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Technology Transfer and  
the Civil Space Workshop

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NASA

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**Technology Transfer and the Civil Space Workshop**

Sandia National Laboratories has identified technology transfer to U. S. industry as a laboratory mission which complements our national security mission and as a key component of the Laboratory's future. A number of technology transfer mechanisms -- such as CRADAs, licenses, work-for-others, and consortia -- are identified and specific examples are given. Sandia's experience with the Specialty Metals Processing Consortium is highlighted with a focus on the elements which have made it successful. A brief discussion of Sandia's potential interactions with NASA under the Space Exploration Initiative was included as an example of laboratory-to-NASA technology transfer.

# The role of the national labs is changing as the national needs change

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## Declining Importance

Threat from "Evil Empire"

Nuclear weapons

Go where we have never gone before

Prolong life at any cost

Large quantities of low-tech products

Long product life cycle

## Increasing Importance

Threat from evil people

High-Tech weapons

Get there! faster, cleaner, cheaper

Reduce health care costs

Custom products

Short product life cycles



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## Sandia's Technology Transfer Program

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### Mission focus :

- Enhance U. S. economic competitiveness
- Focus on market pull for rapid commercialization
- Apply lab strengths to problems of national importance
- Emphasize partnerships with industry and universities

The technology transfer mission complements Sandia's national security missions.



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# Recent/Ongoing Technology Transfer Successes

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- **Combustion Research Facility - User Facility**
- **Semiconductor Equipment Technology Center - SEMATECH WFO**
- **Specialty Metals Processing Consortium - Consortia Agreement**
- **SANDAC Computer - Honeywell Corp. - Direct Transfer via Contract**
- **Semiconductor Bridge Technology - SCB Inc. - Commercial License**
- **Microcellular Foam - Permacharge Inc. - License/CRADA**



## CRF - Industry collaborations increase U.S. competitiveness

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<b>General Motors</b>	<b>Flame chemistry codes, diagnostic techniques</b>
<b>Gas Research Institute</b>	<b>Natural gas combustion, pulse combustion</b>
<b>Exxon</b>	<b>Flame chemistry, soot formation, diesel technology</b>
<b>Altex</b>	<b>Turbulent reacting flows</b>
<b>AT&amp;T</b>	<b>Flame-formed silica</b>
<b>EPRI</b>	<b>Coal combustion</b>
<b>John Deere</b>	<b>Rotary engine velocimetry, Industrial Fellow</b>
<b>Technor</b>	<b>Reduction of NOx from exhausts</b>
<b>Conoco</b>	<b>Coal combustion diagnostics</b>
<b>General Electric</b>	<b>Turbulent reacting flows</b>
<b>Cummins Engine</b>	<b>Diesel particulates, Industrial Fellow</b>
<b>Unocal</b>	<b>Engine knock diagnostics</b>
<b>Lennox Industries</b>	<b>Pulse Combustion, Industrial Fellow</b>
<b>Mobil</b>	<b>Diesel fuel auto-ignition</b>
<b>Ford, Chrysler</b>	<b>Fiber-optic spark plug technology</b>
<b>Combustion Engineering</b>	<b>Mineral- matter deposits</b>



# Semiconductor Equipment Technology Center (SETEC) Program Overview

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**Objective:** Develop and apply tool design model and methodologies to enhance the reliability and operation of U.S. semiconductor manufacturing equipment

- Sponsored by SEMATECH
- Uses established facilities and expertise
- Transfers technology to member companies



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## Sandia Technology Transfer

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### SANDAC Computer

A high-performance, ruggedized, parallel processing computer weighing only seven pounds that can run on batteries while offering supercomputer-like computing power for such things as high-speed navigation, guidance, and control – transferred via contract to Honeywell Avionics Division for production.

### Silicon Bridge Ignitor

A microchip-sized explosive igniter that can ignite an explosive powder about 1000 times faster than traditional hot-wire igniters and requires much less energy – licensed to SCB Technologies, Inc., based in Albuquerque, to develop SCB igniters for automotive air bags. The company has issued a sublicense for SCB air bag manufacture to Thiokol Corporations Tactical Operations Division in Elkton, Maryland.

### Microcellular Foam

A low-density, porous material that is very uniform with a high surface area has been licensed to Permcharge Corporation, a small Albuquerque-based company, which will be using it in high-efficiency particulate air filters for use in hospitals, semiconductor and computer clean rooms, and other facilities requiring extremely particle-free environments.



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## CRADAs Approved

<u>Company</u>	<u>Technology</u>
Signetics Company	Microelectronics Quality Reliability Center (MQRC)
Motorola Inc.	Solvent Reduction Through Use of Self-Cleaning Soldering Process
National Semiconductor	Microelectronics Quality Reliability Center (MQRC)
Permacharge	Microcellular Foam Filtration Media Fabrication and Evaluation
Stellar Systems	Physical Security Technology Outdoor Perimeter Sensor
Vindicator Corp.	Physical Security Technology Taut Wire Fence
Dow Corning Corp.	Microengineering Materials Development Project
Watkins Johnson	Copper Chemical Vapor Deposition for Integrated Circuits
City of Albuquerque	Volatile Organic Monitor for Industrial Effluents
Pratt & Whitney	Intelligent Machining of Castings
Olin Speciality	Microelectronics Quality Reliability Center (MQRC)
LSI Logic	Microelectronics Quality Reliability Center (MQRC)
Schumacher	Copper Chemical Vapor Deposition for Integrated Circuits
BPLW Architects	Physical Security Technology
Sematech	Semiconductor Equipment Technology Center
Carpenter Technology	Joining Technology for Advanced Borated Stainless Steel
Pratt & Whitney	Intelligent Processing of Thin Section Welded Assemblies



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## Specialty Metals Processing Consortium

- Sandia has developed  
Advanced diagnostic and control techniques for forming high quality special metal alloys.
- The specialty metals industry affects microelectronics to jet engines.
- Products include high-strength, high-performance lightweight alloys.
- The consortium will help meet the challenge of foreign competition.

### PARTICIPANTS:

Allegheny-Ludlum  
Cartech  
Cytemp  
Garrett  
Howmet  
INCO Alloys

Pratt & Whitney  
Special Metals  
Teledyne Allvac  
Teledyne Wah Chang  
Wyman Gordon



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## **COST-SHARE CONSORTIA (SMPC MODEL)**

### *Elements -*

- \* Market pull: Industrial \$  
Industry involvement in R&D program
- \* Well-defined technical agenda including short-term benefit to industry
- \* Catalyzed around existing lab facility and technical capability
- \* Flexible cooperative agreement
- \* Laboratory and industrial champions
- \* Involves small and medium-sized companies
- \* Involves both suppliers and end-users
- \* Pre-competitive technology development
- \* Threatened Industry

## **SMPC Program Rules**

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- **Work managed through Project Letter Agreements**
- **Stringent U.S. preference conditions set by SMPC**
- **Commercial-value information protected up to 3 years**
- **Sandia holds all intellectual property -- SMPC members get royalty-free rights under most situations.**



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# Summary Technology Transfer at Sandia

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- Has been elevated to mission status
- Has new, more responsive mechanisms in place
- Focuses on strategic industry partnerships especially consortia aimed at dual use technologies
- Seeks to match capabilities at Sandia with industry/market needs
- Is actively soliciting industry participation



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## *Space Exploration Initiative*

### **Supporting Technologies**

- |                                       |  |
|---------------------------------------|--|
| ○ 1) Heavy lift launch capability     | ● 8) Radiation effects issues                  |
| ● 2) Nuclear thermal propulsion       | ● 9) Telerobotics                              |
| ● 3) Nuclear electric surface power   | ○ 10) Closed loop life support                 |
| ○ 4) EVA suit                         | ○ 11) Human factors for long duration missions |
| ○ 5) Cryogenic fuel issues            | ● 12) Lightweight materials and manufacturing  |
| ○ 6) Automated rendezvous and docking | ● 13) Nuclear electric propulsion              |
| ○ 7) Zero-g countermeasures           | ○ 14) In situ resource utilization             |

Sandia participation: ● major ○ significant ○ minor or none

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