

Perfect focus, any surface: Oblate Optics revolutionizes laser manufacturing

In the world of high-tech manufacturing, precision is everything. Yet, for decades, a fundamental limitation has held laser systems back: a limited depth of focus (DoF). This constraint makes working on curved or uneven surfaces a clumsy, inefficient process. Manufacturers in the marking, cutting, and engraving industries are forced to rely on painfully slow surface mapping and mechanical modules that constantly readjust the laser's position. The results are far slower production, higher material waste, and complex systems that are costly to build and maintain—a persistent headache for industries from electronics to aerospace.

San Diego-based Oblate Optics is leveraging emerging advances in inverse design and nanomanufacturing to create an innovative solution to limited DoF. Its ultra-thin, high-efficiency, AI-optimized DeepFocus™ metalenses use extended depth-of-focus (EDoF) to keep the laser focused over a far greater range of working distances than otherwise possible. This eliminates the need for extremely slow surface mapping, and for mechanical or manual refocusing and moving parts—increasing operation speed, accuracy, and cost efficiency. Its compact, plug-and-play modules replace bulky and expensive optics, streamlining the laser based manufacturing process.



Rajesh Menon, Ph.D., Founder & CTO of Oblate Optics

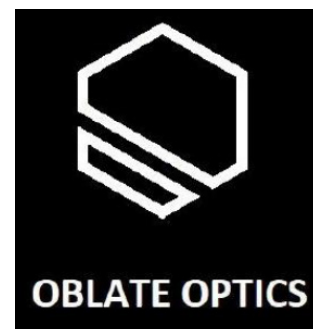
“Our optics offer unmatched performance, compactness, and cost effectiveness, making them uniquely suited for next-generation and ultra-fast laser manufacturing systems,” explained Rajesh Menon, Ph.D., Founder & CTO of Oblate Optics.

BUILDING MOMENTUM: FROM VALIDATION TO VISION

Milestones define a startup's journey. Oblate Optics reached a significant turning point when it was selected for a paid pilot study with Altec Lasers, a leading laser marking original equipment manufacturer (OEM). This study allowed Oblate Optics to test its

technology and validate that its metalenses took the correct technical approach. It also proved the technology could have strong industry demand.

“That milestone, combined with early feedback from NSF I-Corps and support from the Luminate accelerator, gave us the momentum to build a scalable business around



a truly transformative optical technology,” said Menon.

With these findings, Oblate Optics is moving forward to finalize and field-test its next-generation EDoF lens prototypes, complete pilot integrations with OEMs, and ultimately establish a scalable U.S. based manufacturing pipeline.

“In parallel, we aim to expand into glass ablation applications, particularly for co-packaged optics and photonic interposers, where precise laser scribing is critical,” explained Menon. “Hitting these milestones will position us to serve high growth markets in semiconductor packaging, display technologies, and photonic integration.”

Oblate Optics also has goals to tap into the vast marking, engraving, and cutting markets, which range from hundreds of applications such as marking serial numbers to creating precision machine components. Oblate Optics’ initial focus is the global laser marking market, projected to grow to nearly \$5 billion by 2028.

“With typical systems requiring one to two lens replacements annually and a large installed base already in operation, we estimate that our addressable lens market will exceed \$2 billion by 2029,” said Menon.

ACCELERATING EXPANSION WITH LUMINATE

Oblate Optics applied to the Luminate accelerator to access its world-class network of OPI experts, strategic partners, and manufacturing resources in Rochester.

“Through Luminate, we’ve refined our value proposition, built key customer relationships, and ac-

celerated technical milestones,” said Paul Herz, CEO of Oblate Optics. Rochester’s larger OPI ecosystem presented Oblate Optics with the unique opportunity to be surrounded by precision optics manufacturers, laser system integrators, and advanced metrology providers.

“Rochester’s collaborative environment facilitated our early partnerships with significant optics companies such as Edmund Optics, Corning, Thorlabs, and Synchron Optics,” added Herz. “These collaborations quickly advanced our technical readiness and supply chain strategy.”



Paul Herz

Those connections are translating into market impact: starting in late September, Oblate Optics’ DeepFocus metalenses will be available through Edmund Optics’ web catalog—the first metalenses offered for general purchase by any lab.

Oblate Optics is one of twelve startups selected to participate in Luminate this year, and will compete for up to \$1 million in follow-on funding at Luminate Finals this October.

If they were to be awarded follow-on funding, it would allow Oblate Optics to take the next steps in scaling manufacturing, launching its first commercial product, and expanding into new product applications.

“The funding will also support team expansion in optical engineering, customer support, and operations as we move from pilot deployments to full-scale commercial integration,” added Herz.

These efforts could have a significant impact on bolstering the OPI resources available in the Finger Lakes region and the U.S. In related research and development work, Oblate Optics is currently partnering with the U.S. Army, Air Force, and Space Force to develop advanced infrared optics that dramatically reduce the size, weight, and power of imaging systems, while also minimizing dependence on scarce materials, such as germanium, that lack secure domestic supply chains. By leveraging Rochester’s precision optics manufacturing, the company aims to build a new U.S.-based ecosystem for infrared meta-optics with broad national security impact.

WHAT’S NEXT: STREAMLINING LASER-BASED MANUFACTURING

It’s clear that Oblate Optics’ advanced DeepFocus metalenses are poised to transform and streamline laser-based manufacturing in a wide array of industries.

“By enabling simpler, more efficient, and robust optical systems, Oblate Optics will accelerate automation, improve precision, and reduce costs in industries ranging from aerospace and electronics to medical devices and photonic packaging,” said Menon.

The companies of Luminate cohort 8 will compete for \$2 million in follow-on funding at Luminate Finals 2025 on October 22. The program is funded by Empire State Development’s Finger Lakes Forward Upstate Revitalization Initiative. For more information about the Luminate accelerator and Finals 2025, visit luminate.org.