AMFitzgerald develops innovative MEMS and sensor solutions for specialty applications.

We collaborate with our customers to create high value products enabled by customized micro-technology.

With integrity, expertise, and attention to detail, we deliver what has never been done before.
Company background

- Top MEMS product development firm in the USA
- Founded 2003 by Alissa M. Fitzgerald, privately held

Locations:
- Office: Burlingame, CA, near SFO and Silicon Valley
- Fab: 1500m² fab at UC Berkeley, CA

- Over 150 clients served to date: startups to Fortune 100 companies
- Customers and suppliers around the world
Our work is at the leading edge in many markets

Typical Revenue Breakdown, by Market

- **Aircraft, spacecraft sensors**
- **Cardiology guidewires, pacemakers, pumps; diagnostic chips**
- **Microphones, pollution detectors**
- **Atomic clocks, commercial print heads, quantum computers**
- **Fiber optic networking, laser system components, infrared detectors**
- **Industrial/Scientific 20%**
- **Optoelectronics 26%**
- **Medical 28%**
- **Consumer 14%**
- **Aerospace 12%**
MEMS Innovation Services
Novel designs and IP creation

LWIR Bolometer Pixel Array, MEMS fabricated over CMOS
Designed and fabricated by AMFitzgerald
Innovation: examples of our work
Full development services from concept to production

- Advantages of working with us:
  - Multi-disciplinary, expert engineering team focused on MEMS development for volume production
  - Rapid prototyping on state-of-the-art tools common to foundries
  - Own all the design and process IP
  - Bring a mature, de-risked design to the foundry to get better pricing and faster time to production
MEMS core competencies

- **Transducer physics**
  - Piezoresistors, piezoelectrics, capacitive, magnetic, thermal, resonant

- **Sensor types**
  - Motion, pressure, acoustic, infrared, magnetic, radiation, resonators, chemical, gas, particles

- **Actuator types**
  - Motors, switches, valves, pumps

- **MEMS fabrication expertise:**
  - Mask layout
  - Full multiphysics simulation
  - Process integration and all fabrication processes
  - Design for manufacture

ANSYS Multiphysics simulation saves money and time in the fab

In-house prototyping by our expert engineers
Our innovation process: phased development

Initial meeting: assess fit and scope of work
Detailed plan and cost proposal provided
Collaborative interactions

Phase 1: Strategy, feasibility study
Phase 2: Design, simulation, process integration
Phase 3: Prototyping, packaging, testing
Phase 4: Transfer to manufacturing

Client owns all work product

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MEMS Solutions Services
Paths to manufacturing and market

Linear and Rotary Micro-optical Fiber Switches
Designed by AMFitzgerald, fabricated by foundry partner, packaged by assembly partner
Using a sensor designed by us or by others, we deliver the data you need.
MEMS-enabled medical solutions

- Pressure sensor integration for invasive medical applications
- Lead attach, catheter, guidewire, encapsulation
- ISO-13485 contract manufacturing with our partner, Millar
- Sensor testing

Source: Millar OEM
RocketMEMS®: Semi-custom sensors for OEMs

- Leverage existing AMFitzgerald sensor designs for faster time to market
- ISO-certified foundry production
- Pressure sensors available now
  - More sensor types in future

RocketMEMS engagement process:
1. Customer provides desired sensor specification
2. AMFitzgerald tailors reference design to meet customer’s spec
3. Silex (SE) manufactures wafers
4. AMFitzgerald tests and delivers sensors to customer
Custom MEMS production solutions

We transfer to the optimal foundry partner(s) for your technology and business needs

Custom design, low volume

Open search for foundry partner

Custom design, high volume

Open search for foundry partner

Fast time to market with foundry-specific design

Faster time to market with semi-custom sensors

Process flexibility

Speed to market
Our global ecosystem of trusted, expert partners

As capable as a vertically-integrated company, with the efficiency of a small team.
Technology Strategy Services
Key insights from MEMS experts
Technology Strategy Services

• Competitive Intelligence
  – How to win in the MEMS market
  – Players, analysis of market data and research reports
  – Emerging technologies
  – Cost and risk analysis

• Make vs. Buy Analysis
  – Develop MEMS specification
  – Survey COTS options
  – ‘Make’ scenarios
  – Cost and risk analysis

• Patent Landscaping
  – Technical analysis of patent families
  – Design-around analysis
  – Prior art and public domain searches
Technology Strategy Services, cont’d

- **Workshops**
  - Half-day or full-day
  - Content tailored to your specific business interests
  - Ask-the-expert Q&A
  - In-person or via WebEx

- **Operations & Management Consulting**
  - Building engineering teams and operations for success
  - Organization planning
  - Resources allocation
  - Project planning and management
How we have helped our customers

Case studies

<table>
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<tr>
<th>Innovation</th>
<th>Solutions</th>
<th>Strategy</th>
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<td>Complete development of a novel dehydration sensor from concept to manufacturing</td>
<td>1D accelerometer designed to customer specification, fabricated on InvenSense’s NF Shuttle</td>
<td>Re-design of a microfluidic pump in order to shrink chip size and to lower cost</td>
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More case studies and references available upon request
Public client list (partial)

**Startups and Small-Medium Businesses:**

- Aclima
- Advanced Diamond Technologies
- Bay Materials LLC
- Edge Embossing LLC
- Endotronix
- Fluxion Biosciences
- Ascendance (fka Hepregen)
- Microfabrica
- Micralyne
- NovaSpectra
- SemQuest
- Silicon Light Machines
- Silicon Microstructures
- Tactus Technologies
- Wave 80 Biosciences
- Yole Développment

**Public Companies:**

- Agilent Technologies
- Applied Materials
- Caliper LifeSciences
- Cypress Semiconductor
- Finisar
- Maxim Integrated
- Measurement Specialties
- Micrel
- Mirion
- Panasonic ACOM-TC
- Sorin Biomedica
- Symmetricom (now part of Microsemi)
- Ricoh Innovations

**Research Institutions:**

- Alfred E. Mann Foundation
- DARPA
- MIT
- Stanford University
- Stowers Institute
- UCSF, Ophthalmology
- Weill Medical College of Cornell Univ.
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