Sandia National Laboratories Overview

SAND2010-6440C

Hal Morgan

Industrial Partnerships and Strategy
Sandia National Laboratories

Goodyear CRADA Review

September 28, 2010

Sandia National Laboratories

Multiprogram National Security Laboratory

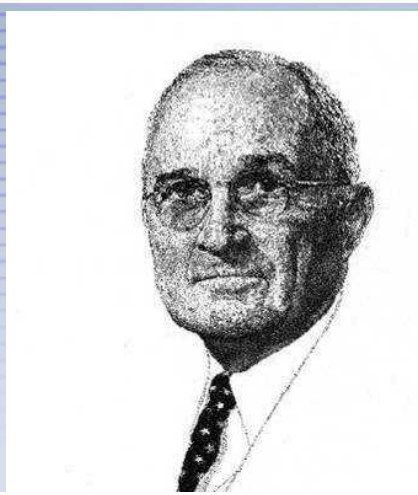
National Security

Sandia National Laboratories

Science & Engineering

Sandia National Laboratories: 60 Years of National Service

- Born of the atomic age.
- Heritage of engineering and production.
- Science mobilized for national security.
- A legacy of industrial management.
- Six key mission areas:
  - Nuclear weapons
  - Nonproliferation
  - Assessments
  - Military technologies and applications
  - Homeland security
  - Energy and infrastructure assurance



"you have …an opportunity to render an exceptional service in the national interest."
May 13, 1949 Letter from President Truman to Mr. Wilson, President of AT&T

AT&T

1949-1993

LOCKHEED MARTIN

1993-Present

Our Highest Goal: become the laboratory that the United States turns to first for technology solutions to the most challenging problems that threaten peace and freedom.

National Security Mission Space

Nuclear Weapons

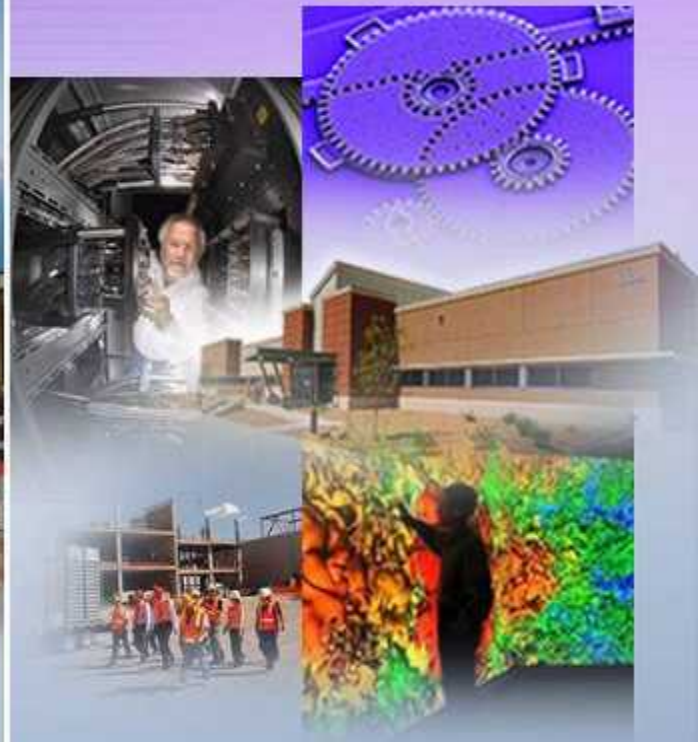
- Nuclear Weapons

National Security Technologies & Systems

- Defense Systems and Assessments
- Energy, Climate, and Infrastructure Security
- International, Homeland, and Nuclear Security

Laboratory Transformation

- Science, Technology, and Engineering



Sandia National Laboratories

The Evolution of Our Mission

1950s
Production engineering and Manufacturing engineering

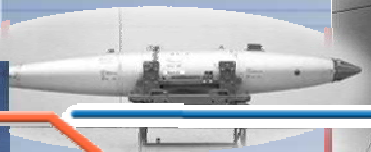
1960s
Development engineering

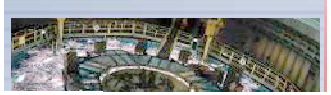
1970s
Multiprogram laboratory

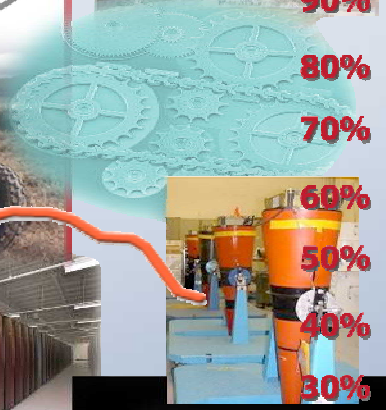
1980s
Research, development and production

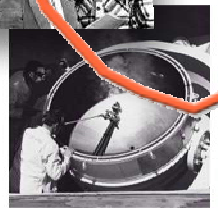
1990s
Post-Cold War transition

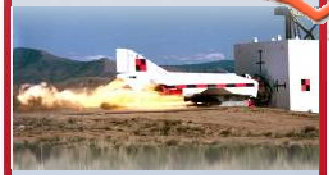
2000s
Expanded national security role

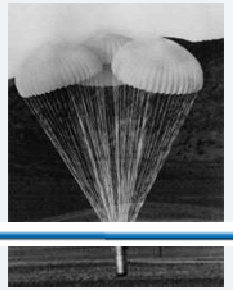


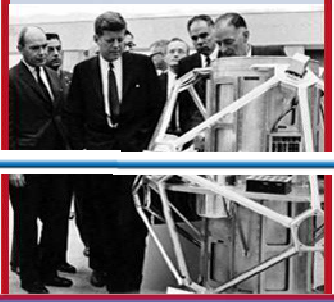


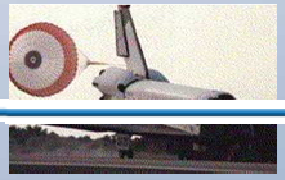








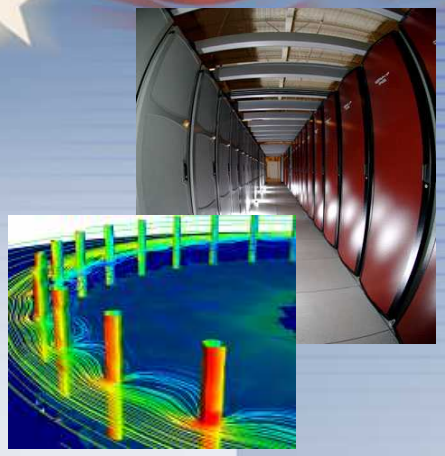
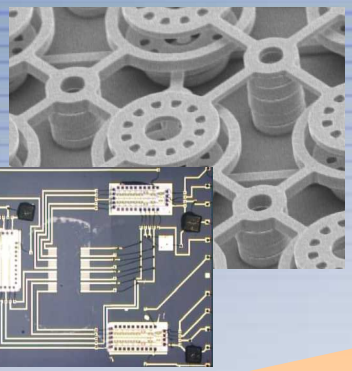
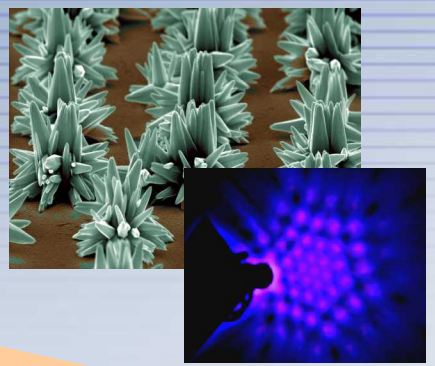
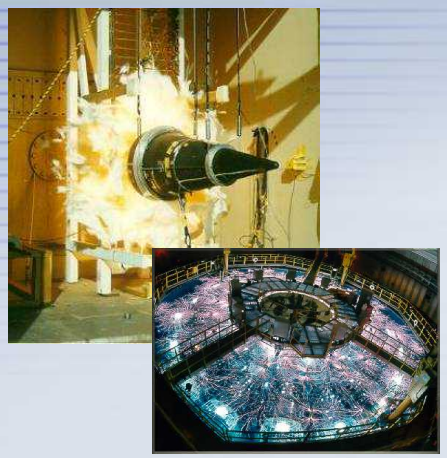




Sandia National Laboratories

Sandia's capabilities are underpinned by six research disciplines

Strategic Capabilities

High Performance Computing

Microsystems

Nanotechnology

Extreme Environments

Computer Science

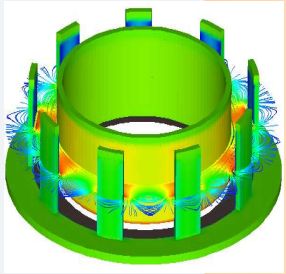
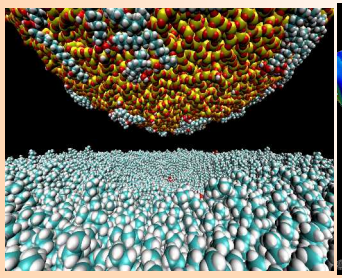
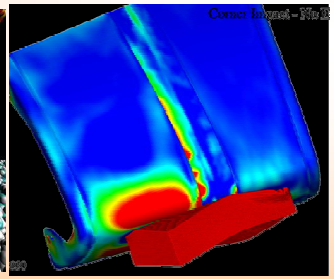
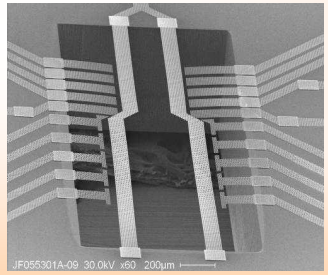
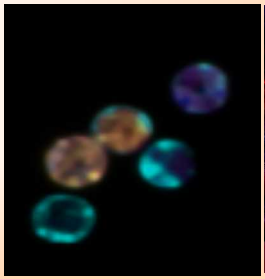
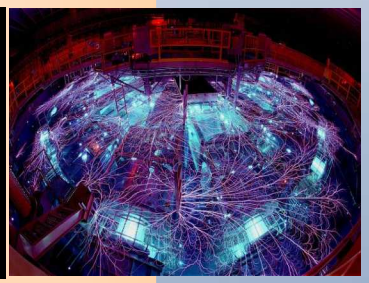
Materials

Engineering Sciences

Micro Devices

Bioscience

Pulsed Power

Research Disciplines

Technology Transfer is a DOE & Sandia Mission

Mandated by Law

- National Competitiveness Technology Transfer Act of 1989
- DEARS Clause in Sandia's Contract
- Establishment of Office of Research & Technology Applications (ORTA)

Tech Transfer Mechanisms

- Unique Expertise
- Unique capabilities & user facilities
- Technology
  - Licensing of intellectual property
  - Entrepreneurial separation from Sandia
- Sandia Science and Technology Research Park
- New Mexico Small Business Assistance

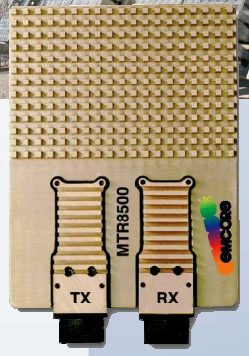
Tech Transfer Requirements

- Funding
  - Full cost recovery
  - From industry or DOE program
- Non-competition with industry
- Fairness of Opportunity
- Substantial Manufacturing in US

Tech Transfer Agreements

- Cooperative Research & Development Agreements (CRADAs)
- Work for Others (WFO)
- Licensing of Sandia IP
- SBIRs
- Memoranda of Understanding

SS&TP Success Story: EMCORE



- EMCORE is a publicly traded company
- First company to move into Park in 1998
- Moved company head-quarters from NJ to NM in 2006
- Licensed from Sandia
  - VCSEL technology
  - Solar cell technology
  - Transponder technology
- $114.7M investment in Park
- 350+ employees at Park
- Signed Distributed Generation Agreement with PNM

Sandia National Laboratories

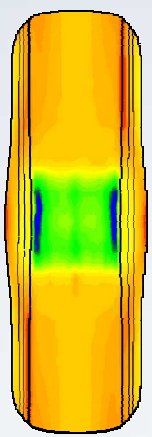
The Sandia/Goodyear Strategic Partnership

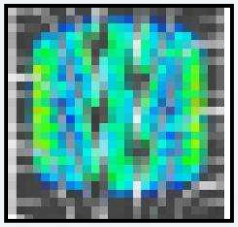
Develop and validate computational mechanics (finite element) tools for predicting structural, thermal, and fluid response of viscoelastic systems during manufacturing & use

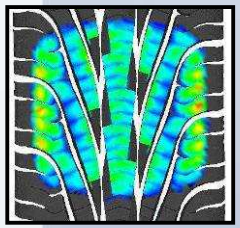
Technology Breakthrough 1994-1996

"The Pneumatic Tire Represents One of the Most Formidable Challenges in Computational Mechanics Today"

A. Noor, Journal of Computers and Structures





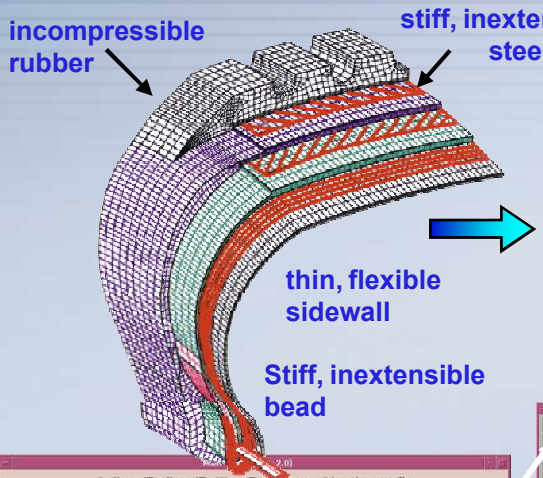


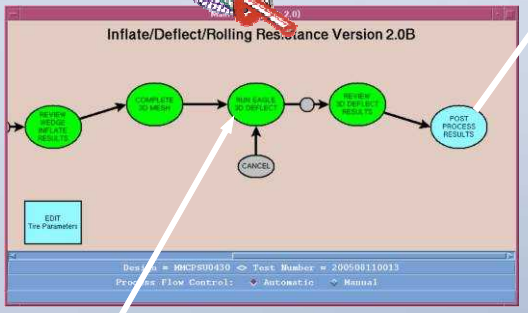
Before

After

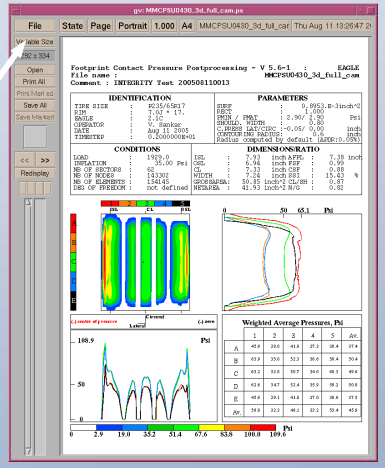
Technology Maturation 1997-2003

Traditional Build/Test Product Development – 2-3 Years



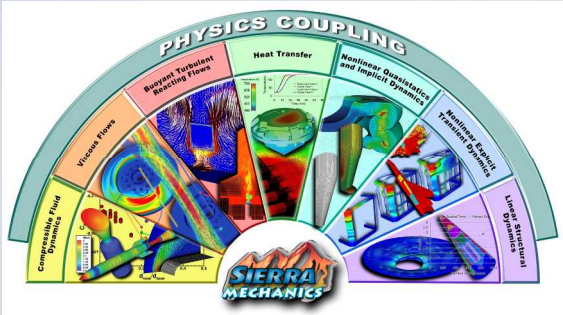


Automated Simulation Process



Innovative New Products 2004 - Future

Today 100% of the tire designs at Goodyear are modeled *before* molds are ordered.



Sandia National Laboratories

History of Sandia/Goodyear Partnership

- **Advanced Mechanics Tools for Engineering/Processing Analyses (1993-2002)**
  - **Objective: Develop and validate computational mechanics (finite element) tools for predicting structural, thermal, and fluid response of viscoelastic systems during manufacturing and use.**
- **Materials for Improved Tire Technology (1994-1996)**
  - **Objective: Apply Sandia's materials expertise to enhance Goodyear's understanding of elastomeric materials.**
- **Computational Simulation and Verification Technologies for Tire Dynamics (1994-2002)**
  - **Objective: Develop a general methodology to obtain verified finite element models to predict vibration of rotating systems (tires, weapon systems).**
- **Advanced Manufacturing of Rubber Products (1997-2002)**
  - **Objective: Provide Sandia and Goodyear with experience and enhanced understanding of modern manufacturing technologies and apply them to tire production.**
- **Engineered Products and Process Reliability (1999-2002)**
  - **Objective: Apply Sandia's expertise in manufacturing and mechanics to provide better understanding of issues related to the manufacturing and performance of engineered elastromeric products (non-tire rubber products).**
- **Chemical (2000-2002)**
  - **Objective: Apply Sandia's expertise in manufacturing and mechanics to provide better understanding of issues related to the manufacturing and performance of engineered elastromeric products (non-tire rubber products).**
- **Umbrella CRADA (2002-present)**
  - **Objective: Facilitate current and future Goodyear/Sandia interactions.**

Sandia/Goodyear CRADA Tasks

Task 1 – Goodyear Chemical - membrane separation – **Completed**

Task 2 – Information Vulnerability Model – **Completed**

Task 3 – Structural Dynamics – **ACTIVE**

Task 4 – Advanced Mechanics – **ACTIVE**

Task 5 – Computing Architectures – **Addressed outside the CRADA**

Task 6 – Sensors – Goodyear Vehicle Systems – **Completed**

Task 7 – Manufacturing Reliability – **Completed**

Task 8 – Performance Prediction – **Completed**

Task 9 – Engineered Products – **Terminated**

Task 10 – Tire Pressure Sensing System Phase I Study – **Completed**

Task 11 – Improved Rubber Nanomaterials – **ACTIVE**

Task 12 – Lignin and Cellulose Functionalization – **ACTIVE**

Task 13 – FOD Detection for Aircraft Tires – **Completed**

Task 14 – Strategic Materials Evaluation – **Never started**

Task 15 – Rapid Response – **Initiating**

Task 16 – Management of Information Shared Across Goodyear Sites (Cyber Security) - **ACTIVE**