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| RESEARCH ARTICLE

Balancing Scanning Control Against Floor Efficiency: Verification-point design for RF putaway, picking, and physical inventory in SAP Extended Warehouse Management

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| ABSTRACT

Every scan an operator makes is a small tax on time and a small guarantee of accuracy, and the art of radio frequency design is deciding which scans are worth the tax. Ask for too few confirmations, and stock ends up in the wrong bin or shipped from the wrong batch; ask for too many and the operator slows down, tires, and starts looking for shortcuts. This paper examines how SAP Extended Warehouse Management lets a team tune that balance through verification profiles, and how to set verification points sensibly across putaway, picking, and physical inventory. It grounds the discussion in the standard verification mechanism, compares it with research on data capture accuracy and human factors in order picking, and offers a simple rule for deciding, field by field, whether a check earns its keep. Done well, the result is scan-verified accuracy near the industry best of 99.9 percent with fewer confirmations than the standard flow demands, and screens that operators trust rather than fight.

| KEYWORDS

SAP EWM; RF framework; verification profile; scanning; picking accuracy; human factors; ergonomics; physical inventory.

| ARTICLE INFORMATION

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1. Introduction

There is a quiet tension in every warehouse that runs on handheld scanners. Each confirmation the system asks for buys a little accuracy and costs a little time, and those little costs add up across thousands of transactions a shift. Push the control too hard and the floor slows to a crawl, operators grow frustrated, and, worst of all, they invent ways around the screen. Loosen it too far and the errors the scans were meant to catch start slipping through. The job is to put the checks exactly where they pay off and nowhere else.

SAP EWM gives you a precise instrument for this, the verification profile, and the point of this paper is to use it well. The standard radio frequency transactions, left alone, ask the operator to confirm every field, which is often more than the situation needs. Knowing which of those confirmations to keep and which to drop, and doing it differently for putaway, picking, and counting, is what separates a fast, accurate floor from a slow or sloppy one.

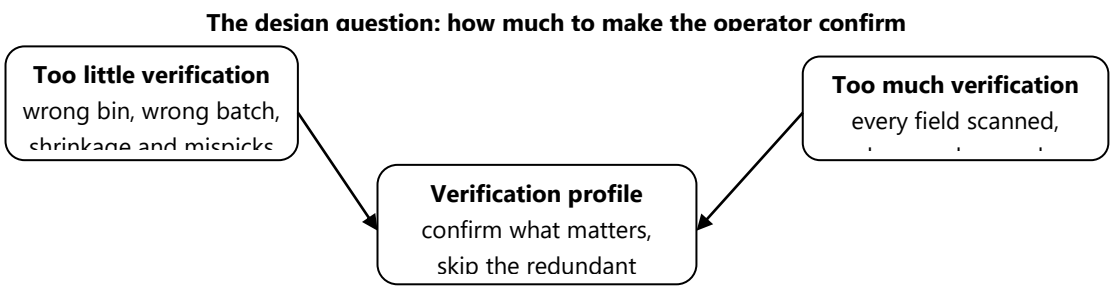

Figure 1. Too little verification lets errors through; too much slows the floor and breeds workarounds. The verification profile is where a team finds the middle, confirming what matters and skipping what is redundant.

2. Literature Review

Two research threads inform this balance: the evidence on how data capture accuracy responds to scanning, and the human factors work on the people doing the picking.

2.1 Data Capture Accuracy

The accuracy case for scanning is not subtle. Keyed entry runs at roughly one error in 300 characters, while a bar code scan sits near one in three million, and pick error rates fall from the one to three percent typical of loosely controlled operations to well under half a percent once scan verification is in place. But accuracy is not free. Scanning verified field is a keystroke or a scan, and the same literature that praises scanning also shows diminishing returns: verifying a value the system already knows to be correct adds cost without adding certainty.

2.2 Human Factors in Order Picking

Grosse, Glock, and Neumann (2017) argue that the picker is a first-class variable in warehouse performance, not an afterthought. Their content analysis of the human factors literature shows that mental workload, fatigue, and task design shape both speed and error rate, which is exactly what a verification profile touches. Davis (1989) adds the adoption angle through his technology acceptance model: a screen perceived as needlessly heavy is a screen people work on, and when workload needs measuring rather than guessing, the NASA Task Load Index (Hart and Staveland, 1988) is the standard tool. A verification point, in other words, is as much an ergonomic decision as a control one.

2.3 Positioning This Paper

The literature tells us scanning raises accuracy sharply and that operator workload matters, but it says little about how a real warehouse management system lets you tune the trade-off. This paper treats SAP EWM verification profiles as that tuning knob, and sets out how to turn it, process by process.

3. Scope and Method

This is a synthesis, not a study with field data. The account of verification profiles and the RF framework reflect standard SAP EWM functionality, including verification objects, profile determination, and the performance settings for asynchronous confirmation. The framing around accuracy and workload is drawn from the peer-reviewed work in Section 2, and the benefit figures are published industry benchmarks applied to a hypothetical baseline for illustration.

4. How Verification Works in SAP EWM

The mechanism is simpler than its effect. Out of the box, standard RF transactions require the operator to verify every field on the screen, which, as SAP itself notes, is usually more than necessary because much of the information is redundant. If a handling unit was already confirmed into a bin at putaway, asking the picker to confirm both the handling unit and the source bin buys nothing. A verification profile is the object that fixes this: you define as many profiles as you need and assign to each the verification objects that have to be confirmed, for example the source storage bin, the pick handling unit, or the quantity.

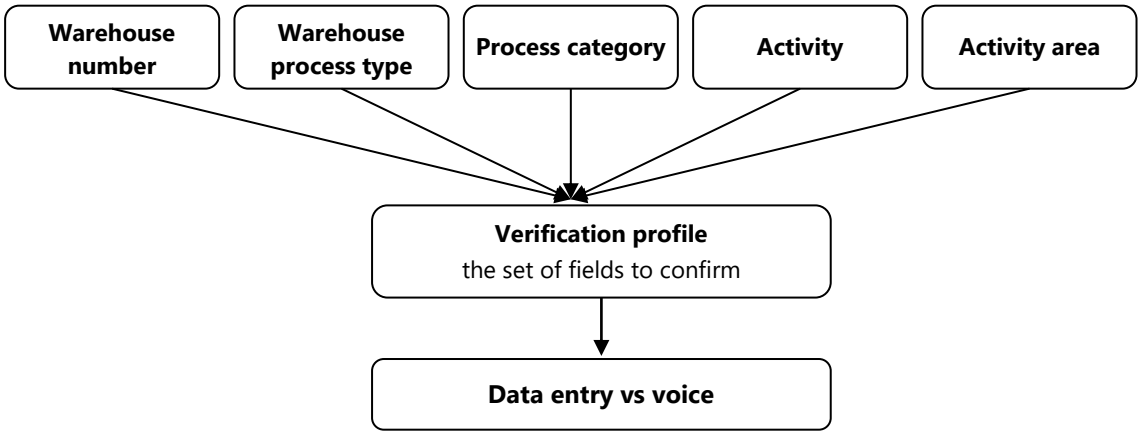

Figure 2. Verification profile determination. EWM picks the right profile from any combination of warehouse number, warehouse process type, process category, activity, and activity area, and can apply a different profile for keyed data entry than for voice.

The profile's power comes from how precisely it can be targeted. EWM determines which profile applies based on any combination of warehouse number, warehouse process type, process category (such as putaway, stock removal, or physical inventory), activity, and activity area. On top of that, it distinguishes ordinary data entry, a device with a screen and a scanner, from voice recognition,

so a hands- and eyes-free voice flow can carry a different verification burden than a screen. The result is that you can be strict in the fast-moving pick face and relaxed in a controlled bulk area, all without touching a line of custom code.

5. Designing the Points, Process by Process

The right set of checks varies by task because the risk does. A useful way to think about it: verify a value when it is first established or when getting it wrong would be costly and hard to catch later and skip it when the system already knows it and trusts it.

Verification objects, switched on only where they earn their place

Putaway	Picking	Physical inventory
Dest bin	Source bin*	Bin
HU	Pick HU	HU
Product / Batch	Product / Batch	Product / Batch
Confirm qty	Confirm qty	Blind count

* source bin verification can be skipped when the HU was already confirmed into that bin at putaway

Figure 3. Verification objects by process. The checks that carry real risk stay on; the redundant ones come off. For example, source-bin verification can be skipped at picking when the handling unit has already been confirmed in that bin during putaway.

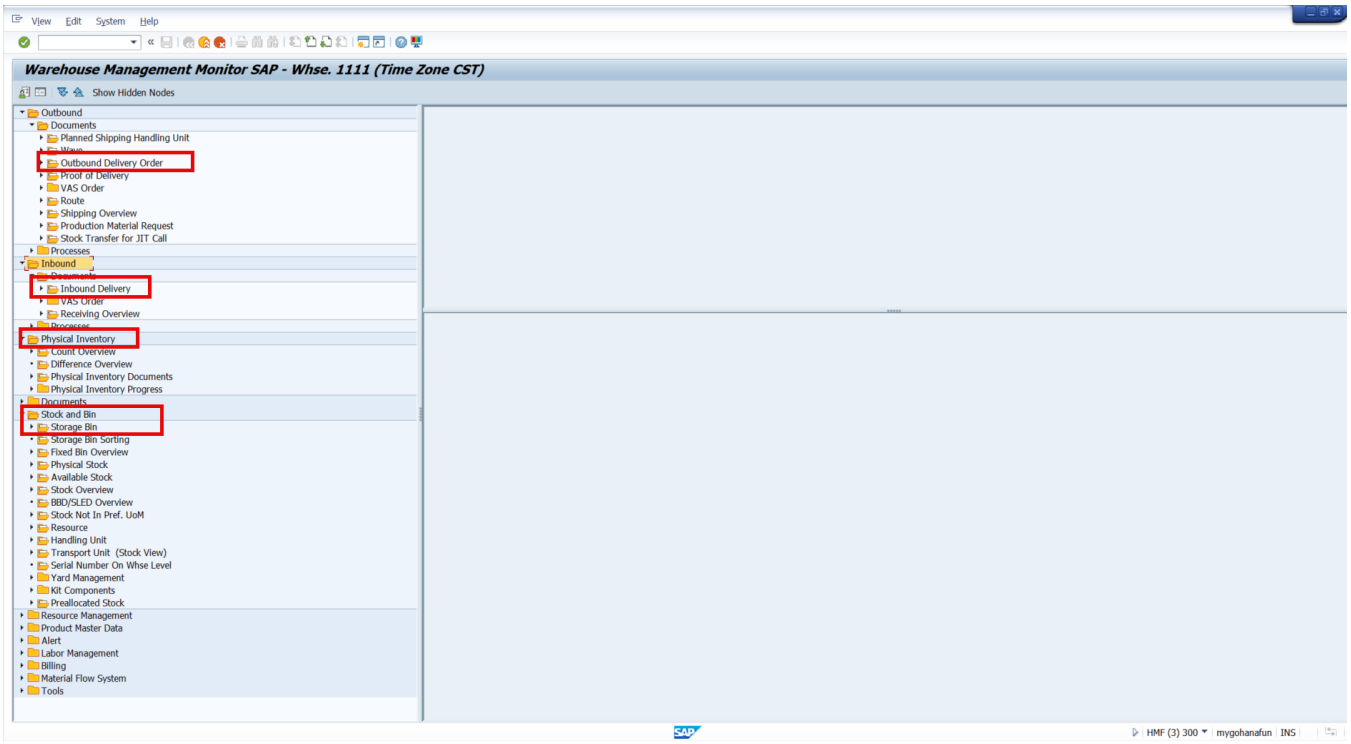

Figure 4. Overview of the process: inbound, outbound, and physical inventory.

5.1 Putaway

Putaway is where a batch and location are first bound together, so be thorough. Confirming the destination bin, the handling unit, the product and its batch, and the quantity here pays for itself, because every later transaction inherits this accuracy. A weak putaway check is the root of most downstream mysteries.

5.2 Picking

Picking is the highest-volume transaction, so trimming redundant checks matters most here. The product, the batch where it applies, and the quantity are worth confirming because a wrong pick ships to a customer. The source bin, however, is often redundant: if the handling unit was confirmed into that bin at putaway, verifying the bin again at picking simply slows the operator without adding certainty. Dropping that one check, exactly the example SAP gives, is a clean win.

5.3 Physical Inventory

Counting has its own logic. Here you want the location and the handling unit verified so you know precisely what is being counted, but the count itself is best entered blind, without showing the operator the expected quantity, so that a real discrepancy surfaces instead of being quietly confirmed away. The point is to verify the frame of the count while keeping the number honest.

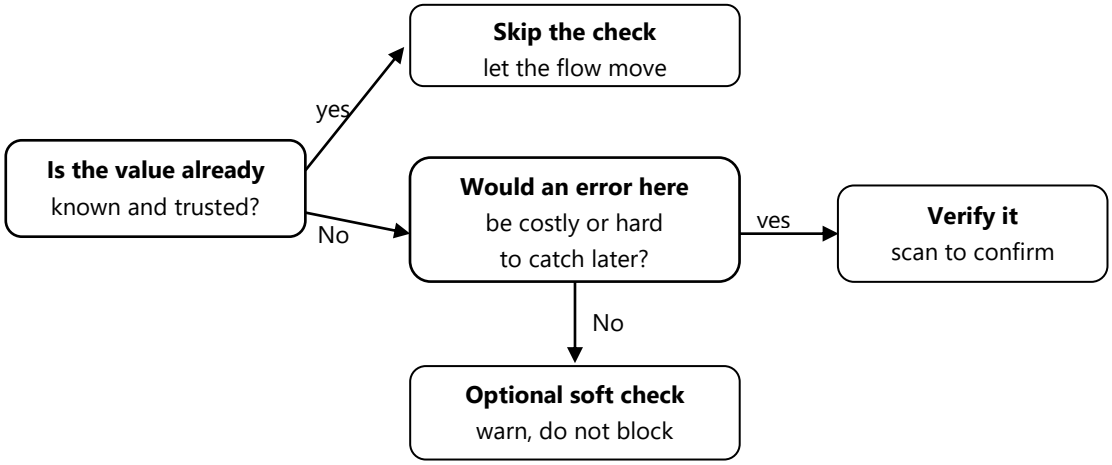

Figure 5. A rule for each field. Skip a check when the value is already known and trusted, verify it when an error would be costly or hard to catch, and use a soft check that warns rather than blocks for the in-between cases.

6. Keeping the Screen Fast

Trimming verification is one half of a responsive screen; hiding database latency is the other. EWM offers two performance settings that let the operator keep moving while the system catches up. Asynchronous delivery update lets a pick confirmation post immediately and updates the corresponding outbound delivery order item afterward, in an RFC queue, instead of making the operator wait. Asynchronous pick warehouse task confirmation works in the same spirit, letting the next screen appear before the database has finished. Neither change what is posted; nor change how quickly the floor feels the screen responds.

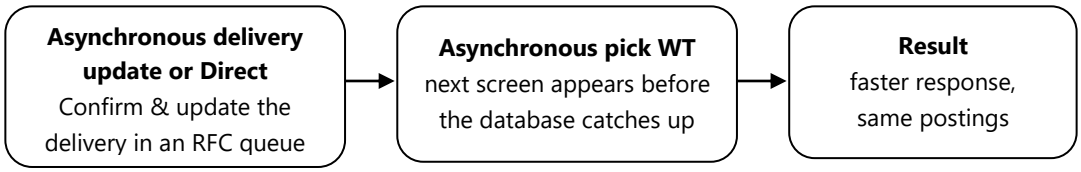

Figure 6. Performance settings. Asynchronous delivery updates and asynchronous pick confirmations let the operator move to the next task while the database work completes in the background, with no change to the postings.

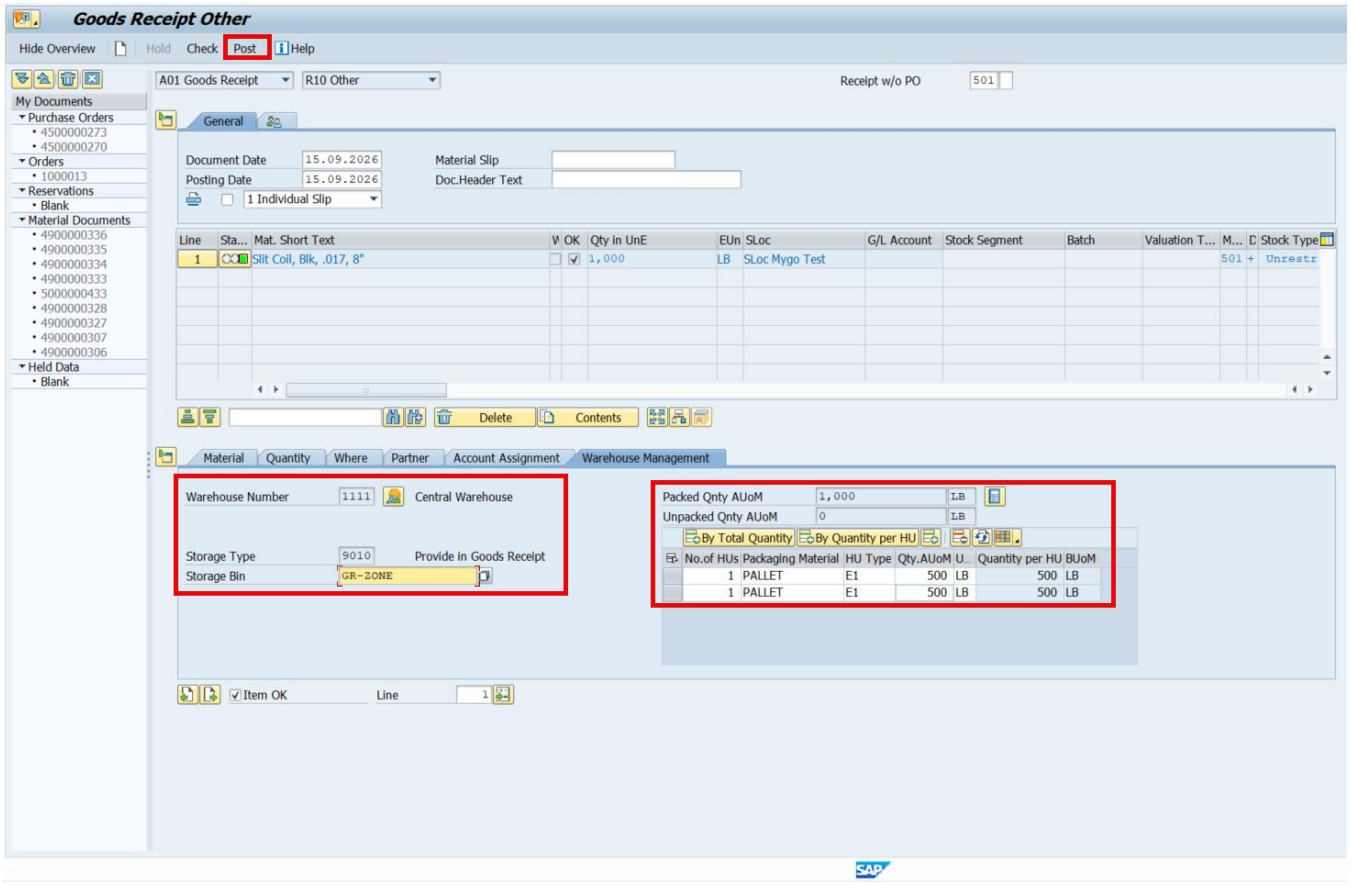

Figure 7. Asynchronous direct packing within the warehouse.

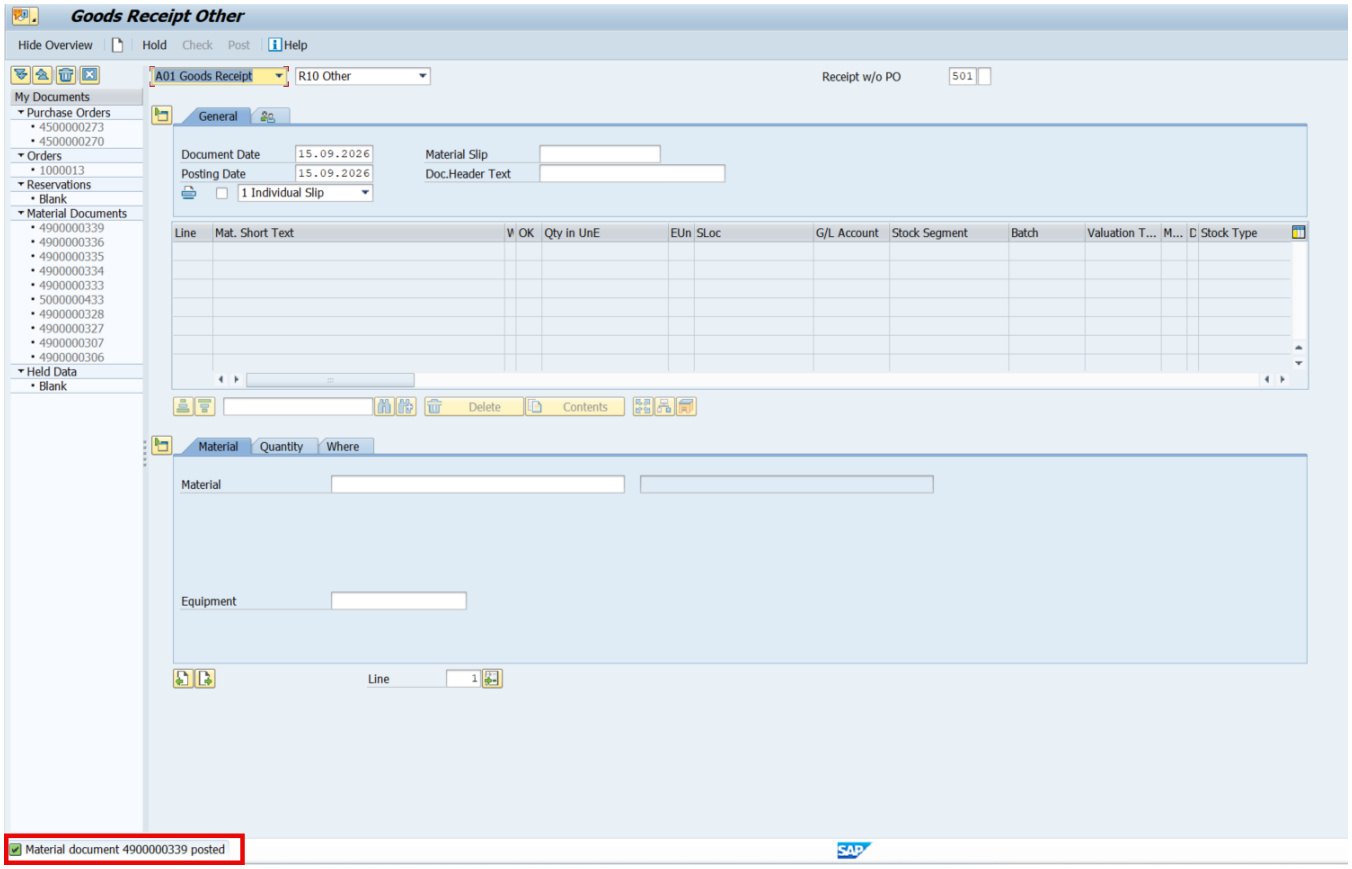

Figure 8. Material document posting for stock received in the warehouse.

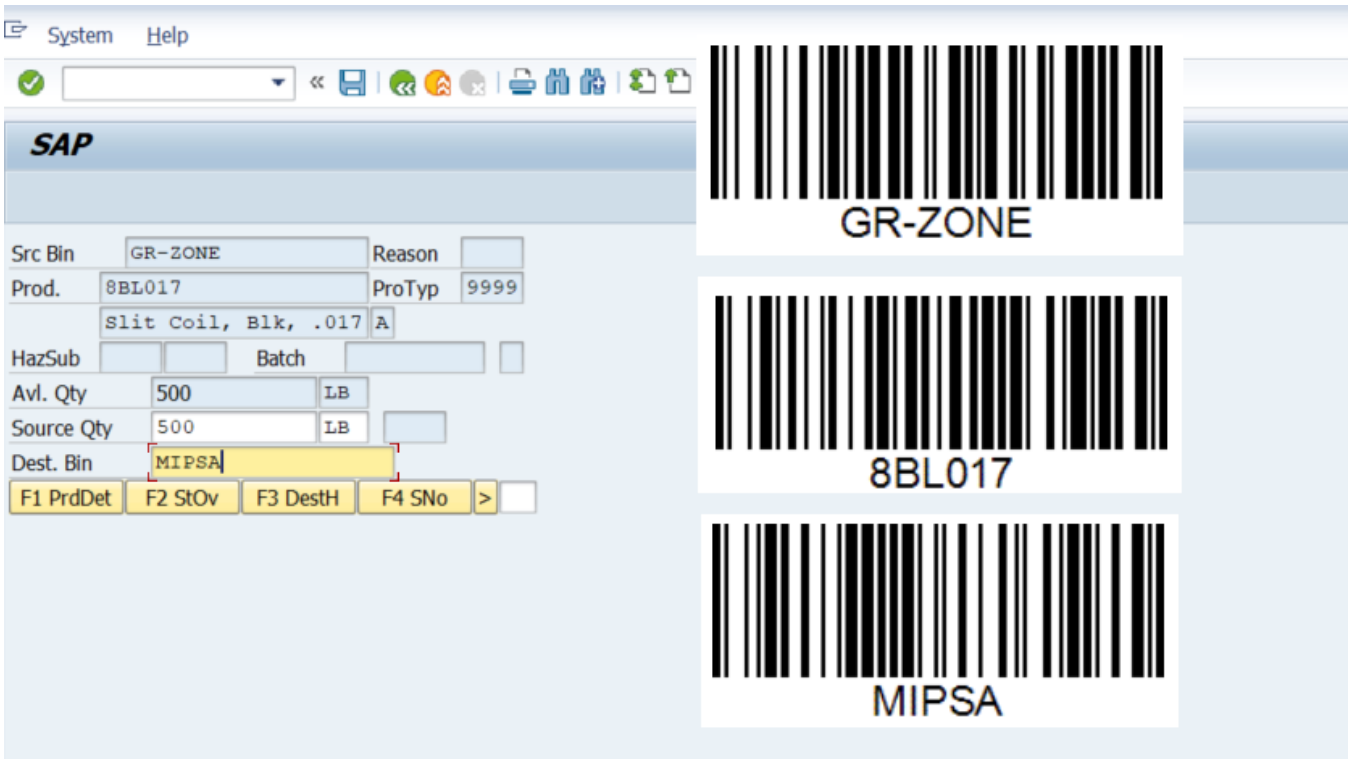

Figure 9. RF step: scan the staging bin to move material to the destination location.

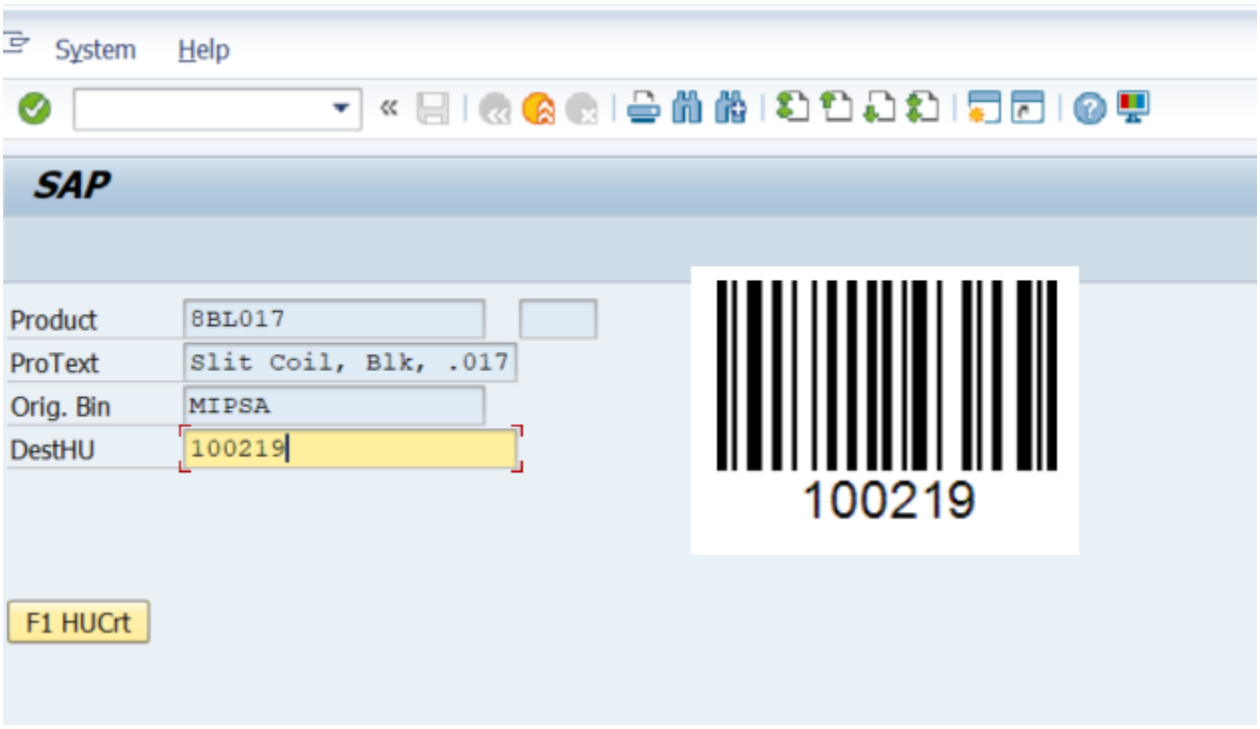

Figure 10. RF step: move material to the destination with handling-unit confirmation (pack material).

7. A Rule of Thumb and a Caution

The design rule is short: confirm what is being established for the first time, confirm what is expensive to get wrong, and skip what the system already knows. Everything else is judgment about where a given warehouse sits on the risk curve.

- **Tie profiles to the work, not the whole warehouse.** Use warehouse process type, activity, and activity area so the pick face and a bulk store can differ.
- **Give voice its own profile.** A hands-free flow tolerates a different set of confirmations than a screen, so tune it separately.
- **Keep the count blind.** Verify the location and handling unit in physical inventory but never show the expected quantity before the count.
- **Watch for workarounds.** If operators are scanning a fixed label taped to a cart to satisfy a check, that check is theatre, and it is time to remove it.

8. Benefits and Business Case

The bottom line first. Verification on the right fields holds pick accuracy near 99.9 percent, and dropping redundant confirmations on the highest-volume transactions returns that accuracy as speed. Put concretely, for a 5,000-line-a-day operation, the combination is worth on the order of $1.4M to $1.7M a year, most of it in avoided mispicks, the rest in recovered picker time and cleaner inventory. You get control without paying the full-time bill.

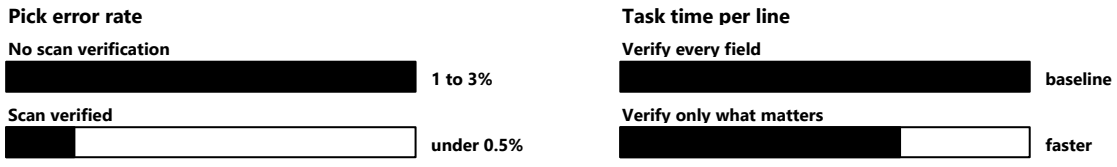

Figure 11. Benefits at a glance. Scan verification drives the pick error rate from one to three percent of loose control down under half a percent, while verifying only what matters trims the time each line takes.

The matrix reads the gains area by area. The figures are industry benchmarks and directional ranges, so what any one site sees turns on its starting point, its volumes, and its scope. Treat them as planning numbers, not promises.

Benefit area	Quantified gain	How verification-point design delivers it	Financial or operational impact
Pick and putaway accuracy	**1 to 3% down to under 0.5**	Scan verification on the fields that carry risk: bin, HU, product, batch	$50 to $75 saved per mispick avoided
Task time per line	**~3 sec per line**	Verification profile switches off the redundant fields the standard flow demands	Lower labor on the busiest transactions
New hire ramp	**faster onboarding**	A shorter, guided confirm sequence lowers cognitive load	Less supervision, quicker peak ramp
Shrinkage and misplacement	**Fewer lost pallets**	The checks that matter, bin and batch, stay on	Cleaner inventory, fewer searches
Adoption	**fewer workarounds**	Operators stop fighting a screen that asks for the obvious	Sustained, honest scanning
Responsiveness	**snappier screens**	Asynchronous delivery and pick confirmation hide database latency	Throughput holds up under load

Two levers carry most of the money. The first is accuracy: moving pick errors from the one to three percent of loose control down under half a percent removes the rework, the reshipping, and the customer call that follows every wrong carton. The second is the time handed back: a single redundant confirmation taken off the busiest transaction, multiplied across every line every day, is hours of picker time that were buying nothing.

8.1 Illustrative Business Case

Put the benchmarks against a mid-sized operation, and they come out roughly like this.

Benefit lever	Estimated annual value
Mispicks cut from 2% to under 0.5% (about 19,500 fewer errors a year at $60 to $70 each)	**$1.2M to $1.4M a year**
One to two redundant confirmations removed across roughly 10,000 RF transactions a day	**About $80K to $90K a year (10 to 12 hours of labor daily)**
Fewer misplaced pallets and cleaner counts from verified putaway	**$50K to $150K a year in avoided search, re-slotting, and expedites**
Faster new hire ramp on a shorter, simpler screen	**tens of thousands a year at peak**
Indicative annual total	**on the order of $1.4M to $1.7M a year**

Illustrative only. Figures apply WERC and Aberdeen picking benchmarks, a $50 to $75 mispick cost, and typical distribution center labor rates to a hypothetical 5,000 lines a day operation running 260 days a year. A real case should be built from the site's own error rate, line volume, mispick cost, and labor rate.

The mapping below turns the rule into a starting configuration for the three core processes. It is a sensible default, not a mandate; a high-value or heavily regulated operation will verify more, and a low-value bulk flow can verify less.

Process	Fields worth verifying	Why
Putaway	Destination bin, HU, product and batch, quantity	This is where the batch and location are first fixed, so verify them well
Picking	Pick HU, product and batch, quantity; source bin only if not already known	Skip the source bin when the HU was confirmed into it at putaway
Physical inventory	Bin, HU, product and batch; count entered blind	A blind count with a verified location is the honest way to find discrepancies

9. Discussion

The claim here is small and practical: a verification point is worth keeping when it establishes or protects something valuable, and worth dropping when it only restates what the system already knows. EWM makes this tunable at exactly the right grain, by process, activity, area, and entry mode, which means the balance between control and speed is a configuration decision rather than a compromise baked into the software.

Where practice outruns the tidy rule is in the human response. The literature is clear that a screen perceived as heavy gets worked around, and a workaround is worse than a dropped check because it looks like compliance while providing none. That is why the caution about theatre matters: the honest measure of a verification profile is not how many checks it contains but how few errors reach the customer and how little the operator resents the screen.

Two limits are worth naming. The benefit figures are benchmarks rather than measurements from one controlled rollout, so they indicate magnitude rather than a promised result, and the ergonomic claims, while well supported in general, would be sharper with a workload study, using an instrument like the NASA Task Load Index, comparing a full verification flow against a trimmed one on the same processes.

10. Conclusion

A handheld screen that asks for everything is not safer than one that asks for the right things; it is just slower, and slow screens get gamed. SAP EWM verification profiles let a team place each check deliberately, thorough at putaway where accuracy is born, lean at picking where volume is highest, and honest at counting where the number must stay blind, and then keep the whole thing responsive with asynchronous confirmation. The reward is accuracy near the industry best with fewer confirmations than the standard flow demands. Verify what matters, trust what the system already knows, and let the floor move.

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[6]. *Product and configuration details on verification profiles and the RF framework reflect SAP EWM standard functionality. Benefit figures draw on WERC and Aberdeen picking benchmarks and barcode scanning error-rate analyses. Release-specific behavior should be validated against current SAP documentation. All third-party texts are paraphrased, not reproduced.*