# Window Shading Systems

## Designing for day 2 Operation, Optimisation and Future Adaptation

Verosol

## INTRODUCTION

Architectural influence extends well beyond the delivery of a completed building. The most enduring designs are those that anticipate change, adapting to shifts in occupancy, evolving technologies, and new operational demands over decades of use. In the context of window shading, whether the system is manual, motorised and automated, this requires a focus not only on the visual and regulatory success of “Day 1” but also on the functionality, maintainability and adaptability that define “Day 2.”

Designing shading systems for Day 2 performance demands a lifecycle approach. Systems must be specified with adaptability, serviceability and longevity in mind, ensuring they can be reprogrammed, upgraded and reconfigured without invasive work. Infrastructure solutions such as eSMART Wiring enable this flexibility by providing a modular electrical and data backbone that accommodates future technology integration with minimal disruption. By embedding such infrastructure from the outset, architects can safeguard the building’s capacity to incorporate advanced shading controls, updated sensors and enhanced system logic as operational needs evolve.

This paper builds on the principles established in Automated Shading Systems: An Essential Guide for Architects, extending them into the operational and post-occupancy domain. It outlines the architect’s role as a “Day 2” designer; one who collaborates closely with services engineers, facilities managers and operators to anticipate long-term requirements and operational realities.

## DAY 0, DAY 1, DAY 2: WHAT'S THE DIFFERENCE?

### Day 0: Design and specification

Day 0 covers the pre-construction phase, when automated shading is integrated into the architectural and building services design. Key tasks include defining performance objectives, zoning strategies, and selecting motors, controls and sensors. Infrastructure such as eSMART Wiring is specified to enable both immediate functionality and future upgrades. Coordination with services engineers at this stage ensures compatibility with the facade, BMS and maintenance access, embedding scalability and lifecycle performance into the design.

### Day 1: Installation and handover

Day 1 is the delivery stage, involving installation, commissioning and transfer to the operator. This includes aligning and calibrating hardware, integrating with HVAC and lighting systems and, if applicable, with Tenant AV and third-party systems, and verifying performance against the design intent. A complete handover package, covering wiring layouts, zoning maps, control logic and sensor locations, should be provided, along with embedded asset registers and operator training to support immediate operational readiness.

### Day 2: Ongoing operation and management

Day 2 represents the operational life of a window shading system, where the focus shifts from initial delivery to sustained optimisation and maintenance. This phase encompasses refurbishment, retrofit and upgrade projects alongside the routine operation of the system.

Traditionally, maintenance during Day 2 has been preventive, based on fixed schedules for inspections, adjustments and part replacements. While this approach helps maintain baseline performance, it can result in unnecessary servicing or overlooked issues. Modern systems equipped with digital motors and integrated analytics enable a shift toward predictive maintenance, where interventions are driven by actual performance data rather than calendar intervals.

By capturing metrics such as runtime hours, cycle counts, start/stop events and total fabric travel, digital motors give operators actionable insight into wear patterns and component health. This allows maintenance to be scheduled precisely when needed.

"What is delivered on Day 1 sets the foundation, but it is Day 2, when a building is operating, evolving and adapting, where true value is delivered."

## STARTING WITH A BUILDING AUDIT

For Day 2 design, particularly in refurbishments or upgrade projects, the process should begin with a comprehensive building audit. While standard dilapidation reports establish the baseline condition for a fit-out, a full system audit goes further, incorporating a comprehensive shading system assessment. This provides architects and building owners with clear insight into the current operational status, integration potential and limitations of existing installations.

When upgrading or automating existing shading systems, a strategic approach is essential; one that balances performance improvement with cost efficiency, minimal operational disruption and alignment with sustainability targets. A well-executed building audit identifies which components can be retained, which can be adapted and which require complete replacement.

Key audit considerations for existing shading systems include:

- Type, condition and mounting of existing blinds.
- Feasibility of retrofitting motors to existing shading devices.
- Availability and accessibility of electrical infrastructure and cabling pathways.
- Control system compatibility, including proprietary versus open protocol platforms.
- Facade orientation, glazing type and existing shading performance relative to thermal and visual comfort targets.

Audit findings should be used to define a clear retention, replacement or upgrade plan. This provides a solid foundation for subsequent Day 2 design decisions and ensuring that the final system is both operationally effective and adaptable to future needs.

**Day 2 activities may include:**

- Conducting building audits to assess shading performance and integration.
- Implementing retrofits and hardware or software upgrades.
- Recommissioning systems to suit new layouts or tenancy changes.
- Using Dynamic Grouping* to reconfigure shading zones via software.
- Integrating with upgraded BMS or energy management platforms.
- Refining control logic based on real-world operational data.
- Performing preventive maintenance such as inspections, adjustments and fabric condition checks.
- Applying predictive maintenance strategies using digital motor analytics (runtime hours, cycle counts, start/stop events, fabric travel).
- Optimising shading schedules and setpoints to improve energy efficiency and occupant comfort.
- Replacing end-of-life components with modular or higher-performance alternatives.

*__Dynamic Grouping__ is a control strategy where the grouping of devices, such as blinds, louvres or curtain tracks, can be reconfigured through software, rather than being fixed by the original wiring or hardware setup.

## WORKING WITH EXISTING ASSETS

In the context of Day 2 design, architects and facilities teams are often tasked with improving shading performance without the scope or budget for a full system replacement. This makes it critical to assess what can be retained, adapted or upgraded from the existing installation.

A strategic approach not only extends the life of serviceable components but also reduces environmental impact, as building, demolition and renovation waste account for roughly 40% of landfill of total solid production waste globally.[1] By prioritising reuse and targeted upgrades, thoughtful Day 2 design can achieve improved functionality, cost efficiency and sustainability outcomes simultaneously. Below are some guiding principles

### Retain where viable

- Preserve high-quality components, such as manual blinds, brackets, or ceiling recesses, when they remain functional, compliant and visually compatible with the new design.
- Where blinds are in good condition, upgrade only the control layer (e.g. motors, sensors, or control interfaces) rather than replacing the full system.
- Reuse existing infrastructure to reduce waste and maintain design continuity, particularly in heritage buildings or high-value interiors.

### Retrofit for minimal intervention

- Motorise existing blinds by integrating retrofit-compatible motors into the existing assemblies.
- Surface-mount control hardware where wall cavities or cable pathways are inaccessible.
- Use wireless digital motors (SMI) operating in a mesh network where hard-wiring is impractical, especially in occupied or fully tenanted spaces.

### Replace where necessary

- Where components are damaged, non-compliant or incompatible with modern automation systems, specify full replacement.
- Upgrade to modular shading systems that support easy servicing, part replacement and future automation enhancements.

Both align closely with the National Construction Code (NCC) and influence government procurement standards.

NABERS focuses on operational outcomes, rating buildings on a 6-star scale for metrics such as energy and water use. Effective shading, whether through awnings, external blinds, or automated facade systems, reduces solar heat gain, lowers cooling loads and improves thermal comfort. By decreasing reliance on mechanical cooling, shading strategies directly contribute to improved NABERS energy ratings.

Green Star, developed by the Green Building Council of Australia (GBCA), assesses sustainability across design, construction and operational phases. Shading can earn credits in areas such as energy efficiency, thermal comfort and daylighting by reducing glare, limiting artificial lighting demand, and enhancing indoor environmental quality.

## FROM PREVENTATIVE MAINTENANCE TO PREDICTIVE MAINTENANCE

Following a building audit and completion of any required upgrades, the next priority in Day 2 is implementing a Planned and Preventive Maintenance (PPM) Agreement. This structured framework ensures the continued performance, reliability and longevity of the automated shading system. For installations equipped with digital motors (such as wired or wireless SMI motors) and integrated analytics, the PPM strategy can evolve into predictive maintenance, where service schedules are driven by real performance data instead of fixed intervals.

A PPM Agreement provides a tailored service plan aligned with the system's configuration, building type, and operational requirements. Typical inclusions are:

- Scheduled maintenance and repairs to keep components in peak condition.
- Incident response protocols for rapid fault resolution.
- System performance monitoring to confirm correct operation. Optimisation and tuning for seasonal adjustments, occupancy changes or facade reconfiguration.
- System updates and upgrades to incorporate new technologies.
- Staff training and support for correct operation and minor adjustments.
- Long-term optimisation strategies for energy efficiency, comfort and system integration.

Predictive maintenance strategies use the system's digital infrastructure to collect and analyse operational data in real time. Key metrics include:

- **Motor runtime hours:** to forecast bearing or gearbox wear.
- **Cycle counts:** to track the number of up/down operations and anticipate mechanical fatigue.
- **Start/stop frequency:** to identify excessive operation caused by poor control logic or sensor misalignment.
- **Fabric travel distance (metres):** to predict when shading fabrics will require inspection or replacement.
- **Load or torque feedback:** to detect obstructions, binding or misalignment before failure occurs.

This data can be integrated with a BMS or cloud analytics platform to trigger maintenance alerts when performance thresholds are reached, rather than waiting for failures or following rigid schedules. Over time, predictive maintenance reduces unplanned downtime, prevents premature replacements, optimises spare parts planning and supports more accurate lifecycle cost forecasting.

## END-OF-LIFE PLANNING AND CIRCULARITY

Shading systems should be specified with their full lifecycle in mind, including how components will be upgraded, replaced or responsibly retired. As buildings evolve and technologies advance, sustainable end-of-life planning reduces environmental impact and supports the continued performance of the system. Below are some guiding principles:

### Design for disassembly

- Specify systems that can be dismantled without damaging major components, allowing for reuse, refurbishment or material recovery.
- Standardise fixings and interfaces to simplify component replacement.

### Enable responsible disposal

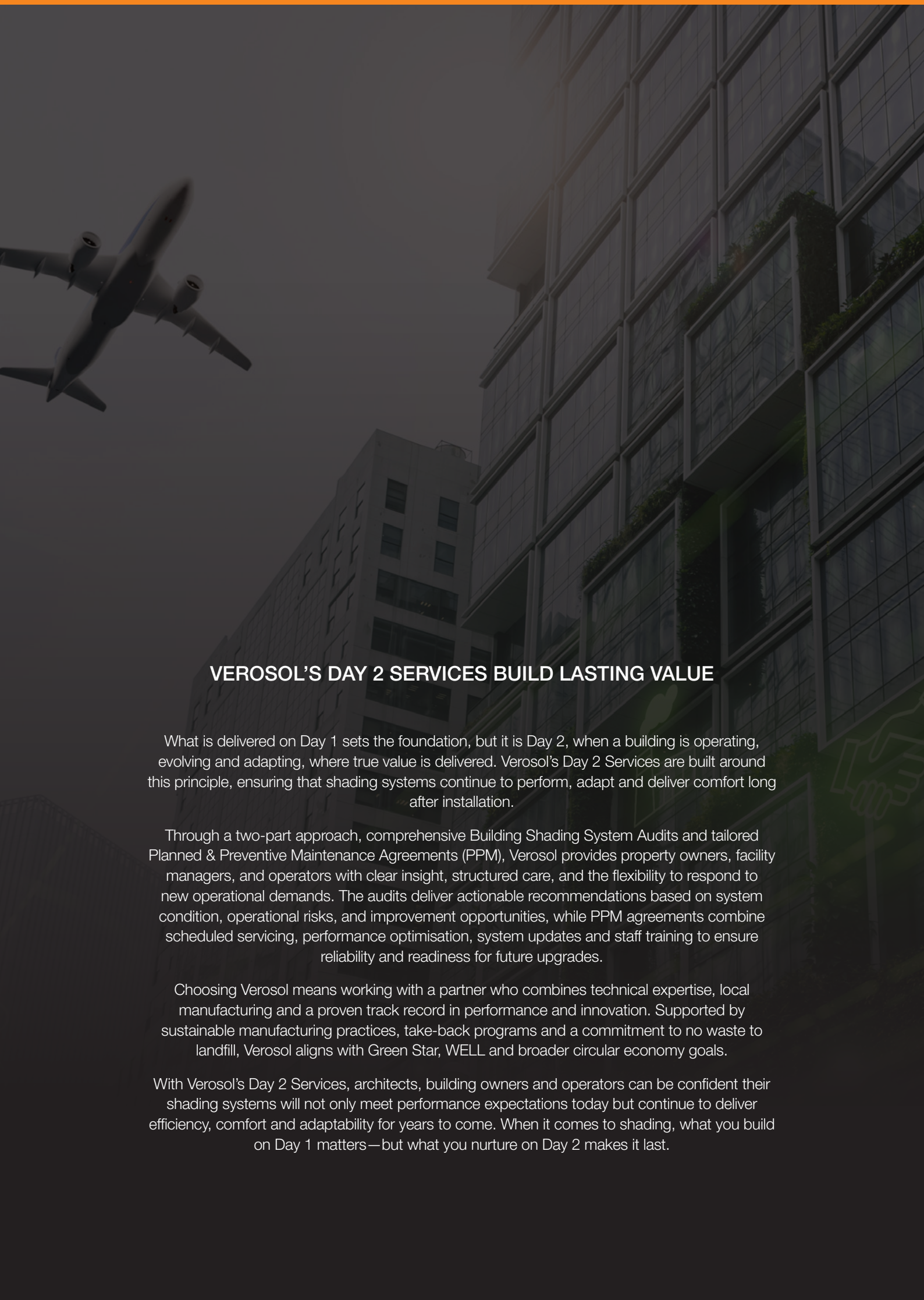
- Select suppliers offering takeback and product stewardship programs for end-of-life components. These programs ensure materials are diverted from landfill and processed through recycling, refurbishment or reuse channels.
- Some manufacturers provide credit or replacement discounts as part of circular product stewardship strategies.

### Support for lifecycle maintenance

- Work with brands that guarantee long-term availability of spare parts and technical support.
- Aim for a 10–15 year serviceability horizon, aligning with typical refurbishment cycles and reducing premature replacement.

### Alignment with green building standards

- Participation in takeback programs and material recovery supports Green Star, WELL and broader circular economy targets.
- Including end-of-life strategies in specifications demonstrates responsible procurement, reduces whole-of-life environmental impact and strengthens alignment with sustainability objectives.



## VEROSOL'S DAY 2 SERVICES BUILD LASTING VALUE

What is delivered on Day 1 sets the foundation, but it is Day 2, when a building is operating, evolving and adapting, where true value is delivered. Verosol's Day 2 Services are built around this principle, ensuring that shading systems continue to perform, adapt and deliver comfort long after installation.

Through a two-part approach, comprehensive Building Shading System Audits and tailored Planned & Preventive Maintenance Agreements (PPM), Verosol provides property owners, facility managers, and operators with clear insight, structured care, and the flexibility to respond to new operational demands. The audits deliver actionable recommendations based on system condition, operational risks, and improvement opportunities, while PPM agreements combine scheduled servicing, performance optimisation, system updates and staff training to ensure reliability and readiness for future upgrades.

Choosing Verosol means working with a partner who combines technical expertise, local manufacturing and a proven track record in performance and innovation. Supported by sustainable manufacturing practices, take-back programs and a commitment to no waste to landfill, Verosol aligns with Green Star, WELL and broader circular economy goals.

With Verosol's Day 2 Services, architects, building owners and operators can be confident their shading systems will not only meet performance expectations today but continue to deliver efficiency, comfort and adaptability for years to come. When it comes to shading, what you build on Day 1 matters—but what you nurture on Day 2 makes it last.

“Modern systems equipped with digital motors and integrated analytics enable a shift toward predictive maintenance, where interventions are driven by actual performance data rather than calendar intervals.”

## REFERENCES


1 Shooshtarian, S., Hosseini, M.R., Kocaturk, T., Ashraf, M., Arnel, T. and Doerfler, J. “The circular economy in the Australian built environment: The state of play and a research agenda.” School of Architecture and Built Environment & School of Engineering. https://nla.gov.au/nla.obj-2983477613/view (accessed 10 August 2025).



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