



# Infrared Optics & Thermal Imaging for Commercial & Military Applications

Presented by: Devin S. Standard- Infrared Technology Specialist  
[Dstandard@lightpath.com](mailto:Dstandard@lightpath.com) (407) 868-7920

**GLOBAL LEADER**  
IN OPTICAL TECHNOLOGY



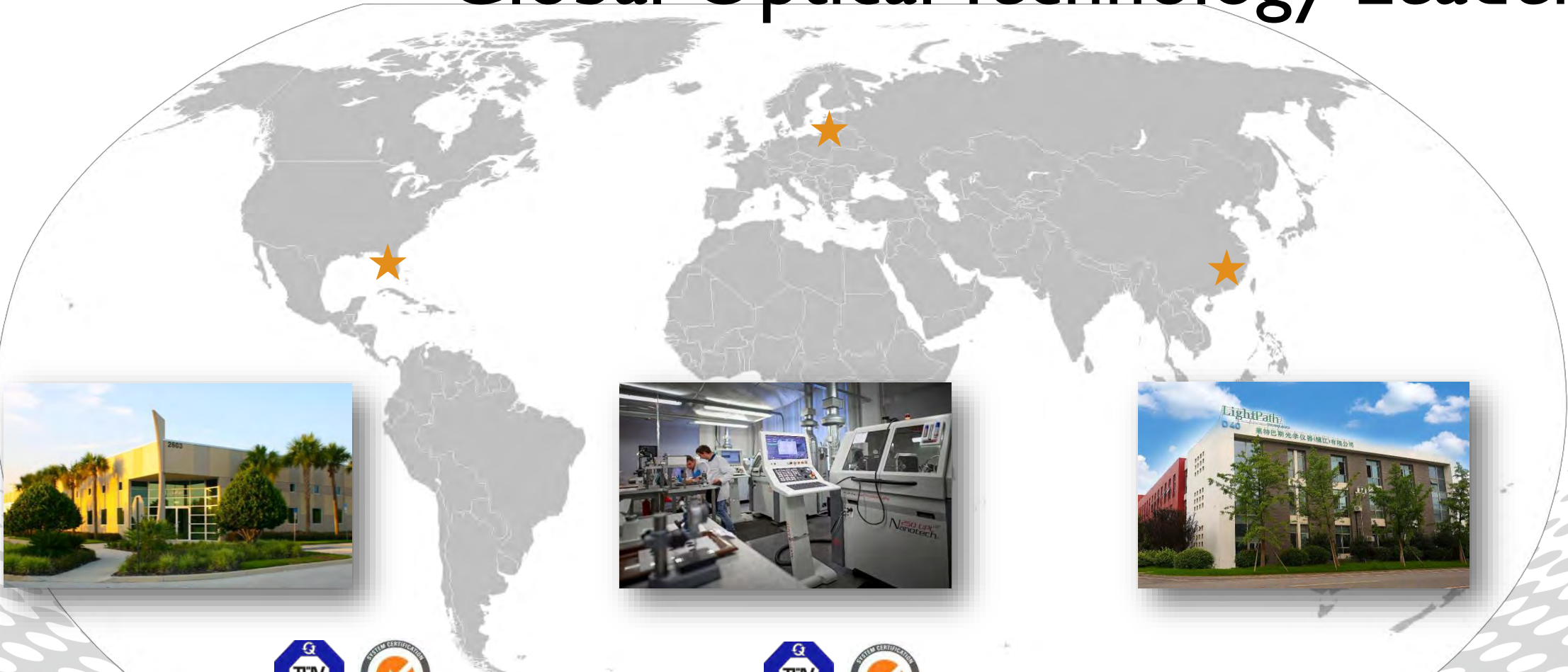
- Who is LightPath Technologies?
- What's so great about IR Optics and Thermal Imaging?
- Practical application examples.
- Why LightPath for IR optics?
- What are we doing next?
- Where we need your help?



SpaceX rocket captured w 75mm lens on  
BAE 12um 640x512 camera- 12 mile distance

This presentation may contain forward looking statements and should not be construed as investment advice.

# Who is LightPath? Global Optical Technology Leader:




## Headquarters: Orlando, Florida

- Prototyping
- R&D
- Molded lens manufacturing
- Chalcogenide production
- Diamond turned manufacturing
- Coating



## Riga, Latvia

- Infrared optics manufacturing
- Diamond turned/CNC polishing
- Crystal growth
- Coating 



## Zhenjiang, China

- Molded lens volume manufacturing
- Coating
- Capacity expansion

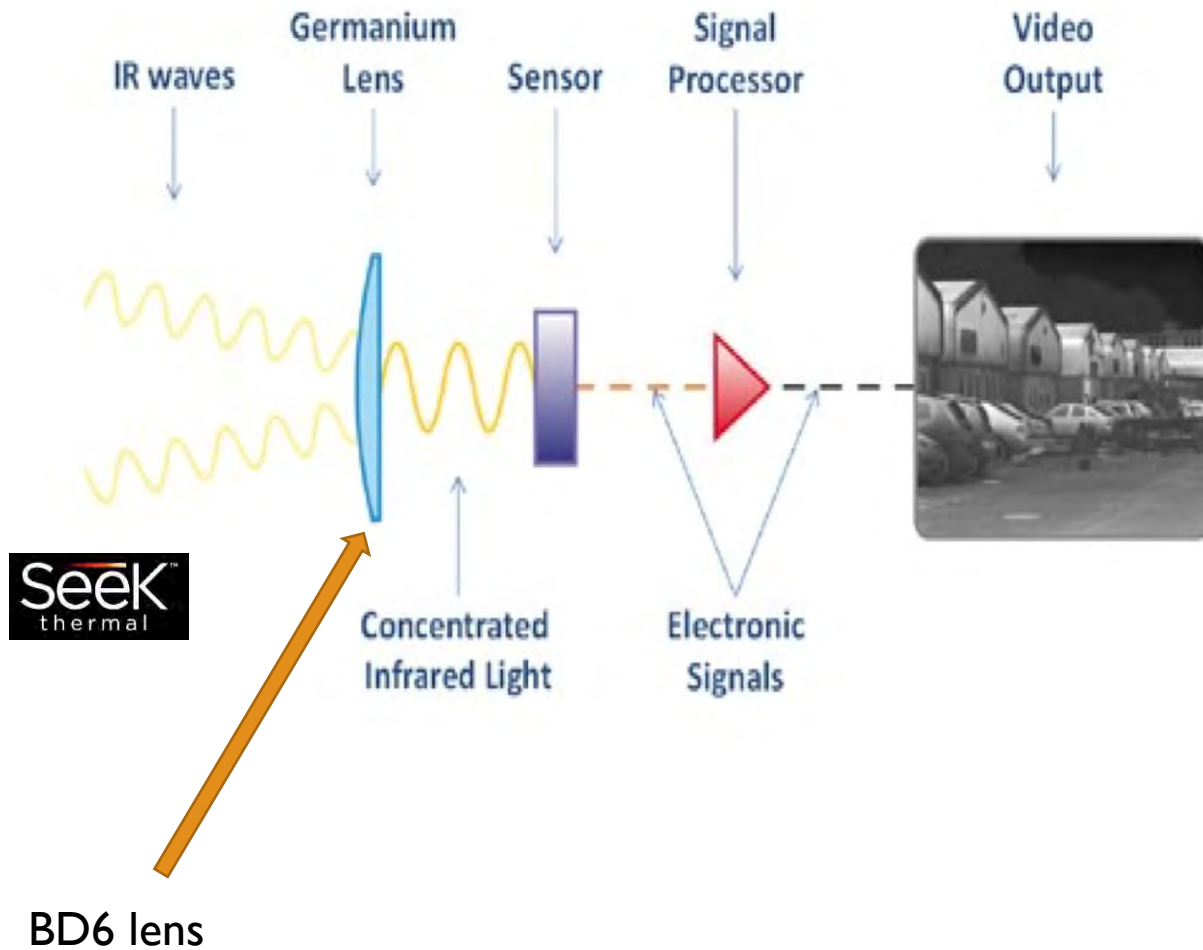
# What's So Great About Thermal(IR) Imaging?

- Thermal imaging cameras allow quickly detection & precise measurement of infrared radiation which is energy (aka heat) in the “invisible” portion of the electromagnetic spectrum.
- We generally talk about energy travelling in the following wavelengths when referring to IR:
  - SWIR 1.5-3um
  - MWIR 3.5-5um
  - LWIR 7-14um
- Capturing energy in these wave lengths & rendering images allows people to measure, analyze, control and make decisions w/data not previously available, in a non-destructive & non-contact fashion.
- IR imaging works perfectly well in total darkness & also works in daylight conditions. No external illumination need.



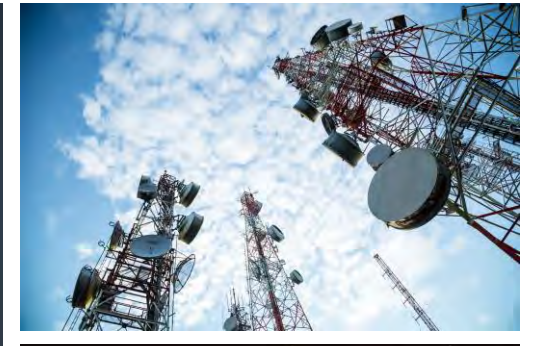


# How Thermal Imaging Works



- Everything above absolute zero emits IR radiation
- Special camera lens captures and focuses photons on the detector.
- The resistivity of the detector changes the energy into signals.
- The signals are processed into information( Ones and Zeros)
- Info is output to a micro OLED display
- Eye piece magnifies image to comfortable size for viewing

# Markets We Serve



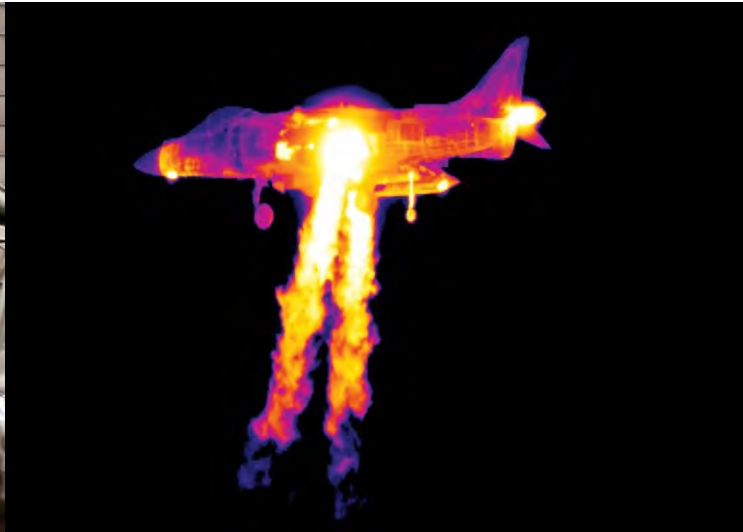


# Automobile Safety- Car vs Deer

- In the USA there are 1,000,000 Car vs deer automotive accidents every year
- Deer normally weigh 68-125Kilos(100-250lbs)
- Automotive thermal night vision can help save lives and reduce property loss



# Military & Police Applications

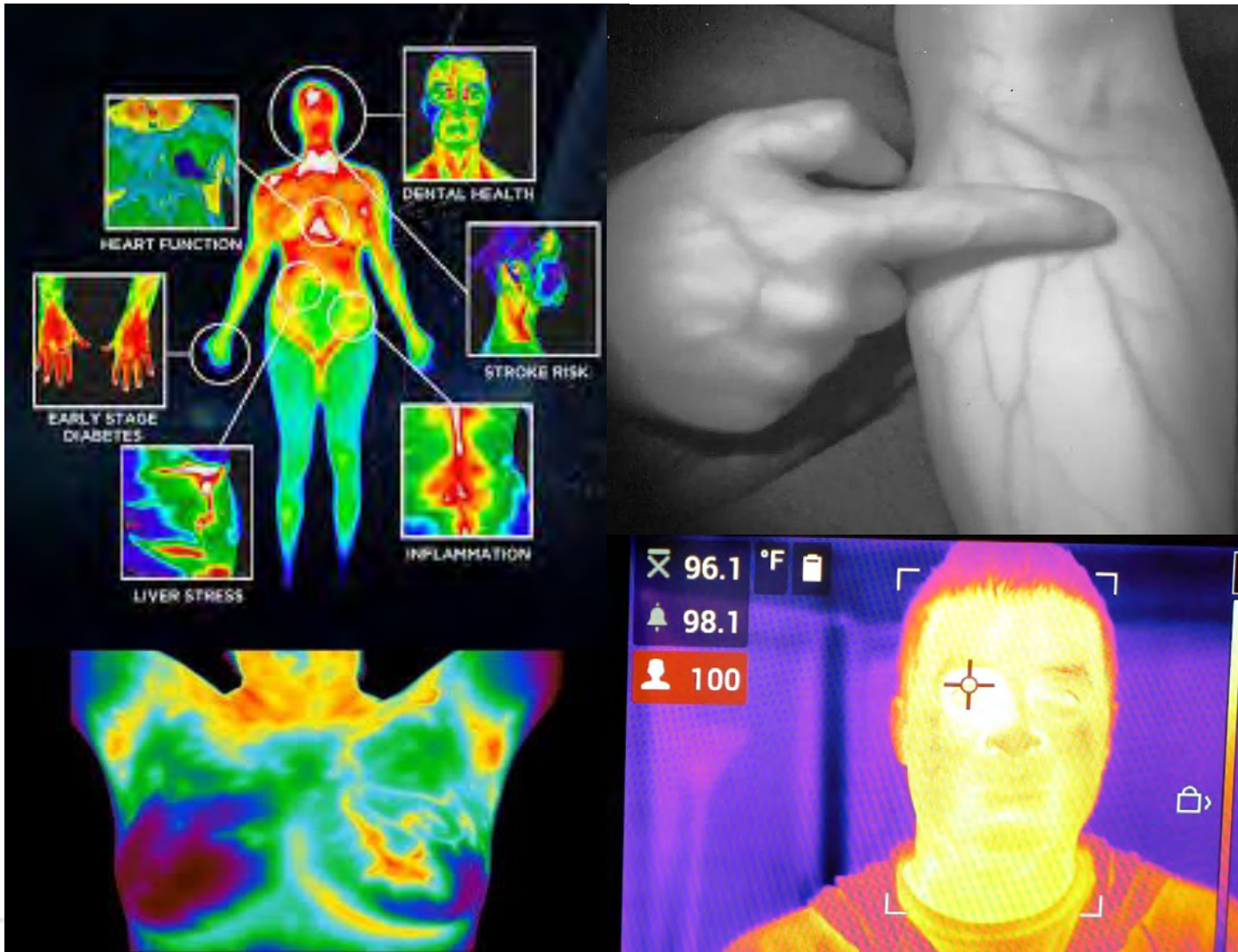


- For low-light/no-light operations when you need to detect, recognize and identify threats from safe distances, IR imaging excels!





# Medical IR Imaging

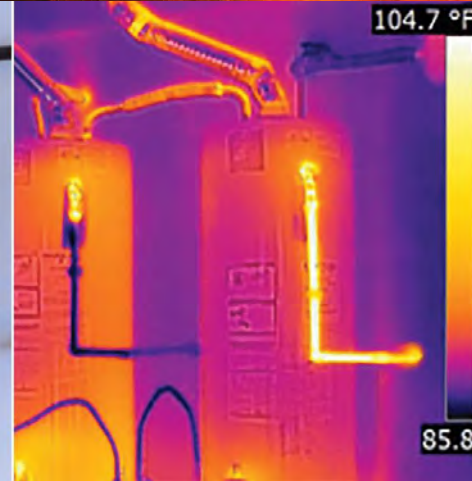


- Non-contact IR imaging is being rapidly adopted for medical screening.
- Note: A baseline must be established for comparison.
- If one wants to do elevated temperature detection you must have a calibrated temp reference, or two to measure against for actionable and accurate information.

# IR imaging ubiquitous measurement tool

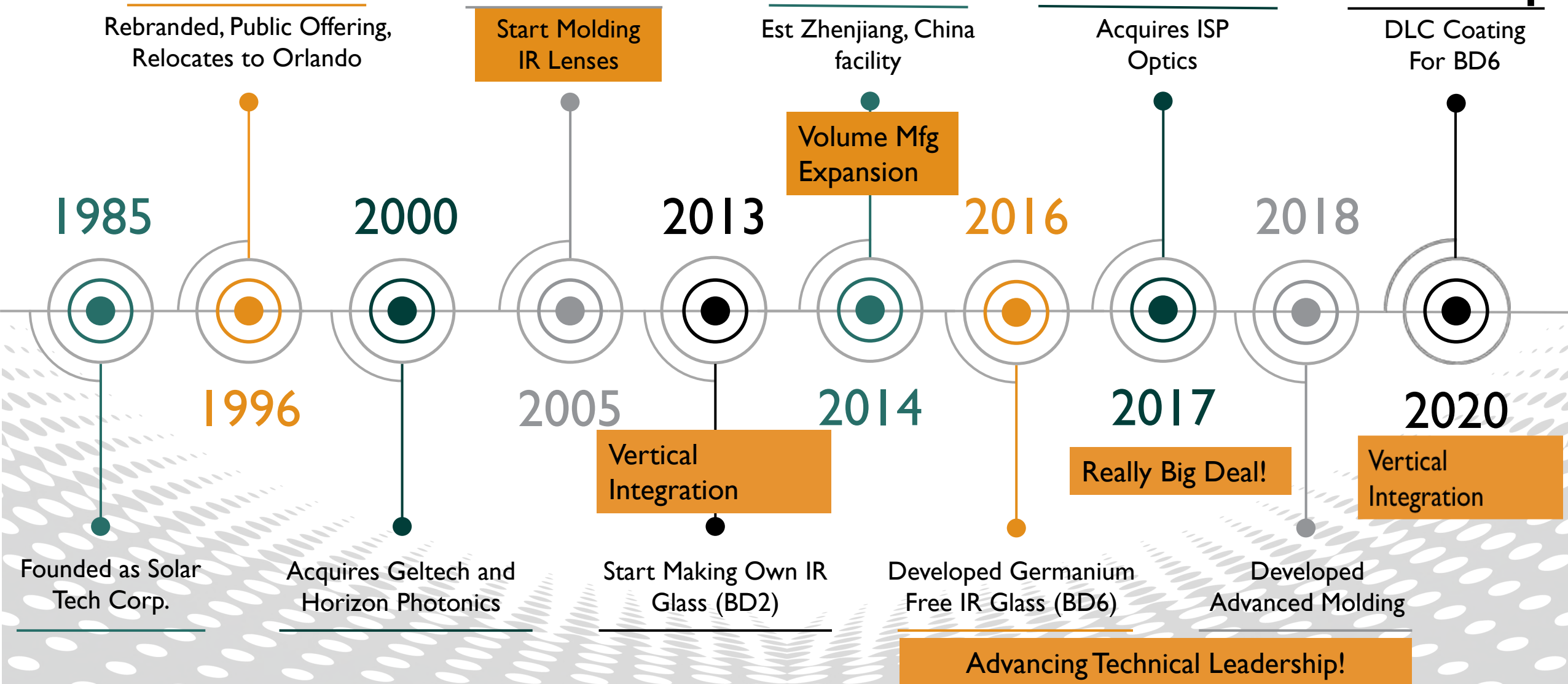


- IR imaging is rapidly being adopted as an accurate measurement tool across industries



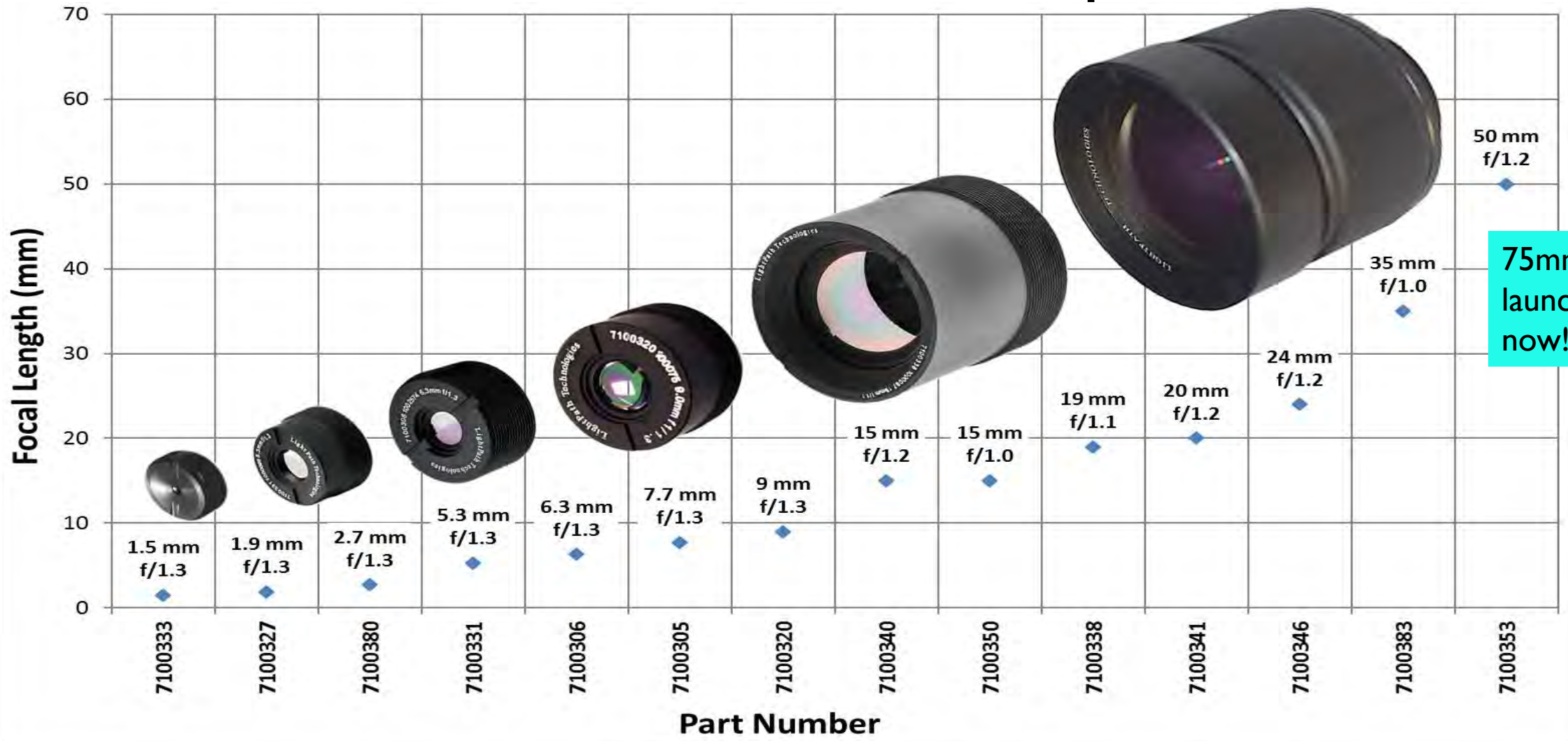


## 15 Years IR Tech Leadership





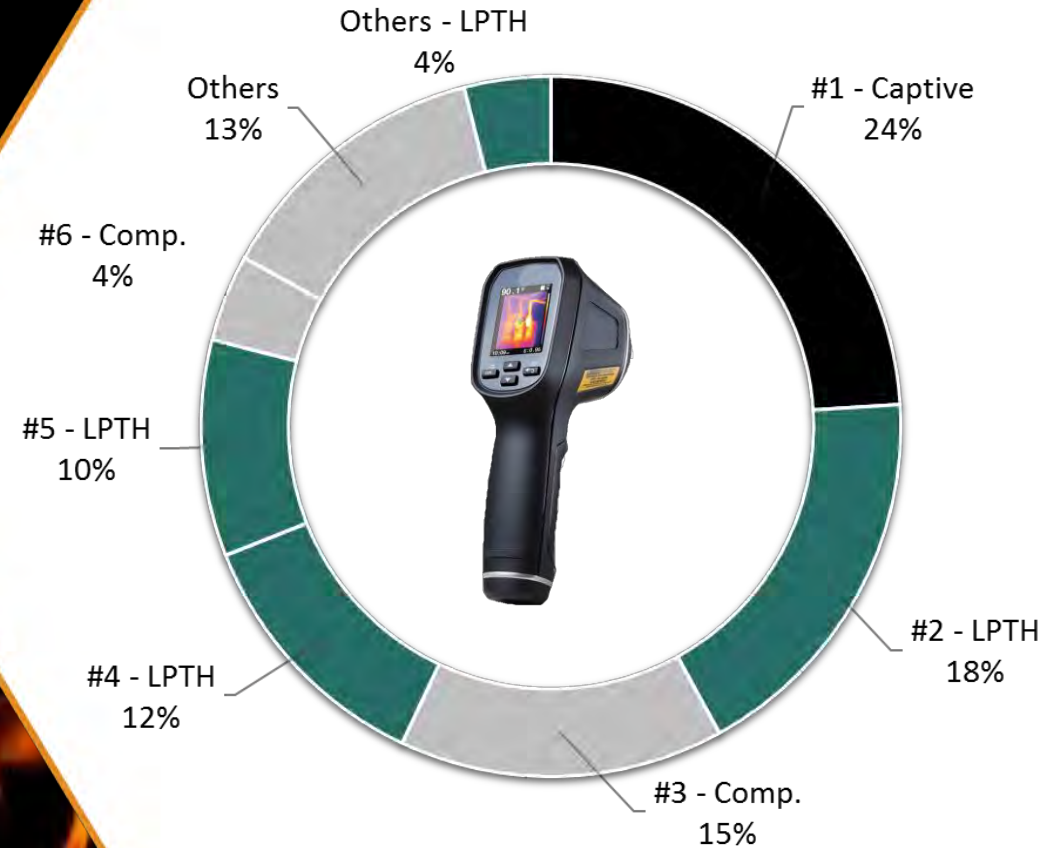
# LightPath Designs & Build IR Optics here in Florida



# The Worldwide Market Leader in Infrared Optics for Fire Fighting



# Fire Fighting World Market 2018



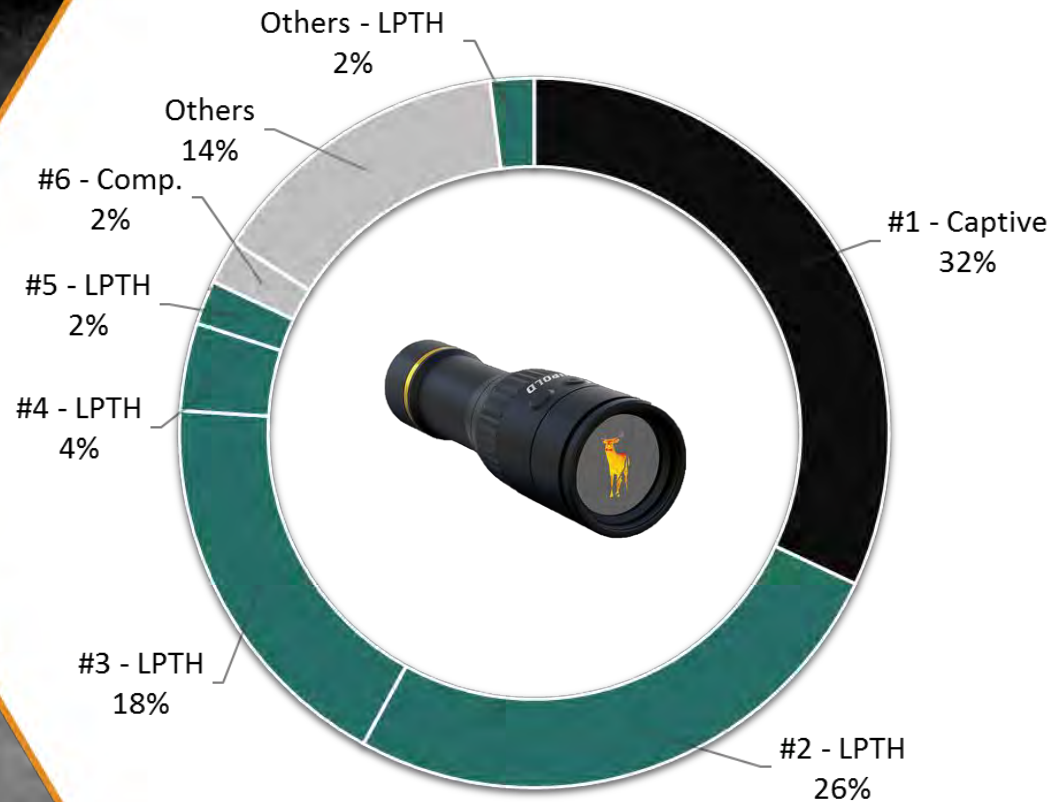
**\$100M Market Size**



# The Worldwide Market Leader in Infrared Sporting Optics

- Supplies to the top **4 of 5** Market Leaders
- Over **100,000** Lenses Per Year
- 79%** Available Market Share

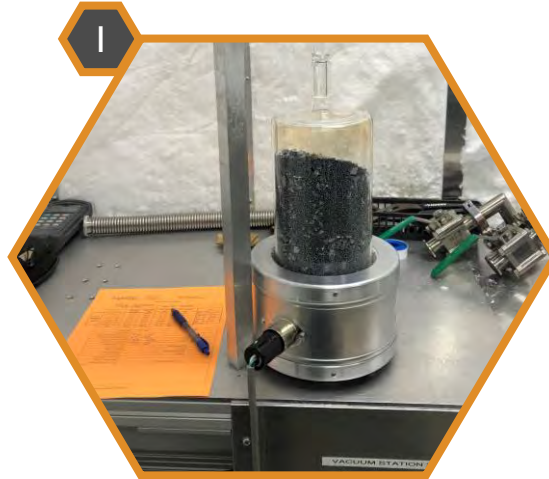
## Commercial Sporting Optics World Market 2018



**\$600M Market Size**



# What is new in Orlando? Complete Vertical Integration



Raw Materials



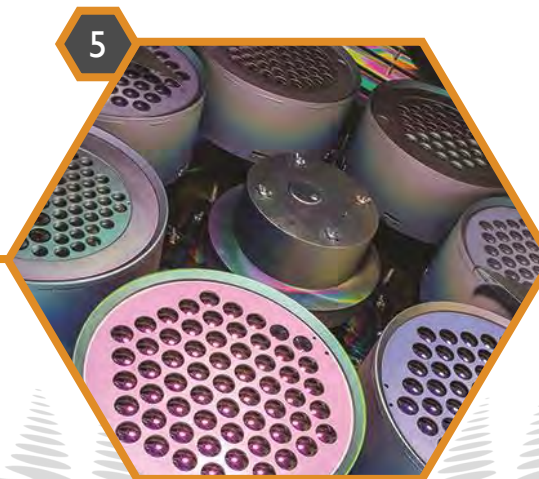
Glass Boule Production



Glass Preform



Lens Molding



Coating



Final Assembly

Chalcogenide Glass and Optical Salt Crystals



## Material Manufacturing

180

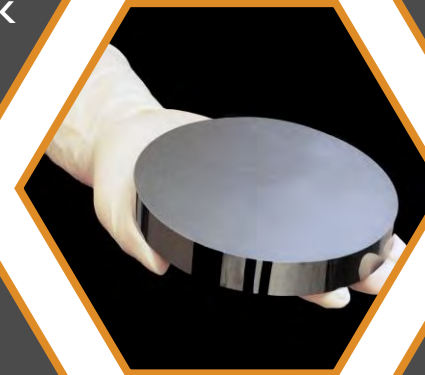
ChG kg. / week  
in USA

10,000

ChG kg  
Produced in  
USA

2

Locations



Thermal  
Imaging and  
FT-IR



Freeforms, Diffractives, Aspheres, Arrays, Off-Axis Parabolas, Cylinders, Lenses, Mirrors, Molds & More



## Diamond Turning

150k  
Lenses per  
Year

20  
Machines

2  
Locations

U.S. &  
International  
Pioneer in  
DT



LightPath<sup>®</sup>  
TECHNOLOGIES

A close-up photograph of a diamond turning process, showing a rotating metal workpiece being machined by a tool. The image is framed within a hexagonal shape.

BaF<sub>2</sub>, CaF<sub>2</sub>, Ge, Si, ZnS, ZnSe, GaAs, CdTe, KRS-5, Chalcogenides, BD6, Al, Plastics, Nickel, Carbides & More





# Expanding Volume Manufacturing

Computer controlled press stations manage the time, temperature, and pressure of the molding process to ensure predictable results and consistent uniformity





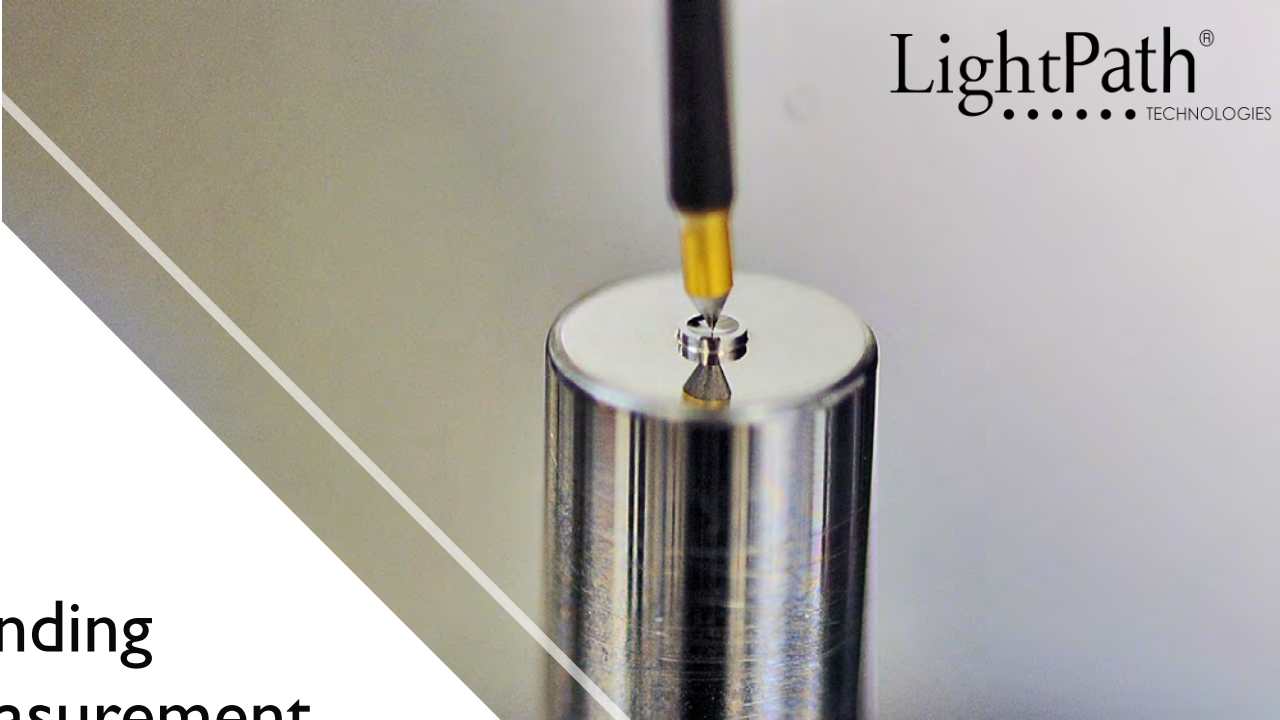
# Expanding AR Coating Facilities

A variety of standard multilayer coatings as well as custom capabilities





Expanding  
Test & Measurement  
Capabilities





# A LEADER IN OPTICAL SOLUTIONS

From concept through prototyping, volume production, and global distribution, LightPath has the optical knowledge and manufacturing expertise to be your optics partner every step of the way.

DID YOU  
KNOW?

Over 40 Engineers on staff to assist with your project.

**We need more Optical Engineers, Mechanical Engineers and Optical Salespeople.  
Call me if you know a good candidate. Thanks!!**



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