

# The National Center for Manufacturing Sciences (NCMS)

The National Center for Manufacturing Sciences (NCMS) is a not-for-profit corporation organized under the National Cooperative Research Act of 1984 and incorporated under the laws of the State of Delaware. The purpose of the NCMS is to fund research which will develop technologies and systems that will improve manufacturing processes and materials. The work of the Center is directed toward implementing those technologies in its member companies in order to make them competitive with the best in the world.

Mounting trade and budget deficits, loss of market share, lagging productivity rates: all point to a serious problem in this country. Clearly, the United States is losing its competitive edge.

How did we get here? And, perhaps more important, how can we climb back up to the top of the global marketplace? These are two tough questions that must be addressed. And the National Center for Manufacturing Sciences is playing an important part in the nation's attempt to address them.

The idea for a national manufacturing research consortium emerged in the early 1980's amid growing concern that the U.S. was not only losing its position of technological leadership, but might also be unable to effectively mobilize in the event of a national emergency. An alarmed Department of Defense called together representatives of a number of trade associations and manufacturing companies to discuss this problem and to try to design a solution.

The National Center for Manufacturing Sciences is the outgrowth of DOD's call for action and the resulting discussions held by the Manufacturing Studies Board of the National Research Council, the National Machine Tool Builders' Association, General Motors Corporation and about 20 manufacturing technology users and suppliers. NCMS was incorporated in November 1986.

Headquartered in Ann Arbor, Michigan, the NCMS comprises some 100 companies from all sectors of American industry. It is supported by member companies, the State of Michigan and

the Department of Defense. Its mission: to find ways to get America's factories back into the competitive lead. That task is a formidable one, considering what the U.S. manufacturer is up against.

In Europe, passage of the Single European Act has brought together the 12 countries in the European Community in the sponsorship of joint research in the areas considered to be most important to Europe's economic growth through the end of this century. In Japan, the Ministry for International Trade and Industry decides which industries will provide the most industrial growth over the future five or ten years and then channels investment and brains into research that will assure Japanese companies pre-eminent positions in those industries. Korea, Taiwan, Singapore, Hong Kong - all have organized groups with the goal of leap-frogging world competition in order to place other countries and companies in a non-competitive position.

Clearly, domestic companies are no longer competing against foreign companies. Some have awakened to the fact that they are facing government-sponsored consortia consisting of the best technical minds in the world. Individual firms realize that no matter how large they are, they cannot mount the research programs needed to best the effort that groups of companies or countries can put together against them.

Historically, American companies were barred from such cooperative research because of antitrust laws. But this changed in 1984 when Congress, recognizing that other countries were mounting massive research efforts and that U.S. policy put domestic companies at a distinct disadvantage, passed the National Cooperative Research Act. Under this legislation, precompetitive research, i.e., research conducted prior to the design and manufacture of a product, was allowed. The NCMS was formed under the provisions of this important act.

The vision of the NCMS is unique. It is the only manufacturing research consortium organized on a national scale. It serves both large and small firms in a broad range of industries. It

does not have, nor does it plan to build, extensive research facilities, but rather finds the best available facility to conduct its research. And perhaps most important, its only mandate is to aid U.S. member companies to become internationally competitive in manufacturing. While under its not-for-profit status, NCMS must make its research available to all without discrimination, member firms play a role in defining research projects, participate in the development of the research, and have first call on the research results. Member firms will be licensed to use the technology developed at lower fees than non-member firms in order to offset their in-kind participation in the research process and their membership fees that help to fund the research.

Manufacturing research at the NCMS is divided into six broad categories, each of which is overseen by a Technical Program Committee, of TPC. The TPC's are made up of representatives from member companies who have expressed interest in one of the research areas. Because the NCMS is a member-driven organization, and because it is dedicated to improving the manufacturing competitiveness of its members, it does not disclose individual research projects. Members, of course, have access to this information. The six areas being pursued are:

## Manufacturing Processes & Materials

This committee is engaged in improving existing, and creating new, manufacturing processes and materials which will put U.S. companies into a leadership position in the worldwide arena. In pursuing these objectives, the committee will work to optimize process design and operations utilizing process modeling, look at the relationship between material properties and manufacturing process performance, research manufacturing processes for new and advanced materials, and produce prototype tooling and support technology.

## Production Equipment Design, Analysis, Testing and Control

The production equipment commit-

tee will develop and demonstrate methods, equipment and systems essential to ensuring that the performance of U.S. manufacturing exceeds the demands of global competition in the 90's and beyond. Emphasis will be on methods and technologies that will reduce manufacturing life cycle costs, reduce performance variability, improve accuracy and dynamic performance and reduce implementation and integration time.

### Manufacturing Operations

In the recent past, senior management in too many American companies did not recognize that managing a factory is a profession with a body of knowledge separate and equal in importance to that of finance, sales design, etc. Manufacturing is the area where business and technology issues meet. This committee will define the characteristics of what is called "world-class" manufacturing. This will require the quantitative and qualitative definition of the total manufacturing environment, and interpreting the proper role of manufacturing in the overall business structure. The committee will also work with the education system in order to provide the world-class education required by the business world.

### Manufacturing Data and Factory Control

The multitude of information systems used to control factories and to communicate between manufacturing operations, even in the same company, have added to cost and confusion in many U.S. companies. This committee will work to define, develop and demonstrate information technology standards and systems to create and define product, engineering, operating and manufacturing data to control and/or manage a factory. The objective is to take a total system perspective. The committee is pointing toward achieving simultaneous engineering, the implementation of factory information systems that are more time and cost effective and the recognition that computer hardware and software must be integrated with both people and manufacturing hardware in a synergistic system.

### Information & Technology Transfer

Technology transfer has never been a strong point of U.S. companies. For a number of valid business reasons, companies avoid or delay the introduction of new technology into the manufacturing process. The IT&T committee will determine the most effective methods by which technology can be transferred from the research stage to the factory floor and, perhaps more importantly, be a major driver in getting member companies to accept improvements in manufacturing systems and hardware which will make American companies more competitive in the international arena. In addition to improving access to new and existing manufacturing technology, the committee will work to reduce the lead time and cost of implementing new manufacturing technologies for members.

### Strategic Issues

The strategic issues committee has the fundamental responsibility of defining the manufacturing parameters that will exist 10 to 20 years in the future, and then working with the other committees, to see that the required technology is developed so that member companies can meet them. The committee will also address possible solutions and offer them for comment to industry, academia, government and the public.

New technology is needed by both large and small firms. Many of our large-firm members hope to gain not only directly in their own manufacturing operations, but also through improvements in productivity of their supplier firms. The benefits of our research will ripple through the U.S. manufacturing sector among firms of diverse size and industries.

Those who have been actively involved in our technical meetings tell us that a major unanticipated advantage of membership is the opportunity too discuss mutual problems with manufacturing executives from other companies, particularly companies in other industries. The field of manufacturing is broad and diverse, and there are few opportunities for these executives to network with their counterparts in other companies who are facing similar problems. ■



## MIND MATTERS

**1 THIS EQUALS THAT**  
The numbers on the left correspond to the phrases on the right with the missing words indicated by initials. Determine the missing words and the "equations" will make perfect sense.  
Examples: 26 = L. of the A. (26 Letters of the Alphabet)  
10 = D. in a D. (10 Dimes in a Dollar)

- 1) 7 = W. of the W. \_\_\_\_\_
- 2) 12 = S. of the Z. \_\_\_\_\_
- 3) 54 = C. in a D. \_\_\_\_\_
- 4) 9 = P. in the S. S. \_\_\_\_\_
- 5) 88 = P. K. \_\_\_\_\_
- 6) 13 = S. on the A. F. \_\_\_\_\_
- 7) 32 = D. F. at which W. F. \_\_\_\_\_
- 8) 18 = H. on a G. C. \_\_\_\_\_
- 9) 90 = D. in a R. A. \_\_\_\_\_
- 10) 20,000 = L. U. the S. \_\_\_\_\_
- 11) 1,001 = A. N. \_\_\_\_\_
- 12) 8 = S. on a S. S. \_\_\_\_\_
- 13) 3 = B. M. (S. H. T. R.!!) \_\_\_\_\_
- 14) 4 = Q. in a G. \_\_\_\_\_
- 15) 24 = H. in a D. \_\_\_\_\_
- 16) 1 = W. on a U. \_\_\_\_\_
- 17) 5 = D. in a Z. C. \_\_\_\_\_
- 18) 57 = H. V. \_\_\_\_\_
- 19) 11 = P. on a F. T. \_\_\_\_\_
- 20) 29 = D. in F. in a L. Y. \_\_\_\_\_
- 21) 64 = S. on a C. \_\_\_\_\_
- 22) 40 = D. and N. of the G. F. \_\_\_\_\_
- 23) 1,000 = W. that a P. is W. \_\_\_\_\_
- 24) 76 = T. in the B. P. \_\_\_\_\_
- 25) 3 = C. in the F. \_\_\_\_\_
- 26) 9 = M. in a S. Y. \_\_\_\_\_
- 27) 100 = D. C. at which W. B. \_\_\_\_\_
- 28) 9 = J. on the S. C. \_\_\_\_\_