

COMPUTER MODELING, SIMULATION, AND VALIDATION AT FMC

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ABSTRACT

Increasing performance requirements of present and future mechanical systems, along with the development of cost effective high performance computers, is creating an environment where new designs require the support of numerical simulations to be successful both technically and commercially. This new design environment requires an integrated systems approach to design with more exhaustive and accurate engineering analyses being made earlier, faster, and at reduced cost and physical risk. The use of analysis in design provides better prototypes, and the same computer models provide a basis for properly interpreting/understanding empirical results. The combined effect is a shorter development cycle and a superior product based on well understood principles.

FMC, because of its diversified product lines has recognized this need and has been developing verified numerical simulation tools in support of design activities. The overall objective has been to develop verified modeling and numerical simulation capabilities to predict the performance of a total mechanical system. Our approach is to incrementally develop, validate, and integrate subsystem models into a total system level model that includes all significant subsystem interactions. Hardware and software tools for computer graphic rendering, test data acquisition, reduction, and comparison are also being developed that facilitate our goals. This presentation will provide a summary of our computer simulation and validation activities in areas of finite element techniques, kinematic and dynamic analyses, vehicle systems analysis, computer-aided testing, interactive simulation, dynamic modeling using symbolic code generation, high-performance computing, and scientific visualization.