

OVERVIEW

The past 25 years have witnessed remarkable developments in structural materials technologies; new nonmetallic materials, such as ceramics and polymer matrix composites, are replacing metals in a wide variety of applications, ranging from cutting tools to tennis rackets. The new materials represent both an opportunity and a challenge for U.S. manufacturing industries. In an era of concern about the long-term economic viability of the manufacturing sector, they open a promising avenue to renewed international competitiveness, new industries, and employment opportunities,

By the year 2000, large markets for ceramic and composite products will be found in military, aerospace, automotive, medical, and construction applications. However, these opportunities cannot be taken for granted. The United States does not enjoy a comfortable lead (indeed it often lags) in new structural materials technologies; key advances continue to come from abroad. Moreover, through well-coordinated government-industry efforts, several countries have succeeded in bringing ceramic and composite products to the market years in advance of comparable U.S. products.

Japan in particular has initiated aggressive programs to commercialize its evolving materials technologies. In order to realize the promise represented by the new materials, a consensus is developing in the materials community that U.S. policymakers in government, universities, and industries will have to come together to define feasible goals and materials applications, coordinate research and development efforts toward these goals, and, especially, focus on reducing the barriers to commercial introduction of advanced ceramic and composite products.

This technical memorandum assesses the opportunities for the use of structural ceramics and polymer matrix composites in the next 25 years, outlines the research and development priorities implied by those opportunities, and concludes with a discussion of some key prerequisites for their realization. A parallel treatment of metal matrix composites, as well as a discussion of public policy options for accelerating the development and commercialization of advanced structural materials, is deferred until the final report.¹

¹Projected publication date September 1987.