

## Development of New Knowledge and Early Commercial Products and Processes

*Advanced Materials and Chemicals; Biotechnology; Electronics, Computer Hardware, or Communications; Information Technology; Manufacturing*

**Table A.1 Advanced Materials and Chemicals**

A. Awardee Name	B. Technology Developed	C. Products or Processes Commercialized or Expected to be Commercialized Soon
Budd Company, Design Center	Low cost disposable film bladder that acts as a vacuum to hollow out parts made from slurry process	Introduced capability to produce SRIM structural impact bumpers in approximately three minutes per unit which may be practical for industries with low-volume output (heavy truck, recreation vehicle (RV), and watercraft)
Caterpillar Incorporated	Functionally gradient materials for heavy machinery	Developed a cost-effective processing technology to enhance production
Ebert Composites Corporation	Five-axis CNC machine that is capable of accurately tracking and machining composite lineals on a continuous basis	Commercialized technology into composite structures for electric power poles and lattice towers
EDO Specialty Plastics (formerly Specialty Plastics, Inc.)	Integral flange technology, heat-activated coupling technology, an improved fitting manufacturing technology through intelligent filament winding using optical sensors	Marketed resin transfer molded flanges, reducers, and elbows and started to earn revenue. Their chief customers are the Shell Exploration and Production Company, Exxon, and Texaco, in the Gulf of Mexico
Ford Motor Company	Liquid composite molding process	Commercialized process
General Electric Company	Monomer from corn that potentially could be used in engineering thermoplastics	Unable to commercialize its technology because of scientific and technical failures, the company is continuing its research into creating a viable product
Honeywell (formerly Allied Signal, Inc.)	54-micrometers thick, metallic glass ribbons with 60% reduction in core loss from that of conventional grain-oriented silicon steel; casting system providing higher cooling rates; established conditions for casting ribbon up to 80 micrometers thick; gained better understanding relationship between casting	Metallic glass ribbons are currently incorporated into many products that are sold worldwide

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	conditions and ribbon properties; crafted 7.6 cm wide, 75 micrometers thick ribbon with high-quality magnetic properties; constructed equipment and processes for cutting thick ribbon; incorporated process for annealing spooled ribbon	
Honeywell, Inc., Technology Center	Generated advanced process understanding for neural network controls and sensors for complex materials and established the groundwork for Honeywell's continued development of neural networks	Continued to explore neural network technology and developed related products, such as its Profit Sensor software
Nanophase Technologies Corporation	Technology that enabled a 25,000-fold increase in the development of nanoscale materials and a 20,000-fold reduction in cost	NTC titania in cosmetic sunscreens; NTC zirconia, ceria, and yttria in catalysts and near-net-shaped ceramics; iron oxides incorporated into cosmetic pigments, NTC alumina in near-net-shaped ceramics and electronic substrates
Norton Diamond Film	Diamond-coating and pretreatment technology for coating complex shapes	Commercialized a diamond-coated end-mill product that it currently supplies to the graphite, non-metallic materials, and metal-machining industries
Praxair Surface Technologies, Inc.	Advanced the coatings industry's understanding of the newest form of physical vapor deposition-Linear Magnetron Sputtering	None. Did not achieve all technical goals
Strongwell Corporation	Large cost-effective, high-performance composite shapes that last longer and are maintained more easily than the concrete and steel that is now aging and deteriorating in the country's infrastructure	Developed a manufacturing process to create high-strength, advanced Fiber-reinforced polymer (FRP) composites that could be used in bridge and building construction

**Table A.2 Biotechnology**

A. Awardee Name	B. Technology Developed	C. Products or Processes Commercialized or Expected to be Commercialized Soon
Genzyme Corporation (formerly GelTex Pharmaceuticals, Inc.)	Continued research for infectious disease	None. Changes in the healthcare marketplace led Genzyme to abandon its research
Hyseq, Inc.	Developed a prototype called the HyChip™ that could sequence entire genes at a time	None. Post-project business considerations have delayed commercialization. Hyseq and Applied Biosystems also spun off a majority-owned subsidiary, Callida Genomics, Inc., to pursue the DNA sequencing upon which Hyseq was founded. If Callida is a success, the company could bring new drugs and sequencing methods to market in the next 10 years (the normal drug development timeframe)
Nanogen, Inc.	Developed a microchip-sized DNA diagnostic system that uses electric current to actively hybridize DNA, allowing for faster and less expensive DNA diagnostic work	The NanoChip® Molecular Biology Workstation is the first product line in what Nanogen hopes will be a long series of DNA diagnostic tools. Current capabilities include detecting abnormalities in gene sequences. Future diagnostic applications include entries into the oncology, infectious diseases, and genetic testing markets
Nanogen, Inc.	Developed a prototype microchip-sized DNA diagnostic system and desktop computer-sized workstation for analysis	Nanogen has commercialized the NanoChip® Molecular Biology Workstation. An automated multi-purpose instrument that facilitates detection of known sequences, such as in the analysis of Single Nucleotide Polymorphisms (SNPs) and Short Tandem Repeats (STRs) using the NanoChip® Electronic Microarray. The unique, open-architecture design permits researchers to define, select, and build their own test panels
Third Wave Technologies, Inc.	Created process known as Cleavase Fragment Length Polymorphism (CFLP) that generates a distinct bar code for every unique DNA sequence	ThirdWave has moved beyond the CFLP and now commercializes the proprietary Invader® Technology, a molecular diagnostic tool that is quickly becoming the industry standard

**Table A.3 Electronics, Computer Hardware, or Communications**

A. Awardee Name	B. Technology Developed	C. Products or Processes Commercialized or Expected to be Commercialized Soon
ColorLink, Inc.	Underlying technologies for a high-efficiency, solid-state, electro-optic tunable filter for color-sequential imaging	Several technologies are being commercialized in the television and monitor display industries. These technologies include retarder stacks and custom laminations
Digital Optics Corporation	Integrated Micro-Optical System (IMOS) for the production of low and mid-volume opto-electronic devices	Photonic Chip™
Displaytech, Inc.	Developed a manufacturing process for mass production of ferroelectric liquid crystals (FLCs) for displays	Mass produced FLC display chip
Eagle-Picher Research Laboratory	Developed blue and green prototype lasers and LEDs exhibiting superior output capabilities. Achieved success in substrate development, laser and LED output power, and substrate quality	None. Eagle-Picher redirected its research into zinc oxide-based lasers and LEDs
Elsicon (formerly Alliant Techsystems, Inc.)	Products and services related to optical alignment of Liquid Crystal Displays (LCDs): pre-tilt analysis system for LCDs, an R&D tool enabling the identification of the process parameters for the optical alignment of LCDs and devices, measurement system for the voltage-holding ratio, materials that support the optical alignment of LCDs	Developed a platform for commercialization of the products and services related to the optical alignment of LCDs at Elsicon
Information Storage Industry Consortium (INSIC, formerly NSIC)	Developed technology for giant magnetoresistive (GMR) recording heads capable of writing and reading 10 gigabits per square inch	The GMR head technology received such broad and fast industry adoption that it became the industry standard in record time
Laser Power Corporation	Development and improvement of Red Green Blue (RGB) microlasers	Sold technology to Melles Griot to continue research and development
MicroFab Technologies, Inc.	Development of a high-volume wafer bumping prototype that demonstrated dispensing of 40 to 120 nanometer spheres of molten solders at temperatures of up to 220 degrees Celsius, on-demand, and at rates up to 2,000 per second	Licensed technology for use in solder balls

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Micron Optics, Inc.	Developed High-Speed Fiber Fabry-Perot Tunable Filters (FFP-TF) for communication networks	Commercialized improved FFP-TF (although all ATP goals not met)
Physical Optics Corporation	New type of diffuser light based on holographic technology. The ATP-funded diffusers are twice as efficient as previous diffusers	Manufacturing holographic diffusers
X-Ray Optical Systems, Inc.	Manufacture of capillary x-ray optics, polycapillary optics lenses, and collimators	Commercialized machines that use polycapillary optics lenses and collimators

**Table A.4 Information Technology**

A. Awardee Name	B. Technology Developed	C. Products or Processes Commercialized or Expected to be Commercialized Soon
3M Company Health Information Systems	Clinical Data Repository	Prototype is installed in healthcare facilities throughout the United States
Accenture (formerly Andersen Consulting)	Developed and demonstrated the functionality of a healthcare information system that could control costs, eliminate redundant care, and give healthcare providers more time with their patients	None. Changes in the healthcare industry, however, made a centralized information infrastructure irrelevant, and commercialization did not take place
American Healthware Systems	Developed a Graphical User Interface that are less complex than the Health Care Plan System	None. Although the company failed to develop an interface that could prompt physicians to use the care plans in an effective manner, the company continued its research into hospital information systems after the project ended in 1997
Hynomics (formerly Hybrithms Corporation, formerly Sagent Corporation)	Hybrid systems, automata, and control theory	Commercialized a workforce optimizer and people scheduler for SAP; one of the largest enterprise solutions providers
KOOP Foundation, Inc.	Developed and demonstrated a business process reengineering information technology application for use by the healthcare industry	None. Changes in the healthcare marketplace prevented the Koop Foundation joint venture from commercializing the ATP-funded technology
KOOP Foundation, Inc.	Developed an essential middleware framework for the healthcare information infrastructure	None. Aggressive cost cutting had not proved successful for healthcare providers, and a universal approach to healthcare delivery had faded from the national scene

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Kurzweil Applied Intelligence, Inc.	Developed voice recognition software as a result of the ATP project	The technology has since been integrated into Lernout & Hauspie's VoiceXpress™ product, which allows voice control of Microsoft and Corel Office software products
MediaBin (formerly Iterated Systems Incorporated)	Produced prototypes of compressors and decompressors using a combination of fractal and non-fractal elements.	None. Changes in the market made ISI's innovation obsolete. By the end of the ATP-funded project in 1995, use of the Internet had become widespread, thus reducing the need to store vast image libraries on PCs
PPD Informatics (formerly Belmont Research, Inc.)	Addressed the problem of data integration by creating a software tool that would browse and automatically extract healthcare data from scattered databases without altering the existing systems. The Table Trans and Belmont Auto Coder products provide these capabilities	PPD Informatics continues to market both Table Trans™ and Auto Coder to the clinical research industry
Reasoning Systems, Inc.	Developed technology that reduced the time, cost, and risk of reengineering across a wide variety of legacy systems	None. After a sharp drop-off in the transformational software purchasing that had fueled its explosive pre-2000 growth, a leaner Reasoning has refocused its business model, secured an additional \$9 million in venture funding, and continues to commercially market the software technology developed during the ATP-funded project
Surgency (formerly Benchmarking Partners)	Created the Retail Working Group, the first Internet-based retail business-to-business collaboration initiative that served as the forerunner to the formation of the VICS CPFR implementation manual and the widespread use of collaborative practices	Warner-Lambert purchased a pilot version of its collaborative technology, and Kmart, Gillette Corporation, and others paid for executive briefings, access to collaborative process models, and consulting services
TopicalNet (formerly Continuum Software, Inc.)	Developed MultiPly™, a technology allowing business programmers to develop scalable business applications without having to learn parallel programming	None. Venture capital not available at the time because the computer industry was focused on Y2K compliance
TopicalNet (formerly Continuum Software, Inc.)	Developed a software tool using projective visualization that would enable the creation of future databases	TopicalNet's ATP-supported technology and its subsequent acquisitions have allowed the company to provide its customers with traffic verification, analysis, and research solutions for the World Wide Web

**Table A.5 Manufacturing**

A. Awardee Name	B. Technology Developed	C. Products or Processes Commercialized or Expected to be Commercialized Soon
Calmac Manufacturing Corporation	Unable to develop an ejector expansion refrigeration cycle (EERC) to increase the efficiency of the cycle by recovering some of the unused energy in the compressed fluid	None. Scientific and technical failures prevented Calmac from successfully developing the EERC technology. Calmac did, however, advance the refrigeration industry's body of knowledge for modernizing the vapor compression process, and future industry efforts may potentially expand on the inroads made by Calmac
Corning Tropel (formerly Tropel Corporation)	Cylinder metrology instrument based on diffractive optics to enable high-speed, in-process, non-contact measurement of complex shapes such as cylinders and cones in a manufacturing environment	Commercialized Cylinder Master™ product
Dana Corporation	Magnetic pulse welding process that combines a precision metal-forming step with unconventional welding aluminum and steel load-bearing structures to enable welding tubular steel to aluminum without depositing additional metal. The process requires precisely crafted and machined tubes of metal bonded by heating generated by a rapidly shifting magnetic field	After durability testing at OEM sites, Dana expects to commercialize the magnetic welding process for use in manufacturers of U.S. and European vehicles
GE Corporate Research & Development	No technologies were successfully developed as a result of this project	None. Although the company did not achieve its goal of developing mercury-free fluorescent lighting for existing sockets, it did advance the state-of-the-art of mercury-free fluorescent lighting
Ingersoll Milling Machine Company	Octahedral hexapod machine tools	Sold three high-precision, multi-axis machine tools based on an octahedron frame and a "Stewart platform" actuator
M&M Precision Systems Corporation	Automatic computer-controlled error correction software, rotary-axis technology enabling smoother and faster gear measurements, and new control technology enabling a smoother, more precise gear motion during measurement	Commercialized the 3500-series measurement machine
Perceptron (formerly Autospect, Inc.)	Using its Laser Ultrasonic technology, developed non-contact method for online measuring of wet-paint thickness to enable a high-quality painting process for the automotive industry	Sold prototype wet film measurement (WFM) system to DaimlerChrysler. No commercialization after that initial sale

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Philips Laboratories	<p>Fabricated sealed cavities that contained a dose of mercury and argon ambient. Created 3 electrode microlamps:</p> <ul style="list-style-type: none"> <li>• 1 high-pressure mercury microlamp</li> <li>• 1 high-pressure mercury microlamp with arcs of 1mm suited for projection applications</li> <li>• 1 with electrodes on one side, a design enabling the microlamp to be illuminated using low electrical current for low-wattage applications</li> </ul>	None. Philips Lighting could not commercialize the product at prices low enough to compete with microlamps already on the market, so the company abandoned plans to bring a product to market
Sheffield Automation (formerly Giddings & Lewis)	Validation of non-interferometric lasers with single-mode optic fiber laser beams for metrology applications and development of a multi-degree-of-freedom laser measurement system	Unable to develop a commercial-ready prototype from their work, but applied technology developed to the later development of its Atlas, Discovery, Endeavor, and ProGage series CMMs