Technology Transfer Programsfor Small Medical Device Companies

Two federal initiatives are helping small medical device manufacturing companies bring new technology to the marketplace. Called SBIRs and STTRs, they provide small businesses with an R&D budget. The following article examines the benefits being seen in the laser machining arena.

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By Dr. Larry Dosser and Kevin Hartke
Medical device manufacturers spend a significant amount of time and money on the research and development of products. The federal government also spends considerable time and money on R&D. Two federal initiatives that are helping small medical device manufacturing companies are the Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (STTR) programs.

SBIRs and STTRs provide funding sources for advanced R&D that cannot be supported by organic funding within small businesses. The technologies developed through these programs not only benefit the federal government but also branch out to benefit commercial companies. To assist readers of *Medical Design Technology*, this exclusive article examines the nuances of such technology transfer programs. It also highlights examples of technology transfer in the field of laser microfabrication.

What Is Technology Transfer?

The intent of SBIRs and STTRs is to develop technology that has a government application or a commercial application——and ideally both. It is critical for the small business to pursue commercialization efforts in parallel with research to create a sustained level of funding. The programs also are characterized by periods of inactivity. For instance, when an SBIR Phase I effort concludes, several months typically pass before Phase II begins. *(See adjacent article "Phases of SBIRs and STTRs.")*

SBIR and STTR programs are meant to supplement a small business and allow them to develop technology. They are not meant to be a way to sustain income. A sustained level of funding can come from a commercial source&#151a company interested in leveraging its internal R&D budget with the development funding that the small business received via the SBIR or STTR program. A sustained level of funding also can come from a value-added service that the company developed as a by-product of the R&D.

The concept of technology transfer is often misunderstood. It does not happen quickly but rather one customer at a time. This is the critical point, which is often overlooked by many small businesses. Since the technology is in its embryonic stage, a commercial customer that understands the challenges of new technology must be sought. This can be one of the greatest challenges facing a small business and can take just as much time, if not more, as completing the research. Inattention to the technology transfer process is a primary reason that small businesses fail in their commercialization efforts.

What Is the Benefit?

The medical device industry is a great place for technology transfer discussions because of the significant level of research being performed across a wide range of disciplines. If a small medical business can establish a level of confidence with a larger company&#151so that it will share details of its technology roadmap&#151then the small business has access to a customer-driven target for product development. As the technology is developed by the small business, there should be an active marketing program to address potential commercial markets.

Technology can be transferred in a number of ways. The medical device customer can find out about the technology through technical papers, advertisements, or face-to-face meetings. It's up to the small business working on the program to drive this commercialization activity. However, the medical device company can also seek out technologies through various SBIR and STTR websites.

Access to technology developed in federally funded programs occurs in several ways. For instance, a medical device company can leverage its own research dollars against those from a federally funded program. It's important to remember that the medical device industry devotes significant amounts of research dollars to advance the development of products. These dollars can be leveraged against complementary research being performed by small businesses through SBIR and STTR programs. This sharing of research allows both companies to become more

competitive and provides a unique partnership for future projects. The medical device company also can benefit from value-added services developed through these programs. One way of sustaining funding after an SBIR or STTR program is completed is to offer a value-added service to the commercial market.

What Are Some Examples?

One example of a value-added service is a laser microfabrication technology that was developed through an SBIR program. The laser microfabrication technology was created for specific defense applications. The commercial company developing it decided to offer a service of contract manufacturing and to contract the R&D of laser microfabrication to the commercial market to sustain the funding after the SBIR program was completed. This effort proved to be successful and the commercial customers gained access to all the technology developed through the SBIR program.

Laser microfabrication is a key area currently being developed under SBIR and STTR contracts. Laser microfabrication uses industrial lasers to micromachine and micro-weld small components. In addition to the standard applications of this technology, there have been unique applications developed under SBIR and STTR programs including laser micromachining of carbon nanocomposites—thermoplastics such as polycarbonates, polypropylenes, and polyetheretherketones that are impregnated with carbon nanofibers. The thermoplastic carbon nanocomposites have many unique characteristics including electrical conductivity and improved mechanical performance. Under an SBIR program, it was discovered that these materials could be rapidly laser micromachined while maintaining features with relatively high aspect ratios. The technology is still being developed and going through commercialization.

In addition to micromachining, it was found that the carbon nanocomposites could be laser welded. Laser welding of these materials allows for the combination of a conductor and insulator without the use of adhesive.

Another area of laser microfabrication developed under an SBIR program was “step-and-scan” laser micromachining. This technology allows the use of a single laser beam to be scanned in a small area using a set of galvanometer-controlled mirrors and then stepping the substrate to the next area for continued scanning. The pattern is contiguous and taken directly from a CAD file. This unique technology allows features as small as 0.0002 inches to be machined over areas as large as 12 inches by 12 inches.

What Businesses Are Included?

There are many types of small business structures that are awarded SBIR and STTR contracts. One type, which has proven successful, has a 50:50 mix between SBIR/STTR and commercial programs. This mix allows the company to continue a strong R&D effort but also provides a customer base for transferring the technology

being developed. The commercial customer provides a sustainable funding source and is a potential user of the technology, and the SBIR/STTR program benefits by having a small business that can grow independently of the program and diversify across many different markets.

In addition, the small business can use unique employee training tactics such as an apprentice or intern program. These types of programs bring in highly qualified students from local universities and train them in the area being developed by the SBIR or STTR program. This allows the student to gain practical hands-on experience and the employer to train a potential long-term employee. The student is not only learning the science through research but also how a business runs.

ONLINE
For additional information on the technologies discussed in this article, see *Medical Design Technology* online at www.mdtmag.com and the following websites:

&#149 www.sba.gov/sbir/indexsbir-sttr.html#sbir
&#149 www.mlpc.com

Sidebar: Phases of SBIRs and STTRs
SBIRs and STTRs are unique opportunities for small businesses to have an R&D budget.

The SBIR program is an openly competitive process. It lets small businesses submit proposals on a variety of topics. The proposals are reviewed for degree of innovation, technical merit, future market potential, and other appropriate criteria. When a business has its proposal accepted, it is awarded a Phase I program with a grant for $100,000 and has six months to complete its work. Based on the results and potential of this work, the business may enter Phase II of the program with $750,000 and two additional years to complete the work.

The STTR program is similar to the SBIR but encourages partnership between small business and non-profit research institutions—typically universities.

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