Athlete FA Corporation

Using SolidWorks for all aspects of semiconductor mounting equipment and assembly apparatus design. Pioneering work towards tolerance optimization in the semiconductor equipment industry.

Since the founding of the company, Athlete FA has been committed to the development and marketing of semiconductor mounting equipment and assembly apparatus. The company first implemented high-end 3D CAD software in 2000, but the platform proved costly and relatively difficult to operate. In 2002, Athlete FA evaluated SolidWorks and found that the software exceeded all expectations, possessing the advanced capabilities required in the equipment manufacturing industry while still meeting the company’s demands regarding initial implementation costs. Currently all semiconductor-related design work at Athlete FA uses SolidWorks and progress is being made to expand its use to other areas of factory automation engineering.

Utilizing SolidWorks in all aspects of semiconductor mounting systems design focusing on semiconductor mounting systems

Athlete FA provide high-density mounting systems and associated systems for semiconductors: from high-mix, low-volume systems to fully automated production lines. The company’s flip-chip system is a device in which a bare-chip is mounted directly on the substrate, and is used in packaging products such as the high-power IC drivers for high-definition flat panel displays. It uses a supersonic wave bonding process that facilitates narrow pitch application while maintaining high productivity. The TAB/COF Potting System, a device in which the same IC driver is encapsulated in resin, has captured a significant global market share due to its high-precision, high-productivity and small footprint. The BGA Ball Mounter for CSP is a device for loading solder balls to the external I/O pad on packaging widely used for products ranging from the information product to on-going maintenance.

Achieved high-density, high-precision equipment design using 3D modeling and visualizations

The company realised that to gain maximum benefit from the transition to 3D CAD it was not just a matter of changing design tools, but that it was also necessary to standardise design methods. To achieve this, the company provided thorough training in the use of SolidWorks and, following consultations regarding features, assembly and modellings, created a standard operation manual.

Then, in order to promote the utilization of 3D data throughout the company, a 3-year plan known as the ”3D Data Utilization Project” was put into practice in 2006. In the past, design reviews were conducted in collaboration with the production and marketing departments using 3D models. Even the manufacturing processes for sheet metal and machining are starting to use 3D data. In sheet metal processing, SolidWorks data is used in its native format, allowing a paperless process. In machining, Athlete FA is working with external component manufacturers to test machining methods that apply SolidWorks data in an integrated CAD/CAM process, without using paper-based drawings as before. In addition to applications in the design and manufacturing processes, there are also plans to utilize 3D data in assembly and operation instructions and in various types of forms. Using SolidWorks digital data company-wide, Athlete FA’s goal for the immediate future is to achieve front-loading.
The Challenge: Athlete FA provided a 2-day lecture course in the fundamentals of tolerance design to all employees, including design engineers. Successful tolerance design has significant impact on cost, quality and time to market. Therefore, in addition to becoming proficient in using SolidWorks, design engineers need to be able to design product functionality itself that incorporates assembly and tolerance. A pioneering example in the equipment manufacturing industry, Athlete FA is proactively verifying the analytical results of tolerance optimization obtained by manual calculation and those obtained using the SolidWorks TolAnalyst.

The Solution: In the design section at Athlete FA there is one SolidWorks seat per engineer. Thanks to a comprehensive training program for all employees and the creation of a standard operation manual covering features, modelling and assembly, the skill level of all engineers is consistent. To make full use of the benefits of a transition to 3D, a set of standard design guidelines was established on the basis of detailed consultations at the time of introducing SolidWorks. All Athlete FA products are now designed using SolidWorks.

Gaining a competitive edge through tolerance optimization and verification using TolAnalyst

The managing director of Planer Ltd., Mr. Hiroshi Kuriyama, worked for 25 years in design and development at Seiko Epson Inc. before establishing Planer in 2001. Mr. Kuriyama is currently a visiting professor at Nagano Technical College and a part-time lecturer in engineering at Shinshu University. A keen supporter of Athlete FA’s enterprises, Mr. Kuriyama explains the relevance of tolerance analysis in the design process:

“For the majority of manufactured goods, it is only after the design specifications and costing of the finished article have been decided - that is, only after the end goal is determined - that the creation of detailed designs begins. As products become increasingly miniaturised and multifunctional, so the demands placed on each of their individual components continually increase. If tolerance settings are tight, there is a corresponding jump in costs and it becomes difficult to meet delivery deadlines. So, in order to reach the end goal, it is essential to achieve a balance through optimal tolerance design. Of course, without tolerance design it is impossible to maintain the quality of the end product.”

In the past, tolerance design was considered to be tacit knowledge in the manufacturing industry, and as such was communicated from designer to designer on the job. However, due to a generational change in engineers and developments in the design environment, recently this method of knowledge transfer has become increasingly difficult. There are now overwhelming numbers of young designers across all sectors of the industry who do not know tolerance design theory. So, in collaboration with Planer, Athlete FA provided not only introductory and intermediate SolidWorks seminars for their design engineers but also training for all employees in the basic principles of tolerance design.

Having implemented the SolidWorks tolerance analysis tool, TolAnalyst, innovative activities such as comparing and verifying the results of manually calculated analysis are being tested. Through such activities the company aims to utilize the SolidWorks design tools to maximum effect.