"IMPORTANCE OF CAE IN TODAY'S COMPETITIVE WORLD"

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In the past, most of the design verification during product development came from physical prototype testing. An analytical approach relying on engineering judgment was applied to evolving designs using well understood, time proven materials. Make a prototype, test it out, then make changes based on the test results. This make-&-break strategy has its advantages–it's the real deal, among others. Over time, designs and materials have become increasingly complex. Initiatives like continuous cost improvement, light-weighting and optimization have put greater demands on product performance, and as a result, on design and engineering.

Today, mechanical engineers have the luxury of being able to analyze and predict product performance using the advanced capabilities of CAE (Computer Aided Engineering) tools to meet specific product performance requirements. Designers and engineers need to understand the physical behaviors of a complex object. They also need to predict the performance of the design, calculate the safety margin, and accurately identify weaknesses in the design. The end goal is to confidently identify acceptable or even superior designs and materials for each unique product. Through the use of Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD), collectively known as CAE, this goal can usually be achieved in less time and at a lower cost than with traditional prototyping alone.

Accuracy in these processes has increased. Simulated testing gets correlated to physical testing at the material, component and system levels. CAE services provides accuracy

appropriate for the design stage and objective of the simulated testing, whether it is for A to B comparison for guiding design direction or for final design validation.

Development cost is reduced. When CAE is implemented early in the design cycle, design is guided in the right direction early in the process, when mistakes are costliest. Once a virtual model has been correlated to physical prototypes and tests, the design team can make modifications and simulate testing on those modifications with ease, without having to physically build and test each new design. This avoids expensive build costs. FEA has become a solution to the task of predicting design flaws, indicating precisely where problem areas exist due to excessive stress or fatigue.

Time to market is reduced. When CAE is implemented in the beginning of the design cycle, the program changes can be implemented fastest and the design is guided in the right direction early in the process. This avoids making changes late in the design process, when changes take longest to implement. As the design progresses, simulated testing with CAE software is done in a fraction of the time it takes to build and test a physical prototype. Physically handling material & equipment and setting up testing labs is more time consuming. Often, operations performed during the testing process are repetitive, requiring slight modifications to input data before re-running a test. In the CAE environment, automation of these repetitive iterations coupled with high performance computing (HPC) drastically reduces testing times. CAE analysis results are easier to understand, since they are displayed with high impact, 3-D, dynamic imaging. And, communication is enhanced by rapidly and accurately sharing data between departments and across distances.

CAE software has changed the world of product design and engineering. Through outsourcing, the powerful benefits of CAE services and software can now be enjoyed by companies producing physical products in every industry sector.