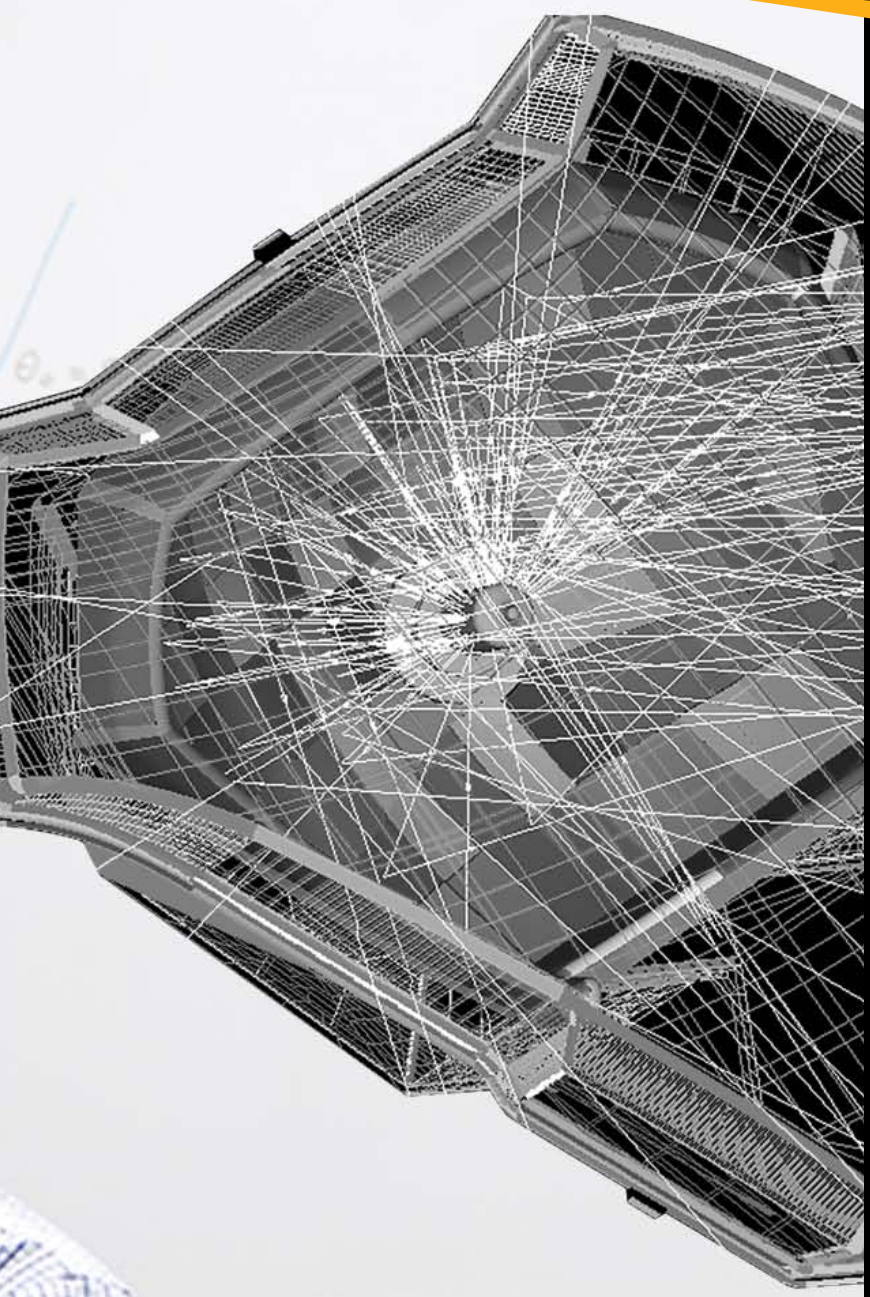

Breault
Research
Taking Light
Further
BRO Engineering Services
Partners in Your Success

Your company and BRO: We make a great team.



BRO Engineering Services designed and tested the headlight (shown above), stoplight, and turn signal illumination systems for the Vectrix all-electric scooter.

If your product needs light, you need the experts at BRO Engineering Services. For over 30 years, we've worked with Fortune 500 companies, national labs, and start-ups to turn their creative visions into optical products. We can save you time and money with our design and manufacturing capabilities. Want the power of a world-renowned R&D team on your engineering project? Look no further than BRO.

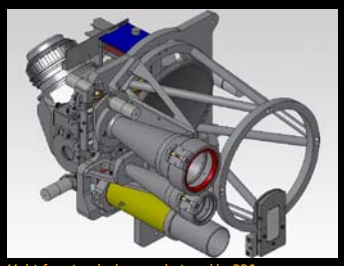
BRO Engineering Services is ready to work for you in whatever capacity you choose. If you require a complete engineering department, let us serve in that capacity. If you have an in-house group, we can work with your people. We are prepared to step into any phase of the design process to help translate your vision into viable technology.

Naturally, you can be sure that your intellectual property remains confidential. So whether you need only an optical design or want us to take your product through testing and manufacturing, we can help you bring your product to market faster, and more reliably, than you ever thought possible. After all, we have the same goal: your company's success.

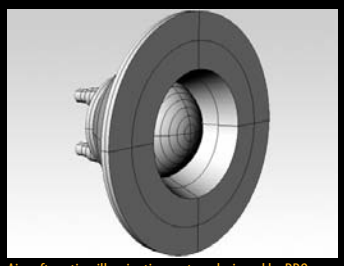
Since 1979, our optical engineers have solved optics-related problems and created innovative products for thousands of companies worldwide. As experts in imaging systems, stray light, coherent optics, and illumination, our team at BRO is ready to turn your vision into a product that will perform in the marketplace.

www.breault.com/engineering

WORK

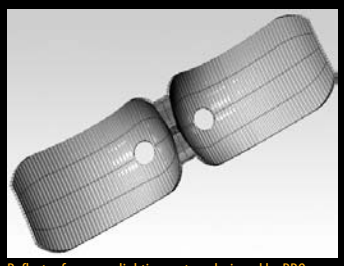


Multi-functional telescope designed by BRO



Aircraft seating illumination system designed by BRO

Optic for traffic warning light designed by BRO



Reflector for egress lighting system designed by BRO

Our Work

Through our quality system, we work with clients to define project objectives and design parameters, then we document designs, analyses, drawings, test plans, and work instructions, which can be given directly to you, or to your designated manufacturing firm.

From the day you first contact BRO for information, we make sure our working relationship is simple and straightforward. Our customers know what to expect, including timeframe and cost. BRO stresses communication throughout the design process, with a formal review at the end of each phase.

BRO is ISO registered, which is part of the system ensuring that tasks are achieved according to schedule and communication remains open between you and our project managers.

Industry Expertise:

Aerospace/Military
Automotive
Bio-Optics
Consumer Electronics
Displays
Optical Metrology
Telecommunications

Project Expertise:

Stray Light Analysis
Illumination Systems
Coherent/Diffractive Systems
Optical Systems Engineering
Scatter Services
Source Modeling

" Other companies we talked to couldn't handle our design challenges and actually recommended we talk to BRO. "

Joe Griffin, Engineering Manager, Decoma International

CAPABILITIES

Our Capabilities

BRO has tremendous experience in solving optics problems. With a quick phone call, we can sometimes give you a first-order assessment of your project and tell you if the solution you seek violates the laws of physics. If not, we'll do our part to help you push the limits of what's possible with design, prototyping, testing, and production services for cutting-edge optical products.

Feasibility Studies

Since BRO engineers evaluate proposed designs from a system perspective, taking into account the optical, mechanical, electrical, and software elements, they can warn you well in advance of barriers to your success. We have saved companies time and money with this service, which is also the first proof-of-concept step in every engineering design project we accept.

Systems Analysis/Design

When optical engineering services are required, BRO's engineering department supplements clients' existing resources or serves as the primary engineering team. We can analyze and improve existing systems or start from as little as an idea. We work with our clients to define the problem and provide the best possible solution.

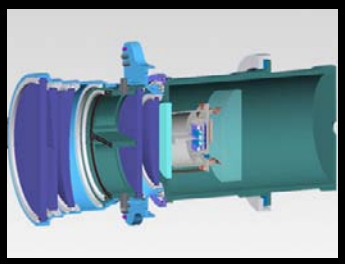
Prototyping and Testing

BRO builds, tests, and evaluates working prototypes of electro-optical and opto-mechanical products. We will even design and build custom equipment and software required to control and test a system's functionality. Test plans may include acceptance tests, design verification tests, Highly Accelerated Life Testing (HALT), and Highly Accelerated Stress Screening (HASS).

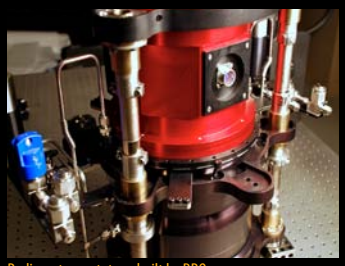
Production and Oversight

BRO does limited production runs and pilot-line setups, and specifies qualified vendors and manufacturing work instructions. BRO either fabricates the units in-house, or provides value-added oversight and coordination of OEM manufacturers to deliver a complete manufacturing solution.

BRO Engineering Services designed the optical and opto-mechanical system of this radiometer for Synodon, a Canadian company using the device to perform in-flight inspection of gas pipelines. Pleased with the design, Synodon contracted BRO to fabricate prototype units and assist with their testing and successful field evaluation. As Synodon's client base grows, the company has plans to contract BRO for additional flight-ready units.



Synodon radiometer designed by BRO

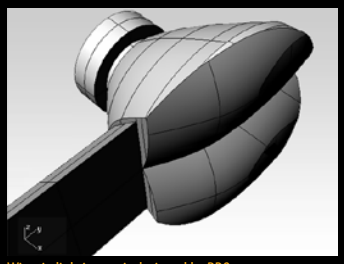


Radiometer prototype built by BRO

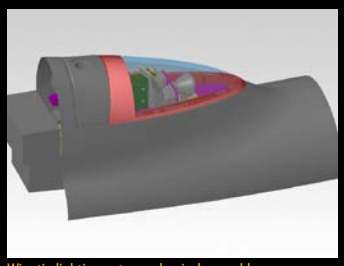
Radiometer prototype installed for aerial deployment

Radiometer successfully evaluated in field

EXPERIENCE



Wingtip lighting optic designed by BRO



Wingtip lighting opto-mechanical assembly

Wingtip lighting system installed for flight evaluation

Wingtip lighting system successfully evaluated in flight

BRO Engineering Services, in partnership with L-3 Communications, designed, prototyped and tested this solid-state lighting system for wingtip illumination of Air Force aircraft. Working from customer-defined specifications, BRO developed advanced prototype units and installed them on military aircraft for flight evaluation. The units performed flawlessly for the length of the evaluation period.

Our Experience

BRO's consulting team is diverse. We realize that innovation often arises from applying the established techniques of one field to the problems of another. BRO currently employs more than 20 optical, mechanical, and electrical engineers, the majority holding advanced degrees.

Our engineers come from the nation's top labs, universities, and corporations. The result is a remarkably diverse and knowledgeable team of leading experts, which rivals in-house R&D groups at large corporations.

Engineers Who Know Light

With all their brainpower, BRO engineers' accomplishments are based on a single principle: Optical engineers manage light. They know how to get light into places where it's needed, how to keep it away from places where it's not, and how to make light do useful work.

By bending and shaping light, BRO engineers create optical systems for everyday and esoteric products. From kitchen appliances to camera lenses, automobile lighting and space-based telescopes, BRO engineers have helped the marketplace integrate optics into virtually every kind of product.

Now that emerging and mature technologies utilize increasingly complex optical systems, it's more urgent than ever to rely on the experts who specialize in light. BRO engineers are respected worldwide as leaders and pioneers in the field of optics.

"BRO delivered... The end result was a more attractive, better performing product brought to market with impressive speed."

Mark Rowan, Electrical Engineer, Griffin Technology

PROCESS

Our Process

BRO's design process is divided into four phases. Each project is looked at individually, and phases may be added, removed, or divided into smaller tasks depending on customer need and system complexity. Progress updates are communicated often and at the end of each task through memos, email, reports, and presentations.

Phase 1 - Feasibility Study

Our engineers will talk with you, either in person or by phone to gather information and design requirements. We then evaluate the proposed design from a system perspective, taking into account the optical, mechanical, electrical, and software elements. BRO will create a statement-of-work, and then together we will set project schedules and milestones. BRO will then provide either a time-and-materials or a firm fixed-price quotation.

Phase 2 - Preliminary Design

Working from the requirements outlined in the Feasibility Study, BRO engineers further refine system design. BRO works towards nominal performance and tolerance performance, and develops an outline of an assembly/test procedure. A Preliminary Design Review is held at the end of this phase, covering system performance, schedule, cost, and assembly concept to date.

Phase 3 - Critical Design

In this stage, BRO engineers finalize design, complete drawings, and receive and evaluate supplier quotes (if applicable). BRO identifies any necessary test equipment, and outlines assembly and test procedures. At the Design Review, BRO will discuss system performance, assembly concepts, and cost and schedule based on quotes from suppliers.

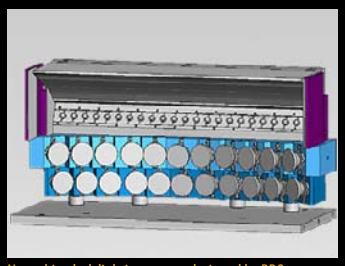
Phase 4 - Fabrication | Assembly | Integration | Test

BRO's engineers will build, test, and evaluate a working prototype of your product. The system will be tested with respect to requirements outlined in earlier phases, ensuring that the prototype performs as expected and adheres to pre-defined design parameters.

BRO Engineering Services designed, prototyped, and tested this solid-state lighting system for use on next-generation Navy ships. This project was completed as a Phase I SBIR. Ahead of schedule, BRO developed a prototype unit with the remaining budget and successfully demonstrated the unit at the Navy's Lakehurst facility. The project is currently a Phase II SBIR and the device is being considered for field implementation.

Request a Proposal

There is no fee and no obligation to discuss your needs. Contact BRO today.



Navy ship-deck lighting system designed by BRO

Lit-appearance of ship-deck lighting system

Ship-deck lighting system prototype built by BRO

Successful demonstration of ship-deck lighting system

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