KINGSFORM METALWORKS

ENGINEERING TOOLKIT

COST REDUCTION HANDBOOK

Design-to-cost, manufacturing efficiency, quality economics and supply-chain improvement

REMOVE STRUCTURAL COST

Challenge parts, features, process steps, specifications and handling that do not create customer value.

PROTECT FUNCTION

Use evidence before changing strength, fit, corrosion protection, safety, quality or regulatory requirements.

SUSTAIN THE SAVING

Update drawings, BOMs, routings, inspection plans, packaging and purchasing data after validation.

DOCUMENT	VERSION	RELEASE DATE	LANGUAGE
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FORMAT	**OWNER**	**CONTACT**	**WEBSITE**
A4 PDF reference	KingsForm Engineering	info@kingsformmetalworks.com	kingsformmetalworks.com

Engineering reference only. Validate every change against function, safety, durability, compliance, customer requirements and capable production before release.

01 PURPOSE AND COST MODEL

Reduce total cost without exporting risk to quality, assembly or the customer

This handbook provides a practical method for reducing the total cost of fabricated metal parts and assemblies. It covers design, material use, process routing, tolerance, joining, finishing, inspection, packaging, logistics and volume economics.

CONTROLLED CHANGE FORMAT

Record baseline + proposed change + technical reason + annual volume + one-time cost + unit saving + validation evidence + approval + updated documents.

Cost is more than the supplier unit price

Compare total landed and lifecycle cost. A cheaper part can create a more expensive assembly, inspection plan, package or field failure.

Cost element	Typical contents	Reduction question
Material	Purchased mass, grade premium, minimum order, remnants and scrap loss	Can geometry, grade, stock size or nesting improve yield without reducing function?
Conversion	Machine time, setup, labor, consumables, utilities, fixtures and internal handling	Can steps be removed, combined, standardized or self-locating?
Quality	Prevention, inspection, rework, scrap, sorting, returns and warranty exposure	Can variation be prevented at source and verification focused on real risk?
Supply chain	Packaging, freight, duty, inventory, expediting, cash and obsolescence	Can pack density, lead time, order pattern or local supply be improved?

THE TARGET IS NOT THE LOWEST PIECE PRICE

Approve changes on total landed cost, functional risk and repeatability. A price reduction that increases defects, line stoppage, inventory or field risk is not a saving.

02 OPPORTUNITY MAP AND PRIORITIES

Remove, simplify and standardize before optimizing

The best cost reductions normally come from changing what must be made, not from asking the same process to run faster or cheaper. Review the product and value stream with design, manufacturing, quality, purchasing, logistics and the supplier together.

Five cost-reduction levers - address them in this order

1	2	3	4	5
REMOVE	SIMPLIFY	STANDARDIZE	STABILIZE	OPTIMIZE
function or part	geometry / process	material / tools	quality / flow	price / logistics
Eliminate non-value work	Reduce steps and variation	Reuse proven capability	Prevent losses and delay	Tune remaining cost

DO NOT START WITH DISCOUNT NEGOTIATION: remove structural cost before asking a supplier to absorb it.

Lever	High-value questions	Evidence before release
Function / architecture	Can parts, fasteners, covers, brackets, welds or adjustments be removed or integrated?	Load cases, service access, safety, customer use and failure-mode review
Specification	Is every tolerance, finish, material grade and inspection requirement functionally necessary?	Fit analysis, environmental data, capability and acceptance method
Process	Can cutting features self-locate parts, eliminate secondary drilling or reduce fixturing?	Prototype, cycle study, fixture trial and first-article inspection
Flow	Where are queues, transport, waiting, overproduction, changeovers and repeated handling?	Current-state map, timestamps, WIP and future-state ownership
Commercial	Are forecast, batch size, MOQ, tooling, material ownership and logistics aligned?	Volume scenarios, break-even model, demand risk and contract terms

PRIORITIZATION SCORE

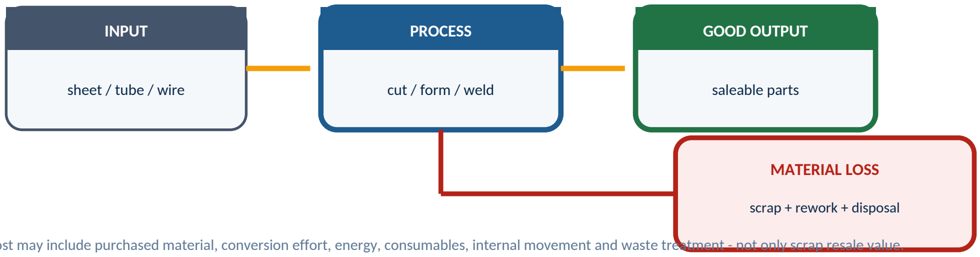
A practical ranking is annual benefit x confidence x probability of adoption / implementation effort. Keep safety, compliance and customer-critical risks as separate gates, not as low-weight scoring factors.

03 MATERIAL UTILIZATION AND MFCA

Treat every lost kilogram as purchased material plus added process cost

Material is often the largest visible cost in fabricated metal products. Measure mass flow from purchased stock to good output, remnant, recoverable scrap, rework and disposal. ISO 14051 formalizes material flow cost accounting as a way to trace physical material flows and evaluate associated costs.

Material-flow cost view: losses carry more than material purchase cost



Loss cost may include purchased material, conversion effort, energy, consumables, internal movement and waste treatment - not only scrap resale value.

Yield = net good-part mass / purchased material mass

Metric / calculation	Formula or method	Action enabled
Mass yield	Good-part mass / purchased material mass	Compare nests, stock widths, cut lengths and alternate blank orientation
Scrap cost	Lost material x purchase cost - scrap recovery + processing already consumed	Expose hidden cost of rejected parts and late-stage defects
Remnant utilization	Usable remnant issued to later orders / total remnant generated	Set minimum remnant dimensions, ID and storage rules
Cutting loss	Kerf + web + trim + skeleton + crop ends + test coupons	Change common-line rules, part mix, edge margin or standard stock size
Good output per heat / batch	Accepted units after rework and sorting	Locate grade-, coil-, operator- or route-specific losses

EXAMPLE

A 1.00 kg part with 70% mass yield consumes 1.43 kg of purchased stock before rework. Improving yield to 80% reduces purchased mass to 1.25 kg per good part - a 12.5% reduction in input mass, before considering lower cutting and waste handling.

DO NOT CHASE YIELD ALONE

A denser nest can increase heat, distortion, unloading time, scratches, mixed-part errors or inability to use grain direction. Optimize the complete route and quality result.

04 MATERIAL AND SPECIFICATION STANDARDIZATION

Reduce premiums, minimum orders, changeovers and approval effort

A controlled material library can reduce purchase fragmentation while preserving required strength, corrosion performance, forming and welding behavior. Standardization is not the same as uncontrolled substitution.

Standardization target	Cost mechanism	Required control
Preferred grades	Higher purchasing volume, fewer certificates, less residual stock and simpler welding procedures	Define mechanical, chemical, corrosion and process requirements; approve alternatives by specification
Preferred thicknesses / walls	Fewer stock items, setup changes, tools and inspection plans	Structural review, buckling/deflection check, finish allowance and availability
Preferred tube / sheet sizes	Better stock utilization and lower special-mill minimums	Envelope, stiffness, mating components, bend tooling and market availability
Preferred fasteners	Lower SKU count, simpler tools, fewer errors and higher purchasing leverage	Strength class, corrosion, thread engagement, torque and access
Preferred colors / finishes	Longer coating campaigns, lower clean-down, simpler matching and inventory	Environment, appearance zone, color tolerance and customer approval
Common design rules	Reuse tooling, fixtures, gauges and proven processes	Published design standard plus exception workflow

Substitution check	Minimum evidence
Strength / stiffness	Yield, tensile, modulus, section geometry, load and fatigue requirements
Manufacturability	Cutting, bending radius, springback, weldability, machining, coating and distortion
Environment	Corrosion class, temperature, cleaning chemistry, galvanic contact and lifetime
Supply	Current market form, tolerance, certificate, MOQ, lead time and alternate mills
Approval	Drawing/BOM revision, customer deviation where required, first article and traceability

SAFE WORDING

Specify performance and approved standards, not a vague “equivalent material.” Two grades with similar strength may differ in chemistry, impact toughness, coating behavior, forming or weld qualification.

05 PART COUNT AND GEOMETRY SIMPLIFICATION

The cheapest component is often the one no longer required

Part reduction lowers not only material and process cost but also BOM control, receiving, storage, fixtures, fasteners, assembly labor, inspection, packaging and failure opportunities.

Design move	Potential benefit	Engineering risks to review
Integrate two brackets into one formed part	Remove welds, fasteners, alignment and part handling	Blank size, bend access, springback, local stiffness, service replacement
Use tabs/slots or formed locators	Reduce fixture adjustment and manual measurement	Clearance, coating buildup, tolerance stack, fatigue notch and weld access
Replace machined block with formed/welded structure	Lower material removal and machine time at suitable volumes	Datum stability, distortion, sealing, fatigue, cosmetic and inspection needs
Use common left/right part	Reduce SKU, tooling, setup and inventory	Assembly error, symmetry, customer interface and ergonomic function
Combine cover and mounting function	Remove hardware and secondary bracket	Service access, vibration, sealing, grounding and appearance
Replace adjustment with controlled fixed geometry	Remove slots, knobs, scales, calibration and assembly time	Range of use, field variation and customer configuration

Part-count business case	Include in saving	Include in risk / one-time cost
Recurring	Part price, fastener, assembly time, inspection, packaging, purchasing and inventory	Potential higher blank cost, cycle time or scrap of integrated part
Launch	Tooling avoided, drawings removed and supplier reduction	Prototype, new tooling, validation, documentation and service transition
Lifecycle	Fewer loose/failed connections and simplified spare logistics	Loss of replaceability; larger replacement module after damage

FUNCTION FIRST

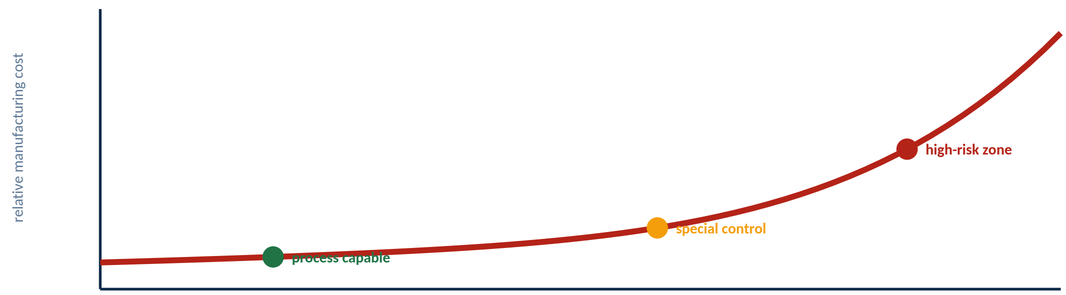
Do not merge parts only to improve the BOM count. A larger integrated component may increase tooling, repair cost, transportation damage or scrap impact. Compare system-level economics.

06 TOLERANCE OPTIMIZATION

Specify what the product needs - and what the process can repeatedly verify

Tight tolerances can require slower operations, special fixtures, controlled temperature, more inspection, lower tool life and sorting. Loose or ambiguous tolerances can create assembly and field cost. Use functional dimensioning and a capable datum strategy.

Tolerance cost is usually nonlinear



Set tolerances from function, assembly and verification needs. Do not loosen a critical characteristic or tighten a cosmetic/nonfunctional dimension without evidence.

Cost-reduction action	Evidence required	Typical result
Convert chained dimensions to functional baseline / GD&T	Assembly datum, mating condition and inspection setup	Less accumulated variation and clearer acceptance
Relax nonfunctional dimensions	Clearance, appearance, envelope and downstream use	Faster process, simpler gauges and higher yield
Separate process stages	Which dimensions are required before vs after welding/coating	Avoid controlling a pre-process value that will change later
Use realistic edge / flatness / weld tolerances	Applicable process capability and measurement uncertainty	Avoid machining, straightening or cosmetic rework
Use standard general tolerances carefully	Drawing scope, size range and excluded critical features	Reduce repetitive callouts without losing intent

CAPABILITY CHECK

For stable approximately normal processes, Cpk = min[(USL - mean)/(3s), (mean - LSL)/(3s)] is one capability indicator. Do not use Cpk alone for unstable, non-normal, mixed-stream or attribute processes; review the data and measurement system.

NEVER “JUST OPEN THE TOLERANCE”

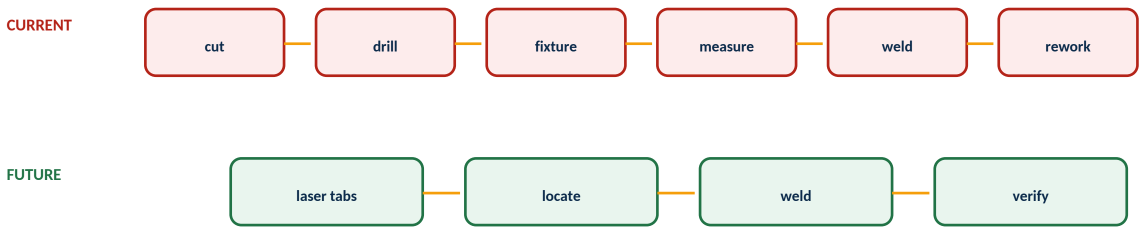
A tolerance change must be approved by the design authority and reflected in mating-part analysis, acceptance criteria and customer documentation where applicable.

07 PROCESS ROUTE SIMPLIFICATION

Remove secondary operations, queues and opportunities for error

Map every value-adding and non-value-adding step from incoming stock to shipment. Value stream mapping is useful for visualizing material and information flow, then defining a future state with fewer delays and handoffs.

Route simplification example: replace handling and joining steps with self-location



A feature added to cutting can remove a fixture adjustment, manual measurement or rework step. Confirm strength, accessibility and tolerance stack before release.

Current route symptom	Possible redesign / process change	Validation focus
Laser cut then manual drill	Cut final hole if quality and thickness permit; use piercing or formed feature	Hole size, taper, burr, fatigue and thread/fastener function
Multiple fixture resets	Add common datums, poka-yoke locators or combine operations	Access, repeatability, clamp distortion and inspection datum
Grinding every weld	Move weld, define appearance zones, use lower-spatter process or formed joint	Strength, corrosion, coating, safety and approved appearance
Straighten after welding	Balance joint layout, reduce heat input, change sequence or use formed section	Residual stress, final geometry and fixture release behavior
Repeated cleaning / masking	Change sequence, protect only critical areas, standardize plugs and contact points	Coating adhesion, electrical ground, threads and contamination
100% manual sorting	Correct process source, automate mistake-proofing or use a capable gauge	Escape risk, false reject, gauge capability and reaction plan

COUNT TOUCHES

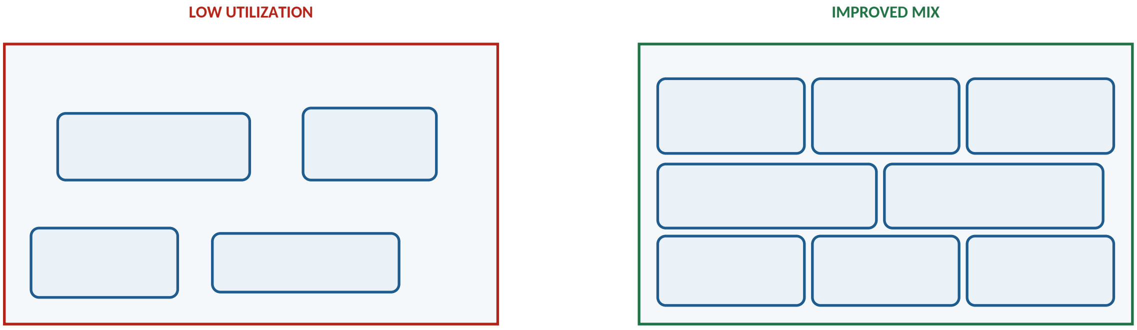
Every pickup, reorientation, container transfer and identification step consumes time and creates damage or mix-up risk. Track part travel distance, queue time and number of touches alongside machine cycle time.

08 CUTTING, NESTING AND BATCH STRATEGY

Optimize stock, setup and flow together

Cutting economics depend on stock dimensions, nest yield, machine time, pierce count, edge requirements, unloading, part identification, remnant handling and downstream batch size.

Material utilization: geometry and order mix change the nest



Yield depends on part shape, web, edge trim, common-line rules, grain, cosmetic side and remnant policy.

Lever	Cost reduction mechanism	Constraints / risks
Common-line cutting	Less cut length and material web	Heat, edge quality, separation, process approval and part traceability
Part family nesting	Fill unusable gaps and share stock sizes	Demand timing, mixed-part sorting, revision control and finish/grain direction
Reduce pierces / micro-tabs	Lower cycle time and consumable wear	Part movement, tab removal, edge damage and automation
Standard blank / cut length	Simpler programming, purchasing and remnants	May increase material if the standard is poorly selected
Right batch size	Balance setup time against WIP, lead time and forecast error	Overproduction, obsolescence, queue time and storage damage
Remnant control	Reuse valuable stock instead of buying new sheet/bar	ID, grade, heat, size, corrosion, storage and program access

UNIT-COST TRAP

A longer production run can reduce machine cost per part but increase WIP, inventory carrying cost, lead time and exposure to revision changes. Evaluate total demand and flow, not setup allocation alone.

09 BENDING, FORMING AND TOOLING

Standardize radii and design for available tool access

Bending cost rises with unique tooling, multiple setups, short flanges, difficult access, tight radii, high springback, orientation errors and post-form correction. Align design rules with proven machine and tooling capability.

Design choice	Lower-cost direction	Check before change
Inside bend radius	Use preferred radii compatible with standard punches/dies and material condition	Cracking, thinning, springback, appearance and minimum flange
Multiple bends	Use common setup where possible; avoid tool collisions and trapped geometry	Bend sequence, backgauge access, part removal and cumulative tolerance
Tube CLR	Reuse existing bend dies and common OD/wall families	Ovality, wrinkling, thinning, mandrel need and tangent length
Special forms / embosses	Use only when they replace parts, machining or assembly work	Dedicated tooling, volume, maintenance, tolerance and cosmetic risk
Symmetric parts	Design reversible or common-hand components where function permits	Assembly mistake-proofing and customer interface
Correction operations	Improve bend data, material control and gauging instead of manual tweak	Batch variation, grain, temper, tooling wear and process feedback

PREFERRED TOOL SET

Publish standard V-dies, punches, tube CLR and end-form tooling.

DESIGN EXCEPTIONS

Quote special tooling and setup separately; document the business case.

FEEDBACK LOOP

Capture actual bend deductions, springback and defects by material batch.

TOOLING ECONOMICS

A dedicated forming tool may be justified when it eliminates several parts or operations. Calculate break-even volume and include tool life, maintenance, storage, ownership and future revision risk.

10 WELDING AND ASSEMBLY COST

Design load paths, access and self-location before optimizing travel speed

Weld cost is influenced by joint preparation, deposited volume, number of starts/stops, access, position, fit-up, fixturing, distortion, cleaning, grinding and inspection. Assembly cost is strongly affected by part count and error-proof location.

Weld-cost logic: deposited volume and access drive time

For an equal-leg fillet, cross-sectional area scales approximately with leg size squared. Oversizing can sharply increase wire, heat, cycle time and distortion.

Weld size must still meet the governing design code, load path, fatigue, seal and corrosion requirements. Never reduce a weld from appearance alone.

Cost driver	Reduction approach	Technical gate
Excess weld size / length	Size to load and governing requirement; use intermittent weld only where permitted	Static/fatigue strength, sealing, corrosion and code/customer rules
Poor fit-up	Add tabs, stops, pilots or formed interfaces; control cut/bend variation	Gap tolerance, penetration, coating allowance and datum strategy
Difficult access	Open tool/gun path, move joint, change sequence or use mechanical fastening	Service, appearance, strength, splash and inspection
Grinding / cosmetic blending	Define appearance zones; improve process and fixture; hide noncritical joints	Sharp-edge safety, coating, contamination and customer sample
Distortion / straightening	Balance welds, reduce heat, use sequence/backstep, stiff section or machined final datum	Residual stress, dimensional stability and inspection timing
Fastener count	Use fewer common sizes, captive hardware, one-sided access or subassemblies	Preload, vibration, corrosion, service and tool clearance

SELF-FIXTURING IS NOT SELF-QUALIFYING

Tabs and slots can reduce setup time, but joint clearance, weld access, fatigue notch effect, coating buildup and final datum accuracy still require validation.

11 SURFACE FINISH AND COSMETIC REQUIREMENTS

Match protection and appearance to the real environment

Surface treatment cost is driven by pretreatment, coating type, thickness, color, texture, masking, hanging, batch size, rework and inspection. The most economical finish is the minimum complete system that meets corrosion, wear, electrical and appearance requirements.

Requirement	Potential cost reduction	Do not compromise
Color / gloss	Use standard stocked colors, wider gloss range and master sample instead of many near-duplicates	Brand/customer approval, UV stability and part-to-part matching
Appearance zones	Define Class A/B/C surfaces; allow hooks, weld tint or minor texture in hidden areas	Visible customer surfaces, hygiene, sharp edges and corrosion initiation
Coating thickness	Specify functional range rather than “maximum possible”; mask only true interfaces	Corrosion durability, electrical isolation, fit, threads and wear
Finish selection	Use powder, paint, plating, galvanizing, anodizing or passivation according to exposure	Substrate compatibility, environment, repair and compliance
Pretreatment	Standardize clean/pretreat routes and avoid redundant cleaning between processes	Adhesion, contamination, conversion coating and residue
Packing after finish	Use qualified interleaf and cure time to prevent rework	Blocking, imprint, abrasion, moisture and adhesive migration

Cost-risk example	Wrong shortcut	Controlled alternative
Outdoor carbon-steel bracket	Reduce coating without exposure data	Define corrosion environment and complete system; optimize color, masking and batching
Hidden welded frame	Blend every weld to cosmetic smoothness	Specify acceptable weld profile and only blend safety/fit/visible areas
Threaded feature	Coat thread then chase every part	Mask, use controlled allowance or select suitable post-finish hardware

SALT-SPRAY WARNING

Do not convert salt-spray hours directly into service life. Use the test only within a defined coating specification and correlate it with actual exposure, design details and failure criteria.

12 QUALITY ECONOMICS AND INSPECTION

Spend more on prevention where it removes larger failure and appraisal cost

Cost of poor quality includes scrap, rework, sorting, delay, concession, return, warranty, line stoppage and lost customer confidence. The objective is not “less inspection” by itself; it is a stable process with risk-based verification.

Quality activity	Cost role	Cost-reduction direction
Prevention	DFM review, control plan, mistake-proofing, maintenance, training and supplier qualification	Invest where it reduces repeated defects and expensive escapes
Appraisal	Incoming, in-process, final inspection, tests, gauges and reports	Focus on critical characteristics; use process controls and capable gauges
Internal failure	Scrap, rework, sorting, retest, downtime and schedule recovery	Measure by defect family and process; remove root cause rather than normalize rework
External failure	Return, warranty, field repair, customer sorting, premium freight and liability	Use severity and escape risk to protect high-consequence features

Inspection redesign	When it can reduce cost	Conditions
Move final check in-process	Defect is generated early and later work is expensive	Clear reaction plan, calibrated gauge and operator access
Use go/no-go functional gauge	High-volume mating feature with simple acceptance boundary	Gauge R&R, wear checks, master parts and correct datum simulation
Reduce sampling	Process is stable/capable and risk permits	Approved sampling plan, traceability, ongoing monitoring and escalation
Automate measurement	Repeatable high-volume measurement with actionable data	False accept/reject study, maintenance and data ownership
Remove duplicate reports	Same evidence is recreated by multiple parties	Customer agreement, source-of-truth data and retention requirements

EXPECTED-COST VIEW

A decision model may compare prevention + inspection cost with probability of escape x consequence. Probabilities and consequences must be based on credible data and must never override mandatory safety or regulatory controls.

13 PACKAGING AND LOGISTICS COST

Increase density without allowing parts to contact, deform or corrode

Packaging and freight can dominate large, light or awkward fabricated assemblies. Optimize pack quantity, cube, stackability, returnability and handling as part of the product design. Use KFR-006 and KFR-023 for detailed packaging specification and validation.

Lever	Potential saving	Risk controls
Nest / fold / detach for shipment	Lower cube and more units per pallet/container	Assembly time, scratches, missing hardware, instructions and structural damage
Increase pack quantity	Less packaging per part and fewer handling units	Gross mass, carton compression, operator handling and customer line-side needs
Returnable racks / totes	Lower recurring packaging, better protection and automation	Reverse logistics, cleaning, tracking, loss, fleet size and ownership
Standard box / pallet footprints	Purchasing scale, better warehouse and transport utilization	Void, overhang, load path and destination restrictions
Local final assembly / postponement	Ship compact components and configure near customer	Quality system, labor, tools, training, inventory and warranty boundary
Combine deliveries / milk runs	Higher truck utilization and lower premium freight	Forecast, lead time, dock schedule and disruption resilience

Logistics calculations	Formula / note
Cube utilization	Product/package volume used / available internal transport volume
Freight per good unit	(Transport + handling + duty + packaging loss) / accepted units received
Returnable break-even	Rack investment + reverse-logistics cost vs avoided disposable pack and damage cost
Inventory carrying cost	Average inventory value x annual carrying rate; include obsolescence and damage where material

DENSITY LIMIT

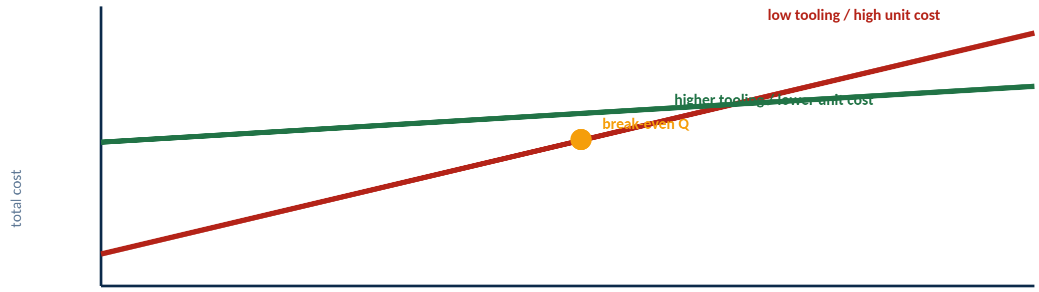
Do not increase pack density until compression, rubbing, corrosion, forklift access, center of gravity and customer unpacking are validated.

14 VOLUME, TOOLING AND AUTOMATION ECONOMICS

Select the route for realistic demand - not an optimistic forecast

Low volume often favors flexible cutting, standard tooling and manual assembly. Higher stable volume can justify dedicated dies, fixtures, robots, transfer tooling, automatic inspection or custom packaging. Model several demand scenarios.

Tooling and automation are volume decisions



Break-even quantity = incremental tooling and launch cost / unit-cost reduction. Include maintenance, changeovers, demand uncertainty and tool ownership.

Decision input	Include	Common omission
One-time cost	Design, tooling, fixtures, gauges, programming, trials, qualification and launch scrap	Internal engineering and customer approval time
Recurring cost	Material, labor, machine, consumables, maintenance, energy, quality and packaging	Tool change, stoppage, operator attendance and spare parts
Demand	Annual volume, mix, life, ramp, seasonality and forecast confidence	Revision, cancellation and product-transfer risk
Capacity	Cycle time, changeover, uptime, yield, shifts and bottleneck effect	Nominal machine speed used as actual output
Commercial	Tool ownership, amortization, maintenance, storage, transfer and end-of-life	Who pays if the forecast is not achieved

FORMULAS

Annual net saving = (baseline unit cost - future unit cost) x accepted annual volume - annual incremental cost.
Simple payback = one-time implementation cost / annual net saving. Add discounting, tax and working-capital effects for formal investment decisions.

15 SUPPLIER COLLABORATION AND CHANGE CONTROL

Give suppliers the function and the freedom to propose manufacturable alternatives

Suppliers can identify cost hidden in tooling, setup, stock availability, process sequence and inspection. The best RFQ clearly separates fixed customer requirements from negotiable design choices.

Information to share	Why it improves proposals
Annual volume and batch scenarios	Allows comparison of flexible, dedicated-tool and automated routes
Function and critical characteristics	Lets the supplier challenge noncritical features while protecting interfaces and safety
Approved materials and finish environment	Enables standard-stock and process-family alternatives
Assembly and packaging context	Reveals opportunities to integrate parts, self-locate, pack denser or postpone assembly
Current defect / rework / lead-time data	Focuses improvement on true cost rather than unit-price assumptions
Change approval and IP/tooling terms	Prevents proposals that cannot be legally, contractually or operationally adopted

VA/VE review question	Owner	Release evidence
What customer function does this feature provide?	Design / customer	Requirement, load/use case and acceptance
Why is this material/process/tolerance required?	Design / manufacturing	Analysis, standard, capability or environmental data
What cost is structural vs supplier execution?	Cost / supplier	Open cost model and route comparison
What new failure mode does the proposal introduce?	Quality / design	Risk review, prototype and test plan
Which documents and systems must change?	Program / operations	Drawing, BOM, routing, control, PO, pack and ERP updates

SUPPLIER SAVING SHARE

Where appropriate, define how verified recurring savings, tooling investment and implementation effort will be shared. Avoid incentives that reward short-term price cuts while shifting cost or risk elsewhere.

16 BUSINESS CASE, VALIDATION AND CHECKLIST

Turn an idea into a controlled and sustained saving

A cost-reduction proposal should have a named owner, baseline, technical validation, customer approval where required and a date when the saving is reflected in production and commercial systems.

Cost-reduction gate: benefit, evidence, risk and ownership

BASELINE	CONCEPT	VALIDATE	APPROVE	SUSTAIN
cost + defect + lead time	changed requirement	prototype + capability	customer + function	KPI + control plan

NO SAVING IS REAL UNTIL THE NEW METHOD IS RELEASED, REPEATABLE AND REFLECTED IN THE PURCHASE / ROUTING / CONTROL DATA.

01 Baseline drawing, BOM, routing and unit cost are revision-controlled.
02 Annual volume, product life and forecast confidence are stated.
03 Total landed cost includes quality, packaging, freight and inventory effects.
04 The customer function and critical characteristics are explicit.
05 Safety, regulatory and contractual requirements are protected.
06 Material yield and loss cost are measured with current data.
07 Material substitutions have approved technical evidence.
08 Part-count reduction has been assessed at system level.
09 Tolerance changes are supported by fit/function analysis.
10 Process route and handling steps are mapped before/after.
11 Tooling and automation use realistic demand scenarios.
12 New fixtures, gauges and maintenance cost are included.
13 Weld, fastener and joint changes meet load and service needs.
14 Surface finish still meets corrosion and appearance requirements.
15 Inspection changes are risk-based and measurement-capable.
16 Packaging and logistics changes are validated on the route.
17 Prototype or pilot quantity is defined and traceable.
18 Capability, dimensional and functional evidence is reviewed.
19 New failure modes and escalation actions are documented.
20 Customer deviation / approval is obtained where required.
21 Drawings, BOM, ERP, routing, control plan and work instructions are updated.
22 Old stock, WIP, tooling and spare parts have a transition plan.
23 Supplier commercial terms and tool ownership are clear.
24 KPI owner and post-launch verification date are assigned.

17 STANDARDS AND OFFICIAL REFERENCES

Use complete standards and confirm current status at every release

These references support quality economics, material-flow accounting, manufacturing KPIs, statistical methods, quality planning, energy performance and risk management. They do not prescribe a universal cost-reduction result. Purchase and apply the complete standard where it governs the organization or contract.

Reference	Use in cost-reduction work	Official page
ISO 10014:2021	Quality management systems - guidance for realizing financial and economic benefits	https://www.iso.org/standard/75233.html
ISO 14051:2011	Material flow cost accounting - general framework	https://www.iso.org/standard/50986.html
ISO 14052:2017	MFCA guidance for practical implementation in a supply chain	https://www.iso.org/standard/54811.html
ISO 22400-2:2014 + Amd 1:2017	Definitions and descriptions of manufacturing operations KPIs; energy KPI amendment	https://www.iso.org/standard/54497.html
ISO 50001:2018 + Amd 1:2024	Energy management systems and climate-action amendment	https://www.iso.org/standard/69426.html
ISO 10017:2021	Guidance on statistical techniques for ISO 9001:2015	https://www.iso.org/standard/77577.html
ISO 10005:2018	Guidelines for establishing and applying quality plans	https://www.iso.org/standard/70398.html
ISO 31000:2018	Risk management guidelines	https://www.iso.org/standard/65694.html
ISO 9001:2015 + Amd 1:2024	Quality management system requirements; current published edition at release date	https://www.iso.org/standard/62085.html
NIST MEP - Value Stream Mapping	Official overview of current/future-state mapping and improvement workflow	https://www.nist.gov/mep/value-stream-mapping
NIST AMS 200-9	The Manufacturing Cost Guide: A Primer, Version 1.0	https://doi.org/10.6028/NIST.AMS.200-9
NIST Design-for-Cost paper	Cost breakdown framework for early design and distributed manufacturing	https://www.nist.gov/publications/design-cost-150-approach-distributed-manufacturing-cost-estimation

STANDARD STATUS NOTE

As of 2026-07-18, ISO 9001:2015 with Amendment 1:2024 remains published while a revision is under development. ISO 22400-2:2014 also has a replacement draft in progress. Confirm status before contractual use.

KINGSFORM ENGINEERING TOOLKIT

Use this handbook with KFR-001 RFQ Workbook, KFR-003 Material Selection Workbook, KFR-004 Surface Finish Workbook, KFR-005 Inspection Workbook and KFR-006 Packaging Workbook to turn DFM ideas into controlled RFQ, validation and release data.

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