

The Truth About Interactive Whiteboard Durability

What durability means and why it's important

August 2006

SMART Technologies Inc.

This white paper is for informational purposes only, is subject to change without notice and should not be construed as offering any future product commitments on the part of SMART Technologies Inc. While significant effort has been made to ensure the accuracy of the information, SMART Technologies Inc. assumes no responsibility or liability for any errors, omissions or inaccuracies contained herein.

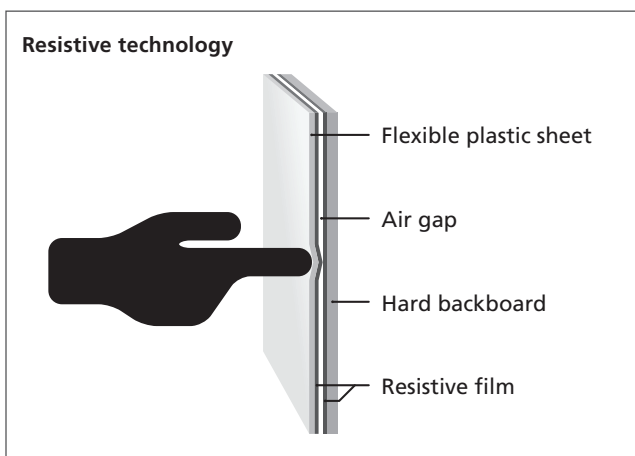
© 2006 SMART Technologies Inc. All rights reserved. SMART Board is a trademark of SMART Technologies Inc. in Canada and the U.S. All other third-party product and company names may be the trademarks of their respective owners.

The Question of Durability

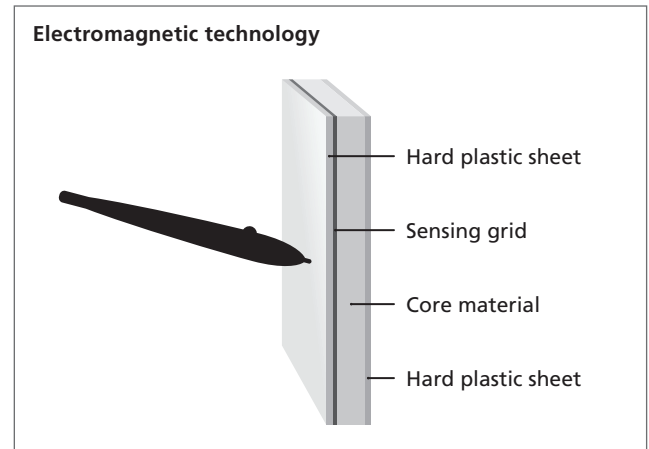
From time to time people ask us about the durability of our front-projection interactive whiteboards* because they are evaluating so-called soft board and hard board options. The terms *soft board* and *hard board*, while not technically accurate, are sometimes used to make a superficial distinction between two kinds of available technology: resistive and electromagnetic.

Boards incorporating *resistive technology* are made with a flexible plastic front sheet and a hard backboard. The back of the flexible sheet and the front of the backboard each have a coating of resistive film. The resistive sides of each are separated by a tiny air gap about the thickness of two human hairs. Pressure applied to the surface of the front sheet closes the gap, registering a contact point that is converted from an analog signal to a serial data stream and then sent to a computer for further processing. This technology can process contact from a finger, plastic pen or any device.

A number of resistive technology boards exist on the market, some using softer sheets than others. In this white paper, the term *resistive technology board* will refer to the most widely used board in this category, the front-projection SMART Board™ interactive whiteboard.



Boards employing *electromagnetic technology* are made by sandwiching a sensing grid and core material such as foam between two nonflexible plastic sheets. The sensing grid registers contact with the board's surface via an electronic pen or a pen containing a magnetic coil. All communication occurs between the special pen and surface alone, i.e., fingers and other devices do not work.



The essential pieces of hardware in both technologies are the board materials and the means of registering contact (finger, electronic pen or other device). Any durability assessment should include an examination of both of these.

The Board Materials

Interactive whiteboards are created from a variety of materials. The front sheet of the SMART Board interactive whiteboard is made from a polyester-based plastic,[†] while the front sheet of some electromagnetic boards is made from a melamine-based plastic. These particular compounds were originally commercialized under such brand names as Mylar® and Formica®.

Some of our customers have heard that electromagnetic boards have no moving parts and they have a rigid melamine-based front sheet, so, the manufacturers claim, they are more durable. But claims like these need to be examined closely. Let's look at them both in detail.

*SMART offers a wide range of rear-projection interactive whiteboards, which use a different projection surface and technology than the interactive whiteboards discussed here. For more information, visit www.smarttech.com.

[†]SMART's hard-coated polyester front sheet should not be confused with the less durable vinyl or polyethylene sheet used in some other manufacturers' resistive technology boards.

Moving parts?

Statements about moving parts derive from the belief that the front sheet and backboard used in SMART Board interactive whiteboards constitute moving parts, which is misleading.

The hard-coated polyester front sheet in SMART's resistive technology board is secured over a backboard made from a robust aluminum honeycomb composite. This material provides high strength and lightweight support behind the front sheet, so when a finger presses the board's surface, it immediately closes the tiny air gap and touches the backboard. The sensation is similar to pressing your finger on a small stack of paper on a table.

The important point here is that no SMART Board interactive whiteboard has ever needed repair or been returned due to the so-called movement of its front sheet.

More durable than hard-coated polyester?

Just because the melamine-based plastic is harder, it doesn't mean the product itself is more durable. The melamine-based surface is as thick as the Arborite® or Formica used to cover countertops and about as sturdy.

SMART's front sheet is made from a hard-coated polyester that offers high durability while maintaining flexibility. It has a rugged character that meets the durability requirements of many users in many different situations. More than 100 SMART Board interactive whiteboards are, for example, currently being used by military forces in the hostile environs of Iraq and Afghanistan. The U.S. Marine Corps Unit Operations Centers use them in the field as well. And millions of students and teachers worldwide use them in classrooms every day.

To date, SMART's interactive whiteboards have been shot by stray bullets, stabbed by knife-wielding students, stapled by primary school children, frozen in storage, rained on and used for more than a dozen years – and all have continued to function. How? Small tears or marks on the surface are extremely uncommon, but if they do occur, they do not interfere with the operation of the interactive whiteboard.

In fact, many argue that the hard-coated polyester sheet is more durable because, like all polyester-based plastics, it has the ability to relax back into its original shape if strained

by scratches, bumps, hits or temperature extremes – much more common occurrences than knife-wielding students or stray bullets. This characteristic is more technically referred to as *elastic recovery*.

What about quality assurance?

SMART Board interactive whiteboard designs and materials go through a variety of quality control tests before they are approved for production. These include the following:

- Taber-wheel abrasion test – an abrasive material like steel wool is rubbed over the board surface 1,000 times to verify that it will not scratch. This is a standard ASTM (American Society for Testing and Materials) test.
- Standard shake and vibration test
- Standard drop test
- Accelerated UV testing – verifies that the interactive whiteboard's surface will not degrade or yellow under UV light

As a result of rigorous testing and quality controls, all SMART Board interactive whiteboards are designed and produced under ISO 9001:2001 certification.

Fingers and Pens

Another important durability factor to consider is the cost associated with wear and damage to interactive whiteboard pens. Electromagnetic boards require special pens that are expensive to replace and essential to the operation of the board. These can be lost or stolen, nibs can be removed and discarded, and pens will wear down after repeated use.

Resistive technology boards do not require any special device to function. SMART's pens, for instance, contain no proprietary technology and do not use batteries. If they are lost, stolen or damaged, the interactive whiteboard can be operated with any object, including your finger, so there is no downtime. Standard SMART Pen Tray functions can still be activated with whatever pen replacements you choose. If, for example, you put small wooden dowels in the pen tray slots, and you lifted a dowel from one of the slots, the color for that slot would activate. You could then write with the dowel or any other object you choose.

A Reliable Measure

In the end, one of the best and most objective measures of interactive whiteboard durability is a manufacturer's RMA (Return Merchandise Authorization) rate, which indicates how many boards have been returned to a manufacturer due to field failure. SMART's RMA rate is less than one percent overall for its 500 and 600 series front-projection interactive whiteboards, and less than a quarter of a percent for the 600 series, which replaced the 500 series in late 2005. Compare these rates with other manufacturers' to obtain an objective measure of durability.

Technology for Today and the Future

When assessing claims about interactive whiteboard durability, you cannot simply consider the relative hardness or softness of the material used to make the front sheet. The hard-coated polyester sheet and aluminum honeycomb backboard in SMART Board interactive whiteboards combine to create a high degree of strength *and* flexibility, and there is no need for special pens that may be damaged, lost or stolen. As well, the product continues to prove extremely durable in the field, as shown by its RMA rate.

SMART has been manufacturing interactive whiteboards since 1991 – longer than any other interactive whiteboard manufacturer in the world. It has installed more interactive whiteboards in more countries than all other manufacturers combined. Part of that success comes from having a strong team of research scientists and engineers who pay attention to *all* the details that contribute to durability and who ensure your interactive whiteboard will work for many years to come.