



Calculated Risk

How Much is too Much?

By **Barbara Leonard**

According to James Mann, co-founder of M4 Sciences, a Purdue-based startup, the element of risk is a key factor in any entrepreneurial endeavor. His experience offers some insight into what and how much risk—personal, financial, technological, business—is too much.

M4 Sciences, founded in 2005, is focused on commercializing manufacturing research at Purdue's Discovery Park Center for Advanced Manufacturing. The company enjoys a close partnership with the university, particularly the cross-disciplinary aspect of Purdue's research environment. It aims to achieve new breakthroughs in advanced manufacturing while addressing the pervasive challenges in ultra-precision machining.

Having taken the path to success for a startup company, Mann and the team at M4 Sciences know the elements of risk well. To those embarking on the journey, these relatively young veterans would ask, "What would you risk to pursue a dream or vision for the future?"

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The type and severity of risk taken by the M4 Sciences team changes with each step of the company's growth. As a co-founder, Mann assumed significant personal and financial risk by leaving an industry career to pursue a dream of starting an advanced manufacturing technology company. Each of the M4 Sciences team members has taken risks: risk of compromised friendships, strained relationships, career impact, and challenges to family life, as well as financial risks associated with personal equity investment and forgoing an otherwise stable career path. The technology risks include the adoption of the new products and processes by end-users.

Risk can certainly pay off. For the guys at M4 Sciences, creating a successful startup is a balance of planning, execution, and ingenuity. The interdisciplinary aspect of the research is crucial. Mann points to collaboration among Industrial Engineering, Materials Science, and the School of Aeronautics and Astronautics as having laid the foundation for the company.

Key Purdue faculty such as Srinivasan Chandrasekar (IE), W. Dale Compton (IE), Tom Farris (AAE), and Kevin Trumble (MSE) have been conducting research in materials and materials processing for more than 15 years. M4 Sciences now seeks to commercialize their discoveries and develop strategic business plans to take those discoveries to the market.

The M4 Sciences management team is composed of three Indiana natives—Purdue doctoral student and co-founder James Mann (BSAAE '90, MSE '94), co-founder Brian Gootee, and Jeffrey Bougher (BSAAE '95, MSAE '97). The extended team includes seven other members, each of whom has at least one or more degrees from Purdue.

With two members who are graduates of Purdue's School of Aeronautics and Astronautics, the company has particularly strong ties to that school. In return, the school is committed to the success of companies like M4 Sciences, providing the engineering education, technical abilities, and critical thinking skills necessary to succeed.

The interests and risks of the entrepreneur are not always well-aligned with individuals from the larger organization,



The M4 Sciences Team (left to right): Chris Saldana, Jeffrey Bougher, Brian Gootee, James Mann, Wilfredo Moscoso, Mike Wildridge, and Jerry Patrick

Mann says. For M4 Sciences, a long-standing relationship with Purdue faculty helped the company maintain a strategic course and is key to M4 Sciences' ability to identify new products and processes related to the company's core machining technologies."

Taking the Plunge

For this team, the risk associated with initiating a high-tech startup and taking an idea to commercialization is a long, complex road filled with rewards and challenges. When asked what he enjoys most about his job, Mann immediately points to the satisfaction of pursuing a dream and engaging others to help make it a reality. "Seeing how the customer reacts when our team is able to provide a solution to their problem is very rewarding," says Mann.

According to Jeffrey Bougher, "Everyone has a different level of tolerance," for risk. "At some point you are going to have to expose yourself to a level of risk that will keep you up at night, that will make your stomach churn and that will likely make those close to you uncomfortable," says Bougher. Planning and forethought aside, "When it comes time to make the bet though, the magnitude of the risk becomes more real, more tangible and more meaningful. At that point, the risk you take to build your own business becomes something you must come to terms with if your goal is to be an entrepreneur."

Realizing the benefits of successfully calculating the risks and getting to the point of delivering on their dream also has its challenges. For M4 Sciences, the most challenging aspects of their efforts include managing technology and product development in parallel with strategic growth and establishing key partnerships and simultaneously directing an unimaginable number of details involved in a startup company. Entrepreneurship, then, seems suited for a particular strong-willed personality.

M4 Sciences co-founder, Brian Gootee, agrees. "The old saying that those who are willing to take the biggest risks are also those who will receive the biggest reward is true



M4 Sciences Delivering Products to Meet Needs

Central to M4 Sciences' mission is the development of its first product, TriboMAM™, which introduces a new class of Modulation-Assisted Machining processes (MAM) and machine tool devices with the potential to transform machining performance and capability. "Manufacturers of precision components, ranging from automobile parts to biomedical devices, are under constant pressure to reduce cost while improving quality and delivery," Mann says. "New, innovative machining technologies are needed to sustain product development and production of the high-performance products that improve quality of life. Examples include ultra-precision orthopedic components and instruments and high-performance fuel injection or hydraulic components for improved automotive and aerospace transportation safety and efficiency."

Funding is ever a challenge to small startups. For M4 Sciences, licensing technology through Purdue has enabled the company to adopt a strategic financing plan that combines the strengths of successful programs from the National Science Foundation, the Indiana 21st Century Research and Technology Fund, and private investment to commercialize the new MAM technology. Mann believes the products and processes for ultra-precision machining that the company specializes in are demonstrating compelling value to the customer, a value that has the potential for endless business development. ■

even today. I believe that there are just fewer people willing or able to take the chance and put their own or their family's future on the line."

When asked what a prospective entrepreneur should consider when attempting a startup enterprise, Mann offers some advice. "Look inward," he says, "and ask a few critical questions of yourself."

- **Do I believe with conviction that this is what I can accomplish?**
- **Do I have the ability to recognize my weaknesses and build a team that prevents them from being obstacles to success?**
- **Do I have the ability to not lose sight of what is important in life, including family, religion, community, and friendship?**

Entrepreneurship in this sense becomes a balance between ideas, initiative, risk, planning and personality, all driven by a dream. As M4 Sciences moves forward with beta-testing of its product, TriboMAM™ (see sidebar), the company expects to introduce its product to the market by the end of the year. Even as it begins its commercialization efforts, the team members are already looking ahead to the next step, which for M4 Sciences includes customer service and introduction of follow-on TriboMAM™ designs, such as second-generation products that Mann says will scale revenue opportunities and sustain future business growth.

The tremendous potential the company holds is tempered by its hope for success. For this team, the proof will be in the execution, itself not a singular entity. Carrying out the plan means attention and precision in all key areas: management, engineering, finance, manufacturing, supply chains, marketing, sales, and service. For a company that specializes in ultra-precision parts and processes, nailing down the details might seem simple. By keeping the process moving forward and constantly anticipating and planning the next move, M4 Sciences—a successful startup enterprise embedded in the university environment—illustrates the risk-taking spirit of entrepreneurship. ■

A Formula for Success

James Mann of M4 Sciences offers his steps for a successful startup:

- **Start with a dream**
- **Be willing to take risks**
- **Have the ability to identify an opportunity**
- **Understand and clearly communicate the value**
- **Lead the way by building a team**
- **Make a plan and secure financial resources**
- **Execute and accomplish all the details under budget**

Do You Have an Entrepreneurial Personality?

Seven traits define the entrepreneurship personality according to the team at M4 Sciences. They are:

- **Relentless work ethic**
- **Passion for success and achievement**
- **Ability to lead the way and convince others**
- **Sincerity in association with others**
- **Integrity**
- **Resilience**
- **Willingness to take risks**