

HOW TO BREAK IN: SMALL COMPANIES ARE FAST AND FLEXIBLE

By David Holthaus

More than 20 years ago, Joe Pegna and a couple of Ph.D. students at Polytechnique Montreal began working on an advanced manufacturing process to produce high-performance fibers that could be deployed in stressful environments in defense, automotive, energy, and other applications.

By 2006, they had advanced and refined the process enough to start a company called Free Form Fibers.

Today, from the home base in Saratoga Springs, N.Y., Free Form Fibers markets its low-cost, high-performance ceramic fibers to a variety of high-tech customers, touting its status as the only business in the world with the technical capability to produce such materials in a cost-effective way.



Free Form Fibers senior engineer Ram Goduguchinta. Credit: FFF

After starting from scratch in 2006, Free Form Fibers today is a company with seven full-time employees and a list of big clients that buy its products.

"We're the little engine that could," said CEO and co-founder John Schneider. "We've been able to get things done that big guys have spent 35 years working on."

That creative drive to innovate is one of the keys to the company's success. Schneider and others agree it's an important component of growth for any small, high-tech business with an eye on expanding.



John Schneider

As small companies look to break into big markets and grow, they can use the advantages they already have to gain work from their much larger counterparts as suppliers and partners.

Industry experts say capitalizing on the speed and flexibility that small companies enjoy is a way to break into working with the big companies. They can exploit their capacity to quickly conduct research, develop products that fill a void, and scale up production.

"The advantage of small company is flexibility," said Doug Freitag, technical director of the U.S. Advanced Ceramics Association, a trade group that lobbies for the advanced ceramics industry.

That's especially true as big multinational companies tend to look for ways to contain their research and development costs and seek to outsource some of that work.



Exothermics takes delivery of a large plasma deposition system.
Credit: Exothermics

"Little companies can act as almost an outsourced R&D department where the really high-risk stuff can take place," Schneider said.

ONE COMPANY'S BIG BREAK

That's essentially what happened at Exothermics, an Amherst, N.H.-based company that has developed and commercialized nonoxide ceramics, refractory materials, and specialty thin films for use in aerospace, defense and semiconductor markets.

Founded in 1996, the company's growth trajectory took off in 2008 when Lockheed Martin approached it with a problem related to the stealth materials in its F-22 fighter jet.

"We ended up developing something for them that basically solved their issues," said Steve DiPietro, founder and CEO of Exothermics. "That put us on the map."

Exothermics' technology, and its previous relationships with people at Lockheed and elsewhere, got it noticed when the big defense contractor needed help quickly.

It's how productive relationships between large and small companies are often initiated, cultivated, and expanded.

MIX THE IMPOSSIBLE

TURBULA® SHAKER-MIXER

For homogeneous mixing of powders with different densities, particle sizes, and concentrations.



Kakuhunter PLANETARY CENTRIFUGAL MIXER

For homogeneous mixing and degassing of viscous materials and pastes.

GlenMills
220 Delawanna Ave.
Clifton, NJ 07014

GlenMills.com

973-777-0777

973-777-0070

Info@glenmills.com

HOW KYOCERA WORKS WITH SMALLER COMPANIES

Like many other big companies, Kyocera started as a small one. Born in 1959 as the Kyoto Ceramic Co. with 28 employees, Kyocera is now a global giant with more than 75,000 employees and sales of more than \$14 billion.

Some of its growth over the years has come through partnerships with small companies, as well as acquisitions, and company executives say they are always looking over the horizon for new technologies and applications.

"We are reading articles, we go to trade shows and conferences, we read patents," said Mark Wolf, vice president of Kyocera's Fine Ceramics Group. "Anything that small companies do that's public,



Mark Wolf

advertising what they have, we're generally going to pay attention to."

Like all big tech companies, Kyocera has a substantial research and development budget, but the company can't do everything on its own, so it looks to small firms to supplement its own work.

"We're interested in new materials, new methods and processes, new equipment," Wolf said.

The company's R&D team explores emerging technologies in new markets and attempts to solve challenges that arise from relying on conventional materials, said Jay Scovie, deputy general manager for corporate communications at Kyocera.



Some of Kyocera Fine Ceramics' products. Credit: Kyocera

A champion for large and small manufacturers

Large and small ceramics manufacturers alike have a friend in Washington in the U.S. Advanced Ceramics Association.

Based in D.C., USACA is an organization that champions the business interests of advanced ceramic producers and their industry customers.

The association was formed in 1985 to facilitate the commercialization of the United States' advanced ceramics industry and has become a leading voice of the industry before the U.S. Congress and federal agencies.

USACA and its member companies work to identify new commercial market opportunities for advanced ceramics and promote their use in new high-efficiency and high-performance products for transportation, aerospace, defense, energy, and industrial applications.

The organization functions through working groups led by USACA members. It establishes working groups on an as-needed basis and currently staffs groups in ceramic fiber and ceramics matrix composite manufacturing, nuclear ceramics, transparent armor, and workforce development.

USACA will hold its 45th annual conference on January 25–28, 2021.

More information about USACA is available at advancedceramics.org.

For example, in mid-2019, Kyocera announced an expanded partnership with Cambridge, Mass.-based 24M to validate that company's manufacturing platform to mass produce a semi-solid lithium ion battery system.

Then in January, the two companies announced the launch of a residential energy storage system using 24M's new manufacturing process.

"24M and Kyocera working together will do something that neither company could do on their own," Scovie said.

The two companies have been long-time partners and Kyocera has been an investor in 24M for some time.

It's the type of business relationship that evolves and grows over time and is typical of how Kyocera and other big companies interact with small firms.

Kyocera will fund research and capital investment at small firms in order to be at the head of the line when it comes to commercializing the company's technology.

"We really like to work with companies first to get to know them before we do anything else," Wolf said.

Sometimes, Kyocera will simply fund good, small-company ideas. In other cases, especially where intellectual property issues may arise, it will enter into joint development contracts, Wolf said.

"I've paid companies millions of dollars to direct their R&D in a direction that Kyocera wants," Wolf said.

Sometimes these arrangements result in acquisitions, as Kyocera staff has opportunities to see what the culture of the small company is like, how its staff works, and what their capabilities are.

CERIX

YOUR PARTNER FOR ADVANCED CERAMICS

OFFERING A WIDE RANGE OF TECHNOLOGIES, E.G.
3D-PRINTING, CIM, AXIAL PRESSING, FINISHING AND
FUNCTIONAL COATINGS

- OUTSTANDING DESIGN OPPORTUNITIES WITH CERAMICS
- OUR CORE COMPETENCIES IN MATERIAL, MANUFACTURING AND FUNCTIONALIZATION AS BASIS FOR SMART CERAMICS
- APPROVED BOSCH QUALITY FOR INNOVATIVE SOLUTIONS

VISIT US:

CLEVELAND OHIO
5TH MAY – 6TH MAY
BOOTH 709



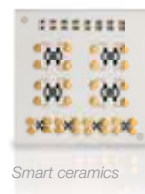
www.cerix-ceramics.de
CERIX - A BOSCH STARTUP



Dispensing nozzle



3D printed part



Smart ceramics



BOSCH
Invented for life



HOW TO MINIMIZE PERCEIVED RISKS

While small companies can be fast and flexible, they can present risks to big corporations, Freitag said. And small-business owners should take steps to minimize those risks.

Small companies should anticipate thorough reviews before the big companies agree to do business with them, he said. This review often takes the form of an audit of the small firms' manufacturing systems, employee capabilities, finances, and other measurements.

"The big companies are very risk averse," Freitag said. "The last thing they want to do is spec your ceramic material into a system then have that company fail."

Free Form Fibers and other companies are compliant with the guidance and recommendations of the Defense Contract Audit Agency, the agency responsible for auditing government defense contracts. Compliance means documented policies and procedures are in place and rigorously followed to meet the government's requirements.

"Good, strong bookkeeping is as important as excellent technical work for small companies and startups, just as it is for larger organizations," Free Form's Schneiter said.

There are programs in place to assist small companies in working with the bigs. One is the Department of Defense Mentor-Protégé program, under which small businesses are partnered with larger companies. It's designed to help small businesses expand their footprints in defense industry work.

"It helps them put into place everything they need to be a good supplier to a big company," Freitag said.

The DOD said the program has helped more than 190 businesses become part of the military's supply chain.

The DOD also maintains its Title III program, which provides funding to ensure domestic industrial defense capabilities, commercialize research and development, and scale up emerging technologies. The program has been in existence since the 1950s and has helped many small businesses transfer technology to prime contractors, Freitag said.

ceramics.org/scpd2020

2020

REGISTER TODAY!

**STRUCTURAL CLAY PRODUCTS
DIVISION MEETING**

in conjunction with

**National Brick Research
Center Meeting**

**June 1 - 3, 2020
Charlotte, NC USA**

The American Ceramic Society
www.ceramics.org

**NATIONAL
BRICK
RESEARCH CENTER**

Defense department officials regularly issue requests for information that could lead to opportunities for small companies. For example, in November 2019, the department issued a request for information on producing ultrahigh and high-temperature composites for hypersonic and strategic systems, and in December it issued a call for proposals to strengthen the industrial base for the production of light and heavy rare earth elements.

One CEO's secrets to success

Steve DiPietro, founder and CEO of Exothermics, offers these tips on working with big companies:

1. Building relationships with a larger company is all about building trust and credibility. This can take some time if you are coming in as an outsider.
2. It's good to find a difficult problem to work on.
3. You must believe in your proposed solution to the problem and be willing to spend painful amounts of your own money to get there.
4. Over the long haul, it is good to have one or more champions for your cause on the inside.
5. You must have a long-term horizon that is not exclusively focused on revenue or profits. You need to have a Pope-like perspective on helping your customer. The profits will come later.
6. Become part of the larger company's long-term development strategy and planning. This integration gives you insight into future areas of interest for collaborative product development and revenue generation.
7. Be willing to accept some of the administrative and bureaucratic requirements that are imposed by essentially all large DOD/aerospace and even commercial concerns (e.g., quality management systems such as ISO, AS9100, SAP systems, liability insurance). These requirements are just a carrying cost for working with large firms.
8. One of the main challenges is to become like a junior version of a large company while not loading up with the administrative overhead that slows things down. In the eyes of the large company, the value of working with a small company is that they have the opportunity to work with someone that can move rapidly with the minimum level of administrative overhead. You need to engage in a balancing act that preserves the character of your entrepreneurial vision while offering an acceptable mechanism for the large company to work with you.

Small companies can use their speed and flexibility to respond quickly to such opportunities, Freitag said.

Once a small company gets connected to a big one, maintaining that relationship and cultivating trust among people on the inside will help create long-term opportunities, DiPietro said. "That's what's of enduring value—when you have champions on the inside," he said.

But he cautions small companies to maintain the traits that led to their success in the first place, even as they work with multinationals that will make many demands on them.

"You're being faced with a set of bureaucratic requirements that you have to manage," he said. "You have to actively push back and not allow your company to be a clone of a Boeing or Lockheed or a Ford or a GM. Preserve those things in your corporate culture that contribute to your creative spirit and lack of bureaucracy." ▀



Thermcraft
incorporated

eXPRESS-LINE
Laboratory Furnaces

- Horizontal & Vertical Tube Furnaces, Single and Multi-Zone
- Box Furnaces & Ashing Furnaces
- Temperatures up to 1800°C
- Made in the U.S.A.
- Spare parts always available

SmartControl Touch Screen Control System

www.thermcraftinc.com • info@thermcraftinc.com
+1.336.784.4800

A SHORT LIST OF RESOURCES AVAILABLE TO SMALL MANUFACTURERS

There are many resources and programs available to small businesses through the U.S. Small Business Administration, the U.S. Department of Commerce and others. These programs have been cited as especially relevant to small, high-tech manufacturers:

SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM

A competitive program that encourages domestic small businesses to engage in federal research and R&D with the potential for commercialization.

<https://www.sbir.gov>

SMALL BUSINESS TECHNOLOGY TRANSFER (STTR)

A federal program that requires small businesses to collaborate with research institutions to bridge the gap between basic science and commercialization of resulting innovations.

<https://www.sbir.gov/about/about-sttr>

PROCUREMENT TECHNICAL ASSISTANCE PROGRAMS

Established to expand the number of businesses participating in government contracts. Administered by the Defense Logistics Agency's Office of Small Business in cooperation with states, local governments and nonprofit organizations.

<https://www.dla.mil/SmallBusiness/PTAP>

DEPARTMENT OF DEFENSE RAPID INNOVATION FUND

A vehicle for small businesses to provide the department with technologies that can be rapidly inserted into acquisition programs that meet specific defense needs. Administered by the Office of the Secretary of Defense, Assistant Secretary of Defense for Research and Engineering and Office of Small Business Programs.

<https://defenseinnovationmarketplace.dtic.mil/business-opportunities/rapid-innovation-fund/>

DEPARTMENT OF DEFENSE MENTOR-PROTÉGÉ PROGRAM

The oldest continuously operating federal mentor-protégé program in existence. Helps eligible small businesses expand their footprint in the defense industrial base by partnering with larger companies.

<https://business.defense.gov/Programs/mentor-protege-program>

SMALL BUSINESS ADMINISTRATION'S ALL SMALL MENTOR-PROTÉGÉ PROGRAM

Mentors and protégés in the All Small program can form joint ventures. These joint ventures would qualify for set-aside contracts that the small business is eligible for.

<https://www.sba.gov/federal-contracting/contracting-assistance-programs/all-small-mentor-protege-program>

