Initiating a CAE Program for Mechanical Designers

Overview

Makita Corporation (head office: Anjo City, Aichi Pref) develops, produces and distributes power tools, pneumatic tools, gardening tools and woodworking machinery under the motto “home construction and living environments around the world as a comprehensive international supplier of tools.” Makita is a global enterprise employing 8,500 people, with production plants and sales bases around the world.

Context of CAE Introduction

Makita initiated a project to optimize its entire development process, focusing on 3-D design in pursuit of quality improvement and a shortened development cycle. After instituting design improvement measures — effective use of 3-D data, concurrent designs (e.g., design review, metal mold, jig-design) and reduction in the number of design iterations using parametric function — Makita needed to speed up product development by incorporating CAE analyses into 3-D design. Makita Corporation has adopted ANSYS, which enables direct processing of 3-D CAD data (Pro/ENGINEER), linear/nonlinear structural analysis and excellent cost performance.

Accumulation of CAE Know-How

Makita originally was ambivalent about introducing CAE. Despite its positive evaluation of successful CAE introductions at other leading companies in the market, Makita believed introducing CAE at its own company would fail if it merely applied superficial success story facts to its own design processes without considering differences in products and their intrinsic technologies. Initial major problems included insufficient knowledge of analysis technologies and a lack of past experimental data usable at Makita. Thus, Makita attached the most importance to the accumulation of CAE technologies/know-how necessary for evolving CAE upstream, in order to encourage its engineers to trust the CAE process. At the same time, Makita exerted more active efforts to verify the correlation between CAE and experimental data, and to gain better understanding of results specific to analyses.

Introduction and Education of CAE for Mechanical Designers

As a result of efficiencies gained from applying CAE to problems during the development phase, Makita’s demand for CAE during product planning increased. Unlike high-level analyses that require the dedication of expert analysts, most product-planning analyses are intended to figure out the direction of a design, requiring less elaborate analyses. Elastic analysis suffices in most of these cases. Along with a growing prevalence of 3-D design, Makita introduced CAE to allow engineering designers to perform analyses by themselves for product planning, and to improve design quality. Accordingly, Makita decided to adopt ANSYS DesignSpace after performing benchmark tests on seven software tools based on requirements that included ease-of-use, high compatibility with 3-D CAD, ability to import 3-D models without any touch-ups, no failure in generating meshes, easy data summarization and easy provision of support by expert analysts.

CAE Training for Design Engineers

In introducing CAE to development and design groups, many opinions were negative at the start, such as “Granted that CAE is effective, there is no spare time for working on such new tasks,” “Making an actual prototype will take less time than CAE operations,” “Performing experiments provides a deeper sense of reassurance,” etc. In response to these criticisms, Makita created an environment that empowered design engineers to use CAE, taking measures including propagation to show the efficiency of CAE, creation of training textbooks for engineering designers and establishment of a support system staffed by expert analysts. After taking these measures, Makita executed CAE training programs. Although Makita initially began CAE analysis operations on projects that would easily get good results, it is now enjoying maximum efficiency that CAE can provide — because it introduced it in a manner best suited to its own product development processes.

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