WHITE PAPER

The 50% myth.

Why EMS manufacturing in China is often more expensive than you think – a complete TCO analysis for OEM decision-makers

Materials, automation, working capital, management costs and ESG – source-based

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Executive Summary

The assumption that manufacturing in China is 30 to 50 percent cheaper remains deeply ingrained in many purchasing departments of European OEMs. It is based on a structurally incomplete comparison that considers only unit price. Anyone making sourcing decisions based solely on unit price is ignoring the realities of modern supply chains.

A comprehensive Total Cost of Ownership (TCO) analysis regularly leads to a different conclusion for medium-complexity electronic assemblies. Once all relevant cost drivers are taken into account, the actual cost advantage of manufacturing in the Far East is often only 5 to 20 percent and may even become negative for many product categories when logistics, working capital, quality management, management effort, and ESG requirements are fully considered.

This white paper analyzes the six key cost dimensions of a comprehensive EMS TCO assessment, identifies the relevant sources, and provides practical guidance for OEM decision-makers in Europe.

Strategic context: This analysis deliberately differentiates according to company size. Large global corporations producing millions of units operate under fundamentally different conditions in Asia. They compensate for geographical distance through their own permanent local organizations and secure direct contracts with semiconductor manufacturers. The situation is very different for European SMEs. Companies producing medium-sized volumes, sourcing through standard global distribution channels, and unable to maintain permanent on-site teams in the Far East bear the full impact of hidden costs. This white paper therefore examines the real-world TCO for upper mid-sized companies.

Key message of this white paper

Comparing unit price alone shifts costs rather than eliminating them. A comprehensive TCO analysis shows that the perceived cost advantage of sourcing from China is significantly reduced by material equivalence, automation parity, working capital requirements, hidden management costs, and ESG requirements. For medium production volumes and complex electronic assemblies, a European EMS partner is often the economically rational choice.

1. The TCO model: Why the unit price is only part of the story

Total Cost of Ownership (TCO) is not a new concept. W. Edwards Deming formulated it in his 14 Management Principles as early as 1982: "End the practice of awarding business on the basis of price tag. Instead, minimize total cost." What was then a management lesson is now an operational necessity.

A Total Cost of Ownership (TCO) analysis considers unit price to be only one of several cost components. According to the methodology of the Chartered Institute of Procurement & Supply (CIPS), these include procurement costs, delivery costs, usage costs (including warehousing, scrap, and warranty services), and end-of-life costs. These cost components arise independently of the purchase price—for example through transportation, incoming inspection, returns, working capital tied up, supplier management, and compliance—and therefore remain invisible in a simple unit price comparison.

For electronics manufacturing, this means that a TCO analysis must include at least six dimensions that are not reflected in a unit price comparison. This white paper addresses each of these dimensions separately – with relevant data and sources.

Source: Chartered Institute of Procurement & Supply (CIPS), Total Cost of Ownership, 2025. Publicly available at cips.org.

2. Material: The biggest cost driver is global.

Electronic components—including capacitors, resistors, integrated circuits (ICs), and connectors—are increasingly subject to global price convergence. While Asian mega-factories may still secure exclusive purchasing advantages through very large framework agreements, this advantage has become far less significant for European OEMs with medium production volumes. Material costs are largely determined by globally standardized pricing from distributors such as Avnet, Arrow, and TTI. As a result, the argument that materials can be sourced substantially more cheaply in China applies, at best, to selected locally sourced commodities, but rarely to internationally branded electronic components.

Since materials typically account for 65 to 85 percent of the total cost of an electronic assembly, the potential impact of labor cost differences is structurally limited. Assuming material costs represent 75 percent of total manufacturing costs and Chinese labor costs are 50 percent lower, the resulting overall cost advantage would amount to only around 12 to 13 percent—even before logistics, working capital, quality management, and other cost drivers are taken into account.

Source: Versa Electronics, Total Cost of Ownership in Electronics Manufacturing, 2025 — freely available (versae.com). Reshoring Institute / Logistics Management, Global Labor Rates, January 2023 — freely available (logisticsmgmt.com). EMS Strategy Group estimate, based on market observations for 2026.

3. Automation: Location-independent efficiency

Modern SMT placement equipment from manufacturers such as ASM Assembly Systems (Germany), Fuji Corporation, and Panasonic delivers comparable levels of productivity worldwide. The equipment is identical, and manufacturing processes are highly standardized. As a result, the placement process itself has become largely independent of production location.

In highly automated industries such as electronics manufacturing, labor cost differences are steadily losing their strategic importance. Although manufacturing wages in parts of China remain below those in Western Europe, they have increased substantially since 2010—by approximately two to three times, depending on the data source and methodology. Combined with globally standardized SMT automation, labor has become a relatively small component of total manufacturing costs. As a result, China can no longer be regarded as a traditional low-cost manufacturing location for high-tech electronics.

What remains is the flexibility advantage of European EMS providers: shorter setup times, direct engineering support without time-zone barriers, and faster implementation of design changes. For medium production volumes—typically between 5,000 and 20,000 assemblies per year—these operational advantages can have a measurable positive impact on the Total Cost of Ownership (TCO).

Source: China National Bureau of Statistics, Average annual wage in the manufacturing sector, 2023. US Bureau of Labor Statistics, Manufacturing in China, 2013. Reshoring Institute / Logistics Management, Global Labor Rates, January 2023.

4. Working Capital: The invisible cost trap

An OEM that manufactures with an Asian EMS partner typically ties up 6 to 16 weeks of inventory: production lead time, sea freight, customs clearance, and incoming inspection. A European partner delivers in 1 to 4 weeks. With an annual throughput of €20 million in electronic assemblies and a calculated interest rate of 6 percent, the additional capital tied up for a 10-week lead time equates to approximately €230,000 per year – a sum that remains invisible in a unit price comparison.

Bain & Company's 2024 nearshoring analysis shows that companies with regionalized supply chains can not only reduce inventory costs but also respond significantly faster to changing market conditions. According to the study, companies that successfully implement nearshoring strategies

can improve their gross margins by up to 30 percent. Eighty percent of the surveyed operations executives also expect to expand their onshoring or nearshoring activities within the next three years—a structural trend that cannot be captured by a simple unit-price comparison.

Source: Bain & Company, Nearshoring: Overcoming the Obstacles, 2024. JEM Electronics, Understanding TCO and How Nearshoring Can Lower Costs, December 2024. EMS Strategy Group, operational assessment May 2026.

5. Management costs and quality escalation at a distance

5.1 Indirect management costs

Managing an EMS partner over long geographical distances is not a soft factor—it is a structural cost driver. McKinsey's analysis of approximately 1,000 manufacturing companies found that indirect operational functions—including engineering, quality management, and production control—typically offer optimization potential of 15 to 25 percent. In partnerships with suppliers in the Far East, these functions are particularly susceptible to inefficiencies caused by time-zone differences, language barriers, and the lack of a permanent on-site presence. Against this background, the EMS Strategy Group considers McKinsey's findings to be a plausible indicator of the additional management effort associated with remote supplier management.

In practice, this includes travel expenses for supplier audits, additional effort required to manage complaints across time zones, increased communication during design changes, delayed problem resolution, and the inability to provide immediate on-site support when issues arise. A European EMS partner can usually be reached within hours rather than days.

Source: McKinsey & Company, Indirect Manufacturing Costs: An Overlooked Source for Clear Savings, February 2023. EMS Strategy Group, Assessment of Transferability to Remote Management, 2026.

5.2 Quality escalation at a distance

The same principle applies to electronics manufacturing: companies do not receive the performance specified in a contract—they receive the performance they actively manage. Without their own local team and the ability to provide rapid on-site support, complaint handling and quality management inevitably become reactive rather than preventive. Quality issues that can often be resolved within days by a European EMS provider may take several weeks when working with suppliers in the Far East.

Analyses and case studies from quality management specialists in offshore sourcing consistently illustrate this pattern. When production is relocated to regions with apparently lower unit costs, indirect costs frequently eliminate the expected savings. Reactive quality management—for example, relying on final inspection instead of continuous process monitoring—results in delayed corrective actions, higher logistics and return costs, and, in severe cases, expensive emergency shipments. For complex electronic assemblies, these additional costs often offset the apparent labor cost advantages of offshore manufacturing.

Source: ET2C International, Offshore Quality Control: The Hidden Cost Killing EBITDA, April 2026.

6. Logistics, customs duties and geopolitical risk

The logistics costs of shipping goods from Asia to Europe typically range from US$1,500 to US$6,000 per 20-foot container, depending on shipment volume and market conditions. Additional costs include customs duties, cargo insurance, customs clearance, and port handling charges. While these direct costs may appear manageable, they represent only part of the picture. Transit times, working capital tied up (see Chapter 4), and increasing geopolitical risks must also be taken into account.

Geopolitical risks have increased significantly since 2018. In April 2025, reciprocal US tariffs on Chinese imports reached rates of up to 125 percent, although electronic products such as computers, smartphones, and semiconductors were exempted from these maximum reciprocal tariffs. They nevertheless remained subject to existing tariffs, including the additional 20 percent tariff introduced in connection with fentanyl-related trade measures and the continuing Section 301 tariffs. At the same time, the US government announced additional semiconductor-specific tariffs. For European OEMs serving US customers or operating production facilities in the United States, tariff-related risks associated with China therefore remain a direct threat to profitability. The semiconductor shortages between 2021 and 2023 also demonstrated that supply chains heavily dependent on the Far East were considerably more vulnerable than diversified or regional European sourcing structures.

Source: The Budget Lab at Yale, State of U.S. Tariffs, April 2025. Peterson Institute for International Economics, US-China Trade War Tariffs, 2025. SVI Global, China Plus One Strategy, 2026. Rhodium Group, China and the Future of Global Supply Chains, February 2025.

7. ESG: From optional to mandatory

ESG requirements—Environmental, Social and Governance—have become an integral part of supplier management for European OEMs, even though the regulatory framework continues to evolve. Germany's Supply Chain Due Diligence Act (LkSG) was eased in autumn 2025 by abolishing the annual reporting requirement and limiting sanctions to serious violations. At European level, the Corporate Sustainability Due Diligence Directive (CSDDD) was significantly revised as part of the Omnibus Simplification Package adopted in December 2025. The directive now applies only to companies with more than 5,000 employees and annual revenues exceeding €1.5 billion. Its implementation will be phased in until July 2028, with full application expected from 2029. Violations may result in fines of up to three percent of global annual turnover.

Although these changes reduce the immediate regulatory burden for many medium-sized OEMs, their practical significance remains considerable. Large customers increasingly pass their own due diligence obligations on to suppliers through contractual requirements such as supplier codes of conduct, compliance questionnaires, and audit obligations. European EMS providers already operate within the framework of European labor legislation as well as REACH and RoHS regulations. As a result, demonstrating compliance becomes significantly easier, eliminating many of the audit, translation, and on-site verification efforts associated with suppliers in the Far East. In addition, carbon emissions—particularly Scope 3 emissions—are becoming an increasingly important purchasing criterion. From this perspective, transporting electronic assemblies by sea from Asia inevitably results in a substantially higher carbon footprint than sourcing within Europe.

Source: The Compliance Manager, LkSG weakened, but CSDDD brings further obligations, 2025. Grant Thornton, Supply Chain Compliance in Transition, 2025. European Commission, Directive EU 2024/1760 (CSDDD). Nuremberg Chamber of Industry and Commerce, Responsibility along the Supply Chain, as of December 2025.

8. The overall picture: What the TCO actually reveals

Bringing together the six cost dimensions results in the following overall picture for medium-complexity electronic assemblies produced in medium-sized volumes:

Cost Category	Far East (China)	Europe (CEE/D-A-CH)	Comments
Material costs	Reference (100%)	comparable	Global component market, largely uniform
Labor costs / Automation	approx. −10–15%	higher, shrinking	China's labor costs have risen by 188% since 2010; SMT is largely automated.
Logistics & Customs	+3–8%	minimal	Sea freight costs, transit, insurance, customs
Working Capital	+3–6%	minimal	6–16 weeks vs. 1–4 weeks lead time
Management costs	+2–6%	minimal	McKinsey: 15–25% higher indirect costs
ESG / Compliance	+1–3%	structurally included	LkSG, CSDDD, REACH, CO2 balance
TCO overall picture	**+5 to +20% possibly negative**	**Reference**	**Depending on product segment and volume**

Source: EMS Strategy Group's own TCO model. Based on the sources cited in chapters 1 to 7 as well as EMS Strategy Group's own practical experience.

The result is not an argument against manufacturing in the Far East, but a factual assessment based on total cost. For products with very high production volumes, low complexity, and stable supply chains, Asian EMS providers can still offer economic advantages. For medium production volumes, more complex assemblies, demanding responsiveness, or increasing ESG requirements, however, a comprehensive TCO analysis often leads to a different conclusion.

9. Conclusion

Unit price reflects only part of the actual cost of electronics manufacturing. Working capital, complaint handling, management effort, compliance requirements, and customs-related risks arise regardless of whether they are included in a supplier quotation. A comprehensive TCO analysis makes these costs transparent and allows them to be evaluated objectively.

Another important factor is management distance. Managing an EMS partner located on another continent requires continuous coordination, additional resources, and higher management effort. Without a permanent local presence, the agreed level of performance cannot always be ensured. Travel expenses, time-zone differences, delayed problem resolution, and limited opportunities for on-site intervention are structural cost factors that are rarely reflected in unit-price comparisons but should form part of every robust TCO assessment.

For OEM decision-makers in Europe, the implication is clear: A comprehensive TCO analysis is not an academic exercise, but an essential prerequisite for making sourcing decisions that remain economically sound under real-world conditions—including quality issues, changing market requirements, supply chain disruptions, and evolving regulatory obligations.

List of sources

All sources are publicly available or have been identified as EMS Strategy Group assessments.

Chapter 1 – TCO Model

- CIPS (Chartered Institute of Procurement & Supply), Total Cost of Ownership, 2025 (publicly available).

Chapter 2 – Materials

- Versa Electronics, Total Cost of Ownership in Electronics Manufacturing, 2025 (publicly available).
- Reshoring Institute, Global Labor Rates, 2023 (publicly available).

Chapter 3 – Automation

- China National Bureau of Statistics, Average Annual Wage in Manufacturing, 2023 (publicly available).
- US Bureau of Labor Statistics, Manufacturing in China, 2013 (publicly available).
- Reshoring Institute, Global Labor Rates, 2023 (publicly available).

Chapter 4 – Working Capital

- Bain & Company, Nearshoring: Overcoming the Obstacles, 2024 (publicly available).
- JEM Electronics, Understanding TCO and Nearshoring, 2024 (publicly available).

Chapter 5 – Management Costs

- McKinsey & Company, Indirect Manufacturing Costs: An Overlooked Source for Clear Savings, 2023 (publicly available).
- ET2C International, Offshore Quality Control: The Hidden Cost Killing EBITDA, 2026 (publicly available).

Chapter 6 – Logistics & Risk

- The Budget Lab at Yale, State of U.S. Tariffs, 2025 (publicly available).
- Peterson Institute for International Economics, US-China Trade Tariffs, 2025 (publicly available).
- SVI Global, China Plus One Strategy, 2026 (publicly available).
- Rhodium Group, China and the Future of Global Supply Chains, 2025 (publicly available).

Chapter 7 – ESG

- The Compliance Manager, LkSG weakened, but CSDDD brings further obligations, 2025 (publicly available).

- Grant Thornton, Supply Chain Compliance in Transition, 2025 (publicly available).
- European Commission, Directive EU 2024/1760 (CSDDD) (publicly available via EUR-Lex).
- Nuremberg Chamber of Industry and Commerce, Responsibility along the supply chain, as of December 2025 (publicly available).

Chapter 8 – Overall Assessment / TCO Model

- Germany Trade & Invest (gtai.de), GTAI survey: SMEs ready for higher raw material costs, 2025 (publicly available).

About the author

Dirk Kaussen is Founder and Managing Director of EMS Strategy Group. With around 40 years of experience in the electronics industry — including founding and managing his own electronics manufacturing company in Germany — he brings deep expertise in manufacturing processes, EMS partner selection, supply chain stability, relocation projects, and risk management. His approach combines practical solutions with a direct connection to industrial reality.

About the EMS Strategy Group

EMS Strategy Group supports industrial enterprises in the strategic advancement and optimization of their electronics manufacturing operations – from high-level planning to operational execution. Our core expertise lies in the strategic relocation of manufacturing volumes to European EMS providers, the establishment of new production capacities, and the expansion of existing manufacturing structures.

Furthermore, we design resilient supply chain frameworks, conduct comprehensive risk assessments, and guide dual-sourcing strategies to secure and fortify supply chains. Upon request, we manage projects closely until a successful serial production ramp-up is achieved.

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