WHITE PAPER

The End of the Two-Year-Old Report

Real-Time Verification, the Digital Birth Certificate, and the Future of Factory-Built Housing

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June 2026

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Executive Summary

The construction industry certifies the safety of buildings, building products, and entire factory-built homes with documents that can be up to two years old by the time anyone relies on them. A test report issued in one year is presented to a permitting office, a lender, an insurer, or a federal procurement officer a year or two later as if nothing has changed in between — no change in formulation, no change in supplier, no change on the production line. With today's technology, a two-year-old report is ancient. The industry simply has not yet acted on that fact.

This paper argues that the marketplace is moving — inevitably — from static, paper-based, point-in-time certification to continuous, electronic, real-time verification. In the future, every phase of production in a manufactured home plant, modular factory, or tiny home shop will be date-stamped and transmitted electronically, in real time, to a permanent digital record that travels with the unit for its entire life: what the industry will come to call the unit's birth certificate.

The shift will reach every stakeholder in the built environment: inspection agencies, permitting authorities, banks, insurance companies, builders, federal agencies including the Department of Defense and FEMA, and — most importantly — the future owners of the property, who finally gain a verifiable record of what was actually put into their buildings.

The case is illustrated here through one of the most promising and most cautionary building materials of the last two decades: magnesium oxide (MGO) board. MGO board's troubled international history is a direct consequence of point-in-time certification, and its bright future depends on exactly the kind of real-time, batch-level verification this paper describes.

1. The Problem: Certification Frozen in Time

1.1 The two-year-old report

Modern building products are qualified through laboratory testing — fire resistance, structural capacity, moisture behavior, freeze-thaw durability — conducted by accredited testing agencies. The output is a report or an evaluation listing. That document then circulates for years. A code official reviewing a permit application, a builder selecting

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sheathing, a lender underwriting a construction loan, and an insurer pricing a policy may all be relying on a report generated as much as two years earlier, describing samples produced under conditions that may no longer exist.

Nothing in that paper trail tells the relying party whether the product being installed today matches the product that was tested. Formulations drift. Suppliers change. Ownership of factories changes. Raw material sources change. The report does not.

1.2 The check-the-box inspection

Factory-built housing is, in principle, the most inspectable form of construction in existence. Manufactured homes are built to a federal code and overseen by third-party inspection agencies; modular homes are built to the International Building Code or International Residential Code under state industrialized housing programs, again with third-party plan review and in-plant inspection. Yet in practice, much of that oversight resolves to a checked box and a label applied at the end of the production line. The label attests that the unit conforms. It does not show when each phase was completed, who verified it, what materials went into it, or which lots and batches those materials came from.

In the future, third-party agencies verifying conformance to the federal manufactured housing code or to the International Building Code will no longer be able to simply check a box at the end of production. Each phase — floor, walls, roof, electrical rough-in, plumbing, insulation, sheathing, finishes — will be date-stamped at completion and transmitted electronically, in real time, to the unit's permanent record.

1.3 Why permitting agencies will move first

Permitting agencies carry the public-safety mandate, and they are the parties most exposed when stale documentation fails. It is anticipated that permitting authorities will be among the first to refuse reliance on aged reports. Once a jurisdiction can receive live, phase-by-phase electronic verification of an incoming modular or manufactured unit — before the unit ever arrives at the site — the comparison with a two-year-old paper certificate is not close. With today's technology, the old model does not merely look outdated; it looks indefensible.

2. Case in Point: The Future of Magnesium Oxide (MGO) Board

2.1 A material whose moment has arrived

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Magnesium oxide board is a cementitious sheathing panel with a combination of properties that conventional gypsum and wood-based panels struggle to match, non-combustibility, high fire resistance, resistance to mold and mildew, resistance to termites and pests, dimensional stability, and impact strength. For structural insulated panels (SIPs), fire-rated assemblies, wet areas, and disaster-resilient housing, MGO board is one of the most compelling skins and substrates available. As the industry pushes toward faster, factory-built, hurricane- and fire-resilient housing, demand for MGO-class materials is positioned to grow substantially.

2.2 The cautionary history: certification without verification

MGO board is also the textbook example of what happens when a market relies on point-in-time certification. In the mid-2010s, large volumes of imported MGO board installed in Northern European construction — most prominently in Denmark — were later found to absorb moisture from humid air. Chloride-rich formulations wept salty water, corroded fasteners and adjacent steel, and damaged assemblies on a national scale. The boards had documentation. What the market lacked was any mechanism to verify that the boards arriving in containers, month after month, were chemically the same boards that had been evaluated — or that the formulation was suitable for the climate at all.

The lesson is not that MGO board is a bad material. Modern magnesium oxysulfate chemistries and well-controlled production have addressed the failures of that era. The lesson is that a certificate describes a sample at a moment in time, while a supply chain is a moving river. Without batch-level, real-time verification, the certificate and the product separate from each other silently — and the failure is discovered in the walls of finished buildings, years too late.

2.3 The future of MGO is verified MGO

For MGO board to achieve its potential in North American factory-built housing, every relying party — the SIP manufacturer laminating the panel, the third-party agency in the plant, the permitting office, the lender, the insurer, the homeowner — must be able to confirm in real time that a specific batch of board, with a specific chemistry, from a specific production run, was tested, conformed, and was installed in a specific unit. That is not a paperwork exercise. It is a data architecture: batch identity captured at the material's origin including the magnesite certification and the board curing process, carried through fabrication, and written permanently into the record of every home the material enters. The materials that win the next era of construction will be the materials that can prove themselves continuously.

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3. The Future: Real-Time Verification

3.1 From documents to data streams

Real-time verification replaces the static report with a living record. Every verification event — a material receipt, a phase completion, an in-plant inspection, a test result, a label application — is captured at the moment it occurs, date-stamped, attributed to the responsible party, and transmitted electronically to a permanent record. The relying party no longer asks, “is there a certificate?” The relying party asks, “what does the record show right now?” — and gets an answer that is current to the day.

3.2 Phase-by-phase production records

Inside the factory, the production line becomes a sequence of verifiable milestones. As each phase of a manufactured or modular unit is completed and inspected, that completion is recorded and transmitted in real time. The end-of-line label stops being the verification and becomes merely the physical token of a verification that already exists, in full detail, in the digital record. A unit cannot reach the end of the line with an unverified phase, because the record makes the gap visible to everyone with a reason to look.

3.3 The birth certificate

The destination of all of these data streams is a single, permanent, unit-level record created at the start of production and maintained for the life of the structure — the unit's birth certificate. It records what the unit is, when and where it was built, what materials and batches went into it, who inspected each phase and when, which code it conforms to, and every subsequent milestone: transport, placement, permitting, occupancy, modification. It applies to manufactured housing, modular housing, and tiny homes alike — the entire universe of factory-built structures, including categories that today fall through regulatory gaps entirely.

For the future owner of the property, the birth certificate answers a question that homebuyers have never before been able to ask with confidence: what exactly, is in my building? For every other stakeholder, it converts trust into verification.

3.4 Imported housing and imported materials

It is anticipated that housing entering the country — whether complete modular or manufactured units or the materials that go into such products — will be required to pass through a process approving the integrity of what is being brought in. Imported units and imported materials would arrive with, or be required to establish, the same verifiable digital record demanded of domestic production: batch identity, test linkage, and phase verification. The Danish MGO experience is precisely the scenario this closes off. A

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container of sheathing without a verifiable record would no longer ride into the housing supply on the strength of a photocopied certificate.

4. Who Benefits: Every Party That Relies on the Truth

Real-time verification is unusual among industry transitions in that essentially every party in the value chain is better off. The table below summarizes the shift for each stakeholder.

Stakeholder	Today: Static Certification	Tomorrow: Real-Time Verification
Permitting agencies	Accept third-party reports up to two years old; no visibility into production	Confirm code conformance digitally, phase by phase, before the unit arrives
Inspection agencies (IPIAs / third-party)	Check a box at the end of the production line	Date-stamp and transmit each production phase electronically as it is completed
Banks and lenders	Underwrite against paper certificates and appraiser photographs	Verify in real time exactly what is in the collateral they are financing
Insurance carriers	Price risk on assumed materials and assumed workmanship	Price risk on verified materials, verified installation, and a permanent record
Builders and manufacturers	Carry liability for components they cannot trace	Demonstrate conformance instantly; isolate defects to a specific batch and phase
Federal agencies (DOD, FEMA, HUD)	Procure against paper certifications that may be years old and unverifiable	Procure against live, auditable, tamper-evident verification records
Property owners	Inherit a structure with no record of what is inside its walls	Hold a permanent digital record of every material and milestone in the home

Two stakeholders deserve special emphasis. Banks and insurance companies are, in effect, pricing blind today: they extend credit and assume risk against assets whose actual composition they cannot verify. Real-time verification gives both industries something they have never had — collateral and insured property with a complete, trustworthy

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provenance. And the future property owner, the party with the longest exposure and the least information, finally receives the record that every other major asset class already provides: an automobile has a VIN and a title history; a home, until now, has had neither.

5. The Government Transition: DOD, FEMA, and Beyond

It is anticipated that all government agencies — including the Department of Defense, FEMA, HUD, and the agencies of state and local government — will move away from paper certification, which can be at least two years old and effectively unverifiable, to real-time verification.

The federal government is the largest single buyer and guarantor of housing in the United States. The Department of Defense procures and maintains housing at scale. FEMA deploys manufactured and modular units in disaster response, under intense time pressure and intense public scrutiny — conditions under which a stale paper certificate is least defensible and a live verification record is most valuable. Federal lending and insurance programs stand behind millions of homes whose construction they cannot currently audit. For every one of these missions, the question is the same: can the agency verify, today, what it is buying, deploying, guaranteeing, or insuring? Paper says no. Real-time verification says yes — and creates an audit trail that survives personnel changes, contractor changes, and decades of time.

Recent federal housing legislation modernizing the treatment of factory-built housing only accelerates this trajectory. As regulatory structures around manufactured and modular housing are rewritten for the modern era, the systems of record beneath them will be rewritten as well — and they will not be rewritten on paper.

6. Conclusion: The Report Is Dead; Long Live the Record

Every previous era of construction accepted a simple bargain: the industry would test occasionally, certify on paper, and trust the gap in between. That bargain made sense when paper was the only technology available. It makes no sense now. The cost of capturing, transmitting, and permanently recording verification events in real time has collapsed, while the cost of relying on stale documentation — measured in failed assemblies, litigation, uninsurable losses, and public distrust — keeps rising.

The future of construction will not rely on reports that are up to two years old. It will rely on records that are current to the hour: phase-by-phase, batch-by-batch, date-stamped, electronically transmitted, and permanently bound to the unit they describe. Materials like MGO board will earn their place in that future not by what a laboratory said about them once, but by what the record proves about them continuously. The birth certificate is coming to housing. The only open question is which manufacturers, agencies, lenders,

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insurers, and jurisdictions lead the transition — and which are left explaining why they trusted a two-year-old piece of paper.

About the Author

Kenneth R. Krantz is an inventor, Certificated building contractor for over 43 years, major contributor as chairperson on many workgroups in ASTM for over 10 years, and the founder of TeraSun Systems LLC, a Florida technology company developing real-time verification, compliance, and lifecycle-tracking systems for the construction and factory-built housing industries, with a patent-pending portfolio assigned to TeraSun IP Holdings, LLC - Delaware USA

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