



## *Simulation Engineering & Design Optimization*

Large scale OEM's within the United States, such as General Motors, Ford, Chrysler, GKN, Detroit Diesel, Rockwell, Xerox, John Deere, TRW, ITT and others, are experiencing increasing difficulty with providing competitive products in fiercely competitive world markets. This has resulted in downsizing of some facilities and closing of others, as well as outsourcing of non-critical components and engineering design responsibilities to tier-one suppliers. Additionally when comparing United States product development times with our foreign trading partners, our product development times are excessive with lower quality and higher manufacturing cost. This imbalance causes an unacceptable foreign trade deficit that increases yearly.

The above situation will only worsen as tier-one suppliers are regulated more responsibility for engineering design, analysis, testing and validation, and manufacturing of components and subassemblies. In fact, many suppliers are now responsible for any component warranty cost incurred by their customer. The result is suppliers that are more focused now than ever before on design and manufacturing quality issues. More often than not, different suppliers have varying quality standards and limited in-house expertise for the extensive engineering design optimization and quality requirements being demanded by their customers. The solution to this ever increasing product development time disparity is not protectionism.



Innovation and advanced technology are not complete answers either, since the United States is currently the world leader. Conversely, tier-one suppliers must be able to design and manufacture products more rapidly with higher quality and lower cost

*Simulation or Computational Engineering* emerged as a scientific and engineering discipline about 30 years ago with the advent of scientific computation as a tool for mathematical modeling and for the computer simulation of complex physical phenomena of practical importance. However, only within the last few years have computational engineering matured to a level that is beginning to have a measurable impact on the design of manufacturing processes and product development.

It is also evident that the science of computational engineering is an essential asset for any industry to position itself for global competitiveness. This tool is invaluable in an integrated product and process development environment, and for the economical use of materials in both their structural product and functional applications. The cost of using the power of computational engineering is already minuscule as compared to the total cost of product development; while the payoff from using these tools continues to increase exponentially.

Toward the goal of providing in-house resources and expertise to assist tier-one suppliers to reduce product development time, as well as, operating, manufacturing and R&D costs, Mechanical Engineering is developing a research thrust in *Simulation Engineering & Design Optimization (SEDO)*. The technical mission of this thrust is toward the integration of design and manufacturing processes through simulation, allowing the development of high quality products at low cost in economically and technologically challenging world markets.