



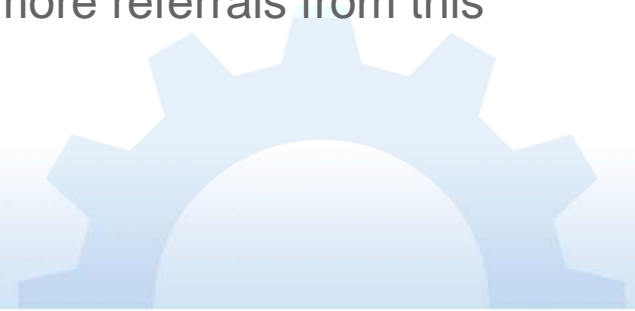
**ARDENTRESEARCH**

**An Introduction**

January 2008

# Who we are

- Ardent Research is a full service R&D boutique firm specializing in the MEMS and Nanotechnology field
  - **Research:** Surveys, Studies, and Diligence help you to make more informed decisions
  - **Development:** Our deep and skilled MEMS team brings integrated simulation and fabrication skills to the table to ensure a smooth and complete development cycle
  - **Boutique:** “Growth” is not in our mission statement. We will not try to expand into your enterprise. We have repeatedly helped customers transition to in-house talent, sometimes even finding replacement hires. In the long run we get more referrals from this than anything else.



# Diligence

- World class PhD's with a variety of expertise
- Deep network of expert contacts
- Experience with investors, lawyers, and acquisitions
- Access to Ardent Research studies and knowledge

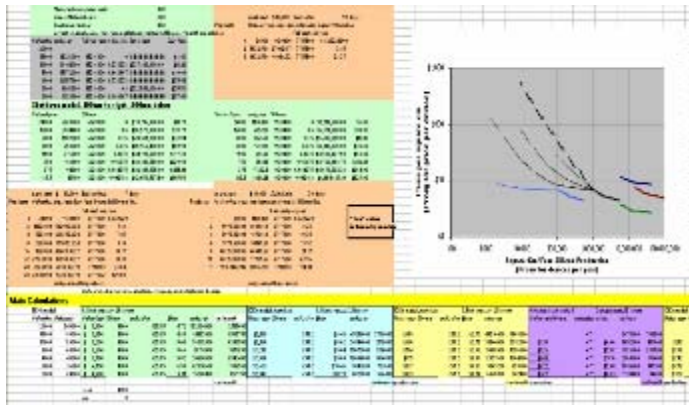
*“Ardent provided us with timely and cost effective due diligence which helped our decision making immensely. They provided expert advice in highly technical areas that enabled our firm to make a confident assessment of an investment opportunity.”*

***Justin Bentley, Berry Ventures***

*“[Ardent team member] was instrumental in helping us diligence a potential RF MEMS investment. He was able to assess competitive technology offerings quickly and efficiently, substantially improving our decision-making.”*

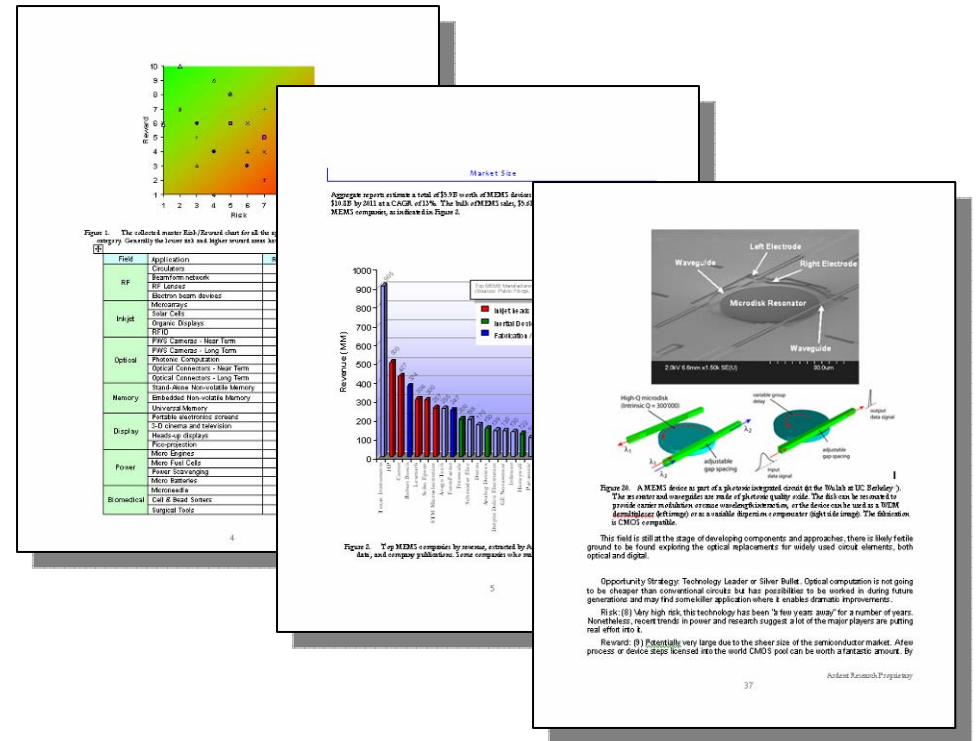
***Tom Bratkovich, Blade Capital***

# Study & Survey Examples

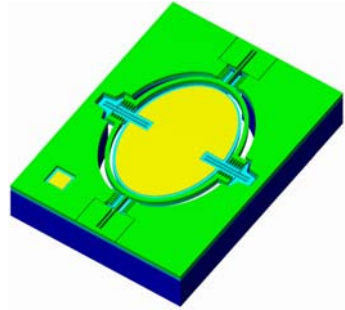


- “Price per Die” study
- Cost per silicon area as a function of annual production, process, approach
- Models benchmarked against industry and foundries
  - Excellent predictive power

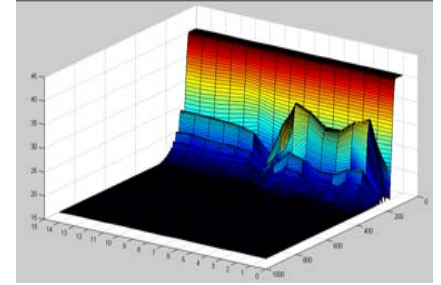
“Arden helped us understand the market value of important assets.”  
 Asset Manager – at a company you would recognize



- “MEMS Crystal Ball” survey
- 85 page survey of dozens of “below the radar” applications with Risk and Reward estimates for investing



# MEMS Design



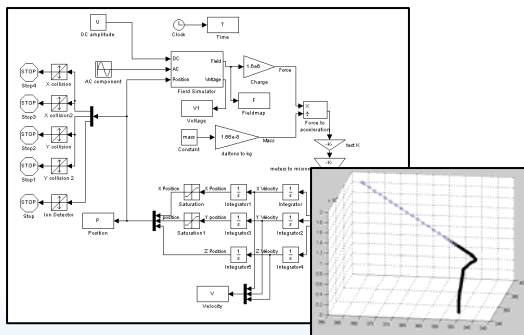
- Ardent has a core team of MEMS designers supported by ASIC designers and simulation specialists
- History of successful designs and transitions to production including Telcordia and fortune 500 proprietary qualifications
- Can handle ITAR or Defense work

*“Ardent has supplied us with a number of design and support services over the last few years. Their world-class team's expertise helped us achieve error-free designs the very first time and gave us a deeper understanding of how our devices perform. Thanks Ardent!”*

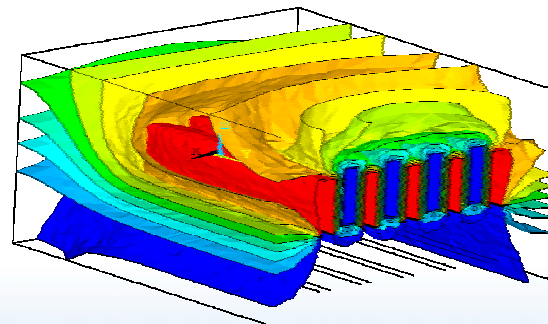
***Dr. Matt Last, Crossfiber***

# Simulation

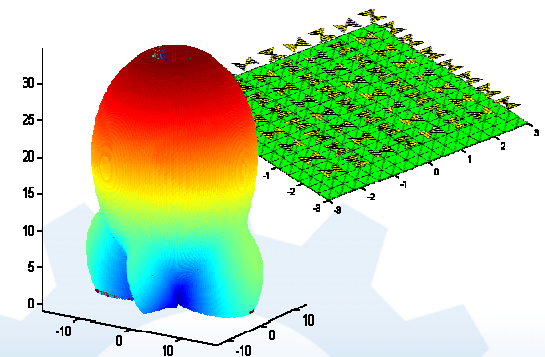
- World class ANSYS capabilities
  - Full multiphysics ANSYS capability
- System-level MATLAB and Simulink simulation
  - Simulation experience from feedback controllers to inertial systems to Quadrupole spectrometers
- In house proprietary code for RF simulation and antenna design



MATLAB/Simulink ion flight path modeling

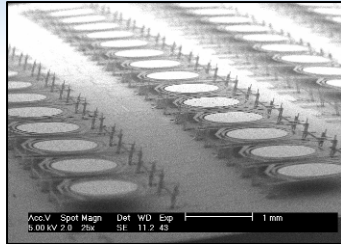
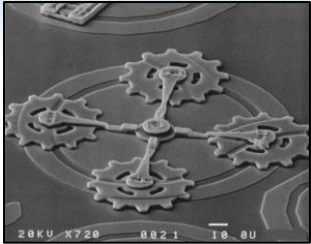


ANSYS coupled electrostatic actuator simulation

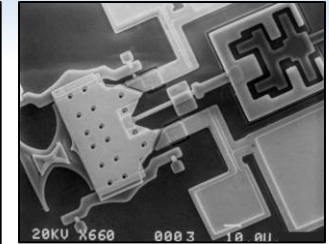
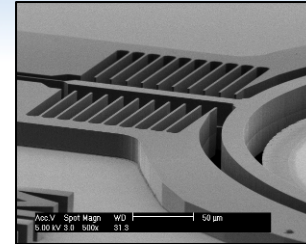


Patch antenna array modeled using proprietary codes





# Fabrication



Ardent Tier 1  
Research and  
Development

1-10 wafers typical  
Processing by PhD level team  
members in academic and  
industrial fabs

Recommended starting point  
for process experiments or  
devices with complex &  
unknown process needs

Ardent Tier 2  
Prototype  
Manufacturing

1-50 wafers typical  
PhD level attention at larger  
fab or allied foundry – mostly  
technician hands

Recommended for devices  
using wide process window  
steps or for devices already  
proven at R&D level

Ardent Tier 3  
Pilot  
Manufacturing

50+ wafers typical  
Processing at allied foundry or  
fab with Ardent design and  
process work

Recommended for initial  
manufacturing. After setup  
Ardent Research can hand  
off relationship.

*“Beautiful work, and astonishingly fast too! Thanks for keeping us on schedule.”*

**Dr. Jim Hamilton, Nanosys Inc.**

# Contact Us

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- Home Page:  
[www.ArdentResearch.com](http://www.ArdentResearch.com)
- We host free MEMS and Nanotech forums at  
[forums.ArdentResearch.com](http://forums.ArdentResearch.com)

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