膠帶應用於 3C 產品之模擬與快速設計工具開發

Adhesive simulation application for 3C products and fast design tool development

廖芳瑜, 黃玉鑫, 吳宜庭
緯創資通有限公司

摘要

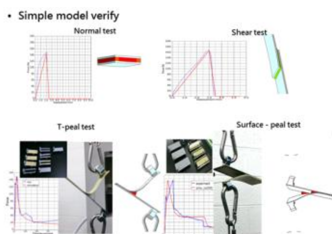
近年來由於筆記型與一體機電腦(AIO)日趨輕薄及窄邊框設計，使得螢幕以及機構件貼合面積急遽縮減，導致膠帶無法承受高低溫環測以及外力作用而脫膠。本研究根據ASTM測試規範取得膠帶基礎參數，並利用ABAQUS中的膠合元素進行模擬初步驗證其可信度。接下來，將驗證過後的材料代入整機進行高低溫環測模擬，預測膠帶脫膠現象。然而模擬需要時程較久，所以同時我們也開發一套膠帶設計工具，於RFQ階段可以快速地計算出適合的膠帶尺寸，避免開發過程中時間的浪費以及trial and error。

關鍵字：膠合元素、膠帶設計工具

ABSTRACT

In these few years, the narrow border and slim design had been often requested for notebook and AIO. Less and less tape area are allowed in the area of screen and bezel structure. Tapes might get peeled off after high/low temperature test (HTHH) or load bearing test. All of tape material properties in this research obtained is based on the ASTM standard test rules. Cohesive element from ABAQUS and simplified tape CAE model are used as basic data to calibrate with test results. After that, the HTHH & loading simulation based on the basic data is used in whole system assembly of a product to check peeling-off phenomenon. However, system level tape simulations take lots of resource and time. As a result, a tape quick design tool that can help us find out the suitable brand of tape and taping area (cost) required is developed in the mean time for quickly response at RFQ stage and avoiding test trial and error.

Keywords: cohesive element, tape design tool

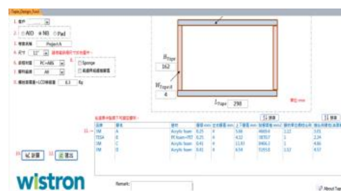


Verification on simple model

Result	Original Usage	Reduce Usage		
		Model 1	Model 2	Model 3
Tape area reducing	-	10.0%↓	25.9%↓	42.9%↓
Simulation Result (w/o humidity)				
HTHH Test Result	NA	0<Step<0.05 OK	0<Step<0.05 OK	* Step < 0 Fail

Verification on system model (high/low temp test)

Static strength test



Tape design tool