From legacy storage to SSDs: lifecycle extension without redesign or downtime

By replacing legacy storage with form, fit and function solid-state storage equivalents Solid State Disks is preserving mission-critical platforms, enhancing reliability, improving efficiency and reducing waste

Legacy storage represents a significant risk across many industry sectors, from aerospace and defence to medical and telecoms. Sustainable Engineering's Jon Barrett spoke to Solid State Disks' sales director, James Hilken, to discover how drop-in solid-state storage emulators provide a solution, keeping platforms – many of which are certified and mission-critical - running longer.

Ageing tape, optical, floppy and hard disk memory subsystems hide real sustainability liabilities. They draw more power, fail more often, depend on scarce spares and trigger redesigns that push usable assets prematurely to scrap. Replacing electromechanical drives with solid-state, 'form, fit and functional' equivalents extends service life without disturbing the host computer, preserving embodied value and avoiding needless waste.

By pairing early obsolescence planning and reverse-engineered replacements with rigorous compliance and predictive monitoring capabilities, engineers are improving system reliability, cutting e-waste, improving energy efficiency and avoiding wholesale redesign.

"Our engineering approach minimises resource consumption and supports circular economy principles"

Editor:
Jon Barrett

Publication Date:
22/09/2025, 10:54

Further Details:
solidstatedisks.com

Solid State Disks addresses the intersection of obsolescence, reliability and environmental performance. The company's engineering approach emulates legacy storage devices precisely at the protocol level, delivering the same commands, timings and interfaces the host expects while removing the moving parts that cause power, heat and reliability headaches. The result is lifecycle extension at the component boundary rather than an expensive, costly platform overhaul.

The breadth of legacy media in the field is bigger than many assume. Beyond familiar SCSI and SASI hard drives sit decades of optical formats, tapes and even DVD mechanisms that are no longer available on the open market. When one major US telecom could no longer buy a reliable DVD unit, Solid State Disks supplied a drop-in solid-state replacement to keep the installed system running.

James said: "Obsolete storage components can halt operations, leading to costly redesigns or, in some instances, full system replacement. That's where we come in. We help OEMs overcome the problem by providing solid-state drop-in replacements that extend life and reduce the environmental impact."

How reverse-engineered emulation keeps hosts happy

Under the hood, sustaining legacy platforms with modern flash is a careful balance of fidelity and improvement. Engineers start by capturing signals from the working legacy device, decoding protocols and recreating exact behaviours in a new hardware or software emulator. Logic analyzers are used to map timing and command sequences so the host 'sees' the same device it was certified with, even though the core is now solid state.

One counter-intuitive challenge is performance. Flash responds far faster than a tape or optical mechanism. If left unchecked, that speed can violate host expectations, so Solid State Disks deliberately throttles responses to match historical timings.

James explained: "We have to slow the read and write speeds down. For example, it takes time to rewind a magnetic tape and the host computer's software may have factored that in. If we supply the data in a split second, the host may not like that."

Mechanical fit matters too. Some legacy drives were physically large; the emulator might be a compact 3.5 in PCB that must mount exactly where the original sat, including matching hole patterns and connectors. Hilken described a US carrier visit where emulation was straightforward but the 'fit' was awkward, requiring careful mechanical packaging to meet the original form and mounting constraints.

The same fidelity lets teams safely add useful features where the host allows. For example, health telemetry and predictable maintenance windows can sit alongside strict timing emulation, giving operators actionable status without perturbing certified behaviour.

Compliance first, then enhancements

In highly regulated domains, storage is only one piece of a safety-critical chain. Solid State Disks aligns replacements to the original performance envelope and supports the evidentiary burden that quality teams require. According to Hilken, the company works with customers to: maintain strict quality assurance and documentation; follow applicable industry standards; and tailor solutions to sector-specific compliance needs in defence, aerospace and telecoms.

James said: “Qualification regimens extend to humidity and drop testing and ensuring the device copes with pulses on the power line. A fixed bill-of-materials is maintained, and any board change triggers a product change notice so operators can test before adoption.”

This engineering approach also supports the kind of maintainability and upgradeability progress manufacturers and customers like to see. Interfaces can be consolidated, wiring harness pain points removed and security features added on the storage module where the original mechanism had none: all while preserving the three Fs: form, fit and function.

Sustainability outcomes: less energy, less waste, longer service life

Sustainability benefits flow directly from eliminating moving parts as James explained: “Solid-state memory has no moving parts, uses less power and generates less heat. That results in improved energy efficiency and longevity. We reduce e-waste by preserving the broader system. Our solutions typically last for decades.”

Those savings aren’t limited to the device itself. In remote assets, every vehicle and boat trip required to swap media wastes time, fuel and money.

James added: “By upgrading a Federal Aviation Administration radar programme to enable networking, engineers can now remain at base and communicate directly with deployed storage units, dramatically cutting maintenance miles and human exposure. It turned repeated logistics journeys into a secure, remote task.”

Sustainability expectations are maturing through tenders and audits as James explained: “The company’s stance is clear. We are aligning with OEM’s sustainability goals by offering products that reduce power, extend system life and eliminate the need for full system replacement. Our engineering approach minimises resource consumption and supports circular economy principles.”

At fleet scale, the value of lifecycle extension multiplies. When an OEM avoids a wholesale redesign, the organisation keeps known processes, trained engineers and validated configurations in place, rather than burning resources to create and certify a replacement platform. That is pragmatic circularity applied where it counts, at the storage boundary that was gating system reliability and performance.

When to engage and how projects run

Obsolescence signals are rarely subtle. Drive vendors issue end-of-life notices, service spares run down and failure rates creep up. Historically, OEMs made large 'last-time buys' to cover multi-year support obligations. However, when the parts finally run out, engineers start searching for answers. Early contact with a company like Solid State Disks shortens the path to a qualified, low-risk solution.

Hilken's experience is that enquiries often originate from engineers closest to the failing assets and advocates getting ahead of the curve: "Start planning early. Don't wait for the failure. Assess your obsolescence risks today, exploring solid state replacements to maintain compliance, performance and sustainability without massive costs or disruption. Partnering with specialists like us can make all the difference."

A typical reverse-engineering engagement begins with a working drive and media, even when original schematics are available. The engineering team capture signals and timings, decode protocols and implement a functionally identical drop-in replacement that the host recognises. There is no need to modify the host. Where needed, response throttling ensures the host's assumptions about read and write latencies still hold, while added diagnostics provide round the clock visibility on drive performance.

Predictive (memory wear) monitoring is a practical differentiator. Solid State Disks offers software that is based on self-monitoring, analysis and reporting technology (SMART) and lets operators see the remaining life of the memory, so maintenance can be planned rather than panic driven. That visibility supports reliability targets and reduces avoidable waste by swapping media at the right time: not too early and not during a service outage.

Next steps: turn obsolescence planning into lifecycle extension

For those responsible for maintaining legacy systems, the playbook is simple but time sensitive. First, inventory installed storage types across programmes and identify where tapes, opticals, floppies and/or older hard disk interfaces are still in service. Map failure patterns and spares burn-down to identify which systems are approaching support cliffs. Then engage 'while everything still works' so emulation can be captured against a healthy reference device.

Next, define the compliance frame. Specify the in-service environment, required test regime and documentation trail required for internal approval. A fixed bill-of-materials, formal product change notices and evidence of environmental and mechanical testing make for a relaxed auditing process. Highlight form, fit and function constraints early, including any mounting and connector oddities that matter within the system enclosure.

Finally, plan for maintainability: use health monitoring to schedule swaps; take advantage of remote connectivity where permissible to reduce people-miles; and introduce simple quality-of-life improvements where possible without touching host software. The sustainability dividend is real when OEMs turn a failure point into a predictable, serviceable component.

James concluded: “Start planning early. Don’t wait for the failure of the old drive and possible loss of data. And the sooner you act the sooner you can extend the service life of the host system, cut energy use and avoid needless e-waste.”