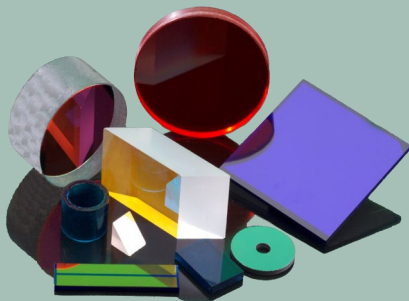
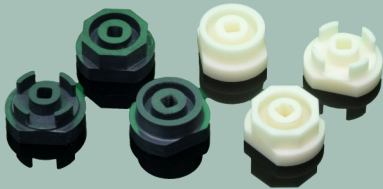
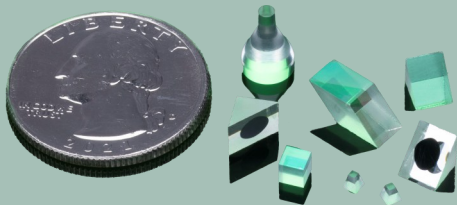




## BUSINESS INFORMATION

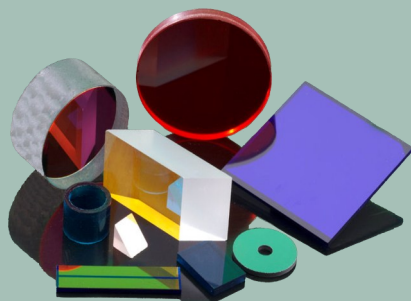
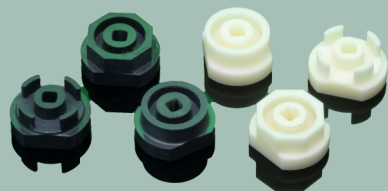
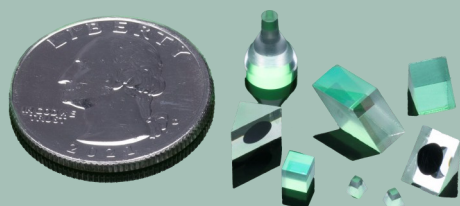
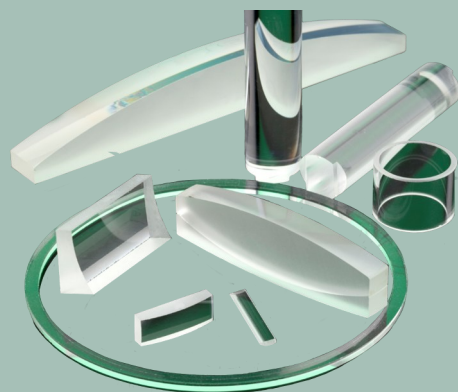
- Legal Name: P. N. E., Inc
- dba IRD Glass, IRD Ceramics
- DUNS #: 038386462
- In business since 1982
- Registered in SAM
- ITAR Registered
- ISO 9001:2015 Certified
- AS9100 Compliant
- 40,000 FT<sup>2</sup> of Manufacturing Space
- 2025 sales: \$16 million
- 65+ employees
- NAICS: 327215 SIC: 3231

## Markets Served

- Laser OEM
- Medical
- Sensor OEM
- Aerospace
- Precision Tooling & Fixturing
- Defense
- Machine Vision
- Lighting
- High Energy Laser

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|                  | LAP             |                | POLISH       |             |
|------------------|-----------------|----------------|--------------|-------------|
|                  | Typical         | Best           | Typical      | Best        |
| <b>Roughness</b> | Ra < 10 $\mu$ m | Ra < 5 $\mu$ m | Ra < 15 Å    | Ra < 2 Å    |
| <b>Angles</b>    |                 |                | 5 arc min    | 3 arc sec   |
| <b>Flatness</b>  | $\pm .000050"$  | $\pm .000010"$ | 1 wave       | < 1/20 wave |
| <b>Parallel</b>  | $\pm .000050"$  | $\pm .000010"$ | 30 arc sec   | < 5 arc sec |
| <b>Max Size</b>  | 35" Diameter    |                | 35" Diameter |             |

|                  | MACHINE         |               | GRIND                |               |
|------------------|-----------------|---------------|----------------------|---------------|
|                  | Typical         | Best          | Typical              | Best          |
| <b>Dimension</b> | $\pm .005"$     | $\pm .0001"$  | $\pm .002"$          | $\pm .0002"$  |
| <b>Radius</b>    | $\pm .005"$     | $\pm .002"$   | $\pm .005"$          | $\pm .001"$   |
| <b>Roughness</b> | Ra 30 $\mu$ m   | Ra 10 $\mu$ m | Ra 40 $\mu$ m        | Ra 10 $\mu$ m |
| <b>Flatness</b>  | $\pm .005"$     | $\pm .002"$   | $\pm .001"$          | $\pm .0002"$  |
| <b>Parallel</b>  | $\pm .005"$     | $\pm .002"$   | $\pm .001"$          | $\pm .0002"$  |
| <b>Max Size</b>  | 30" x 16" x 16" |               | 24" Diameter (6" ht) |               |

|                  | SAW           |               | WATERJET       |               |
|------------------|---------------|---------------|----------------|---------------|
|                  | Typical       | Best          | Typical        | Best          |
| <b>Dimension</b> | $\pm .005"$   | $\pm .001"$   | $\pm .010"$    | $\pm .005"$   |
| <b>Radius</b>    |               |               | $\pm .010"$    | $\pm .005"$   |
| <b>Roughness</b> | Ra 30 $\mu$ m | Ra 10 $\mu$ m | Ra 90 $\mu$ m  | Ra 60 $\mu$ m |
| <b>Flatness</b>  | $\pm .005"$   | $\pm .002"$   | $\pm .001"$    | $\pm .0002"$  |
| <b>Parallel</b>  | $\pm .005"$   | $\pm .002"$   | $\pm .001"$    | $\pm .0002"$  |
| <b>Max Size</b>  | 14" x 8" x 1" |               | 40" x 24" x 2" |               |

|                  | DICE                 |                |
|------------------|----------------------|----------------|
|                  | Typical              | Best           |
| <b>Dimension</b> | $\pm .005"$          | $\pm .0005"$   |
| <b>Radius</b>    |                      |                |
| <b>Roughness</b> | Ra < 10 $\mu$ m      | Ra < 5 $\mu$ m |
| <b>Flatness</b>  |                      |                |
| <b>Parallel</b>  | $\pm .000050"$       | $\pm .000010"$ |
| <b>Max Size</b>  | 8" Dia x .300" thick |                |

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## Core Competencies

IRD Glass specializes in the manufacture of challenging **precision optical and technical glass and ceramic components**.

With a sincere commitment to partnership and collaboration, IRD has become a **trusted sole-source provider**, making their **dreams for tomorrow a reality today!**



### Precision Machining – Glass & Technical Ceramics

Custom sizes and complex shapes of ultra-precise optical and non-optical components are produced using **CNC mills, lathes, saws, dicing machines, and waterjets**. Materials include **visible and IR glass, sapphire, silicon nitride, silicon carbide, alumina, zirconia**, and similar technical ceramics.

### Custom Laser OEM Optics

IRD manufactures **custom homogenizers, light pipes, cavity reflectors, cylindrical and rod lenses, and precision mirrors** in a range of shapes and sizes.

Using advanced metrology and proprietary polishing processes, we ensure exceptional surface quality with **cutting-edge coating options** available.

### Flat Optics

We produce **laser mirrors, prisms, optical flats, certified wedges, filters, diffrusers, vacuum plates, and precision windows** for multiple applications.

Patterned masks and **chrome-on-glass reticles** are also available.



### Precision Tubes, Pedestals & Rods

IRD manufactures **precision glass tubes and pedestals** for the pressure transducer and sensor industries.

We also produce **high-accuracy glass and ceramic rods** used as optics, tooling, spacers, and masks.

### Super Polish

Our **super polish capabilities** provide the highest level of surface finish for demanding optical and laser applications.

See our Capabilities insert for details.

### Additional Services

We offer a full suite of **value-adding services**, including:

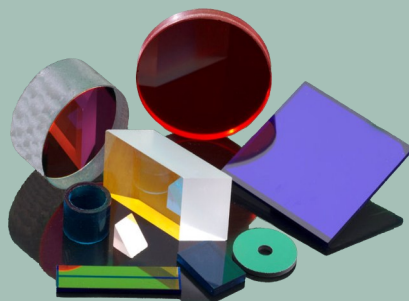
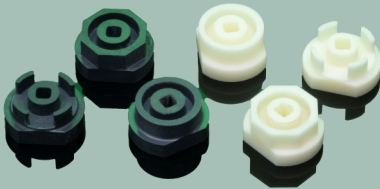
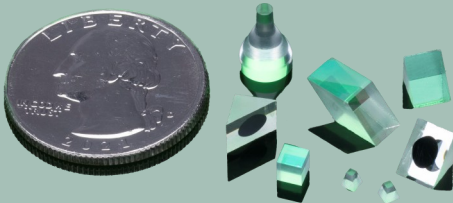
- Simple and complex optical assemblies
- Adhesive-free contact bonding
- Custom thin-film coatings
- Laser damage and mirror coatings
- Rapid prototype turnaround

### Metrology Equipment

IRD ensures quality through advanced inspection tools including:

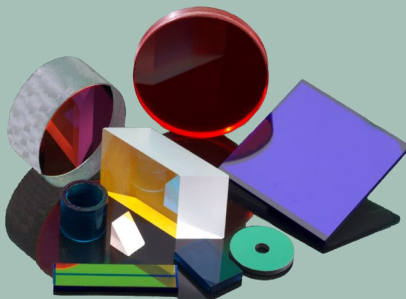
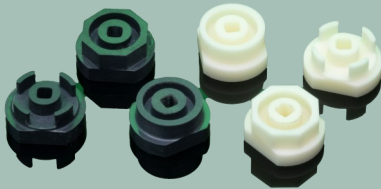
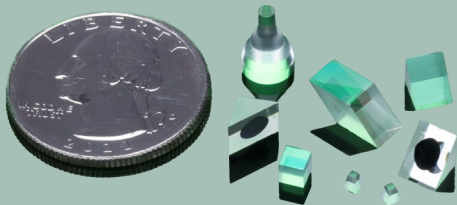
**Optical vision systems, darkfield autocollimators, white-light interferometers, computer-generated holographic cylinder nulls, CMMs, and polarizing and toolmaker's scopes.**

A complete list can be found in the Equipment insert.



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### Machining

- ◆ HAAS CNC VMC (9)
- ◆ HAAS CNC HMC
- ◆ Manual Mill (3)
- ◆ Matsura CNC VMC
- ◆ OMAX CNC Waterjet
- ◆ HAAS CNC Lathe
- ◆ Citizen Swiss (4)
- ◆ Hyundai CNC Lathe
- ◆ Miyano CNC Lathe

### Grinding

- ◆ Blanchard Surface Grinder (20)
- ◆ DAMA edge beveler
- ◆ Hyundai 400G Lathe (2)
- ◆ KO Lee Cylindrical Grinder
- ◆ Landis Cylindrical Grinder (2)
- ◆ Rod Grinder (2)
- ◆ Saeda Edge Grinder (2)
- ◆ Sidai Auto Optical Edger
- ◆ Mildex Bevel System (2)

### Sawing/Dicing

- ◆ Chevalier CNC Slicing Saw (3)
- ◆ Custom Diamond Saw (6)
- ◆ Disco Dicing System (2)
- ◆ K&S Dicing Saw
- ◆ KO Lee CNC Slicing Saw
- ◆ STC Annulus Saw (2)
- ◆ Accretech Dicing Saw
- ◆ Piccola CNC Scribing system

### Lapping

- ◆ LapMaster 9B DS Lap
- ◆ LapMaster SS Diamond Lapper 36"
- ◆ LapMaster SS Lapper 30"
- ◆ LapMaster SS Lapper 36" (2)
- ◆ PR Hoffman PR1-66T
- ◆ Speedfam 16B DS Lapper (2)
- ◆ Somos DS Lapper

### Polishing

- ◆ Cylindrical Polishing System (6)
- ◆ Fire Polisher (5)
- ◆ LapMaster 9B DS Polisher (2)
- ◆ LapMaster CP 48" (3)
- ◆ PR Hoffman PR1-66T
- ◆ Proprietary Rod Polisher (11)
- ◆ Speedfam 16B DS Polisher (3)
- ◆ Speedfam CP Pitch 48" (2)
- ◆ Speedfam CP 48"
- ◆ Lapmaster CP 36" (2)
- ◆ Strasbaugh CP 36"
- ◆ Strasbaugh CP 24" (3)
- ◆ Strasbaugh CP Diamond 30"
- ◆ Unajec Submersed Pitch
- ◆ Somos DS Polisher
- ◆ Custom CP systems 96" (3)

### Metrology/Inspection

- ◆ CGH Cylinder Null (4)
- ◆ HEPA Clean Room (2)
- ◆ K&S Microwash Spin Station (2)
- ◆ Nikon 6D Interferometer
- ◆ Nikon Toolmaker Scope
- ◆ OGP CNC Vision Inspection System
- ◆ Starrett Easy View Toolmaker Scope
- ◆ Ziess O-Inspect CMM
- ◆ Zygo 6" Verifire
- ◆ Zygo GPI Interferometer (2)
- ◆ Zygo NewView 7300 Interferometer
- ◆ Automated Optical Inspection system
- ◆ Apre Mini Fiz
- ◆ Trioptics Digital Autocollimator
- ◆ Tagarno Digital Scope
- ◆ MicroVu Vision System
- ◆ Benchmark Vision System
- ◆ Agilent Spectrometer

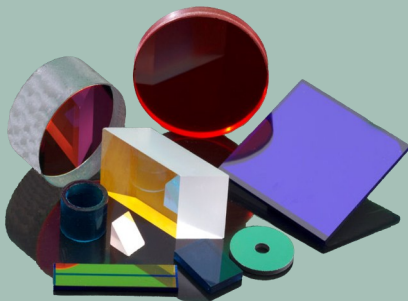
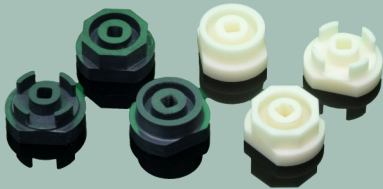
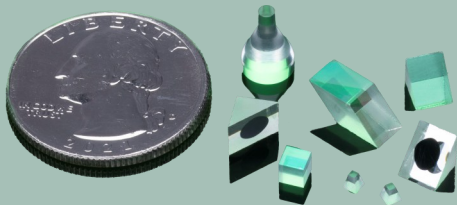
### Coating

- ◆ Ion assist E-Beam Coating Chamber (2)
- ◆ Epilog Laser Marking system

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## Precision. Partnership. Possibility.

At IRD Glass, we specialize in delivering a complete range of precision glass fabrication services — all under one roof. Our capabilities include **grinding, lapping, polishing, assembly and bonding, thin film coating, sawing, dicing, drilling, coring, and machining**. Beyond glass, we apply the same expertise to **traditional and technical ceramics**, as well as **sapphire components**, giving you the flexibility to bring your most demanding designs to life.

## Advanced Materials. Exceptional Results.

Our team manufactures precision components from **optical and non-optical glasses and technical ceramics** such as **zirconia, sapphire, ALON, and silicon carbide and silicon nitride**.

Some of our most commonly produced parts include:

- **Reflectors and light pipes** for laser OEMs and directed energy applications
- **Sapphire windows, precision tubes and components** for sensors and pressure transducers
- **Cylindrical and rod lenses, ring laser gyro bodies**, and other guidance system components
- **Optical assemblies and sub-assemblies**, including UV adhesives, contact bonding and laser welding
- **Prisms, optical wedges, and windows** for a wide range of precision applications.
- **Thin-film coatings, high laser-damage mirrors, and reticles**
- **Ultra-precision tooling and fixturing**

Every component is crafted with a deep understanding of materials science, optical performance, and manufacturing precision — ensuring your parts not only meet, but exceed, specifications.

## Built on Partnership.

For more than four decades, IRD Glass has been guided by one simple philosophy: **partnership drives performance**. We work hand-in-hand with our customers, building lasting relationships built on trust, innovation, and shared success.

That commitment has earned us long-standing sole-source partnerships with world-class companies, including:

**Honeywell — 44 years**

**Medtronic — 29 years**

**3M — 29 years**

**Lockheed Martin — 18 years**

**Alcon — 23 years**

**Collins Aerospace — 31 years**

At IRD Glass, we care deeply about the people behind every project — our employees, our customers, and our vendors. Together, we turn your dreams for tomorrow into reality today!

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