay Between Two Polarizations
- ±50ps Delay, 0.1ps Resolution
- < 1.2dB Losses over the Delay Range
Polarization Measurement Systems

* Includes Source, Meter & Master PM Patchcord
* Measures up to 40dB Extinction Ratios
* Available for 400 – 2000 nm
* FC, SC, LC, MU, E2000 or Custom Connectors & Ferrules
* Test Systems for PM Fiber Pigtailed V-Groove Assemblies
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Polarization Dependent Loss Emulator

- 0.05dB to 10dB polarization dependent loss
- Fixed or manually variable PDL
- Broad wavelength range, compact, and low cost
- PMD Free Version Available
PM Fiber Power Monitors/Tap Couplers

- Wide Wavelength Range, up to 2 Watts Power Handling
- Single Channel
- Digital Display Version Used to Monitor and Measure Power Simultaneously
- Allows optical monitoring without disconnecting
- Can be locally or remotely accessed
- Ideal for FTTH networks
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PM Components for OCT Applications

* Complete Module or Separate Components such as:
  - Broadband Isolators
  - Sources
  - Attenuators
  - Collimators
  - Fused Splitters
  - Delay Lines
Fiber Modules/Systems/Routings

* Advanced fusion splicers for multimode, singlemode, polarization maintaining and specialty fibers.

* 3D CAD capabilities for enclosure and mounting hardware design.

* Extensive inventory of test and measurement equipment, including broadband and tunable laser sources, optical power meters, return loss meters, optical spectrum analyzers, polarization meters and controllers, etc.

* Skilled technicians well versed in fiber routing and layout.
Pulse Compressor And Peak-field Booster

* Compresses pulses from Femtosecond Lasers
* Increases peak optical power
* Spectrally Broadens the signal
Fiber Modules/Systems/Routings
Thank You for Choosing OZ Optics

Please Contact Our Sales Dept:
Tel: 613-831-0981 ext 3370
Toll Free: 1-800-361-5415
Email: sales@ozoptics.com.