**Medical Optical**

**CASE STUDY**

**Client:** AccuVein  
**Product:** AV300 Handheld Vein Finder

**Customer Overview:**
AccuVein presented us with a working prototype of their fascinating medical device: a laser-guided, optical vein finder. Shine it on an arm and it provides an instantaneous, non-contact, real-time image projection of the vein’s location below the skin surface. While other vein finders existed, none were as simple, portable or effective for patients with small, deep or otherwise hard-to-find veins.

**Challenge:**
AccuVein had reached a point in their development where performance inconsistencies from one prototype to the next was an obstacle. In addition, a critical design element was managing both the visible and non-visible emitted laser light, which could pose a threat to someone’s eyesight if a malfunction occurred.

**Services offered:**
- Optical design  
- Industrial design  
- Mechanical engineering  
- Electrical design  
- Software design  
- Manufacturing
Solution:

Expert Engagement:

Benchmark was brought in to establish a formal engineering development process, bridging the gap between a working concept and a viable marketable product.

Working closely with AccuVein, our product development process captured all of the system's parameters, enabling performance to become controlled and reproducible, providing a path for design optimization. The Benchmark product design team, engineering and manufacturing experts were a part of the process, ensuring smooth transitions from design to engineering to manufacturing to market.

Benchmark identified four required performance quadrants:

- Reflection of ambient light
- Detection of veins via infrared laser
- Projection of the vein image with visible red laser
- Protection of the user and patient

Each quadrant could influence the other and had many parameters, adding complexity to the system's algorithms. Finding the "sweet spot" that met the needs of all four performance quadrants in order to achieve the optimum performance from the technology was a careful balancing act.

Product Development

Complete in-house optical, mechanical, electronic, software, industrial design and human factors services.

High density optical packaging and miniaturization.

In-house Design of imaging, non-imaging, and laser based optical products:

- Cameras
- Laser interferometers
- Fiber waveguides
- Optical engines

Optical Test and Manufacturing Expertise

- Competent evaluation of existing designs and Design for Manufacturability (DFM) analysis.
- Clean Room Assembly including close tolerance active alignment for optics and assembly of die-level electronics
- Die and Wire bonding, hermetic sealing/testing, wafer sawing, cleaning of components.
- Materials evaluation and process development for unique product requirements.
- In-house functional test development and process automation design teams
- Custom, dedicated optical alignment, assembly, and test systems
- In-house development of precision fixtures, tools, and processes for prototype and production.