Nick Clark · Published April 25, 2026 · PDF

Madaster alternative: material passports as a building registry vs credentialed surfaces bound to the physical material

Madaster is a materials-passport and registry platform that catalogs the materials in a building so owners can track composition, residual value, and circularity across a building's life. The hard problem it addresses is knowing what is in the built environment and where it can go next, so materials are recovered rather than landfilled. This article contrasts that registry approach with Credentialed Surfaces, an architecture of credentialed admissibility profiles bound to the physical material, disclosed in U.S. Provisional Application No. 64/050,895.

What Madaster Does

Madaster is an online platform that functions as a registry, or cadastre, of the materials and products used in buildings and other assets. An owner, designer, or contractor uploads a building's model or bill of materials, and the platform organizes that information into a materials passport: a structured record of what a building is made of, in what quantities, and where those materials sit in the structure. From that record it derives circularity indicators and estimates of the residual or reuse value of the constituent materials, so that at renovation or demolition the building can be treated as

a source of recoverable stock rather than as waste. The underlying premise, that the built environment is a large and poorly documented material bank, is a real and important one, and giving that bank an addressable record is a genuine contribution.

Several strengths are widely associated with the platform. It ingests common design data such as building information models and product data, so it fits into existing design and asset-management workflows rather than demanding a parallel one. It produces reporting aligned with the disclosure and circularity frameworks that owners and regulators increasingly ask for. And it maintains the passport as a living record across a building's life, so the documentation is meant to stay current rather than freeze at handover. These are substantial capabilities addressing a real and growing need, and this platform is a deployed product used by real owners and portfolios. Nothing here is a criticism of that work. The purpose of this article is narrower: to name one architectural axis and describe how the disclosed approach is structured differently along that single axis.

The Architectural Axis

The axis is where the record of a material lives, and what that record is able to do at the moment an operation on the material is attempted. A materials-passport registry is organized around a database record that describes a building's materials: a catalog of products and quantities, indicators computed over that catalog, and a portal through which stakeholders read and update it. The record is the primary artifact, hosted in the platform, and the physical material is the thing the record refers to and points back at.

The disclosed architecture inverts that relationship along one dimension. Its primary artifact is a credentialed admissibility profile bound by cryptographic signature to the identity of a specific physical material, element, or assembly, and structured not merely to describe the material but to be evaluated as policy when an operation is attempted against it. The specification defines an admissibility profile as a structured data object declaring one or more property surfaces, each surface declaring property-specific

parameters and admission conditions, and defines a credentialed admissibility profile as such a profile bound to the material's identity and traveling with it through manufacturing, installation, in-service operation, and end-of-life processing. The profile is bound to the element by the cryptographic signature of one or more credentialing authorities, so it is carried by the material rather than held only in a central catalog. This is a difference in what the artifact is for, not a defect in the registry approach: one is a hosted record describing a building's stock, the other is a material-bound policy surface admitted against at evaluation time.

How the Disclosed Approach Differs

Several structural features in the specification make the difference concrete on this axis.

Property surfaces, not a single catalog entry. Rather than one passport row describing a product, the disclosed profile carries a plurality of independently credentialed property surfaces, each covering one declared property category. The specification enumerates structural, thermal, energy storage, electrical distribution, data network, water-coupled, thermal-coupling, fire-performance, sound-transmission, vapor-permeability, environmental, and carbon-sequestration surfaces, and states that each surface is independently credentialed by an authority competent for that scope. A structural engineering authority signs the structural surface; a fire-marshal authority signs the fire-performance surface; an environmental-credit authority signs the carbon-sequestration surface. This is the multi-authority signature block described in the specification: the profile is not attested by one issuer but composed from separately scoped attestations that each admit independently.

Composition rules as signed, versioned artifacts. The property surfaces do not merely coexist in a record; they compose through a composition-rule architecture. Each composition rule is itself a credentialed and signed data artifact declaring a scope, a composition logic specifying how the relevant surfaces interact, a version vector for

deterministic conflict resolution, a conflict-resolution policy, and an authority signature, held in a composition-rule registry consumed at admissibility-evaluation time. The specification gives representative rules, including one that reduces storage admissibility to zero when the fire-performance surface declares a fire event, and a carbonation-tracked rule that degrades the storage surface as a function of cumulative carbonation depth. Cross-property behavior is therefore an evaluable, versioned, signed object rather than an interpretation applied by a human reader of a catalog.

Lineage as a governed cradle-to-cradle chain. The specification records each lifecycle transition, pre-installation credentialing, in-service operation, an end-of-storage-life substate, end-of-structural-life decommissioning, recycling-grade re-credentialing, and re-installation, as a credentialed event signed by an appropriate authority and recorded in a lineage chain that forms a directed graph of transitions persistent across multiple structural lifetimes. End-of-structural-life decommissioning is signed by a licensed demolition or deconstruction contractor and produces a demolition-recovery attestation declaring the recovered material's grade, mass, and physical state; recycling-grade re-credentialing is performed by a recycler authority producing a new profile at recycled grade. This is the same cradle-to-cradle intent that motivates a materials passport, expressed as a chain of authority-signed transitions carried by the material rather than as revisions to a hosted record.

Attestations and identity that migrate with the physical mass. Because the profile is bound to the material's identity, the specification describes continuous re-credentialing across operational material flows during service life, including mortar repointing, coating refresh, and substrate top-up, each a credentialed event signed by an installer authority and re-evaluated against the cumulative material flow. It further describes a migrating carbon attestation in which biogenic carbon-credit attestations move with the substrate across material flows and across structural lifetimes as credentialed transactions signed by an environmental-credit authority. Under this metabolic-

lifetime model the material's credentialed identity persists while the physical stock is refreshed. The attestation is not only a record about the material held elsewhere; it is bound to and travels with the specific physical mass.

Where They Fit Together

These approaches are more complementary than competing, and honesty requires saying so. A materials-passport registry answers questions the disclosed architecture does not: it aggregates a whole building's or portfolio's stock into an addressable, human-readable catalog, computes circularity and residual-value indicators over that catalog, ingests widely used building-model and product data, and produces the reporting that owners and regulators consume. That portfolio-scale accounting, valuation, and reporting is real work that a single material-bound profile does not by itself perform.

A plausible composition is straightforward. The disclosed credentialed profile could serve as the material-bound, policy-evaluable, authority-signed attestation that a physical element carries and that admissibility evaluation consults at the point of an operation, while a materials-passport registry serves as the building-scale and portfolio-scale catalog that collects those profiles, indexes them, values them, and reports over them for the owner and the regulator. One is the local policy surface bound to the physical material; the other is the aggregate ledger and reporting fabric for the built asset. They address different halves of the problem, and treating them as substitutes would misread both. A registry that pointed at material-bound credentialed profiles, rather than at catalog rows alone, would gain a verifiable and policy-evaluable foundation for the indicators it reports.

Boundary Conditions

The comparison must be honest about asymmetry. Madaster is a deployed, in-market platform with real customers and portfolios. The disclosed subject matter is a provisional patent disclosure of an architecture. It is not built, validated, benchmarked, or independently verified, and this article asserts no such thing. Any advantage described here is an architectural property of the disclosed design as written, not a demonstrated result.

The materials science underlying the disclosed substrate is prior art. Cementitious composites, carbonaceous additives, electric-double-layer storage, and non-corroding reinforcement are pre-existing, and the disclosure claims no newly discovered chemistry and no novel basic science. The specification frames the underlying material behaviors as known and its performance numbers, such as storage capacity, cycle life, and round-trip efficiency, as declared design ranges rather than measured outcomes; they should not be read as benchmarks. The novelty at issue is the credentialing and admissibility-profile architecture applied to physical materials, and the multi-function-surface category, not the materials themselves.

Finally, the axis addressed here is narrow. It concerns where a material's record lives and how it is evaluated as policy at the moment of an operation. It does not extend to the portfolio-scale cataloging, circularity indicators, residual-value estimation, model ingestion, or regulatory reporting where a dedicated registry is purpose-built, and no claim of superiority on those dimensions is made or implied.

Disclosure Scope

The architecture described on the disclosed side of this comparison, credentialed admissibility profiles bound to physical materials, multi-authority signature blocks, signed and versioned composition rules, a governed cradle-to-cradle lineage chain, and migrating attestations, is disclosed in U.S. Provisional Application No. 64/050,895. All

statements about Madaster and about the broader materials-passport and circular-construction market are external context drawn from generally available descriptions of that category and are not representations of the filing, not part of its disclosure, and not claims made in it. Nothing here asserts or implies any defect, deficiency, or wrongdoing in Madaster or any other named product; the platform is treated as a capable, in-market offering, and the comparison is confined to a single architectural axis of where a material's record resides and how it is evaluated. Descriptions of the disclosed subject matter reflect the provisional specification as written and are not representations that any system has been built, tested, or validated.

Credentialed Surfaces (/credentialed-materials)

All 40 steps → (/inventive-steps)

Building surfaces as credentialed agents that participate in the structure's networking and electrical systems.

Provisional application

PRIMARY TECHNICAL DISCLOSURE

- Credentialed Building Materials: Cryptographic Admissibility for Structural Surfaces (/articles/credentialed-building-materials-cryptographic-admissibility-for-structural-surfaces)

SECONDARY TECHNICAL

- Carbon-Sequestration Admissibility Surface (/articles/credentialed-materials/carbon-sequestration-property-surface)
- Composition Rules Governing Surface Interactions (/articles/credentialed-materials/composition-rules)
- Decommissioning And Re-Credentialing Attestation (/articles/credentialed-materials/decommissioning-and-recredentialing)
- Electrical-Distribution Admissibility Surface (/articles/credentialed-materials/distribution-property-surface)
- End-Of-Storage-Life Attestation (/articles/credentialed-materials/end-of-storage-life-attestation)

- Energy-Storage Admissibility Surface (/articles/credentialed-materials/energy-storage-property-surface)
- Lineage Chain Across Material Lifecycle (/articles/credentialed-materials/lineage-chain-across-lifecycle)
- Authority Signatures Block Binding Property Surfaces To Material Identity (/articles/credentialed-materials/master-credential-binding)
- Multi-Authority Signature Block (/articles/credentialed-materials/multi-authority-signature-block)
- Data Network Admissibility Surface (/articles/credentialed-materials/network-property-surface)
- Profile Versioning Continuity (/articles/credentialed-materials/profile-versioning-continuity)
- Structural Admissibility Surface (/articles/credentialed-materials/structural-property-surface)
- Thermal-Property Admissibility Surface (/articles/credentialed-materials/thermal-property-surface)
- Versioned Admissibility Profiles With Lineage Chain (/articles/credentialed-materials/versioned-profiles-with-lineage)
- Water-Coupled Admissibility Surface (/articles/credentialed-materials/water-coupled-property-surface)

APPLICATIONS · GENERAL

- Credentialed Structural Materials for Construction and Civil Infrastructure: Carrying Strength, Mix, and Provenance as Multi-Authority Attestations (/articles/credentialed-materials/construction-and-infrastructure)
- Carbon-Credit-Bearing Building Materials: Sequestration Attestations That Survive Incorporation, Transfer, and Decommissioning (/articles/credentialed-materials/carbon-credit-materials)
- Building-Product Compliance and Code Approval: Property-Surface Profiles as Machine-Evaluable Admissibility Evidence (/articles/credentialed-materials/building-product-compliance)
- Credentialed Building Materials for Real Estate Valuation, Insurance, and Disclosure: A Property History That Binds to the Asset (/articles/credentialed-materials/real-estate-and-asset-lifecycle)
- Recredentialing Recovered Materials: Verifiable Lineage for Reuse and Decommissioning in the Circular Economy (/articles/credentialed-materials/circular-economy-and-decommissioning)
- Energy and Grid-Coupled Surfaces: Crediting Stationary Storage in Structural Mass Without Trusting the Cell (/articles/credentialed-materials/energy-and-grid-surfaces)
- Credentialed Surfaces for Water and Environmental Infrastructure: Signed Performance and Compliance Attestations on Water-Coupled Concrete (/articles/credentialed-materials/water-and-environmental-infrastructure)
- Data-Center Infrastructure Substrate: Collapsing UPS Rooms, Cooling Distribution, and Raised-Floor Wiring Into One Credentialed Structural Surface (/articles/credentialed-materials/data-center-infrastructure)

- Turning EV-Charging Sites Into Structure: Credentialed Substrate That Stores, Distributes, and Settles Power in the Slab (/articles/credentialed-materials/ev-charging-infrastructure)

APPLICATIONS · SPECIFIC

- Circularise, a blockchain-based supply-chain traceability and digital-product-passport platform for materials vs credentialed material surfaces: attestations bound to the physical material (/articles/credentialed-materials/circularise)
- EC3 (Embodied Carbon in Construction Calculator) by Building Transparency vs a credentialed carbon-sequestration surface bound to the material (/articles/credentialed-materials/ec3-building-transparency)
- CarbonCure Technologies, which injects and mineralizes CO2 into concrete during mixing vs a credentialed carbon-sequestration attestation architecture (/articles/credentialed-materials/carboncure)
- Sublime Systems, maker of low-carbon cement via an electrochemical (ambient) process vs a credentialed carbon-sequestration surface bound to the material (/articles/credentialed-materials/sublime-systems)
- Brimstone carbon-negative portland cement vs credentialed material attestations: process decarbonization or per-element carbon accounting? (/articles/credentialed-materials/brimstone)
- The EU Digital Product Passport (DPP) under the Ecodesign for Sustainable Products Regulation (ESPR) vs credentialed surfaces: a data-carrier standard next to a material-bound attestation architecture (/articles/credentialed-materials/eu-digital-product-passport)
- One Click LCA, a life-cycle-assessment and EPD software platform for construction vs a credentialed carbon-sequestration property surface bound to the material (/articles/credentialed-materials/one-click-lca)
- Concrete.ai vs credentialed carbon-sequestration surfaces on structural materials (/articles/credentialed-materials/concrete-ai)
- **Madaster alternative: material passports as a building registry vs credentialed surfaces bound to the physical material (/articles/credentialed-materials/madaster)**

Credentialed Surfaces overview → (/credentialed-materials)