

Testing Tubes

Companies can squeeze out profit and brand loyalty using sensor technology.

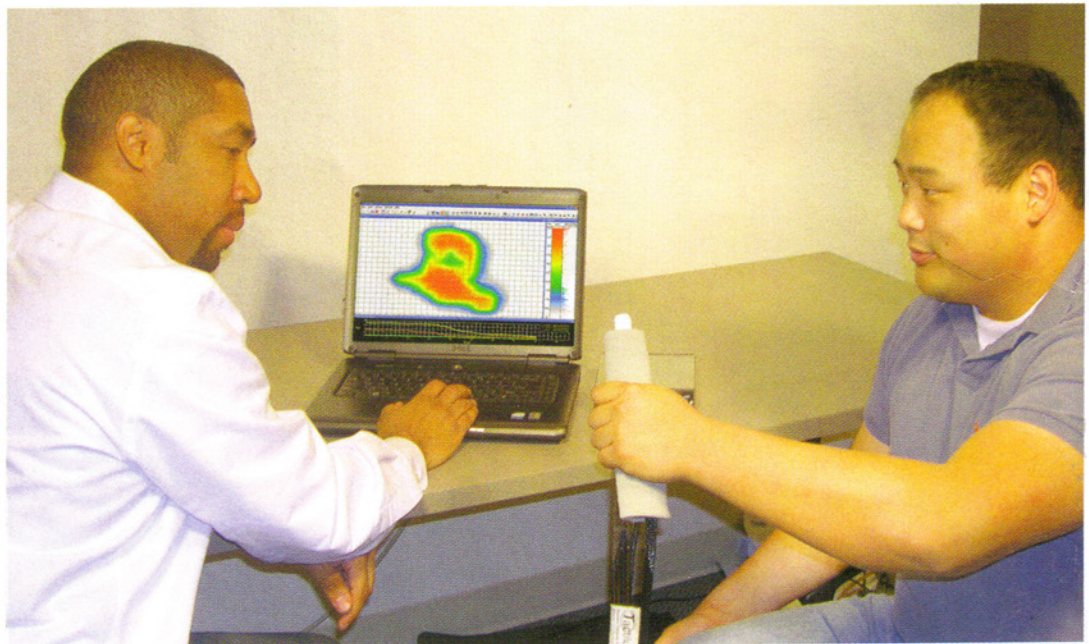
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In the world of consumer packaging, the cost, the customer's experience, and the marketing of the product are all intertwined. These factors complicate package design and explain why so much of a company's product breakdown is spent in packaging.

Most manufacturers agree that cost influences product success. A household product that is very expensive to produce is rarely successful in the market. To bring costs down, raw-material costs must be minimized without compromising usability. If the package does not survive its application, or if contents are difficult to dispense, the product loses its consumer appeal.

Shampoo, hair gel, ketchup, and toothpaste are among the many products that require a somewhat-squeezable package for dispensing. When too little is dispensed, consumers can become frustrated; when too much is dispensed, use may become messy and shorten product life.

A major consumer toothpaste manufacturer wanted to develop a less-expensive material construction that lowered material costs and reduced the amount of force needed to dispense the contents. The company developed different types of prototype packaging and asked Sensor Products Inc. to encase its tubes



As the test subject squeezes the tube surrounded by a Tactilus sensor, his grip is displayed as a pressure distribution map on the laptop.

with the Tactilus electronic sensors. The client then assembled a focus group and asked the test subjects to squeeze all the toothpaste out of the tube. The pressure to squeeze was measured along the tube, and the common practice of rolling the tube up to exact every ounce of toothpaste was profiled.

Testing subjects were recorded on video as they squeezed tubes to pair visual records with the pressure-over-time data gathered by the Tactilus pressure mapping sensor system. The results

showed not only which packaging was best suited to save costs, but also established, for the first time, real quantitative as well as qualitative measurement of squeezing efforts. This created a baseline that packaging engineers could use in the future to precisely measure and improve product standards.

Additional projects that could be undertaken include designing and testing nozzle size and shape; determining the amount of pressure needed to burst the cap; and a comparison of squeezing

efforts to different sizes of packaging.

The Tacilus pressure mapping system records the exact pressure over a matrix of piezoresistive sensors. The values are then recorded through its software and displayed in a variety of formats, including 2-D and 3-D pressure mapping profiles as well as pressure, force, and area-versus-time graphs. All data are exportable to Excel where further data comparison can be made with third-party software.

The size and shape of a tube is very influenced by demographic factors. In the U.S. market, bigger is better, but in many foreign markets, different sizes and shapes are essential for marketing global products. Bathrooms do not have large medicine cabinets in many countries, so space is at a premium. In order for companies to sell their products, they must make them conform in size to whatever space is available. Cultural and behavioral habits of how people dispense product and the amount of force they are comfortable exerting also need to be studied.

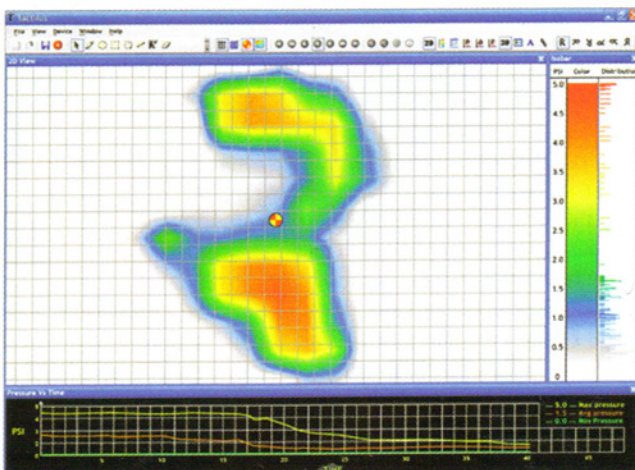
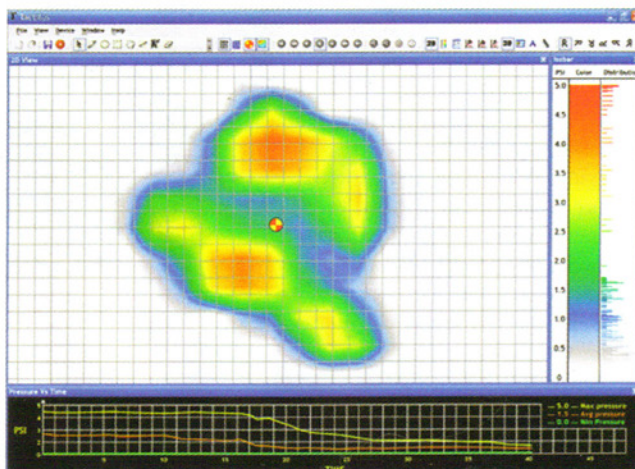
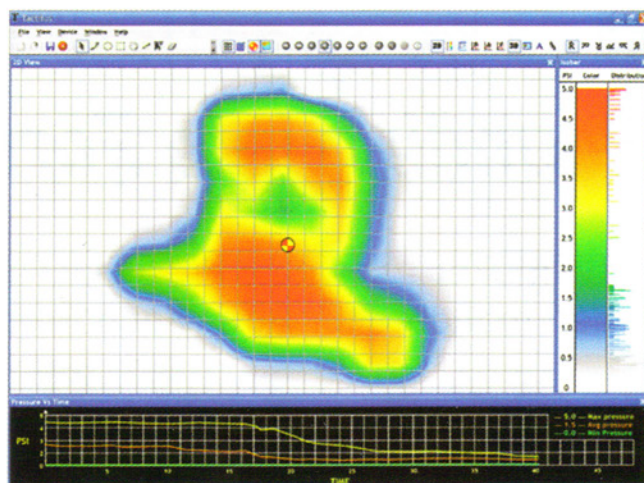
In addition, tubes designed for men and women vary significantly in their size, shape, material selection, color, and graphic design. As the population ages, adaptation of the packaging to

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meet their physical needs becomes more important. In recent years, ergonomic designs have been developed that pay special attention to the area that needs to be gripped as well as to the area that needs to be squeezed for dispensing.

Every package designer's nightmare is catastrophic failure of a product. In packaging, catastrophic failure may result from bad seals that leak as well as the loss of brand loyalty owing to products that do not dispense properly. While aggressive quality control measures may have resulted in fewer product recalls, manufacturers still need to lower their scrap rates to reduce costs. The failure of a bad seal that is not readily apparent to visual inspection, but does not have sufficient durability over time, may be very discouraging for a customer. Electronic Surface Pressure mapping systems have been developed by Sensor Products Inc. that calibrate equipment and align heat-sealing machinery to aid quality control efforts.

A company that considers every part of its product development process important will be rewarded with higher revenue and great product following. It is therefore important for those in tube packaging to be aware of technological advancements and the human forces that shape their success. ■



These pressure maps show how surface pressure changes over time as the contents of a tube are dispensed.