

ROBOMARKER: ONLY THE BEGINNING OF INVENTIONS

The idea for a new device is a gift; the work lies in refining it.

BY ALAN W. BROWN, MD



The RoboMarker (Figure 1), a corneal marking device for use in refractive and cataract surgery, was the first product launched by my company, Surgilūm, but it will not be the last. I am a practicing ophthalmologist as well as an inventor and the holder of multiple patents.

Although the first couple of Surgilūm's products are in the ophthalmology space, I hope to also eventually launch products in other fields, both in and outside of medicine. This article explains how I approach my dual role as an ophthalmologist and inventor.

MAKING THE TIME TO INVENT

I was a solo practitioner for a time, but I knew I needed a reliable partner if I was ever going to be able to pursue product development as more than a hobby. I found that partner in Dax Hawkins, MD, who seems to me to be a doctor's doctor.

Our practice, Surgical Eye Care, does only surgery. LASIK volume dropped off with the economic downturn, so we are currently more of a cataract refractive practice. We also do a significant number of glaucoma stent implants for a glaucoma specialist colleague who does not perform cataract surgery, and we are investigators in the Hydrus Microstent (Ivantis) FDA clinical trial and the Glaukos Supra trial.

I do most of my inventing and product development after practice hours and on certain days that I reserve just for those purposes. Dr. Hawkins has taken over management of the practice so that I can concentrate on the invention business.

I have learned that one person gets little accomplished by oneself. Fortunately, our practice is productive enough that I can use my earnings from eye surgery to fund a team that includes a part-time engineer, an operations manager, a sales manager, and a couple of interns. My wife Debbie basically runs Surgilūm. And, yes, when we exhibit at medical meetings, I have had three of my five children along with Debbie manning our booth on the trade show floor. When you get this much help from others, it allows you to have a better work-life balance, but still I can attest that I rarely get to watch TV or go fishing.

For those not familiar with the RoboMarker, it is a self-leveling corneal marker. It has a pendular weight system balanced between two high-precision ball bearings. The device's

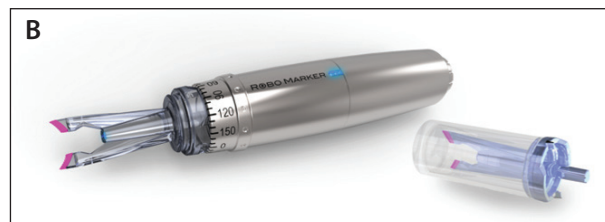


Figure 1. The first RoboMarker prototype was made from a lighted pen base, a single ball bearing, a weight cut out of a brass disk, and a modified viscoelastic plunger with two felt tip markers (A). The RoboMarker is a self-leveling corneal marker with a pendular weight system balanced between two high-precision ball bearings (B).

gravity-based system ensures that its ring dial maintains the chosen axis, allowing the surgeon to focus on marking the cornea rather than trying to keep the device level. The pre-inked disposable tip means no waiting for an autoclave while the special dried gentian violet ink allows corneal marks that last up to 2 hours (Figure 2). Figure 3 shows a comparison of the RoboMarker features and the actual device.

POLISHING THE GEMS

Although most of our practice is centered around cataracts, we have some variety in our surgical mix to stimulate a lot of invention ideas. I am always bumping up against things that could be done better. As I am working, a need arises, and voilà: An invention idea appears.

I love to socialize with my patients and perform surgery, but I think I was blessed with my ability regarding innovation. One

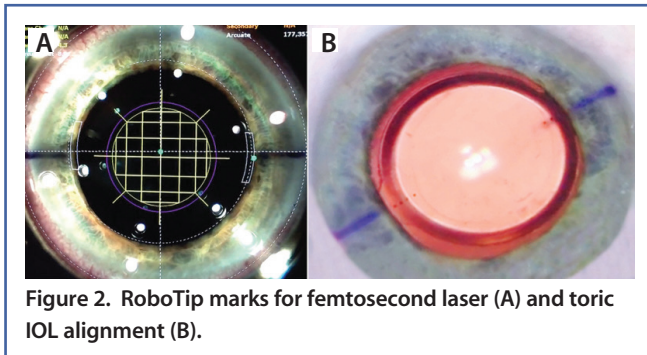


Figure 2. RoboTip marks for femtosecond laser (A) and toric IOL alignment (B).

thing I enjoy about inventing is the fact that one cannot really take credit or have pride about having an idea. To me, ideas are gifts from above that fall onto my path. I liken it to finding a rough emerald on the ground; if that happens, you are a lucky individual. There is, however, a massive amount of work required to turn that rough stone into a cut gem worthy of someone's attention.

About half of my ideas are specific to eye surgery or eye care. Another third are in other areas of medicine such as orthopedics, endoscopy, and dermatology, and about 20% are strictly consumer products. For example, I invented a surgical staple and sold the vascular rights to a company that was later acquired by Abbott Laboratories (parent company of Abbott Medical Optics). I have an idea in development to reduce pain from laser treatments and injections. On the consumer side, inventions range from a new type of barbecue grill, to coffee makers, bicycle security ideas to foil thieves, personal transportation ideas, and innovations in community hygiene, cosmetics, health drinks, automotive, and surfing.

One of the biggest compliments I have received—and it might not seem like a compliment at first—is when people look at the RoboMarker and say, “This is so obvious, why wasn't it done before?” I think a lot of people invent ideas, but they think, “Oh, if I've thought of it, I'm sure someone already has a patent on it or is already doing it.” Well, maybe

AT A GLANCE

- The aim of Surgilūm is to create first-in-class devices that solve common surgical frustrations, but that also have a design that puts them into the *cool vibe* category.
- Surgilūm's first product, the RoboMarker, is a self-leveling corneal marker with a pendular weight system balanced between two high-precision ball bearings.
- When an eye surgeon with no manufacturing or formal business experience decides to form a company, he or she is in for a character-building yet priceless experience.

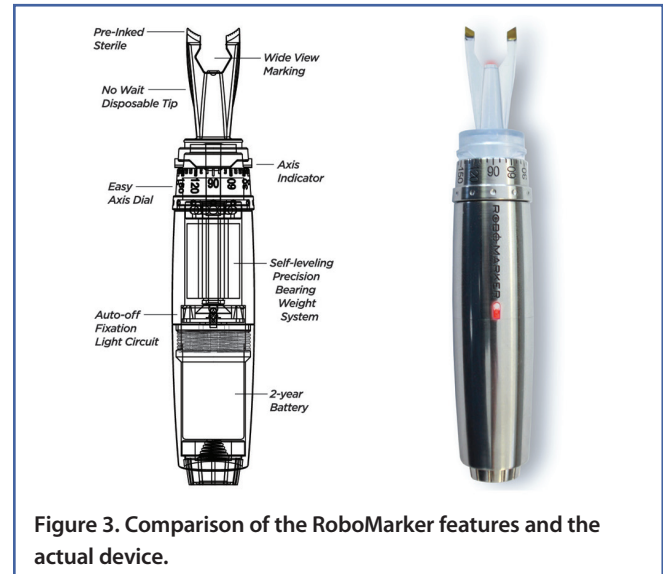


Figure 3. Comparison of the RoboMarker features and the actual device.

100 people have thought of it, but maybe you are the only person who has the impetus to do something about it—to take that stone, put it on a cutting wheel, and start to facet it out. That is the work behind the invention.

BECOMING A MANUFACTURER

I never intended to become a manufacturer, but that changed when I invented the RoboMarker. When I showed the device to the large ophthalmic companies, they all said they liked it, but nobody was willing to “take me to the dance,” as they say. I soon realized that I would have to go to the dance alone and do it myself.

When an eye surgeon with no manufacturing experience and no formal business experience decides to form a company, he or she is in for a character-building experience. The experience has been priceless because, when you have to learn about regulatory issues and the technical details of making molds, milling, sterilizing, packaging, and so on, you also learn to become a better inventor. Before, I would invent without a clue as to the many steps needed to bring a product to market. Now I invent with those steps in mind.

I also now appreciate why established companies were never quite as excited about my inventions as I was as the inventor; it is because they understood the long and challenging road to success better than the person drawing the idea out on a napkin. (I generally had more than a napkin: usually, a prototype to show.)

BOOTSTRAPPING

So far, we have not raised capital from venture capital investors. Other than a bank loan and a North Carolina Biotechnology loan, everything else has been bootstrapped out of personal funds. I did not raise outside funds early on because I did not know how to do that. I did not want to ask



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family and friends for funds because I realized I was just an inventor and not an experienced business person (and I also wanted to keep my family and friends). I did not want to risk anyone else's money.

Now that we have increasing sales, I may not have to raise capital for the RoboMarker or our second product, a self-illuminating speculum, the Photon Speculum.

William Link, PhD, of Versant Ventures, told me that if I could get one or two successful products to market, then the larger companies would start coming to me. True to his prediction, there is now interest from established ophthalmic companies in some of our products.

Dr. Link was supportive with advice, but he was also wise not to swoop in with his army of talent and take over my project. By having to figure it out myself, I am essentially earning an MBA in product development. Eighteen months ago, I did not know what ISO 13485 certification was, let alone how to obtain the CE Mark, but we have accomplished both recently.

I have significantly bigger ideas in the pipeline that will require serious investment from venture capitalists in the future. These are complex devices on the order of IOLs or glaucoma stents, which will require clinical trials, for which tens of millions of dollars would be needed. Success with my initial, smaller inventions should help me raise that money when the time comes.

A DIFFERENT KIND OF MEETING

As an ophthalmologist first and foremost, I primarily attend ophthalmology meetings. However, when I decided I was going to manufacture the RoboMarker myself, I looked around for conferences for medical device manufacturers. I went to my first medical device manufacturers' conference (MD&M East) about 2 years ago, and I have been back since. These conferences are great places to learn about what is needed to bring a product to market. Attendees can take classes on topics such as regulatory issues, insurance, and becoming ISO certified. There are also many contract manufacturers and vendors available to discuss support for upcoming products.

For an inventor, these conferences are like being in Candyland. There is row upon row of vendors offering robotics, packaging equipment, micromachining ideas for optics: It is a storehouse of ideas. Just walking up and down the aisles, you can find vendors to talk to about processes you may need for a future project, whether it be laser machining, 3-D printing, milling, or casting metal.

WHAT IS NEXT?

We at Surgilūm have been pleased to win local recognition for our efforts, such as the Charlotte (North Carolina) Venture Challenge; to be a finalist in the Medical Design Excellence Awards International Competition, against competition such as Stryker and Ethicon; and to have the RoboMarker recognized by *Outpatient Surgery News* as one of the top innovations at the 2014 American Society of Cataract and Refractive

Surgery (ASCRS) meeting. Our next product, to be released later this year, is the Photon Illuminator and Surgilūm speculum, which, when coupled together, will provide the world's first self-illuminated speculum. The tangential light from this speculum lights up the anterior segment and allows surgeons to see detail they have never seen before while protecting the retina from phototoxicity.

Surgilūm will continue to grow and develop innovative products. Its profits (or, potentially, funds from an eventual sale to a larger company) will be used to broaden our innovations to more complex problems in eye surgery and medicine in general. The consumer products division will give us an outlet for products that are not tied to years of regulatory and clinical trials.

Surgilūm is my primary focus outside my practice, but the dream is eventually to evolve. My goal is to be successful enough with ophthalmic innovations that I can transition into creating a design innovation company that primarily takes ideas to the preproduction stage, validates the market demand, and then sells or licenses those ideas to companies that specialize in those areas. We feel we have the unique ability to be a company by surgeons for surgeons. We want to create first-in-class devices that solve common surgical frustrations but that also have a design that puts them into the *cool vibe* category.

My advice to all my fellow inventors out there who are not sure how to get their ideas to market is just simply “do it.” Yes, it is difficult to have a full-time practice and also start another company, but if I can do it, anyone can. You just have to decide to start walking that path, be excited for all you will learn, and not be too discouraged by the many mistakes you will make along the way. It is greatly rewarding to have colleagues tell you that your idea improves their patients' outcomes and makes their surgery days easier. The reward of those compliments comes after all the polishing of your rough gem idea, once people can see the beauty of your discovery coupled with your determined perseverance. ■

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- Financial disclosure: Inventor (RoboMarker)