

## DOE SBIR-STTR SUCCESS STORY



### *Continuing a U.S. Manufacturing Legacy*

The company was not founded by Fred Brechtel Jr. nor was it originally delivering instrumentation for measuring nanoparticles that control cloud formation. However, when Fred became part of the Brechtel team in 2002, his goal was “to shift the paradigm; to take climate change and air quality measurements from sophisticated and expensive to user friendly, durable and inexpensive.” Originally founded in 1983 by his father in a Silicon Valley garage, the family business was passed to Fred in 2012. Over the last 10 years, the company has evolved and expanded to employ a staff of 18 and annual revenues of nearly \$6M. A key part of the team’s success has been sustaining a spectrum of in-house manufacturing capabilities critical to fabricating items for products. These capabilities remain important even today.

The current iteration of Brechtel has its roots in the research work Fred completed at Colorado State University in the late 1990s. That research explored why some particles work well as nuclei for cloud droplet formation and others don’t, leading Fred to the conclusion that there needed to be more and better data for modeling the factors that impact weather, precipitation patterns, and climate change. “The challenge at the time was that data gathering was expensive, that was preventing widespread adoption of better cloud and climate models,” says Fred.

## Brechtel Manufacturing Inc. FAST FACTS

### **SBIR AWARDS**

Since 2003, 14 SBIRs totaling \$4.6M from DOE, Navy, NSF, NOAA

### **PHASE III SUCCESS**

Revenues: Nearly \$6M  
Employees: 18, growing  
Private Funding: None

### **IMPACT**

Providing better data to constrain climate models while creating high-paying engineering jobs

### **PROGRAM OFFICE**

Biological and Environmental Research (BER)

### **CONTACT**

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Clouds have long been the biggest uncertainty in climate calculations. Clouds can both shade the Earth and trap heat. Which effect dominates depends on how reflective the clouds are, how high they are, and whether it is day or night. Analysis is made more complicated because cloud dynamics are complex and happen on small scales that are hard to include in the models used to predict future climate.

To address this gap in cloud-related climate model uncertainties, Brechtel applied for and won a series of SBIR Phase I and Phase II grants. Brechtel Manufacturing's fourth DOE SBIR Phase I was awarded by the Office of Biological and Environmental Research (BER) in 2012 for the development of a new, compact instrumentation package for unmanned aerial vehicles (UAVs). The package included modules to measure aerosol size distributions, nanoparticle concentrations, black carbon mass, and to obtain filter samples for chemical analysis during UAV flights. The instrument suite was designed with a single, integrated control system so any desired combination of instruments might be deployed. BER subsequently awarded a Phase II award in 2013 and a Phase IIB in 2016.

According to Fred, "Our biggest technical hurdle was to reduce the size and complexity of the instrumentation without compromising on measurement accuracy, and that is exactly what this project accomplished. In the end, based on those early grants, we have accomplished a significant reduction in hardware complexity, a factor of 2.5 reduction in cost, and an 80% reduction in size." Our work continues to drive these numbers even lower.



Fred continues, "All our tech evolved out of SBIRs, and we are laser-focused on our customer needs and commercialization. The company has been self-sustaining for over 15 years, with global product sales representing 82% of income. The balance is made up of contract manufacturing (8%) and SBIR grants (10%)." The company credits \$8-10M in product sales to the \$4.6M the company received in SBIRs. Brechtel Manufacturing's first SBIR was from the Department of the Navy in 2003. Overall, the company has received fourteen SBIR awards - seven (7) DOE grants totaling \$3M and two (2) from NOAA, two (2) from Navy and three (3) from NSF totaling \$1.6M for a cumulative total of \$4.6M. "We aim to commercialize all of our SBIRs; we go into these grants with established customer needs and a strong commercialization plan," says Fred.

The company has plans to grow the employee base from 18 employees (as of the writing of this article in December 2022) to over 30 employees by the end of 2023. The company is growing organically by boosting sales with internal staff and through joint development agreements. Fred

states, “We are looking to expand into new markets by partnering with professionals with experience in markets that we are interested in. We are focused on air quality and climate change markets, helping researchers in those areas of the world that are most dependent on climate modeling data. We now have 15 distributors and sales representatives around the world – in China, Taiwan, South Korea, Scandinavia, Europe and India.”

Fred still operates the company in the same building where his father grew the business that bears their name. Sales growth required doubling the available R&D, assembly and testing space 6 years ago through the purchase of another 8000 square foot building right next door. Looking forward, the future for Brechtel Manufacturing, Inc. appears to be as bright as the midday sun reflected from the cirrostratus clouds over the open ocean.