



### Fred Flitsch, PhD, MBA

Chief Executive Officer, Futrfab, Inc.

### An Atypical Technology Manufacturing Executive

**LIKE THE STARTUP TECHNOLOGY COMPANY HE FOUNDED IN 2011, FUTRFAB'S CHIEF EXECUTIVE OFFICER, FRED FLITSCH, IS DIFFICULT TO DEFINE IN TYPICAL CORPORATE TERMS.**

With degrees in both Physics and Chemistry and a PhD in Physical Chemistry from *Harvard University*, one is tempted to label him as a scientist; certainly a category in which he could be grouped. But then, that wouldn't take into account an MBA in General Management from *Boston University* or two decades of experience overseeing Manufacturing Operations for companies such as *IBM* and *Philips Semiconductors*.

And, neither categorization would easily do justice to the numerous patents and pending patent applications he has filed for innovative high-technology manufacturing processes, operations and devices.

When asked, Dr. Flitsch defines himself quite simply as, "An Inventor who is skilled in organizational leadership and the development of technology processes and devices, operations and manufacturing."

So, how did a 'typical' chemistry major from one of the most influential universities in the country wind up so 'atypical'?

#### 1984 - 1991 - 'Graduate Studies'

While pursuing advanced studies in both Physics and Chemistry at *Harvard University*, Dr. Flitsch became one of a handful of students tasked with 'making something from nothing', building and automating a tightly funded surface science research group's ultrahigh vacuum equipment from inexpensive components. He also joined *Boston University's* MBA program, satisfying a growing curiosity about business and entrepreneurship. Little did the young graduate student know that he was building a foundation that would significantly alter his future career.

#### 1991 - 1999 - 'The IBM Years'

Applying the affinity discovered in Graduate School for making things tick, Dr. Flitsch was aggressively recruited into *IBM Corporation* through its 'Technical Vitality' hiring program for the company's manufacturing division. He never looked back. Building manufacturing tools and inventing new processes along the way, he quickly became the go-to resource for solving technical challenges

in *Bipolar IC* manufacturing as he rose through the ranks.

In 1995, he was asked to join the *MiCRUS Program*, an *IBM/Cirrus Logic Joint Venture* he would eventually come to lead as one of its Operations Managers. By early 1998, Dr. Flitsch had deftly overseen manufacturing, equipment and engineering for 5 integrated departments, managing a staff of 150 people.

During his tenure, he developed 18 *Key Business Processes* for categories as diverse as *Cost, Yield, Quality Control, Logistics, Automation* and *Operations*. One of the world's first SMIF based fabs, *MiCRUS* achieved significant productivity gains, growing by 300% to become *Semiconductor International's Top Fab of 1998*.

Shortly after, he realigned portions of the *MiCRUS* facilities to support development of *IBM's* leading edge SOI technology. As *Executive Project Manager* of the \$20 million program, Flitsch led both procurement and installation of equipment and processes, making a key impact on the technology through crucial innovations in its basic material processing.

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### 1999 - 2004 - 'Philips Semiconductors'

Continuing in his role when *Philips Semiconductors* acquired the MiCRUS division in 1999, Dr. Flitsch's organizational and operational skills were again put to the task when he was asked to revive and transition his previous Bipolar IC technical and manufacturing success. Transferring Philip's leading edge *BiCMOS* technology, he spearheaded the stabilization of this critical capability for the burgeoning cellular phone market.

By 2001, the Fishkill BiCMOS program was being showcased within Philips as the ultimate model for Technology Transfer. Flitsch had played a critical leadership role in the site's success and had

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become one of the executive elite; serving as *Senior Staff* to its General Manager. By 2003, his technical responsibilities included enterprise wide focus for *Technology Qualifications, Yields, and Development*. His mounting business responsibilities included budget oversight and business plan development and he was directly responsible for contract negotiations with critical suppliers resulting in tremendous cost savings and increased operational flexibility.

### 2004 - 2009 - 'The Birth of Futrfab'

As his technical knowledge and organizational skills rose, Flitsch found himself more and more dissatisfied with the direction of the semiconductor industry. For decades, the industry had provided the world's consumers with improvements in all facets of its business. Quality, function, cost and time factors relating to innovation and improvement had been remarkable, but Flitsch felt that the industry's growth had created a crossroad of sorts.

In 1980, a typical state-of-the-art fabrication plant, or 'fab' had cost approximately \$100 million to build. Ownership of such a facility was a common aspect of companies in the electronics business space who competitively developed their own processing flows. Research and

development at various small scales was possible for many players. Since then, innovation in processes and equipment had led to dramatic improvements and increased wafer sizes, but due to increases in complexity, equipment prices and manufacturing costs had skyrocketed.

By 2004, the cost of a typical fab had risen to an astounding \$3-4 billion with only a handful of the largest corporations able to compete at that level. *(Today, a state of the art fabricator, such as Taiwan Semiconductor Manufacturing Corporation's (TSMC) "Gigafab," costs nearly \$10 billion to install. Given a liberal operating lifetime of 10 years, such a fab will need to produce nearly twenty million dollars of gross margin output every week of its life just to cover depreciation costs.)*

Flitsch foresaw a large void in the economic ability to perform small volume activities. Believing that void threatened improvement in the entire industry, he saw the need for a novel solution in the future and resolved to make it happen.

Leaving *Philips Semiconductors* in 2004, he founded a consulting practice while pursuing his vision for the future. A solution that would not only dramatically lower the cost of building and operating fabrication facilities but, ultimately, foster renewed innovation in the industry by enabling small volume technology fabrication, packaging and research and development in one location.

For the next several years, Dr. Flitsch consulted in technology, intellectual property and business management. While helping to shape programs and facilities for both small technology based companies with innovative products and one of the largest and most advanced manufacturing companies in the world, he methodically refined the theories that lie at the foundation of his *Futrfab* vision of the future.

### 2009 - 2011 - 'Array Optronix, Inc.'

Ready to put his innovations and patented technologies to the test, Flitsch began searching for a company with the foresight and fortitude to stand with him. In 2009, he became Chief Executive Officer for *Array Optronix*, designers and manufacturers of leading edge, customized photo-detector array technology. Building a world-class team of specialists for the development of intellectual property and its implementation, he began a 2-pronged campaign for Array.

Product advancement from *Generic Photodiode Arrays* to *Advanced Integrated Photodetector Array Technologies* was an initial company priority along with short term manufacturing solutions for small volume product needs. Utilization of a *Futrfab* facility and its processes were to be the company's long-term vision. While successful in advancing Array's product technology, changes in scope within Array resulted in a shift in long-term goals. After supporting the company's transitional needs, Flitsch set out in 2011 to pursue the *Futrfab* environment on his own.

“Through small volume production, *Futrfab* allows designers and engineers to freely conceive and implement revolutionary changes in design—and then, put those concepts into practice within short periods of time.”

**2011 - Present - 'The Future of Futrfab'**

Today, Fred Flitsch is the visionary founder and *Chief Executive Officer* of the start-up technology company, *Futrfab, Inc.* He is resolved to improve the state of semiconductor and technology manufacturing forever through implementation of his patented and patent pending designs and processes.

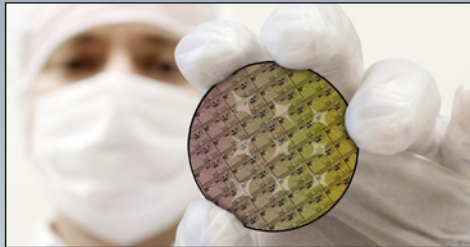
Says Dr. Flitsch, "This is about much more than a few inventions. At its core, the *Futrfab* manufacturing environment empowers designers and engineers. Through the accommodation of small volume production, *Futrfab* enables them to freely conceive and implement revolutionary changes in design and then put those concepts into practice within short

periods of time. It's the fabrication facility of the future."

Supported by an impressive Board of Directors, investors who believe in his vision and a growing group of dedicated followers, the future appears anything but typical for this 'atypical' technology manufacturing executive.



**Futrfab, Inc. – Enabling Revolution Through Innovation.**



For decades, innovations in the semiconductor industry have led to dramatic improvements and increased wafer sizes. Quality, function, cost and time factor improvements have been remarkable, but the industry's growth has created a crossroad of sorts.

**The cost of building a fabrication plant has increased by over 5,000% in the last 30 years.**

In 1980, a typical state-of-the-art fabrication plant, or 'fab', cost approximately \$100 million to build. Today, a truly state of the art fab, costs nearly \$10 billion. Given a liberal operating lifetime of 10 years, the fab will need to produce nearly \$20 million of gross margin output every week of its life just to cover depreciation costs.

With today's economic pressures, companies face high risks when placing 'novel' designs into large volume production lines. It is difficult, if not impossible, for designers to test and implement radical changes. A truly viable small volume manufacturing solution greatly decreases the associated financial risks.

**The Futrfab environment is a one-stop resource for R&D, prototyping, production and packaging.**

Large volume fabrication facilities simply don't support small volume activities well. Research and Development is often done thousands of miles away from the designers. Prototyping is restricted to standardized flows. Packaging is usually performed in far off locations, resulting in weeks of delays due to shipping and customs issues.

A *Futrfab* incorporates every aspect of the manufacturing process into one centralized location for small volume fabrication, and will be the environment of choice for development of new types of components that incorporate or support electronics.

**It's the semiconductor fabricator of the future.**