Landed Cost: The Duty Line Everyone Underestimates

> A $10 unit cost, $8 freight, 25% duty rate. Duty on cost alone: $2.50. Duty on the real dutiable base, cost plus freight: $4.50. The $2 gap is not a rounding error, it is a fixed mistake in what the duty rate applies to.

Three numbers on this platform share the same quiet failure mode: a calculation that looks complete because it produces a real number, but is built on a narrower cost base than the one that actually applies. Landed cost, detention exposure, and consolidation savings all have a naive version and a correct version, and the gap between them is never obvious from looking at either number alone.

Landed cost: duty on cost alone versus duty on cost plus freight

A $10 unit cost, $8 freight cost per unit, 25% duty rate, $0.50 in other fees. Duty calculated on unit cost alone: $2.50, for a naive landed cost of $21.00. Duty calculated on the real dutiable base, cost plus freight ($18): $4.50, for a landed cost of $23.00. The $2.00 per-unit understatement, about 9.5% of the naive total, comes entirely from applying the duty rate to the wrong base. Standard customs valuation applies duty to cost plus freight and insurance to the port of entry, not to product cost in isolation, so the naive number is not a simplification, it is simply wrong.

The understatement scales with how large freight is relative to unit cost. A $50 unit cost with $10 freight at a 20% duty rate understates by $2.00 per unit, about 2.8% of the naive total, a smaller share because freight is a smaller fraction of the dutiable base. High-freight-share shipments (bulky, low-value goods relative to shipping cost) see the largest gap between the naive and correct duty figures.

Detention cost: full dwell time versus dwell time past free allowance

Detention charges apply only to time past the carrier's free time allowance, not the full dwell time. A shipment sitting 10 hours with an 8 hour free allowance and a $75/hour detention rate owes detention on 2 billable hours, $150 per shipment, not 10 hours worth ($750). Across 40 shipments a month, that is $6,000 in real exposure, not the $30,000 a full-dwell-time estimate would suggest. Netting out the free time allowance correctly is the difference between a moderate-risk number and one that looks four to five times worse than reality.

Consolidation savings: a volume-conserving count versus a naive gap subtraction

Estimating how many shipments could be saved by consolidating below a utilization threshold is not as simple as subtracting the utilization gap from the shipment count. A volume-conserving calculation, one that actually re-packs the same total volume into fewer, fuller shipments, at 45.5% average utilization across 20 monthly shipments consolidated to an 85% threshold, finds 11 shipments needed instead of 20, a savings of 9 shipments and $10,800 a month at $1,200 per shipment. A naive gap-subtraction estimate undercounts this by at least one shipment in the same scenario, because it does not correctly account for where the freed-up capacity actually lands once shipments are repacked.

Key takeaway. The naive version of a freight or duty calculation is not automatically conservative or automatically wrong in a predictable direction, it is simply built on the wrong base. Check what a rate actually applies to (the full dutiable base, the billable time past free allowance, the true consolidated shipment count) before trusting a quick estimate.

Assumptions

- Duty rate is applied to the dutiable base (unit cost plus freight cost per unit) per standard customs valuation practice, not to unit cost alone.

Sources

- Standard customs valuation practice: duty rate applies to the dutiable base (product cost plus international freight and insurance to the port of entry), not to product cost alone

Frequently asked questions

Does the duty-base mistake always understate the true cost?

In the landed cost case here, yes, since duty on cost alone is always less than duty on cost plus freight when freight is a positive number. The magnitude of the understatement depends on how large freight is relative to unit cost and the duty rate itself, so it is worth checking on a shipment-by-shipment basis rather than assuming a flat percentage.

Why would a shipper track detention cost with the free time allowance instead of full dwell time?

Carriers only bill for time past the contracted free allowance, so a full-dwell-time estimate substantially overstates real financial exposure and can lead to over-investing in dwell-time reduction relative to the actual dollars at risk. Netting the free allowance out gives a number that matches what would actually appear on an invoice.

What makes the consolidation calculation "volume-conserving"?

It solves for the number of shipments needed to carry the same total freight volume at the target utilization threshold, rather than assuming the utilization gap translates directly into a shipment count reduction. The two approaches usually land close but not identical, and the volume-conserving method is the one that matches how consolidation actually works in practice, repacking the same freight into fuller containers.

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