



Strategic White Paper

Essential Collaboration Across the Electronics Industry: OEMs, EMS Providers, Distributors and PCB Manufacturers Working Together.

Why Electronics Manufacturing Can Only Function as an Integrated System – and Why Communication Between All Participants Matters

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1. Initial situation: When the chain no longer holds

In recent months, reports have been piling up in the industry that would have been considered exceptional until recently. Requests for simple prototype runs, which used to be fulfilled within a few weeks, are now met with delivery times of well over three months. Some printed circuit board manufacturers are now rejecting requests altogether because their capacity is tied up elsewhere. What has been anecdotal in specialist forums and on LinkedIn can now also be supported by reliable market data.

The trigger is known, but its extent is often underestimated: The global expansion of AI data centers is tying up a growing share of global manufacturing capacity for printed circuit boards and their precursor materials. Server boards for AI applications require significantly more layers, finer structures, and special high-frequency materials than conventional server boards – thereby consuming significantly more manufacturing capacity per board assembly [1]. Before the AI boom, lead times for complex multilayer boards were four to six weeks. In 2026, lead times of twelve to twenty weeks are being reported for advanced server boards in many factories, and even longer in material-dependent cases [1].

It is not only the printed circuit board itself that is affected. Prices for base material (copper-clad laminate, CCL) have risen by up to 90 percent in some segments since the beginning of 2025, and the utilization of global CCL capacities was between 92 and 95 percent in the first quarter of 2026 [3][5]. This development is impacting a European manufacturing landscape that is already under structural pressure – more on this in section 3.

2. Four players, one system

Electronics manufacturing is often still viewed as a series of individual contractual relationships: The OEM commissions an EMS provider, the EMS provider orders from a printed circuit board manufacturer and distributors. In practice, this model is becoming increasingly unreliable. When capacity is scarce and material availability becomes uncertain, any delay at one point immediately impacts the other three.

The OEM

is responsible for the product and ultimately defines what has to be manufactured – including production volumes, delivery schedules and quality requirements. However, OEMs often have only limited visibility into the actual capacity situation at PCB manufacturers and material suppliers because this information originates several tiers further upstream in the supply chain.

The EMS service provider

The EMS translates product requirements into a manufacturing process and carries a particularly high risk in day-to-day operations if critical materials are unavailable. Well-positioned EMS partners therefore increasingly maintain a structured, proactive risk management approach – with close coordination with customers and the broader supplier base, instead of solely reacting to disruptions [13].

The printed circuit board manufacturer

While it forms the technological foundation, it has become a structurally vulnerable sector in Europe. By the end of 2025, there were only around 168 to 190 printed circuit board (PCB) manufacturers operating at over 180 production sites in Europe. For comparison, around the year 2000, there were approximately 560 manufacturers. The European PCB industry has thus lost a significant portion of its industrial base within approximately 25 years [6][8][16].

Among European base material manufacturers, concentration is even more advanced. Industry representatives point out that Europe effectively has only one manufacturer of PCB base material (CCL) and one manufacturer of copper foil, while producers of woven electronic glass have completely disappeared [5].

The Distributor

Distributors are often overlooked in discussions about collaboration, even though they are structurally closer to the industry's early warning system than any other player. Distributors aggregate demand across many customers, maintain inventory levels and just-in-time concepts, and in many cases identify shortages earlier than individual OEMs or EMS companies because they can observe order patterns across the entire portfolio [15].

Friction between these four roles rarely stems from a lack of willingness to cooperate. It arises because each actor primarily optimizes their own subsystem and only shares information once a problem has become apparent. This is precisely where the following section begins.

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The four roles are not new, but their interdependence was easier to ignore in calmer market phases. When capacity becomes scarce, the extent of their interdependence becomes clearly visible. This does not mean that every relationship needs to be reorganized. However, it is worthwhile to systematically examine where information is not available in a timely manner within the company or across the supply chain.

3. What the numbers show

European printed circuit board production grew by 2.4 percent nominally in 2025 – positive news at first glance. However, the global market grew by more than 11 percent during the same period, so Europe's share of the global market continued to decline [6][7]. At the same time, the number of manufacturers decreased by eleven companies in 2025.

Overall, a net increase of two production sites is expected for 2026. One of the reasons is the decision of a Swedish OEM to establish its own PCB manufacturing capability. This shows that individual companies are increasingly examining the vertical integration of their value chains again [6].

Europe's share of global printed circuit board (PCB) production is now around 2 percent – lower than its share of semiconductor production, which is around 10 percent and is targeted to be doubled to 20 percent with substantial political investment [8]. For PCBs, without which semiconductors cannot be used, there is currently no comparable industrial policy priority.

In connection with the planned European Chips Act 2, the proposal for which was expected in spring 2026, industry associations are calling for printed circuit boards to no longer be considered in isolation from semiconductors, but rather for the entire value chain – from material procurement to assembly manufacturing – to be treated as an integrated system [9]. Whether and to what extent this objective will be reflected in future legislation remains uncertain.

On the demand side, the AI boom is further exacerbating the situation. Market observers report semiconductor delivery times of up to 40 weeks for certain memory and fiber optic components in the first quarter of 2026, with lead times for optical network components ranging from 36 to 56 weeks, compared to a previous norm of 12 to 16 weeks [2][13]. These shifts indirectly affect traditional, non-AI-related electronic products via material and capital allocation by suppliers.

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These figures don't justify panic, but they do warrant a sober reassessment. Companies still planning on the basis of lead times and material prices from 2023 are likely to face repeated disruptions in the coming quarters. This doesn't just affect companies directly involved with AI – the shift in capacity and material requirements impacts the entire printed circuit board manufacturing sector.

4. Cooperation and vertical integration are growing together

A recurring pattern in current industry discussions is the observation that companies with vertically integrated value chains – such as EMS providers with their own printed circuit board manufacturing – may have greater flexibility in material and capacity planning during tight market phases [12]. A Chinese EMS provider, which has built up its own PCB capacity over the years, now explicitly describes the integration of printed circuit board manufacturing as an attractive strategic option because the EMS landscape suffers more from overcapacity compared to the PCB industry and the capital expenditure for entry is correspondingly lower [12].

For most medium-sized European OEMs and EMS companies, in-house PCB production is not an economically realistic option – they generally lack the necessary production volume. However, the underlying principle is transferable: actively managing the interfaces between the various stages of the value chain, instead of leaving them to chance, significantly reduces risk – even without investing their own capital in additional production steps.

Market analyses and industry reports from the first quarter of 2026 show that companies with systematic monitoring of critical delivery times and early management of long-lead-time materials were able to react better to the current supply shortage than companies with predominantly reactive procurement processes [13].

A common feature of these companies was that they treated their supplier relationships as a strategic asset and had already qualified alternative sources of supply before the primary allocation was exhausted [13].

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Vertical integration is the most far-reaching approach, but not the only one. For most companies, greater leverage lies in early coordination with their partners, increased transparency along the supply chain, and systematic communication of critical information. This approach is often faster to implement and more economically realistic than building additional manufacturing capacity.

5. The missing interface: Communication as a bottleneck in itself

When speaking with OEMs, EMS companies, PCB manufacturers, and distributors about the current situation, a recurring pattern emerges: Collaboration rarely fails due to a lack of mutual interest. It fails because the four roles speak different languages, have different planning horizons, and do not exchange their respective early warning signals in a common format.

The OEM thinks in terms of product approvals and bills of materials, the EMS provider in terms of production capacity and material planning, the PCB manufacturer in terms of technology roadmaps and tool utilization, and the distributor in terms of forecast accuracy and inventory coverage. Each of these perspectives is correct in itself – but without an intermediary to translate between them, the different perspectives often only come together once a delivery commitment can no longer be met.

This coordinating function is not a minor detail; it represents a distinct capability within the system – comparable to the role that close, long-standing supplier relationships once played in a smaller and more manageable industry. As globalization reshaped the electronics supply chain, many of these close relationships were replaced by increasingly transactional procurement structures. In many organizations, printed circuit boards are now treated as standardized purchasing items, even though they continue to play a critical technological and strategic role in the final product [16]. Today's capacity constraints are highlighting the need to re-establish this coordinating function – not necessarily through the informal relationships of the past, but through consciously designed and professionally managed collaboration across the supply chain.

Who performs this role depends on the individual situation: it may be an experienced purchasing manager with a broad industry network, a specialized distributor with strong technical expertise, or an independent consultant. What matters is not the organizational role itself, but the ability to bring together different perspectives, connect relevant information at an early stage, and actively coordinate collaboration across the supply chain. Particularly in complex sourcing and production relocation projects, such a neutral coordination function can make a significant contribution to identifying risks early and supporting well-informed decision-making.

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A coordination interface doesn't replace any of the four operational roles and doesn't solve capacity problems on its own. However, it ensures that capacity and material problems are identified earlier, when there are still real options for action – instead of only when damage control is the only remaining possibility. The value lies in the time saved, not in a new miracle solution.

6. Approaches to action

No universally applicable solutions can be derived from current developments – product portfolios, production volumes, and risk profiles vary too widely from one company to another. Nevertheless, several approaches are likely to be beneficial across much of the electronics industry:

- **Regularly review bills of materials against current lead times rather than relying on the experience of the past two or three years** – especially for components requiring high-layer-count PCBs or specialized high-frequency materials.
- **Actively obtain early market signals from distribution partners instead of relying solely on order confirmations** – distributors often identify emerging shortages before they develop into manufacturing bottlenecks.
- **Qualify alternative sources of supply and, where economically viable, establish relationships with European PCB manufacturers before supply constraints limit available options.**
- **Treat communication between engineering, procurement, and manufacturing partners as a structured business process rather than an informal exchange** – for example, through regular cross-functional reviews of capacity, lead times, and material availability.
- **For strategically important product lines, assess whether an independent coordination function between the OEM, EMS provider, PCB manufacturer, and distributor would add value** – particularly where the necessary expertise or organizational resources are not available internally.

None of these measures necessarily requires major investment. Most depend primarily on exchanging information earlier, more systematically, and with greater transparency across all four parties involved – not only within traditional contractual relationships.

Conclusion

Electronics manufacturing in 2026 can no longer be viewed as a chain of isolated bilateral relationships. OEMs, EMS providers, PCB manufacturers, and distributors form an interconnected system whose resilience depends not only on the strength of each individual relationship, but also on how effectively information flows across the entire network.

The current shortages in manufacturing capacity and materials have made these interdependencies more visible than ever. The long-term competitiveness of the European electronics industry will depend not only on technological expertise and manufacturing capabilities, but equally on how effectively OEMs, EMS providers, PCB manufacturers, and distributors exchange information, coordinate decisions, and collaborate across the entire electronics value chain.

List of sources

All sources mentioned below are freely accessible at the time of publication, without paywall, subscription or registration requirement.

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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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