

MINUTES OF THE HOUSE COMMITTEE ON ECONOMIC DEVELOPMENT.

The meeting was called to order by Chairperson Barbara P. Allen at 3:30 p.m. on January 23, 1996 in Room 423-S of the Capitol.

All members were present except: Rep. Henderson - excused  
Rep. King - excused  
Rep. Lane - excused  
Rep. Glasscock - excused  
Rep. Packer - excused  
Rep. Kirk - excused

Committee staff present: Lynne Holt, Legislative Research Department  
Bob Nugent, Revisor of Statutes  
Nancy Kirkwood, Committee Secretary

Conferees appearing before the committee: Paul Sutor, Surfaces Research  
Paul Clay, CEO MAMTC  
Kevin Carr, Director Manufacturing Extension Partnership  
(NIST)

Others attending: See attached list

A motion was made by Rep. Empson to re-introduce one KDOCH bill (now **HB 2719**). Rep. Benlon seconded the motion. The motion carried.

Rep. Boston made a motion to strike **HB 2688** from the House calendar due to revisor error. Rep. Benlon seconded the motion. The motion carried.

Paul Sutor, Surfaces Research, gave a briefing on how he conducts problem-solving analyses and R&D programs in materials science and surface science, to determine causes and solve material failures and characterize and improve products and their manufacturing processes (**Attachment 1**).

Paul Clay, CEO MAMTC, gave a briefing on how MAMTC helps small and medium-sized manufacturers adopt the appropriate technology and business techniques to improve quality, productivity and sales, and to reduce costs (**Attachment 2**).

Kevin, Carr, Director of the Manufacturing Extension Partnership (NIST), explained that by helping industry surmount technical risks and obstacles as it pioneers, develops, and implements new technologies, NIST improves the prospects that our nation will be both the source and the beneficiary of technological opportunities (**Attachment 3**).

Minutes were distributed and approved.

The meeting was adjourned at 4:30 p.m.

The next meeting is scheduled for January 24, 1996.

HOUSE ECONOMIC DEVELOPMENT COMMITTEE  
GUEST LIST

DATE: Tuesday, January 23, 1996

NAME	REPRESENTING
Mark Barcellona	KDCCH

# **SURFACES RESEARCH**

**The Premiere Laboratory for the  
Study of Surfaces in the Midwest**

The performance or failure of materials depend on the chemical composition and properties of their surfaces and the interfaces between materials.

Surfaces Research conducts problem-solving analyses and R & D programs in materials science and surface science to

- determine causes and solve material failures
- characterize and improve products and their manufacturing processes

*Economic Development  
JANUARY 23, 1996  
Attachment 1*

# **R&D AREAS**

**Microelectronics**

**Composites**

**Coatings**

**Biosurfaces**

**Adhesives**

**Surfactants**

**Tribology/Lubricants**

**Corrosion**

**Automotive Applications**

**Materials Processing**

**Forensics**

**Polymers & Ceramics**

# History and Growth

Barbara J. Kinzig, Ph.D., founder and President.

Incorporated in 1987.

Grown from \$100,000 to \$850,000 annual revenues, from 2 to 9 employees, most of whom are degreed scientists and engineers.

Growth projection in next 5 years to \$4,000,000 annual revenues, 50 employees.

# Interactions with KTEC

Surfaces Research has been involved with KTEC since its inception.

**KTEC Action:** KTEC-sponsored Venture Capital Forum May 1988. Surfaces Research was invited to present our concept for a laboratory for analysis and R&D.

## **Results:**

- SR secured the needed matching equity from a private investor to obtain a loan for significant laboratory equipment
- Allowed us to obtain loan in June 1988
- Moved into laboratory facility in November 1988

**KTEC Action:** Received 2 SBIR Phase I proposal preparation matching grants from KTEC, total \$6,000.

**Results:** Surfaces Research has obtained 3 Phase I and 3 follow-on Phase II SBIR contracts totaling over \$2,000,000.

**KTEC Actions:** Held regional SBIR conference, presented award for our SBIR work. Surfaces Research received first \$50,000 SBIR bridge funding loan.

**Results:** In negotiation with commercialization capital firm. Offers for early evaluation of our engine oils in the Federal Express truck fleet and Eaton transmissions.

We are poised to enter a superior product in the synthetic motor oil market, currently 40 million gallons per year and growing at 25% annually. We project sales of 100,000 gallons annually and 50 employees within the next 5 years, with 100% return on investment to KTEC.



*Economic Development  
January 23, 1996  
Attachment 2*

**A MAMTC Presentation to:**

# **The House Economic Development Committee**

**By Paul Clay, MAMTC CEO**

**January 23, 1996**

**MAMTC**

*Giving manufacturers the edge.*

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## MAMTC's Mission

**Help small and medium-sized manufacturers  
adopt appropriate technology and business  
techniques to improve quality, productivity and  
sales, and reduce costs.**

**MAMTC**

*Giving manufacturers the edge.*

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# MAMTC's Services and Products

Primary service is hands-on consulting to identify and resolve problems in the manufacturing process. Services include:

- ◆ Hands-on consulting
- ◆ Seminars and workshops
- ◆ Vendor and technology searches
- ◆ Product process testing and analysis
- ◆ Equipment and software demonstration
- ◆ Limited customized training
- ◆ Industry cooperatives and networking groups

**MAMTC**

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# Client Success Stories in Kansas

- ◆ Doerr Metal Products (Larned) - Helped company design and market a welding table. Doerr's table won the "Best New Product" Award in 1993 from the Western Kansas Manufacturing Association.
- ◆ Audio Communications, Inc. (Overland Park) - Produced a wood mold to serve as a prototype for a voice-technology product. Client gained 8 investors for his business venture and won a business plan competition.
- ◆ Manufacturing Development, Inc. (Cheney) - Trained company in Total Quality Management and Statistical Process Control. Client gained supplier certification to keep a major contract and achieved an annual cost reduction of \$132,000.
- ◆ Concept W Systems, Inc. (Emporia) - Assisted company in establishing policies and procedures for purchasing, receiving and inventory control. Improvements in these areas were expected to generate \$350,000 in increased sales.

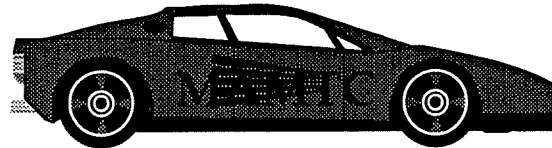
**MAMTC**

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# The MAMTC Process



1. Call MAMTC



2. Engineer Visit



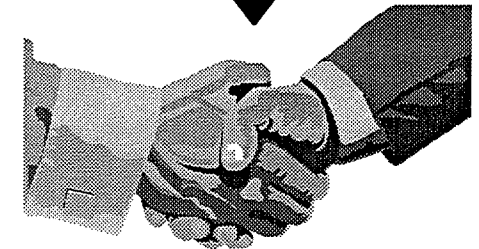
3. Information Gathering



6. Project Completion/  
Update



5. Project Services

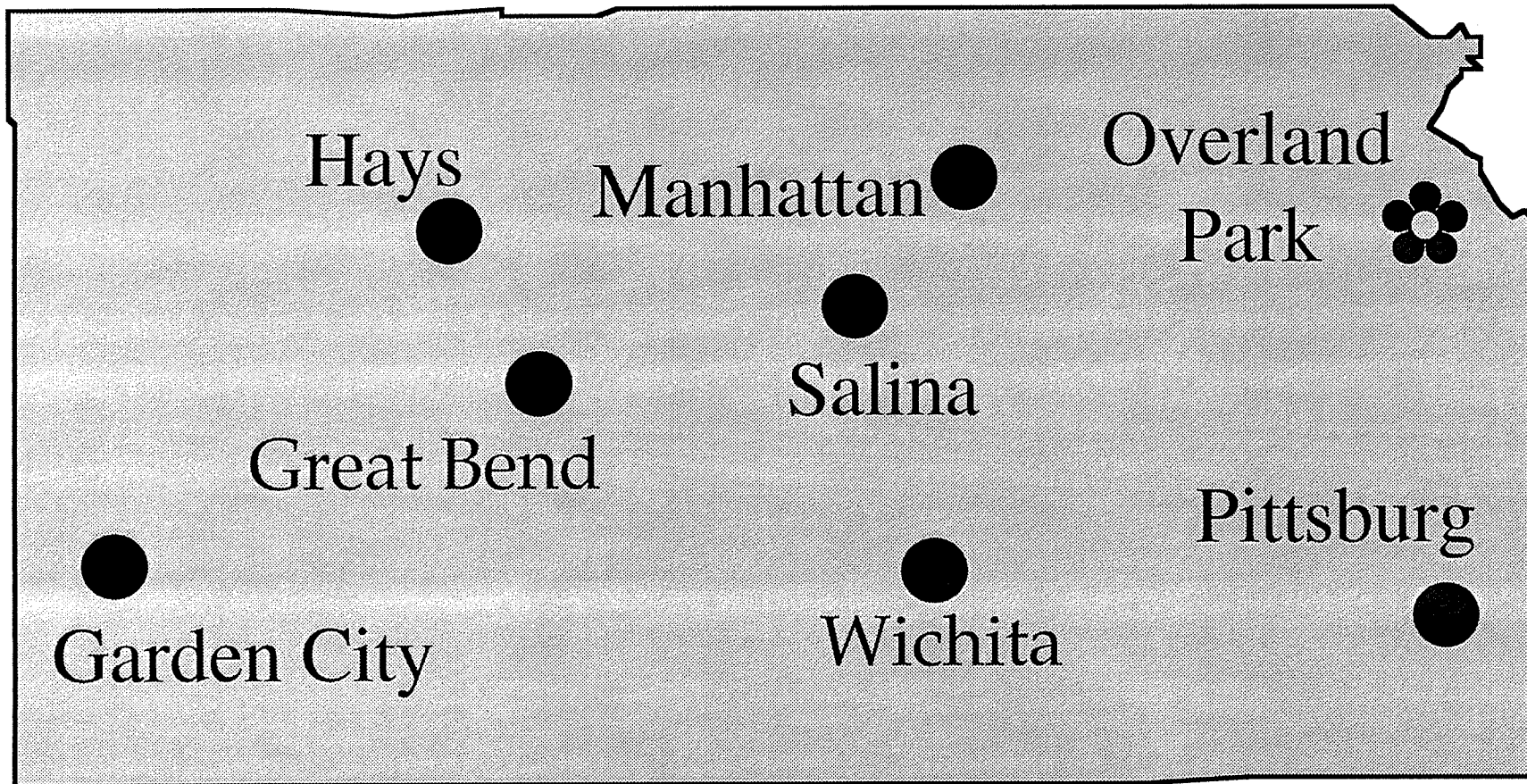


4. Project Agreement

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# MAMTC - Kansas Offices



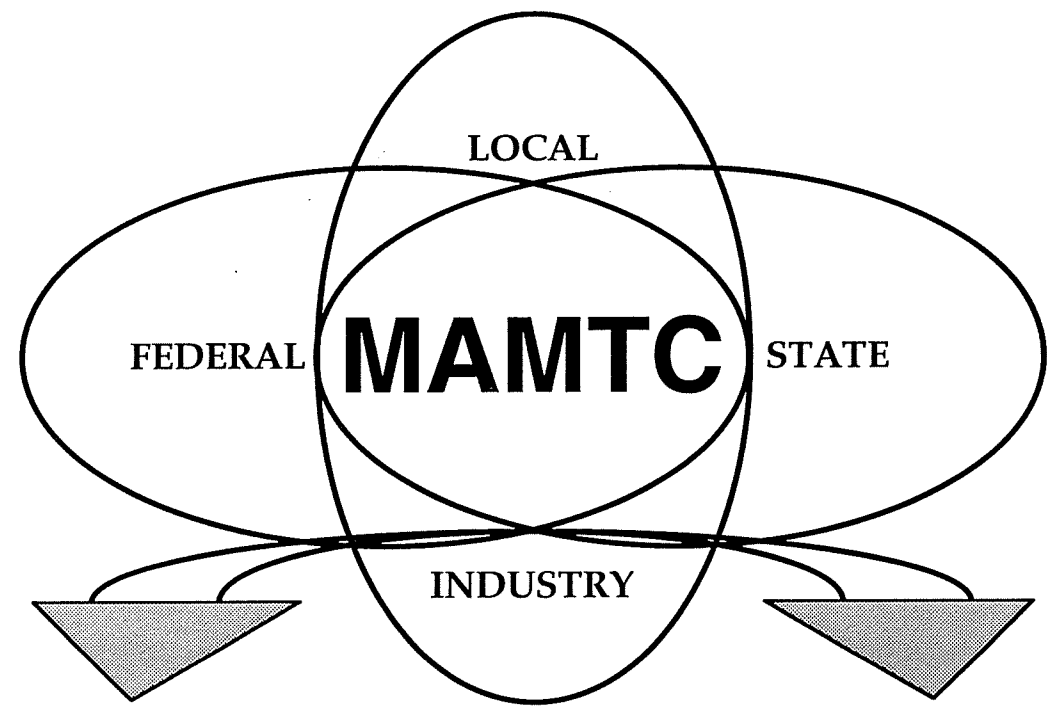
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# The MAMTC Concept



Technology Assistance

Business Assistance

- Assistance Request
- Needs Analysis
- Resource Coordination
- Implementation



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# General Focus Areas

- ◆ **Quality and Inspection**
- ◆ **Process Design/Plant Layout**
- ◆ **CAD/CAM/CAE**
- ◆ **Product Evaluation and Analysis**
- ◆ **Business Systems and Business Management**
- ◆ **Market Development**
- ◆ **Electronic Data Interchange**

**MAMTC**

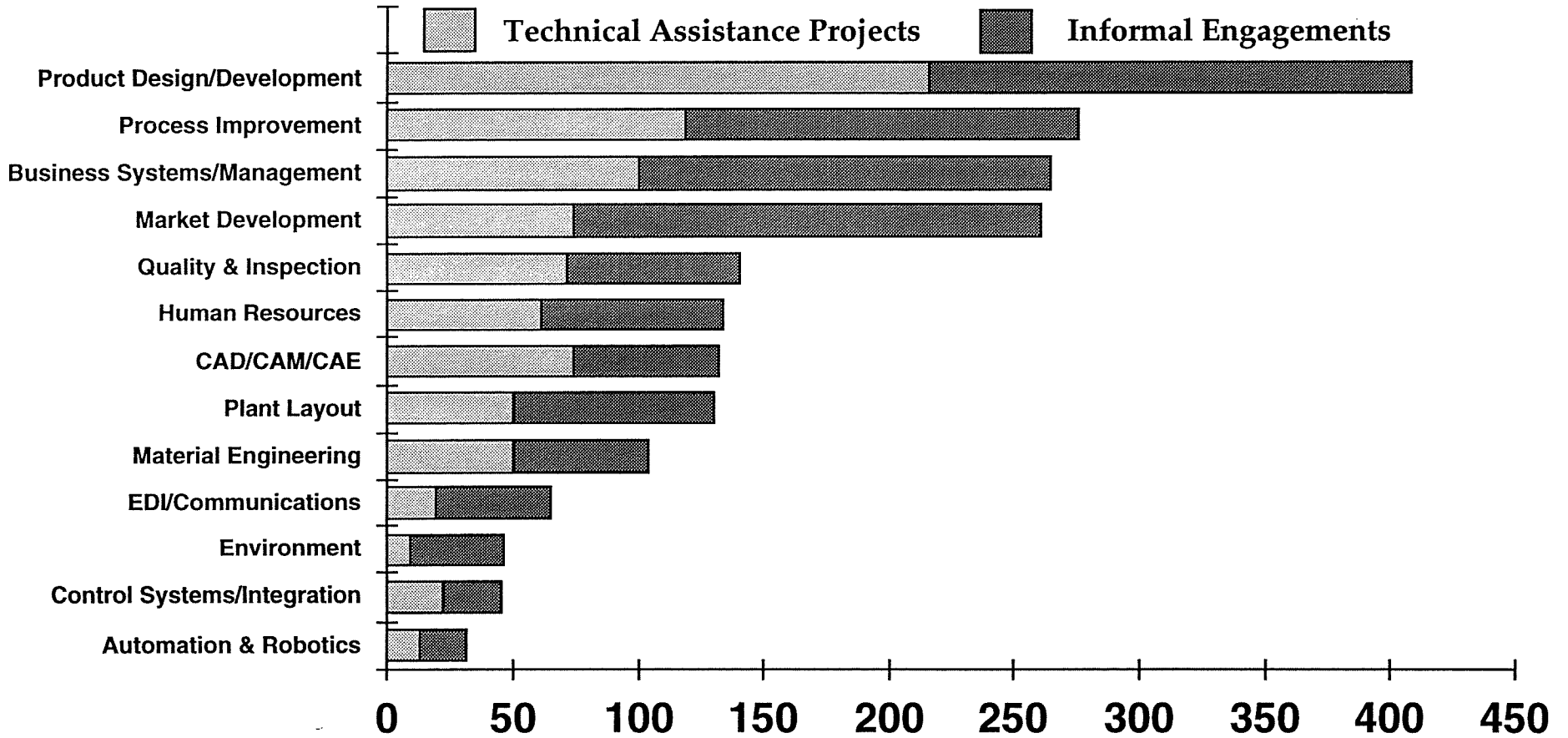
*Giving manufacturers the edge.*

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# Types of Client Projects



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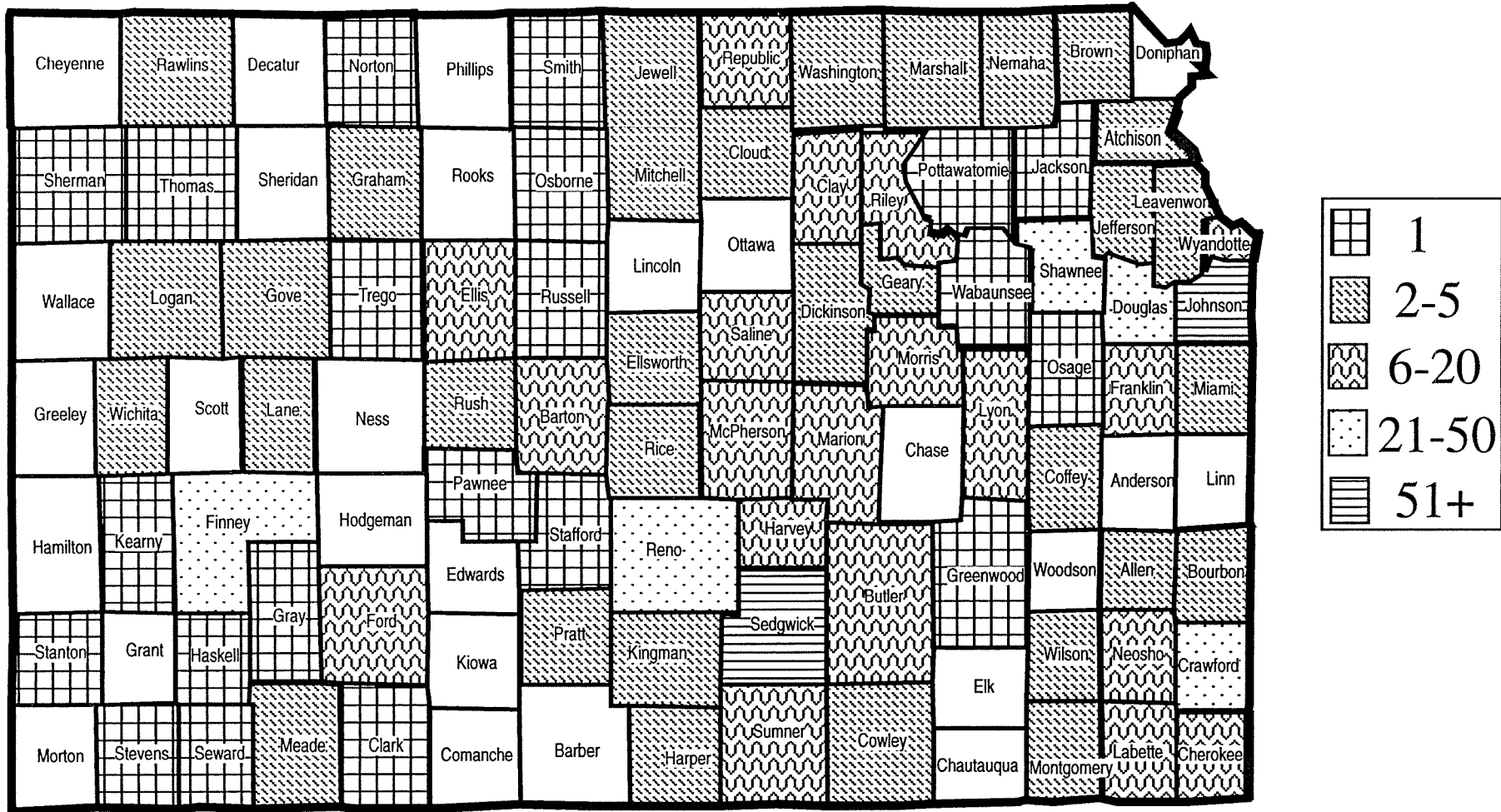
# MAMTC Economic Impact Projections in Kansas

(July 1, 1992 through December 31, 1995)

	<u>Cumulative</u>
Sales Increases	\$43,001,000
Reduced Costs	\$22,566,900
Capital Spending Increases	\$16,252,200
Jobs Created or Saved	1,471

Source: Independent surveys of companies that have completed 342 projects with MAMTC.

# MAMTC Clients by Kansas Counties



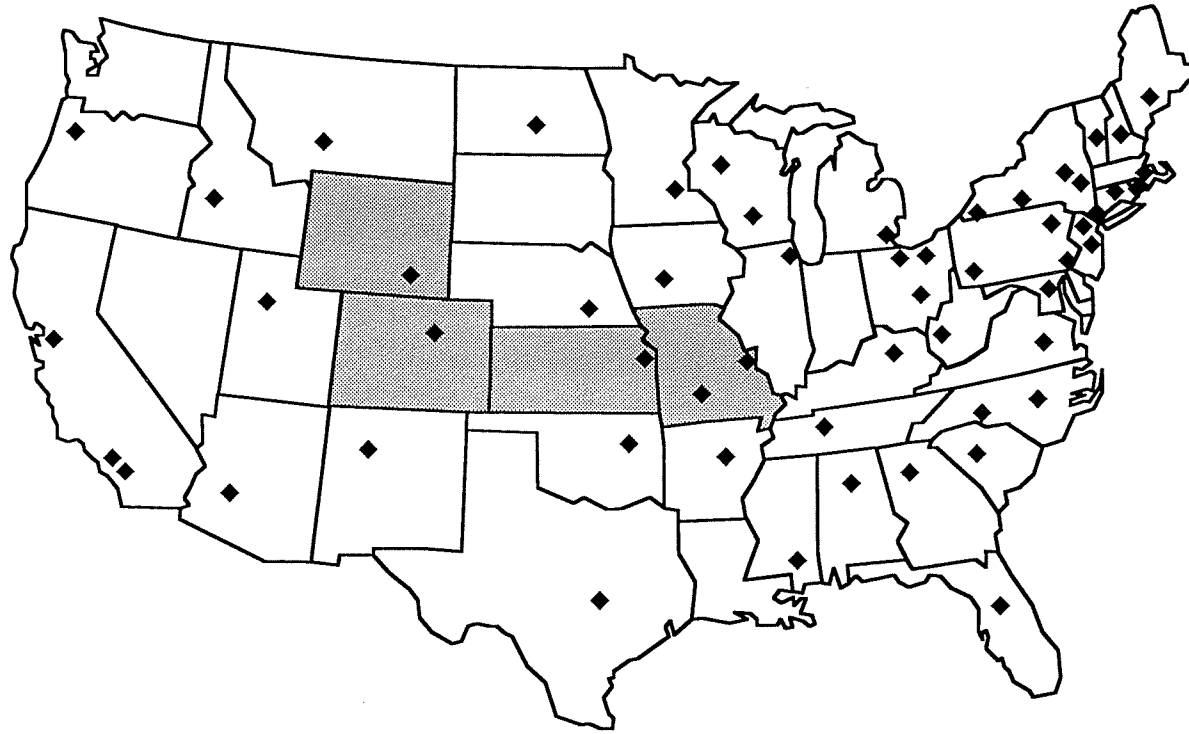
## MAMTC

*Giving manufacturers the edge.*

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# The Manufacturing Extension Partnership

A network of centers throughout the U.S.



**MAMTC**

*Giving manufacturers the edge.*





## **NIST/ MID-AMERICA MANUFACTURING TECHNOLOGY CENTER (MAMTC)**

MAMTC is a non-profit organization with the mission of improving manufacturing competitiveness. It is designed to help small manufacturers grow their businesses by increasing sales and productivity, reducing costs, and improving quality. MAMTC can assist more than 15,000 small manufacturers in Kansas, Missouri, Colorado and Wyoming.

### **What does MAMTC do?**

MAMTC mainly provides hands-on consulting -- identifying and resolving problems in the manufacturing process that can impact a manufacturer's bottom-line. A list of MAMTC's services includes:

- hands-on consulting
- customized training, seminars and workshops
- industry roundtables and cooperatives
- demonstration of equipment and software of interest to companies
- product testing
- vendor and technology searches

MAMTC works in a number of technical areas that are vitally important to the manufacturing community. Examples include: quality improvement, product design, plant layout, cost measurement, equipment and software selection, inventory control, materials handling, industrial marketing, setup reduction and quick changeover, environmental compliance, Computer Aided Design (CAD), and electronic communication.

### **What is the impact of MAMTC's services?**

A small reduction in cost or a quality improvement may be all a manufacturer needs to maintain or grow its business. With international competition affecting most companies, that improvement could mean life or death. The actual project described in the following paragraph can potentially be multiplied by the 15,000 firms in the MAMTC service area. As of June 30, 1995, MAMTC clients reported more than \$110 million in increased sales and decreased costs and the creation or retention of 1,560 jobs.

An aircraft parts manufacturer had an extremely high product defect rate, making the manufactured cost higher than the prevailing market price. MAMTC engineers helped the company determine the cause of the defect and how to correct it. The defect rate dropped ten-fold and the product became profitable. The company, which had considered discontinuing the part, continued to bring in annual sales of \$200,000.

### **How does MAMTC work?**

MAMTC has 25 offices staffed with engineers who have practical experience. They work with companies and make confidential recommendations to implement improvements. The engineers can solve problems on their own, or use the resources of universities, community colleges, economic development specialists, or private consultants.

### **How do I reach MAMTC for more information?**

Manufacturers may call their nearest MAMTC office or MAMTC's home office at 913/649-4333 or write to the address below. MAMTC also has a toll-free number: (800) 653-4333.

### **What kinds of manufacturers does MAMTC help?**

MAMTC will work with any small or medium-sized company that manufactures a product. Opportunities are limitless: we have worked with businesses that manufacture everything from complicated electronics to chicken-salad sandwiches.

### **How was MAMTC created?**

MAMTC got its start in 1991, when the Kansas Technology Enterprise Corporation (KTEC) was awarded a \$12.9 million grant from the National Institute of Standards and Technology (NIST). The award is prestigious: KTEC's proposal was one of two selected out of 20 competing proposals. Since then, MAMTC has expanded to Colorado, Missouri and Wyoming, and is supported by all four states.



**DELIVERING  
RESULTS**

**Excerpted From**  
***A PROGRESS REPORT***  
***FROM THE NATIONAL***  
***INSTITUTE OF***  
***STANDARDS AND***  
***TECHNOLOGY***

U.S. DEPARTMENT OF COMMERCE  
Technology Administration

*Economic Development*  
*January 23*  
*Attachment 3*

**U.S. DEPARTMENT OF COMMERCE**

Ronald H. Brown, Secretary

**Technology Administration**

Mary L. Good, Under Secretary for Technology

**National Institute of Standards and Technology**

Arati Prabhakar, Director

**Manufacturing Extension Partnership**

Kevin Carr, Acting Director

National Institute of Standards and Technology

Gaithersburg, Md. 20899-0001

(301) 975-2000

Boulder, Colo. 80303-3328

(303) 497-3000

**Writer:** Mark Bello

This is an excerpt from the complete publication *Delivering Results: A Progress Report from the National Institute of Standards and Technology*, revised June 1995. For a copy of the complete book, including reports on other programs at NIST—Advanced Technology Program, NIST Laboratories, Baldrige National Quality Program—and related appendices, please fax requests to NIST Public and Business Affairs at (301) 926-1630.



**A** process that slashes the cost of advanced materials by a factor of 10 ... A partnership that helps a high-tech start up to develop novel technology with potential to increase the information-carrying capacity of telecommunications networks ... Timely technical assistance that

enables an automotive parts supplier to reduce scrap and improve its on-time delivery rate ...

A quality management tool that a small business credits with helping it increase sales by 35 percent in 1994.

These examples of real benefits from the programs of the National Institute of Standards and Technology (NIST) represent the kinds of initial returns that federal taxpayers will earn on the dollars they are investing in the agency this year. Allocating funds among its four industry-driven programs, NIST aims to deliver the biggest economic bang for the buck out of the entire \$70 billion of the federal R&D budget.

Ultimately, returns will be realized in new jobs and companies, productivity growth, increases in sales, new markets, gains in market share, and other economic benefits that, together, are the reasons for NIST's existence. These are the kinds of impacts expected from an agency that has the straightforward and unique mission of promoting economic growth by providing part of the basic technical infrastructure needed by U.S. industry.

To satisfy taxpayers' expectations of economic benefits, NIST first must deliver useful results to its primary customers: U.S. companies. After all, U.S. industry, not government, drives economic growth by transforming technology into the products and services that generate jobs and profits—returns that improve the nation's standard of living. In tackling with industry key tasks that companies cannot accomplish on their own, NIST provides timely, indispensable support that com-

panies themselves fashion into competitive advantages—new or more reliable processes, innovative products and services, new R&D capabilities, shorter product-development cycles, and improvements in quality.

NIST and its parent organization, the Commerce Department's Technology Administration, know that by being a strong partner to U.S. industry, we can leverage the taxpayers' investment and make the most of NIST's one percent share of federal R&D expenditures. To be sure, many factors determine a nation's industrial competitiveness, from the business climate and international trade practices to the skill levels of the workforce. But of all these factors, technology is the most dynamic—and volatile. Each new technology creates an opportunity to change the terms of competition. By helping industry surmount technical risks and obstacles as it pioneers, develops, and implements new technologies, NIST improves the prospects that our nation will be both the source *and* beneficiary of technological opportunities.

This report describes how NIST delivers results that translate into competitive advantages for individual companies and entire industrial sectors—and, ultimately, into benefits for the U.S. economy. It relates representative examples of realized and anticipated returns on activities in each NIST program. For our newer and longer-term efforts, early-stage indicators of progress toward economic benefits are presented. This document follows our earlier report that described how U.S. industry's priorities drive the content of NIST's programs and how the agency evaluates its efforts. We welcome your ideas on how we can deliver even greater value to our customers and even better returns to our investors.



Arati Prabhakar  
Director, NIST



Mary Good  
Under Secretary for Technology, DOC

## FOREWORD



**W**hen the Boeing Co. told Manufacturing Development, Inc. (MDI) it needed to meet the aircraft maker's stringent D1-9000 quality standards—or risk losing its largest customer's business—MDI Vice President Michael Castor knew the company needed help. MDI, a 30-person sheet metal fabricator located in Cheney, Kan., called the NIST Mid-America Manufacturing Technology Center. The extension center's technical

staff provided MDI employees with on-site training in statistical process control, and they helped MDI secure a state grant that paid for half of the training costs. MDI earned supplier certification from Boeing, while improving its overall operation. The company estimates, for example, that it will achieve a 50-percent reduction in scrap, reduce rework by 25 percent, and realize annual savings of \$132,000.

**W**ith assistance from the NIST New York Manufacturing Extension Partnership, Clipper Diamond Tool Co. of Long Island, N.Y., modernized its manufacturing and

office operations and, as a result, improved productivity and morale and regained lost customers. Individual actions ranged from redesigning the plant floor layout and installing computer-aided design and manufacturing equipment to providing employee training in statistical process control and quality management. "Our company has been revitalized," says Joseph Klipper, founder of the 50-year-old company. "We are once again able to compete both here in the United States and around the world."

**I**n less than two years, Dyna Mow, Inc., a Cushing, Okla., manufacturer of commercial lawn mowers, has increased its annual production sixfold and more than doubled its payroll, to 16 employees. If sales continue to grow, the workforce soon could double again. Credit for this progress goes to the company. But the firm's new owners attribute a large part of their success to an important technical assist from the Oklahoma Alliance for Manufacturing Excellence, an affiliate of the NIST MEP. "When we took over, the internal paperwork was a shambles—they didn't really know how much it cost to manufacture each mower," says co-owner Ronald Good. That's not the case today. With the help of the Alliance and private consultants that work with the MEP center, the company made sweeping changes—from locating a larger facility to redesigning processes to modernizing the firm's computer system. Without the Alliance's help, says Good, Dyna Mow's improved business fortunes would not have been possible.

# MANUFACTURING EXTENSION PARTNERSHIP

# W

hether delivered to individual manufacturers, to clusters of firms organized into supplier-improvement groups, or to classrooms of workers and managers, services of the NIST Manufacturing

Extension Partnership are making a real difference in the competitive fortunes of small and medium-sized companies. Like Clipper Diamond Tool, some of the several thousand manufacturers that have worked closely with the MEP's locally managed extension centers credit the technical assistance they received with helping them to turn their businesses around. The resulting improvements reversed declines in performance and opened the way to gains in sales and profitability.

Other MEP client firms view the centers as one-of-a-kind resources. For these companies, the impartial expert advice and hands-on assistance provided by the centers are valuable, yet hard-to-come-by tools. Firms use these tools to solve a particular set of problems or needs as they go about the tasks of meeting changing customer requirements, upgrading their equipment, fine-tuning processes, or overcoming other technical challenges that inevitably arise in the business of manufacturing.

Begun in 1989 with the establishment of three extension centers, the MEP is now making the transition from a modest pilot program to a nationwide network leveraged to achieve substantial impact. When completed, the 100-center network will put hard-to-find technical assistance within reach of all of the nation's 381,000 small and medium-sized manufacturing establishments. Results of evaluations conducted to date suggest that, in making this assistance accessible to smaller manufacturers in all regions of the country, the MEP will deliver sizable benefits, reaped on scales ranging from individual factories to the national economy.

Experience to date indicates that the federal investment in manufacturing extension efforts is rewarded many times over. Results of surveys of a subset of smaller manufacturers that received technical assistance from MEP centers in 1994 are illustrative. (Also see graph on page 37.)

	Total	Project Average
Change in sales	\$225,000,000	\$369,000
Capital spending	\$54,000,000	\$88,000
Capital avoidance	\$4,000,000	\$7,000
Reduction in inventory	\$13,000,000	\$22,000
Labor & materials savings	\$26,000,000	\$43,000
Jobs created or saved	3,417	5.60
Total company-estimated impact*	\$167,000,000	

Based on surveys returned by 610 companies served by 13 centers in 1994. Federal funding for the centers totaled \$20 million.

\*Impact = (change in sales x 0.60) + capital avoidance + (reduction in inventory x 0.10) + labor and materials savings. Because of input and overhead costs, only 60 percent of the increase in sales is included in the estimate. Cost savings due to reductions in inventory are estimated to be 10 percent of the reduction in inventory volume. Jobs created or saved and benefits derived from new machinery and other capital items are not factored into the impact estimate.

- Benefits anticipated by the 610 firms responding to MEP centers' survey totaled \$167 million, the result of sales increases and cost savings attributable to actions undertaken with assistance from MEP centers.
- Anticipated impacts translate into a conservatively estimated benefit of \$8 on each \$1 that the federal government invested in the MEP.

These aggregate results, consistent with those from earlier evaluations, are but one gauge of the MEP's economic impact. Other benefits—such as greater efficiency in the delivery of services and in the use of public and private resources—enhance the network's effectiveness. They all contribute to the bottom-line impacts realized by companies, communities, and the nation.

## FIRMS ANTICIPATE SIGNIFICANT GAINS FROM MEP SERVICES

## MEP Role

**M**EP focuses its activities on a strategically important sector of national, regional, and local economies: manufacturing establishments that employ fewer than 500 people. These small and medium-sized manufacturers account for more than half the total value of U.S. production. They employ nearly 12 million people, or two-thirds of manufacturing workers. Between 1967 and 1992, smaller manufacturers added 1.7 million workers to their payrolls, while larger plants trimmed their workforces.

Within the manufacturing sector, smaller companies have grown in number and importance. Large companies are downsizing and outsourcing a growing share of their operations. Information technologies are bringing continents, customers, and suppliers closer together. Consequently, the performance and capabilities of smaller manufacturers are becoming ever more fundamental to the productivity and competitiveness of the entire manufacturing sector and to the health of the entire U.S. economy.

Smaller U.S. firms lag behind their overseas counterparts in adopting performance-improving technologies. Many continue to use decades-old technologies and manufacturing methods. Not surprisingly, the productivity of smaller manufacturers has been declining relative to that of large U.S. producers. One consequence is that the nation's larger manufacturers—and largest exporters—look increasingly to off-shore suppliers. That trend is already evident in several major domestic industries.

Because of limited budgets, lack of in-house expertise, and other constraints, according to a 1993 study by the National Research Council, smaller manufacturers face significant barriers to learning about and adopting modern equipment and techniques—technologies that can improve their ability to compete. Yet, the expertise and technical assistance that companies need to over-

come these barriers often are not readily available from the private sector. Many consultants focus on large companies. They bypass small firms because the costs incurred in reaching and securing these firms as customers often are not justified by the amount of business generated.

The MEP is helping to fill this critical void. As a nationwide system of community- and state-based non-profit organizations, the MEP provides smaller manufacturers with access to public and private resources, information, and services to meet their unique needs in improving production and business practices. Specifically, MEP works with states to establish or to expand services designed to assist small and medium-sized manufacturers. Services supported with federal dollars matched by states are provided through non-profit manufacturing extension centers. All centers are chosen and funded through a rigorous, merit-based competition. Emphasis is on grassroots service delivery, facilitated by a small NIST staff of fewer than 60 people.

Through its State Technology Extension Program (STEP), MEP also assists states not yet ready for a center. In 1994, for example, MEP awarded STEP grants to 15 states. The grants will support efforts to evaluate the competitiveness of local small and medium-sized manufacturers, determine needs for technical services, and begin building the organizational relationships required for efficient delivery of appropriate technical services.

To ensure that federal participation and investment in manufacturing extension efforts add value and contribute new capabilities to the mix of services available to local manufacturers, the MEP:

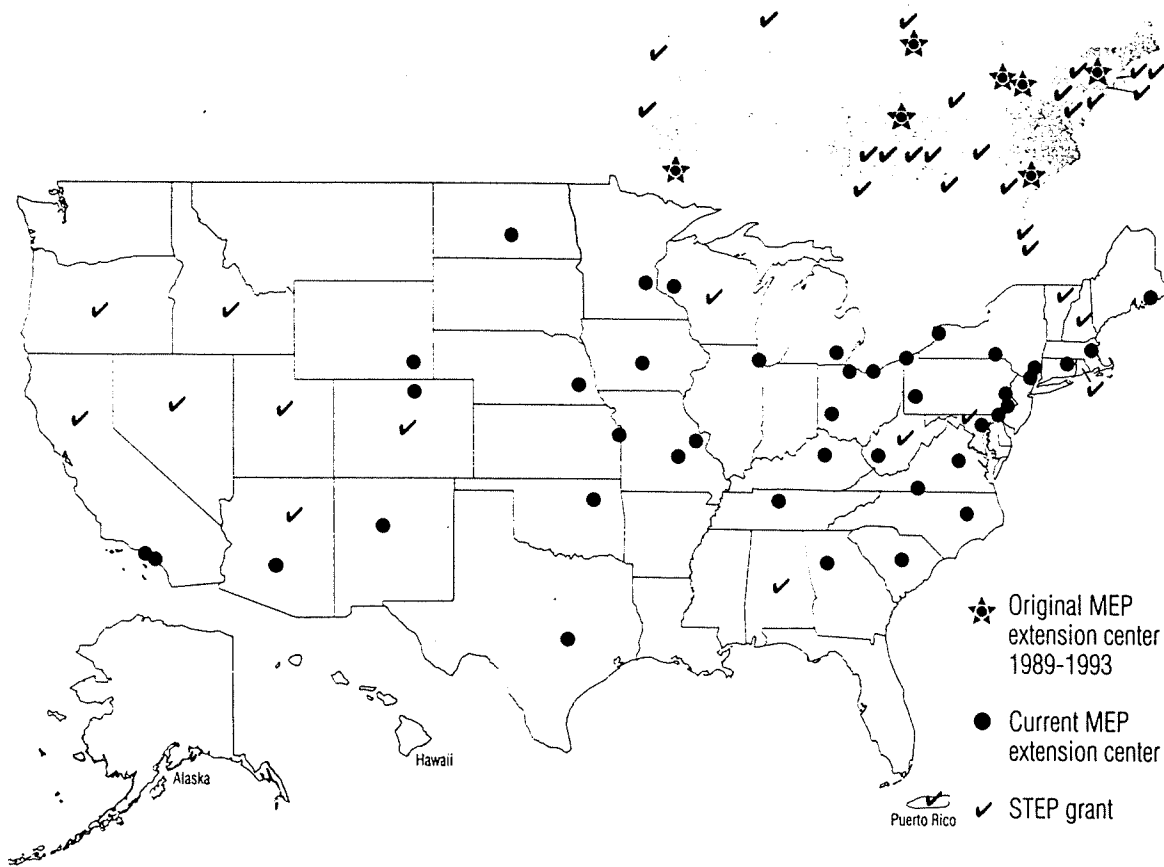
- builds on the foundation of existing state and local industrial extension resources;
- focuses on needed services that the private sector either does not provide or cannot deliver economically to smaller manufacturers because

the necessary economies of scale do not or because of other externalities;

- develops common tools, resources, and systems needed by each of the individual centers—enhancing centers’ local efforts while achieving economies of scale;
- supports shared learning between and integration among individual manufacturing extension centers;
- promotes continuous improvement of services through common evaluation methodologies;
- forges constructive working relationships with consultants to make private-sector expertise more accessible to smaller manufacturers; and
- brings national technology and information resources—from federal laboratory technology to national information databases—to support and enhance state and local efforts, thereby increasing the depth and breadth of expertise and services available to local manufacturers.

## Expanding to Reach Smaller Manufacturers

In 1993, fewer than one smaller manufacturer in 20 was located within the collective service area of the seven federally sponsored extension centers. Since then, MEP’s reach—and service to U.S. manufacturers—has expanded significantly, making a major stride toward becoming a truly nationwide network. (See map below.) By May 1995, 42 MEP centers were sending engineers and other specialists with manufacturing or business experience into the field to work with firms. One additional center was preparing to open. The current MEP centers are located in regions that contain two-thirds of the nation’s smaller manufacturers. In many regions, particularly areas of high manufacturing density, a single center is but a first step toward building and integrating



### PROGRESSING TOWARD A NATIONWIDE MANUFACTURING EXTENSION NETWORK

Shaded map shows MEP and STEP activity 1989 to 1993

Large map illustrates current MEP and STEP activity

service-delivery capabilities on a scale commensurate with the many and diverse needs of the large clientele base.

**GROWING ROSTER OF  
MEP PARTNERS  
EXPANDS SERVICES FOR  
MANUFACTURERS**

**MEP-WIDE SUMMARY**

Tabulated on the basis of data reported by 34 MEP centers

Types of Partner Organizations	Number
Technology center/business assistance center	154
Non-profit economic development organization	97
Community college/vocational institute	85
Private consultant or firm	84
University or four-year college	80
Industry association	44
State or local government	36
Small business development center	27
Utility	22
Federal laboratory or agency	21
Training organization	18
Cooperative extension	4
Service Areas of Partners	Number
Business management/finance	192
Manufacturing/technology	168
Supplier interactions/networking	157
Engineering/design	138
Human resources	122
Environmental issues	112
Quality	109
Defense conversion/marketing	83

Last year's growth of the MEP network was enabled by the Technology Reinvestment Project (TRP), led by the Defense Department's Advanced Research Projects Agency. As part of its efforts to foster integration of the defense-dependent and commercial sectors of the economy, the TRP provided funds—matched by state and local sponsors—that enabled the MEP to add new affiliate centers to the extension network. Centers initiated with the aid of TRP funding must meet the MEP's performance standards.

When TRP start-up funding ceases, centers that demonstrate high levels of performance and impact will be eligible to receive cost-shared support from the MEP.

The TRP also has provided matching funds for projects that are developing training modules, assessment tools, and other support services that will enhance the ability of MEP centers to deliver quality services to customer firms. Other cost-shared projects are testing new approaches to building more productive relationships between large companies and their suppliers and to enable interfirm collaboration. As is true for all of the MEP, these projects were selected competitively.

**Building Partnerships**

The MEP and its individual centers have developed relationships with hundreds of organizations that increase the breadth and depth of the centers' capabilities and those of the network. As of mid-1994, 34 centers, most of them in the start-up stage, reported linkages to a total of nearly 700 partner organizations, for an average of about 20 partners per center. Among these partners, the most common are non-profit or university-sponsored technology or business assistance centers, followed by non-profit economic development organizations, community colleges and technical schools, private consultants, and universities and four-year colleges. To date, about half of the centers have ties to industry associations.

Services provided by partner organizations supplement the centers' technical capabilities. In addition, many of these organizations offer expertise that helps companies address non-technical obstacles to improving operations and becoming more competitive. As they modernize, manufacturers confront a spectrum of related challenges, from upgrading the skills of workers to identifying sources of capital to complying with local, state, and national regulations. As a result, MEP centers now can help manufacturers respond to

the many factors influencing their efforts to improve. For example, the typical center has ties to about six organizations that offer services in business management and finance. Moreover, the typical center has relationships with at least three organizations with expertise in one or the other of the following areas: manufacturing technology, supplier interactions and networking, engineering and design, environmental issues, and quality.

Broader access to services saves companies time and money and lowers the threshold for taking concrete actions to better their performance. At the same time, partner organizations are spared the cost and expense of developing their own service-delivery mechanisms to reach smaller firms across the nation.

Developing working ties with other organizations in support of the entire extension network also is a high MEP priority. Strategic partners now include the National Association of Manufacturers, National Governors Association, National Alliance for Business, Council for Adult and Experiential Learning, and several federal agencies. In 1994, for example, the MEP and the Environmental Protection Agency completed preparations for a jointly funded, \$3 million initiative to help smaller manufacturers lower costs through waste-reduction techniques. A major objective is to prevent pollution and associated environmental problems and, thereby, eliminate the need for companies to undertake costly actions to comply with regulations. The initiative will support several types of enabling activities, including:

- developing methods and approaches for integrating environmentally focused services into the portfolio of manufacturing extension services; and
- establishing industry-specific pilot programs for gathering and distributing information on waste-reduction and pollution-prevention technologies, environmental regulations, and cost-effective methods for achieving compliance.

Another national initiative begun late last year is augmenting the quality-improvement and supplier-development efforts of the individual centers. The MEP joined with the Commerce Department's Bureau of Export Administration and Department of Energy laboratories in technology efforts focused on a key group of suppliers in the U.S. electronics industry. The partners launched an MEP-led consortium that aims to reduce manufacturing costs and improve quality among suppliers of the brazed pins that connect semiconductor chips to the circuit boards of computers and other electronic products. Industrial participants include pin manufacturers, many of which are small companies, and their customers, the makers of semiconductor packages. MEP centers now are working with pin manufacturers to define technical obstacles to improving production, finishing, and cleaning processes as well as key aspects of pin performance. The MEP also will help these suppliers assess training needs, long-term financing options, and opportunities for cooperative purchasing of manufacturing materials. Extension centers then will work with pin manufacturers as they carry out technical improvement projects and apply the results of research performed by other consortium partners.

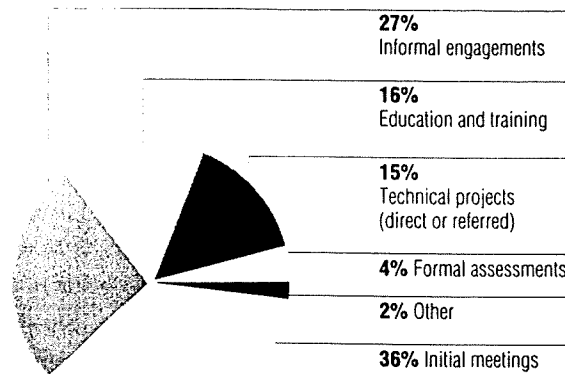
## **Interactions with Manufacturers**

In all, personnel from 28 MEP centers that operated during at least part of 1994 provided services or made initial visits to about 15,000 companies during the year. (See pie chart on page 34.) In addition, the centers offered training and educational activities that involved employees and managers from more than 5,000 manufacturing firms. Because they were the only centers that operated over the entire year, the original seven MEP centers (or Manufacturing Technology Centers) accounted for a disproportionately large share of interactions with companies. (See customer profile on page 35.)

**MEP CENTERS ENGAGED IN MORE THAN 30,000 ACTIVITIES WITH CLIENT FIRMS IN 1994**

Percentage of total MEP interactions

Extrapolated from quarterly reports. 32 of 35 centers reporting. Reports differentiate training and education programs from other types of activities, such as assessment and technical assistance projects

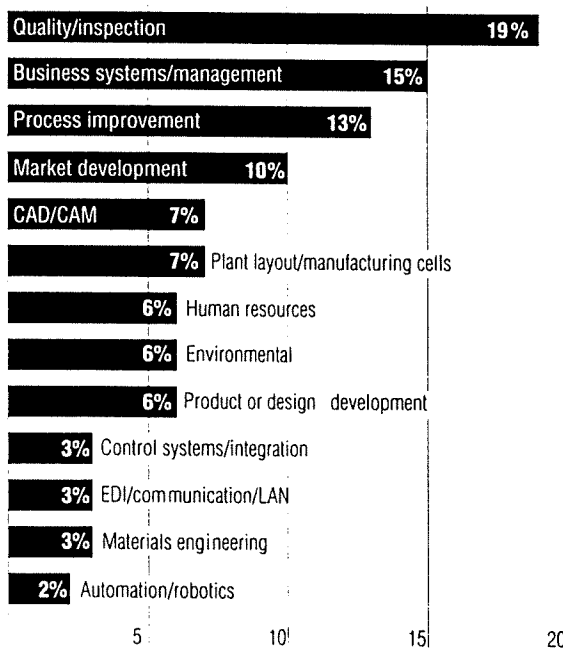


MEP activities varied widely in terms of areas of technical activity and the type, length, and intensity of interaction. Center staff made more than 10,000 initial site visits, which include preliminary assessments of company operations, the first step toward undertaking improvement efforts. The centers also organized forums and seminars on manufacturing and business-related issues. In addition, they fielded thousands of requests for quick problem-solving assistance or for referrals to sources of information and expertise.

**FIRMS SEEK MEP ASSISTANCE IN A WIDE RANGE OF AREAS**

Areas addressed in client firm interactions

Based on 1994 quarterly reports of the seven original Manufacturing Technology Centers



Extension personnel engaged in or helped initiate more than 4,000 full-fledged technical assistance projects. Many involved private-sector consultants. Such projects entailed, for example, redesigning plant-floor layouts, installing and implementing computer-integrated manufacturing systems, training and guidance to achieve quality certification, or market development. Often, a combination of technical and training activities were carried out in a single assistance project.

All MEP activities are tailored to the particular needs of local manufacturers, individually or collectively.

- Assistance in the areas of quality and inspection was the service in greatest demand. It was a chief component of one-fifth of the activities carried out by the seven original Manufacturing Technology Centers in 1994. Help with business and management systems and with process improvements were the second and third most common areas of technical assistance, accounting, together, for more than one-fourth of the seven centers' activities. (See bar graph at lower left.)

- Center activities promote timely adoption of technologies and practices that the marketplace defines as key to the competitiveness of: specific sectors (such as computer-aided design and manufacturing in tooling), major industries (such as electronic data interchange in the automotive industry), or all of manufacturing (such as continuous quality improvement).

- Extension centers reach a broad cross-section of manufacturing firms. Four industries—industrial machinery and equipment, electronic and other electrical equipment, fabricated metal products, and rubber and miscellaneous plastic products—accounted for 60 percent of MEP client firms. The heavy representation of these industries reflects, in part, the composition of the manufacturing sectors in the original seven centers' service areas. As the total service area of the

MEP expands, the distribution of client firms is expected to mirror that of the manufacturing sector as a whole.

- The MEP has helped to improve the quality and productivity of relationships between suppliers and major manufacturers. Supplier development is a strategic focus of many new and established centers, resulting in an array of programs and services grouped under the heading of “quality”—the category of services used most heavily by MEP client firms. Virtually all major U.S. manufacturers are trimming their base of suppliers and retaining only those able to meet their quality requirements. Some, such as the Ford Motor Co. and the Boeing Co., linked up with extension centers to help strengthen the quality systems and capabilities of smaller manufacturers so they can achieve the status of certified or preferred suppliers.

**Impacts**

Ultimately, the MEP is judged on its impact on the competitiveness of individual firms and on the economy. Surveys of client firms indicate that manufacturing extension services are fostering significant improvements in manufacturing and business performance, catalyzing company-estimated benefits that greatly exceed the federal investment in the MEP. At the same time, the MEP is prompting changes in the behavior of private- and public-sector providers of extension services and in the technology awareness of manufacturers exposed to those services.

**Impacts on Service Delivery.** The MEP is creating new opportunities in the delivery of manufacturing extension services. For example, federal support and ties to a national network of supporting services are enabling previously existing, state-sponsored extension centers to extend their reach, develop new capabilities, and broaden the range of services available to companies. Integration and coordination of activities have introduced collective learning and shared development of tools and resources into extension

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Median size of an MEP client company	<b>50 employees</b>
Median annual sales of an MEP client company	<b>\$5.4 million</b>
Median age of an MEP client company	<b>26 years old</b>

Based on Dun & Bradstreet's 1994 survey of client firms of the original seven Manufacturing Technology Centers.

efforts. More than 300 field engineers and other center personnel have been trained, for example, in the fundamentals of manufacturing extension services or the uses of assessment tools, such as those for evaluating workforce needs and capabilities. A comparable number have been trained in competitive benchmarking, an evaluative method for showing individual manufacturers how their performance compares with that of similar firms. To achieve continuity in efforts focused on workforce-related issues, MEP centers have formed a network-wide working group. Composed of extension center representatives, the group disseminates information, develops training programs for extension personnel, and serves as a point of contact and collaboration for federal agencies and other partner organizations with programs and interests related to the manufacturing workforce.

In addition, organizational partnerships engendered by the MEP are proving to be productive, extending the reach of new and existing manufacturer-focused services. For example, many private-sector consultants are finding that they can reach smaller manufacturers more efficiently by working with the centers. Results of a recent Dun & Bradstreet Information Services survey of consultants, MEP client firms, and manufacturers who do not use MEP services indicate that extension and private services tend to be complementary. Nearly 80 percent of client firms did not perceive centers and consultants as being in direct competition. In many instances, manufacturers are tapping the expertise and capabilities of both the MEP and the private sector. The combination is filling the void in informational and technical resources that can impede smaller manufacturers' self-improvement efforts. To



ensure a complementary relationship, MEP centers must be vigilant in clearly distinguishing their role from that of the private sector.

- More than 70 percent of MEP clients believe that extension centers provide services that are not available elsewhere or that complement the work of private consultants.

- Nearly two-thirds of MEP client firms considered extension centers the better or only source of cost-effective assessments.

- Nearly two-thirds of MEP client firms considered extension centers the better or only source for unbiased information on products and services.

## Examples of MEP Projects

**Cohu Inc.** The Electronics Division of Cohu, Inc., is a leading manufacturer of high-performance, closed-circuit television cameras and accessory equipment systems for security, surveillance, machine vision, robotics, and defense and aerospace original equipment manufacturers. The company was facing declining profitability and dwindling sales opportunities due to a declining defense industry, foreign competition, and quality and process control problems. Working with the California Manufacturing Technology Center, San Diego-based Cohu implemented a total quality management process and achieved impressive results. Among them: improved on-time delivery processes cut three days from its lead time; changes in its shipping process resulted in savings of more than \$10,000 per year; and revamping processes for manufacturing printed circuit boards reduced costs by 8 percent.

**Display Technologies.** Display Technologies, a Carthage, Mo., manufacturer of color and monochrome displays, wanted to improve on a quality inspection process that was labor intensive, fatiguing for personnel, and yielded variable results. Final adjustments to monitors accounted for as much as 40 percent of the 20-year-old company's labor costs. Display Technologies chose to explore vision inspection systems. It turned to the Mid-America Manufacturing Technology Center to help it evaluate the available options. The extension center linked company engineers with a facility that had implemented a vision system so they could study one in operation. Center field engineers then helped the company gather technical information on specific features and capabilities most appropriate for Display Technologies' operations. "With MAMTC's help, we were able to greatly cut down the time it took to investigate, analyze, and formulate a plan for our vision system," says

Jeff Slama, test systems engineer. "MAMTC knew where to turn for the information we needed to get the job done." Once the system is implemented fully, Display Technologies anticipates that product quality will increase, while inspection costs will decrease by 40 percent.

**Universal Rundle.** A commitment to quality improvement and employee training has paid off for Universal Rundle, a manufacturer of toilets and lavatory fixtures, with plants in Monroe and Union Point, Ga. To help it develop and train quality improvement teams, the company tapped the expertise of the Georgia Manufacturing Alliance, an affiliate center of the MEP. Extension personnel provided instruction on quality management theory, data-gathering methods, and problem-solving techniques. Subsequent improvements in the company's operations led to decreases in defect rates and customer complaints. When other firms in the industry were laying off workers in response to a slow market, Universal Rundle was pressing to keep up with growing customer demand. It added new workers and instituted overtime. The company attributes the growth in sales to higher productivity and improved product quality, which, it says, is the result of increased employee participation in the quality process.

**Accu-tech Industries, Inc.** Accu-tech, a Shelby Township, Mich., machine shop and parts supplier to the auto industry, wanted to improve operations and find new ways to market products. The Michigan Manufacturing Technology Center carried out an assessment focusing on marketing, quality, and organization. The findings enabled Accu-tech to develop new, more customer-responsive sales and marketing strategies and to restructure its management organization. The company invested in new technology, increasing capital equipment purchases by 10 percent, and it generated a 15-percent increase in annual sales.

- MEP centers serve as a bridge to private-sector expertise, which client firms may tap when implementing their technology plans. Ninety-one percent of the consultants surveyed said MEP clients are more knowledgeable of outside consultants than firms that do not use extension services.

- More than three-fourths of consultants said that MEP client firms are more able to benefit from their services than firms that have not used extension services.

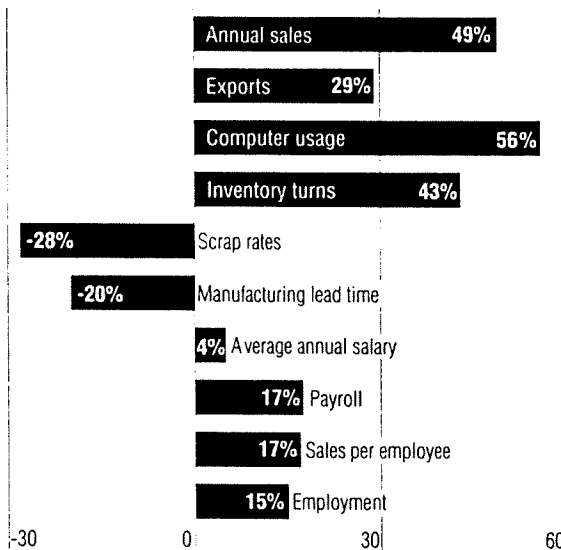
- The MEP helps eliminate obstacles that can prevent consultants from working with smaller firms. Three-fifths of the consultants who work with MEP centers reported that, on their own, they were unable to recover marketing and other "front-end" costs expended in trying to reach smaller manufacturing clients. This suggests that centers significantly extend the reach of technology assistance available to manufacturers, beyond that which would occur in the program's absence.

**Impacts on Manufacturers' Technology**

**Awareness.** The success of MEP efforts begins with firms' awareness of the benefits of modern manufacturing technology and methods. Only then will individual companies become receptive to possibilities for improving their operations. Once they recognize the competitive advantages to be gained, firms are much more likely to invest in their own growth and development, to upgrade their technology and capabilities, and, most importantly, realize the benefits that motivated their investments.

MEP centers are cultivating this recognition through educational programs, continuous improvement groups, manufacturing assessments, and many other activities with companies—setting the stage for concrete actions.

- Some 225 firms used the MEP's Performance Benchmarking Service in 1994, when the service first was made available to all centers. Results of comparisons with similar firms attest to the importance of building smaller manufacturers'



**BEFORE-AND-AFTER LOOK AT A SAMPLE OF MEP CLIENT FIRMS**

Progress measures: average percentage change 1990-1992

Based on surveys returned by 55 companies who received service from three Manufacturing Technology Centers in 1991. Percentages compare actual company performance in 1990 and 1992, using mean company data.

awareness of the need to improve. A large majority of firms have discovered that they greatly overestimate their level of performance. On all performance measures, half of the benchmarked firms rank themselves in the top 10 percent, and 80 percent place themselves among the top 25 percent.

- MEP client firms are more aware of the competitive benefits of using modern technologies than non-client firms. Client firms also are more likely to be planning to implement those technologies. The study of consultants and manufacturers mentioned above reported that, compared with the other manufacturers surveyed, MEP clients were significantly more likely to be planning improvement actions in 12 of 14 technology areas, from applying statistical process control methods (six times more likely) to implementing worker empowerment activities (2.6 times more likely).

**Client Firms' Valuation of MEP Services.**

To assess firms' perceptions of the value of MEP-provided assistance, centers survey client firms after technical assistance projects are completed. Though the experiences of individual client firms demonstrate that MEP services can lead to fairly immediate improvements in capabilities, the full impact must be measured over longer spans and, of course, is influenced by a firm's follow-

through efforts. Similarly, economic conditions and a number of other external factors can mask the benefits that firms derive from MEP services.

Client valuation surveys are a first step toward evaluating eventual firm-level performance and business impacts. Firms are asked to estimate the benefits they expect to realize from changes and improvements made on the basis of the services and assistance they received.

Results from 610 companies that completed valuation surveys in 1994 are presented in the table on page 29. The cumulative estimated economic impact for this sample of firms totals about \$167 million, as compared with the federal investment of \$20 million. On the basis of results for this sample, which are consistent with previous findings, the MEP delivers an estimated benefit of \$8 on each federal dollar invested in the MEP. Although based on self-reported data, the estimate probably undervalues the return on the federal investment. The estimate is limited to a subset of client firms participating in technical assistance projects. It does not capture benefits that firms may realize in subsequent years. The estimate also omits benefits that companies realize from participation in less intensive activities. These include educational and informational programs, informal consultations with technical staff, technology demonstrations, and formal assessments of plant operations. These activities are highly valued by firms and also can lead to improvements and economic benefits.

**Client Progress Reports.** Centers also follow the progress of individual firms in three areas: use of modern manufacturing technologies, manufacturing performance, and business performance. Measures relevant to each of these areas are tracked in the year preceding and the year following the completion of a technical assistance project. These before-and-after assessments provide an additional means of evaluating the firm-level impact of extension services. Client progress reports are in the early stages of implementation.

Results for 55 firms surveyed by three Manufacturing Technology Centers in 1993 are shown in the bar graph on page 37.

On average, these firms improved markedly in all 10 areas. While these measures relate to the objectives of most technical assistance projects, other factors also may have contributed to the improvements documented in client progress reports. Consequently, the MEP is exploring methods for further refining its estimates of the impact of extension services on manufacturers and on local and regional economies. For example, the MEP and the Census Bureau are exploring the feasibility of comparing the performance of client firms with that of similar companies that have not used manufacturing extension services. Such comparative evaluations would permit more detailed assessment of the impact of extension services on the performance of client firms.

The MEP is committed to continuous performance measurement, focusing on the bottom-line economic impact resulting from its work with client companies. It also is committed to monitoring the efficiency and effectiveness of its services and its service delivery mechanisms. For example, NIST and its New York state partner agreed recently to discontinue funding for the headquarters center of the New York MEP. The agreement reflects New York's restructuring of its manufacturing assistance programs and NIST's decision that federal resources would be used most effectively by directly supporting the four manufacturing extension centers that had been reporting through the New York MEP headquarters operation. NIST also has taken steps to ensure extension center management was improved in two other states—with good results. The MEP also will continue to explore innovative approaches to helping the nation's smaller manufacturers continuously improve their performance. Manufacturing extension is still in its infancy in this country, but the results to date augur well for this vital force in our changing economy.