



DVD Rot, or Not?

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By Don Labriola, PC Magazine

The recent Associated Press story about insidious, disc-devouring "rot" wasn't the first to hit the mainstream press. Major news outlets Worldwide have for years been publishing sensational reports that up to 20 percent of all mass-produced CDs and DVD-Video discs were slowly destroying themselves. But when an alarmed DVD industry investigated whether the problem was indeed as catastrophic as it appeared, it turned out that most reported incidents had actually been caused by improper disc handling and storage. Despite the latest round of headlines, true "DVD Rot" today appears to be exceedingly rare. Users themselves are the greatest threat to the longevity of their DVD collections.

Most people think of DVDs as little more than high-capacity CDs, but though the two are very similar, DVDs have vulnerabilities that require particular care in their handling, storage, and cleaning. But with a bit of knowledge and effort, nearly all damage to DVDs can be prevented.

Disc Anatomy

A CD consists of a piece of polycarbonate "substrate" into which up to 6 billion tiny pits that represent stored data have been molded. This pattern is coated with a reflective material like aluminum, which is covered by an ultrathin protective coating. When a CD player aims its laser through the clear substrate, the aluminum reflects the beam back. The drive reads data by detecting changes in the reflected beam as it passes across the molded pits.

Mass-produced DVDs employ similar technology, but with a few important differences. Most replicated DVD-Video discs store two layers of data and use a semireflective material like gold to coat the layer closest to the laser (see <http://www.pcmag.com/article2/0,1759,1573655,00.asp>). This allows DVD drives to select which layer to play by simply adjusting laser power and focusing distance. DVDs also boast greater data density and can store up to 4.7 billion bytes per layer, far more than the 650–800MB that can be squeezed onto a CD. This means that, despite a more robust error-checking and correction mechanism, each bit of DVD data is smaller and more easily obscured by tiny scratches and debris on the disc's surface.

Unlike a CD, which is a solid piece of plastic, a DVD is composed of two polycarbonate discs that are bonded together. This helps protect the coatings, as it sandwiches them between plastic layers. But it also makes DVDs more vulnerable to stresses caused by severe bending and flexing, especially at the disc's inner hub.

DVD Care and Handling

DVDs may be more delicate than they look, but it doesn't take much to prevent problems. It's a good idea to store them vertically in their original packaging whenever possible. Some DVD cases support a disc only at the hub, allowing it to sag at the edges when stored flat for long periods of time or at out-of-spec temperatures. Any resulting deformation will be slight, but it doesn't take much to unbalance a high-speed DVD drive.

Never store DVDs in CD jewel cases, which may apply too much hub stress. DVD-approved jewel cases, designed to reduce hub pressure, can be differentiated from CD versions by an embossed DVD logo on the tray insert.

Poorly conceived packaging can contribute to problems that make DVDs unplayable. Some off-brand cases require excessive force even when you use the correct procedure to remove a disc, while others

release discs too easily, allowing mail-order DVDs to bang around the case for days while in transit.

Well-made cases, such as Amaray's DVD-Safe clamshell models (www.amaray.com/products_dvd.asp), grip a disc securely in a stress-free locking hub while allowing it to rotate freely. Attempting to pry a disc out of the case without unlocking the hub can result in over-flexing the disc, delamination, and even hub cracks. The rosette in the center of the case must be gently pressed until the disc pops free, letting you lift it effortlessly by its edges.

Even with better-quality jewel cases, it's not hard for a disc to pop off its hub and get scratched in the case. To prevent this, line your jewel cases with soft adhesive pads sold by companies such as Azuradisc (www.azuradisc.com). But don't panic if the surface of your disc does sustain some damage. Fine scratches can be removed with specialty formulations like Novus Plastic Polish (www.novuspolish.com) or by carefully polishing the surface with white toothpaste and a soft cloth. In extreme cases, a professional disc-polishing device like those made by Azuradisc can restore discs that would otherwise be impossible to salvage.

Avoid storing discs in paper or cardboard sleeves. Paper can leave tiny surface scratches when you insert or remove the disc. If you must use sleeves, choose those made of soft woven material like DuPont's Tyvek.

When you store discs in binders, don't load each volume with so many pages that the platters are under potentially deforming pressure. Use binder pages lined with a woven material, not with paper or cardboard. It's especially important when using binders to be sure that no debris is trapped against the data surface of a stored disc.

Adverse environmental conditions can greatly shorten the life of a disc. Avoid extremes and rapid changes in temperature or humidity, and never leave a disc in direct sunlight. Try to maintain an ambient temperature of between 55 and 75 degrees Fahrenheit, and keep the humidity within a 20 to 50 percent range.

Never apply adhesive labels to a DVD. Although paper labels are okay for CDs, it takes far more precision to read a DVD's much denser data. Even a slightly off-axis label can create unstable playback conditions. The best way to label a disc is to print directly onto it with a disc printer like the Primera Bravo II Disc Publisher or any of the Epson Stylus Photo R200/R300/R800 line (\$99, \$179, and \$399 direct).

Recordable and rewritable DVD media have their own handling requirements. Their recordable surfaces should never be exposed to bright sunlight, and you should avoid breaking their shrink wrap before you're ready to use them.

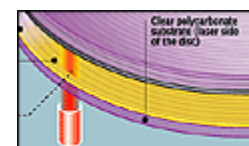
Cleaning the Platter

The best disc-cleaning solvent is deionized water, but even distilled or soft tap water can work in a pinch. Diluted dish detergent or rubbing alcohol can remove tougher contaminants. Never use any organic solvent, polish, antistatic solution, or cleanser that you suspect might attack or coat the plastic surface. In all cases, be sure to rinse the disc with water and dry with a cloth to avoid staining or residue; use a soft, lint-free cloth or photographic lens tissues.

Always wipe discs in a radial motion, moving in straight lines between the hub and the outer edge. Almost any type of cleaning will leave microscopic scratches, but a DVD's error-correction mechanism can compensate for thin scratches that cross a data path at a right angle. Wiping discs in a circular motion can leave scratches that cover a longer span of data and may not be correctable.

Is Something Rotten?

Similar to the "laser rot" that cropped up in some early laserdiscs, DVD rot makes discs unplayable by impairing the ability of their aluminum layer to reflect light. Its most likely causes include oxidation caused by air coming into contact with the reflective layer, a galvanic reaction between a dual-layer disc's gold and aluminum coatings, and a chemical reaction triggered by impurities in either the



disc's adhesive or in the aluminum itself. The good news is that although the aluminum coatings of a small percentage of discs manufactured before 2001 have slowly deteriorated spontaneously, the vast majority of reported cases of DVD rot have been shown to be due to user mishandling. [Click to Enlarge](#)

In a February 2003 study, Australian engineer Rohan Byrnes generated photographic evidence of aluminum deterioration in the unplayable areas of several affected discs (www.andraste.org/discfault/discfault.htm). This triggered an alarming article in a Sydney newspaper that extrapolated Byrnes findings to conclude that a huge number of discs would eventually rot away (www.smh.com.au/articles/2003/01/31/1043804519345.html)—a story that has since grown into an urban legend, which still periodically inspires headlines in mainstream news venues.

Most observers agree that real cases of DVD rot do exist but are probably limited to discs from a few plants that had quality control problems in the late 1990s. Fortunately, there seem to be no new cases, and Byrnes hasn't found problems with new discs. Also, DVD rot doesn't affect recordable or rewritable DVD media, which use a radically different dye-based technology to store data.

A Reliable Medium

The bottom line is that, in the absence of profound manufacturing defects, replicated DVD-Video discs remain a credible storage medium. Their longevity depends on how well you treat them. With proper handling and storage, they can provide reliable performance for decades.

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