SAND2007-4522C

SAMPLES™ Program:

Designing and Prototyping

with SUMMiT V™ Technology

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

National Nuclear Security Administration

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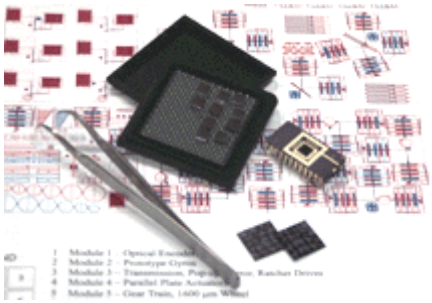
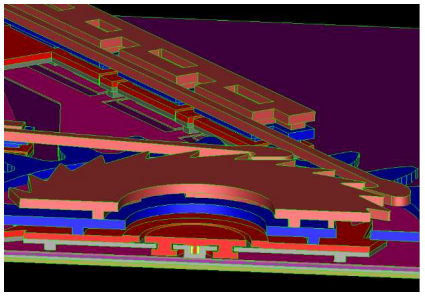
The SAMPLES™ Program Offers Ready, Comprehensive Access to SUMMiT V™ Technology:

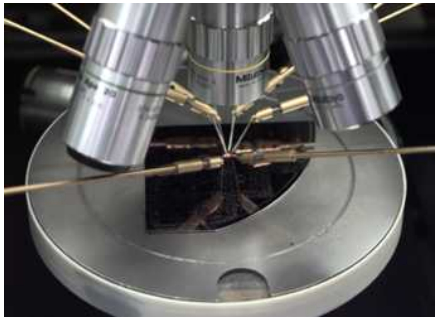
Education



Prototype Fabrication



Design Tools



Services

SAMPLES™: Sandia's Agile MEMS Prototyping, Layout Tools, Education, and Services

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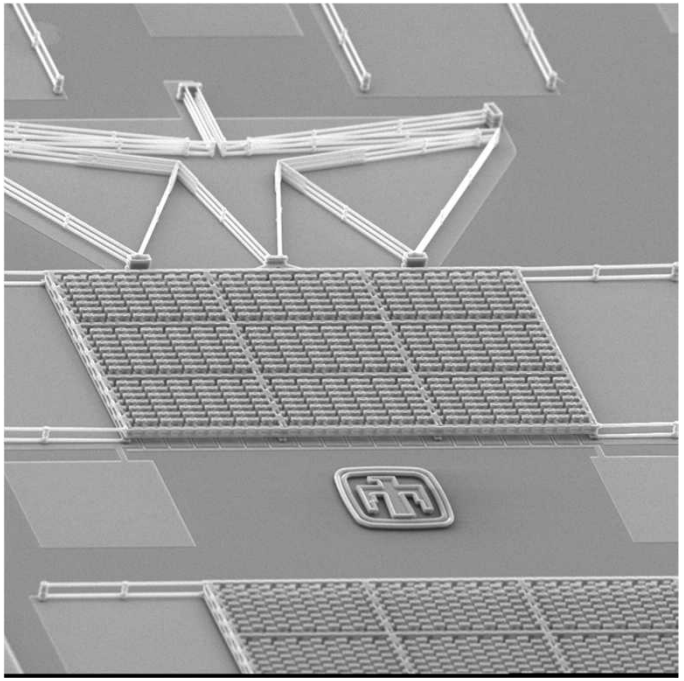
MEMS Education Through the SAMPLES™ Program

- **Short Course Curriculum:**
  - **2 courses to ensure successful creation and implementation of MEMS designs**
  - **Taught by Sandia's technology experts**
  - **Multi-media, interactive**
  - **Compact disk of course slides, also available separately, $490**



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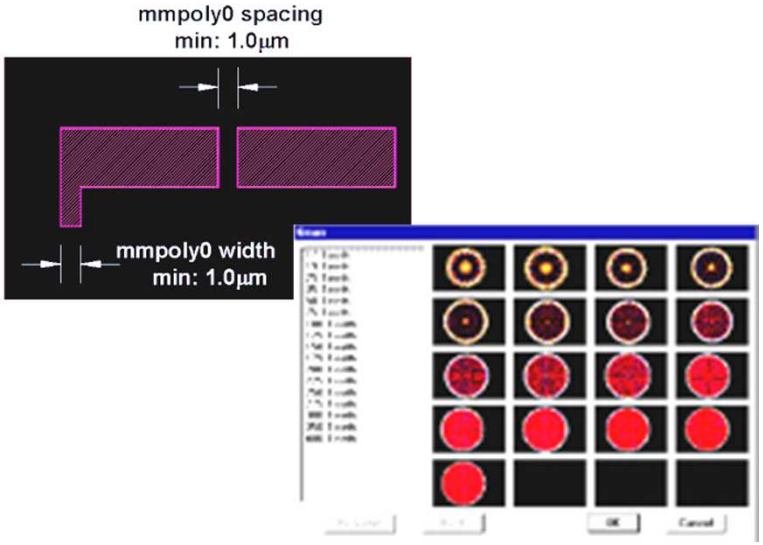
Education: MEMS Short Course Curriculum

- **Introductory**
  - **Introduction to SUMMiT V™ technology encompassing all aspects from design conception to packaged device.**
- **Design and Reliability Concepts**
  - **Equips the participant to successfully create designs to be fabricated with Sandia's SUMMiT V™ fabrication process as well as addressing reliability, materials, and testing to enable designing with reliability in mind.**

SAMPLES: Design Layout & Visualization Tools

- Specific to SUMMiT V™ technology
- Integrated into AutoCAD environment
- Comprehensive suite of design tools
  - Advanced MEMS Design Tools software
  - Standard Components Library
  - Design Rule Checker
  - 2D Process Visualizer, 3D Visualizer Tools Software
  - 3D Modeler



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Design Tools: Sandia MEMS Software Tools

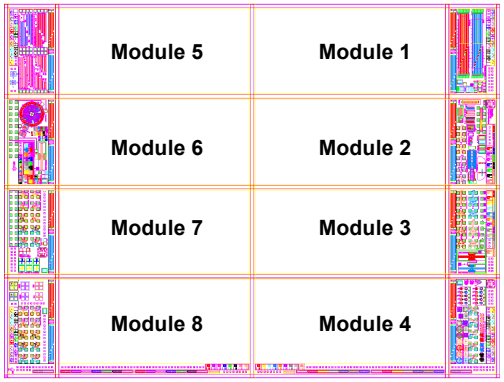
- **Sandia Advanced MEMS Design Tools**
  - Includes Standard Components Library, Design Rule Checker, Prototype File
  - $5000 one-time license fee
- **Sandia MEMS Visualization and Modeling Tools**
  - SUMMiT V™ 2-D & 3-D Process Visualizer and 3-D Modeler
  - $5000 one-time license fee

*** It is highly recommended both sets of tools are purchased together for optimal design capability.**

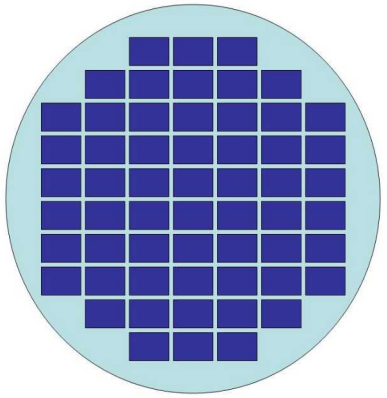
Using the SAMPLES™ Program to Prototype with SUMMiT V™ Technology

SAMPLES™ modules are fabricated with the SUMMiT V™ Process

- **Reticle size: 16500 µ X 12400 µ**
- **Diagnostic devices help characterize fab process**
- **Customer receives approximately 100 unreleased die**
- **Fabrication cost is shared among customers, $11.2K per module**



2820 µ X 6340 µ modules



~ 58 die per wafer

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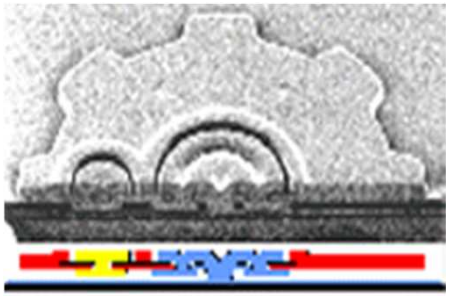
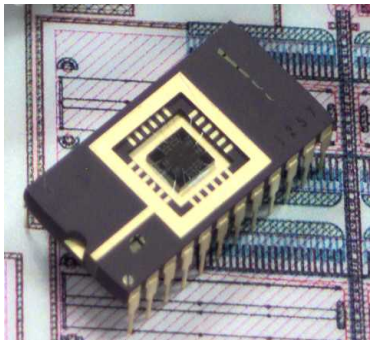
SAMPLES: Additional Services Available

- Design Reviews
- Metallization
- Back-end processing
- Packaging
- Reliability characterization
- Failure Analysis
- Testing
- Individual specialized agreements
- Alternative processing available on a case by case basis





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MEMS Drivers: Sandia Software Tools

- **SuperMicro Driver**
  - Programmable waveform software and amplifier, provides controlled power to micro machines
  - $3000 (Domestic) $3500 (International) one-time license fee, available from TEGAM
- **MEMScript**
  - Programmable MEMS control software with analysis features and real-time measurement of performance
  - $4995 one-time license fee (5% off for universities), available from EM Optomechanical

Sandia's MEMS University Alliance (UA): Leveraging the SAMPLES™ program

Highlights of the University Alliance License:

- **Site license for SUMMiT V™ design and visualization tools**
  - For use in lab or classroom by course participants (1-50 students)
- **Instructional materials from Sandia MEMS Short Courses**
  - Introductory and MEMS Design and Reliability Concepts
- **Training and technical support for a University POC to become a "Superuser"**
- **Opportunity to participate in the annual design contest**
- **MEMS parts for use in teaching**

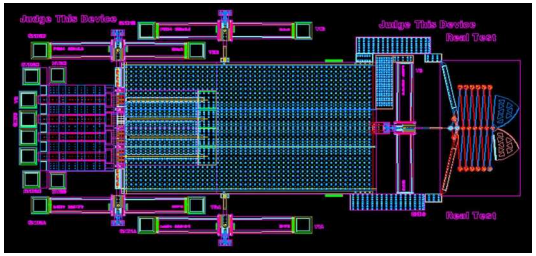
One-time License
Fee of $5000

UA Design Contest

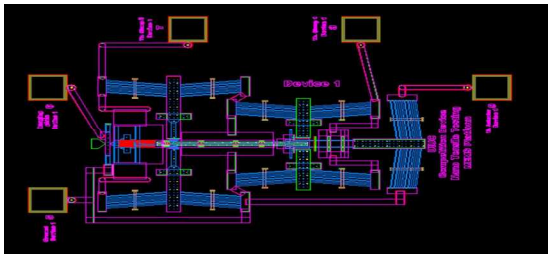
2007 MEMS UA Design Competition Winners are Oklahoma & Illinois!

- Top schools have their design fabricated for free
- When possible, first place student and professor are invited to Sandia to present their design
- 1st Place to receive MANCEF membership & MEMS Roadmaps
- Intent to submit due early 2008; Design due April 2008
- All UA schools receive MEMS parts

2007 NOVEL DESIGN WINNER



2007 CHARACTERIZATION/RELIABILITY/NANOSCALE PHENOMENA WINNER



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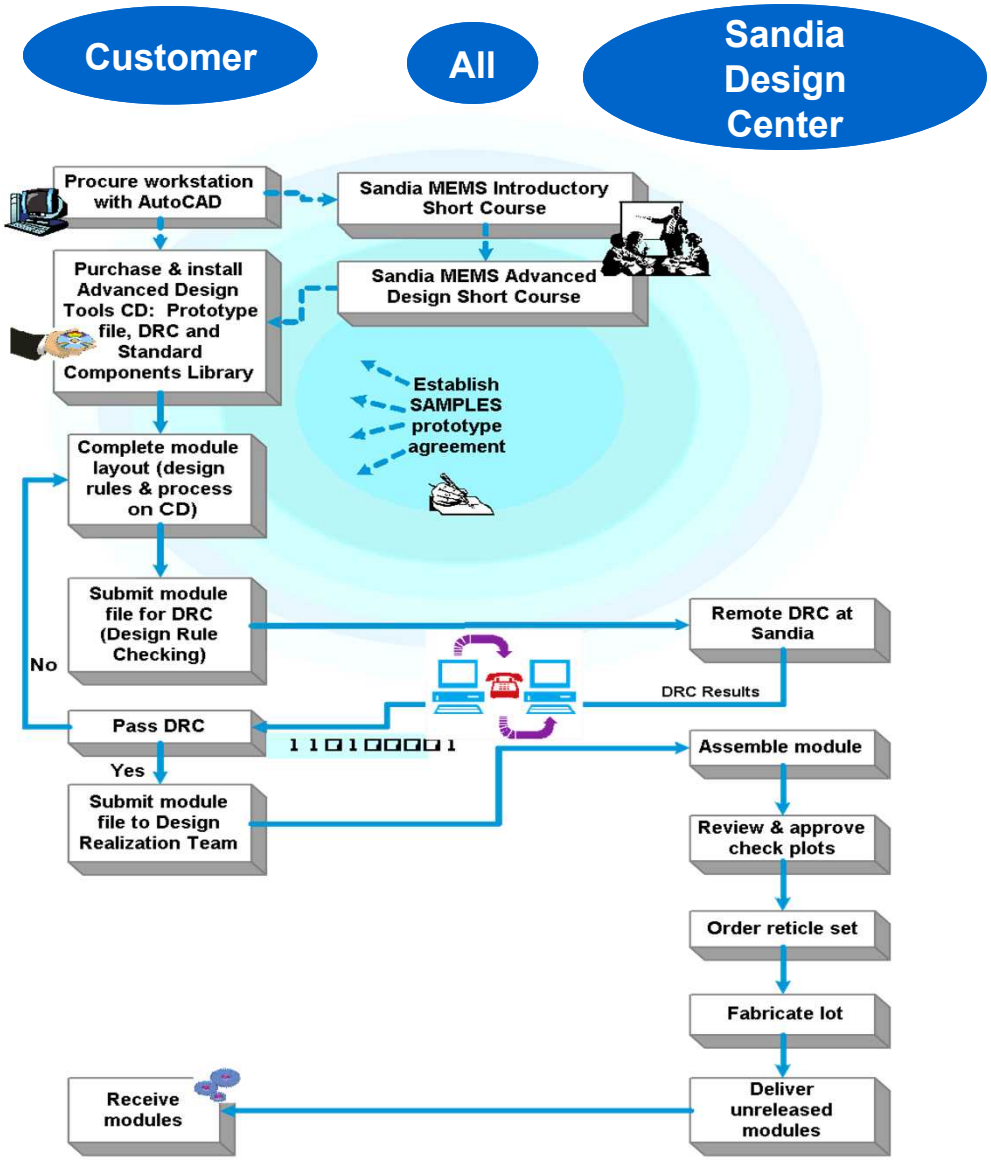
Current MEMS UA Partners

• University of Oklahoma	H. Stalford
• Worcester Polytechnic Institute	R. Pryputniewicz
• Austin Community College	J. Tiede
• Central New Mexico Community College	F. Lopez
• UNC-Charlotte	H. Estrada
• Chemeketa Community College	C. Watkins
• University of Utah	I. Harvey
• Luna Community College	G. Gallegos
• Texas Tech University	T. Dallas
• University of Wisconsin – Platteville	O. Jadaan
• Texas State University	G. Spencer
• University of Florida	G. Wiens
• Northwest Shoals Community College	J. Bonner
• North Dakota State College of Science	M. Burke
• New Mexico State University	T. Burton
• University of Arizona	S. Pau
• University of Illinois Urbana/Champaign	I. Chasiotis

Partner Commitment

- Teach degree-level, term-long MEMS course(s) (1-50 students)
  - Including SUMMiT™ technology and/or design tools
- Designate and support a Superuser
  - An on-site SUMMiT™ technology and design expert

Participation in the SAMPLES™ Program:



Contacts

Short Courses and course CDs:

Stephanie Johnson

(505) 844-3757, memscc@sandia.gov

SAMPLES™ Program and University Alliance License:

Program inquires, tool CDs, module design and submission:

Stephanie Johnson

(505) 844- 3757, memsinfo@sandia.gov

Design Realization Team:

Design submission issues for SAMPLES™ customers:

drt@drc.sandia.gov

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