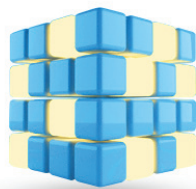


Expertise



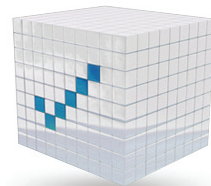
PASSIVE COMPONENT DESIGN

- Multi-element and aspheric lenses
- Optical fiber and waveguide structures
- All-fiber components – couplers and Bragg gratings
- Micro-optic components and optical assemblies
- Mechanically and thermally tuned devices



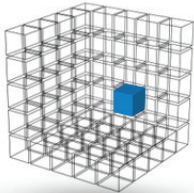
LASERS AND OPTICAL SYSTEMS

- Fiber lasers and amplifiers
- Fiber based assemblies and systems
- Opto-electronic sensing and instrumentation
- Quantum computing optical modules



TEST AND MEASUREMENT

- Optical front ends
- Optoelectronic and vision-based measurements
- Environmental controls
- Automated sequencing and parametric characterization



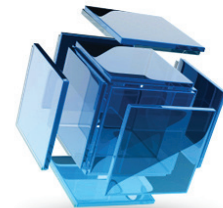
ZEMAX AND PHYSICAL MODELING

- Zemax sequential, non-sequential and physical propagation
- CAD integration
- Ad-hoc models



ELECTRONICS AND FIRMWARE

- GHz bandwidth analog
- Low noise
- High power
- Digital
- FPGA and micro-controllers
- In-house rapid prototyping



SYSTEMS

- Opto-electronic integration
- Enclosures
- Firmware and software

Expertise



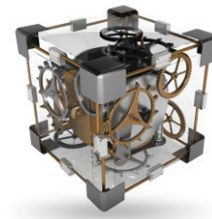
AUTOMATION

- Robotic micro-optic assembly
- Customized, intelligent computer-controlled stations
- PLC process automation
- Pneumatics/motion/sensors/vision
- Electronics and software
- Data management



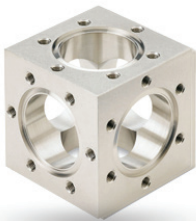
ASSEMBLY STATIONS

- Vision & parametrically driven motorized actuation
- UV cure, inductive & laser reflow
- Dispensing automation
- Accurate micro gripper design and contact sensing
- Custom electronics and actuation solutions
- Sequencing and full software automation



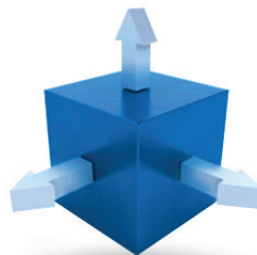
MECHANICAL DESIGN

- Solid modeling
- Detailed drawing and sourcing
- BOM generation



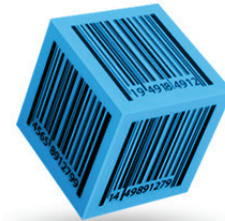
MACHINING AND RAPID PROTOTYPING

- In house 3D printing of plastic composites
- In house 3-axis Benchman XT for precision milling with 40k RPM spindle
- Extensive network of close collaborators offering high precision machining and finishing with fast turn around (aluminum, stainless, brass, copper, ceramics, kovar, invar, plastics etc.)



FINITE ELEMENT ANALYSIS

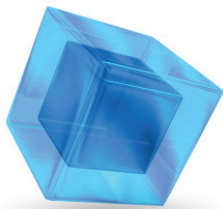
- Strain/stress
- Thermal modeling
- Computational flow dynamics



MANUFACTURING

- Manufacturing line optimization and setup
- NPI including:
 - Product and process documentation and KPIs
 - Staff training in preproduction environment
 - Technology transfers
 - Supplier management

Expertise



PACKAGING AND ENCAPSULATION

- Optoelectronic package development, die bonding, wirebonding
- Pigtailling of photonic integrated circuits, laser diodes, photodetectors
- Micro-optic assemblies and package design
- Hermetic sealing and screening
- Polymer seals and molecular sieve moisture/hydrogen management
- Thermal stress management
- Materials: adhesives, solders, glasses, ceramics, plastics, alloys, composites, plating and vacuum coatings
- Processes: plasma cleaning, curing, controlled atmosphere reflows, induction, laser



KW LASER POWER HANDLING

- Packaging design for multi-kW lasers, components and fiber cables
- Package atmosphere management
- Optical loss thermal management solutions
- Stepped stress plans and failure analysis



MEDICAL DEVICES

- Biocompatible material selection
- Autoclave resistant optics
- Seals for liquid reprocessing
- Endoscopes and microlenses
- Galvanic isolation solutions
- Fog resistant designs
- Distal tips and laser delivery



SCREENING

- Proof testing
- Hermeticity qualification and controls
- Burn-in and stress testing
- Sampling methodology



RELIABILITY PREDICTIONS

- Reliability test plans and qualification
- Low fit (0.1FIT) designs for critical deployments
- Statistical analysis and plotting of failures (log normal, Weibull, etc.)
- Fiber integrity and reliability predictions based on the power law model
- Product maintenance



FAILURE MODE ANALYSIS

- SEM, AFM, cross sectional analysis
- Hermeticity issues, fine leak testing, internal vapor analysis
- Fiber fractography analysis
- Documentation and reporting
- Customer interface, liability estimates, corrective action plans