

TONEPROOF
WHITE PAPER

\$18M+

in counterfeit Gibson guitars seized in a single 2024 shipment — and that's just what customs caught.

Beyond Serial Numbers

Solving the Instrument Authentication Problem

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Executive Summary

The musical instrument industry has an authentication problem hiding in plain sight. Serial numbers can be filed off, re-stamped, or duplicated. Certificates of authenticity are pieces of paper — easy to forge, and easy to separate from the instrument they describe. Meanwhile, counterfeit instruments move through global supply chains at a scale large enough to trigger multimillion-dollar federal seizures, and online marketplaces are flooded with listings manufacturers themselves estimate are majority counterfeit.

Manufacturers absorb the brand damage, the warranty exposure, and the lost sales. Dealers and collectors absorb the risk of paying for something that isn't what it claims to be. And in the middle of a transaction — at a shop counter, at a gig, on a marketplace listing — there is still no fast, reliable way for anyone to check an instrument's authenticity on the spot.

ToneProof was built to close that gap. Rather than adding a tag, chip, or label to an instrument — all of which can be removed, copied, or lost — ToneProof verifies the instrument itself, using the naturally occurring, unrepeatable surface characteristics every instrument already has, checked with an ordinary smartphone.

The Problem: An Industry Built on Trust, With No Reliable Way to Verify It

The market this problem sits inside is a large and growing one. The global musical instrument market was valued at roughly \$14.72 billion in 2024 and is projected to reach \$15.37 billion in 2025; the used guitar segment alone is projected to reach \$2.1 billion by the end of 2025, with used electric guitars making up around 70% of that activity.¹ A meaningful share of that market runs on trust in an instrument's history and originality — trust that current verification methods do very little to actually secure.

Counterfeiting inside that market is not a fringe issue. In November 2024, U.S. authorities intercepted more than 3,000 counterfeit Gibson guitars at the Long Beach Seaport in California — the largest seizure of fake musical instruments on record — with a value exceeding \$18 million had the instruments been genuine.² It was not an isolated event: in 2021, 85 counterfeit guitars valued at \$260,000 were seized at Washington Dulles International Airport,² and in 2023, Hong Kong and mainland China together accounted for 46% of the nearly 19,724 counterfeit-goods seizures made by U.S. Customs and Border Protection.²

The problem extends well beyond physical seizures. Fender identified nearly 32,000 online listings representing potential trademark infringement, with the

company estimating that roughly 70% of those listings were counterfeit.³ As Fender executive Ed Magee put it, addressing the problem requires manufacturers, marketplaces, and trademark holders “working together... to prevent counterfeit goods from entering the stream of commerce.”³ Zoomed out further, counterfeit goods overall are estimated to have cost the U.S. economy \$131 billion and 325,000 jobs in a single year.³ Instruments are one corner of that much larger economic problem, but the mechanics are the same one seen across every counterfeit-prone category: goods that are hard to verify move easily through resale channels and online marketplaces.

The people who ultimately absorb this risk are not abstractions. A shop that unknowingly resells a counterfeit exposes its own reputation. A musician who spends thousands of dollars on what was represented as an authentic, vintage, or simply “real” instrument has little recourse once the sale is done. And a manufacturer whose name is on a counterfeit's headstock takes the reputational hit for a product it never made.

Why Current Verification Methods Fall Short

Every method the industry relies on today shares one of two weaknesses: it depends on something attached to the instrument, which can be separated from it, or it depends on a human expert's judgment, which does not scale.

- **Serial numbers.** Serial numbers exist to help track manufacturing batches — they were never designed to resist tampering. They can be filed off, re-stamped, or duplicated directly onto a counterfeit body. Even a serial number that checks out only proves a number matches a record; it says nothing about whether the specific object in front of you is the specific object that number was originally issued to.
- **Certificates of authenticity.** A certificate is a separate paper document, which means it can be lost, forged, or paired with the wrong instrument entirely. It records someone's opinion at a point in time — it is never physically bound to the object it describes.
- **Holograms, RFID, and other add-on tags.** These solve part of the problem and introduce a new one: anything attached to an instrument after manufacture can also be removed, copied, or degrade over time. In practice, these methods authenticate the tag, not the instrument — and they add a manufacturing step and a per-unit cost to do it.
- **Expert appraisal.** This remains the most trusted method available today, and also the least scalable. It requires a specific expert, in person or working from detailed photos, and can take days and real money for a single opinion — not something a musician can do before buying, or a dealer can do at volume.

The common thread running through all four is the same: nothing on the market today verifies the instrument itself, instantly, using nothing but a device most people already carry in their pocket.

A Different Approach: The Instrument's Own Physical Identity

Every physical object carries subtle, effectively unrepeatable surface-level variation once it has been made — in an instrument's case, the wood grain, pore structure, and microscopic irregularities left behind by finishing and assembly. This variation is not a flaw to hide; it is naturally occurring, unique to that individual object, and extremely difficult to reproduce on a second object, even one built from the same materials on the same production line.

This general principle already has a name in security research: a “physically unclonable function,” or PUF. Engineering researchers have already demonstrated systems that use an ordinary smartphone camera to capture microscopic surface irregularities and verify a product's identity in seconds, without adding any tag to the object at all — an approach being explored for problems like counterfeit pharmaceuticals precisely because it solves the two weaknesses of holograms and ink: cost, and dependence on subjective human judgment.⁴ The category of approach is proven; ToneProof applies it to a category — musical instruments — that has never had it before.

ToneProof's patent-pending technology, known as PIIGRS, applies this same category of thinking specifically to musical instruments. Rather than adding anything to an instrument, ToneProof captures and archives an instrument's own optically observable surface characteristics at a point in time — at the factory, at point of sale, or whenever an owner chooses — creating a reference record for that specific, individual instrument. That same instrument can later be re-verified by anyone with a smartphone, simply by comparing what's in front of them against that original record.

In practice, that means there is nothing to attach, nothing to lose, and nothing a counterfeiter can copy from a photo or a marketplace listing — because what's being checked is the object itself, not a label sitting on top of it.

What This Means for Manufacturers

For a manufacturer, the case for this kind of verification is not abstract — it maps directly onto problems already costing real money and real trust:

- **Brand protection at the source.** Instruments can be registered at the point of manufacture, giving the manufacturer itself — not a third-party dealer,

grader, or appraiser — the authoritative reference record for every unit that leaves the factory.

- **Counterfeit and gray-market defense.** A fast, no-equipment way for customs officials, retailers, or a manufacturer's own brand-protection team to check a suspect instrument against factory records — rather than relying on visual inspection of logos, inlays, and body curvature alone, which seizure records show counterfeiters are already replicating convincingly.
- **Warranty and service integrity.** Confirm that an instrument presented for warranty service is the actual unit the manufacturer sold — not a counterfeit, and not a swapped or parts-built instrument passed off as original.
- **Resale and secondary-market trust.** Manufacturers increasingly care about their brand's presence in the resale market, which industry estimates place in the billions of dollars and growing. A manufacturer-backed verification option extends brand trust into that market instead of ceding it entirely to third-party graders and online forums.
- **Low operational friction.** Because the “signature” being used is the instrument's own surface, there is no added component, no per-unit hardware cost, and no new point of failure to build into a manufacturing line. Registration works with what's already there.
- **A new product opportunity, not just a defensive one.** Authentication becomes something a manufacturer can offer directly to owners and dealers as a value-added feature — supporting resale value, insurance, and provenance — rather than remaining a pure cost center.

Status and Next Steps

ToneProof's underlying technology is patent-pending in the United States. The company is currently building toward a musician- and dealer-facing verification experience — designed to be as simple as pointing a phone at an instrument and getting a clear answer — and is actively looking to start conversations with instrument manufacturers interested in exploring what factory-level registration could look like for their own product lines.

ToneProof is a solo-founder company built around a simple premise: an instrument's authenticity should be something anyone can check, instantly, without special equipment — not something that depends on a serial number that can be altered, a certificate that can be forged, or an expert who isn't in the room.

For manufacturers, dealers, or collectors interested in discussing a pilot, licensing conversation, or simply learning more, ToneProof welcomes the conversation.

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Sources

1. Fraud Magazine (Association of Certified Fraud Examiners), "Counterfeit guitars flood global markets," June 2025.
2. Rolling Stone, "U.S. Border Agents Seize \$18 Million of Fake Gibson Guitars," 2024; figures on the 2021 Dulles seizure and 2023 CBP seizure geography per Fraud Magazine, June 2025 (same source as note 1).
3. National Association of Manufacturers, "Fender Fights Counterfeiting," nam.org.
4. NC State University College of Engineering, "New authentication system uses unclonable, microscopic features to detect counterfeits with smartphone," 2022, describing physically unclonable function (PUF) research and its application to anti-counterfeiting; cited here as background on the general scientific category, not as a description of ToneProof's own technology.

This document is provided for general informational purposes. Market and seizure figures are drawn from third-party industry and news sources as cited above and are presented for context; ToneProof, LLC does not independently verify third-party statistics. Nothing in this document should be read as a technical disclosure of ToneProof's patent-pending methods.