

尽管很多“EMS”公司投资在设计资源和能力上投资，大部分公司在提供同设计有关的服务方面只获得有限的成功。外部公司常用来弥补初始设备制造商技术能力的不足。能够提供扩大供应链管理和工程解决方案的“EMS”公司在支持这些需求方面处于最有利的地位。为了进一步降低将新产品推向市场的成本并缩短达到批量生产所需时间，还可以做什么呢？本论文探索称为虚拟聚类的原理，使专门设计项目工程和供应链功能的特定公司汇合起来，降低“OEM”的成本。

# A Supply-Chain Engineering Solution

Bill Coker

## How “clusters” of linked world-class suppliers can create products in ways vertically integrated EMS firms cannot.

OEMs face market forces that require continually refreshed product lines, reduced research and development costs, reduced time-to-volume cycles and optimized supply chains to reduce the costs of acquisition and product support. Many OEMs have developed cost-reduction strategies focused on major cost drivers. Some companies have shifted design engineering to lower-cost geographies. Some have strategically switched to original design manufacturing solutions. Many have divested internal manufacturing operations and now leverage contract manufacturing services provided by EMS companies. Others have outsourced back-end logistics needs to third-party logistics providers (3PL). As a result, OEMs have effectively reduced vertically integrated overhead costs, yet continue to seek solutions that further optimize the supply chain and drive to the absolute lowest cost of acquisition.

Major direct cost drivers include:

- Research and development.
- Project engineering.
- Supplier support.
- Production.
- Distribution.
- Product support.

What can be done to further reduce cost and time-to-volume? The answer lies in supply-chain engineering.

For years OEMs have leveraged EMS companies to reduce product costs. But that leverage

has been mostly limited to material sourcing and low-cost global manufacturing and distribution. To provide more differentiated value for their OEM customers, EMS companies have expanded their service portfolios to provide cost-effective design-to-distribution solutions. Many have added front-end design and product industrialization services in an effort to leverage design and thereby win volume production contracts. Others have invested in vertical integration capabilities including plastics molding, sheet metal, PCB fabrication and interconnect products which, when added to their existing capabilities, offer a complete system solution.

Offering individual service solutions (design, prototyping, NPI, supply-chain management, production, distribution and repair) is simply not enough. The key is providing a comprehensive supply-chain solution that seamlessly addresses all the major cost drivers concurrently. Such a solution – and the resulting value propositions – would provide any EMS compa-

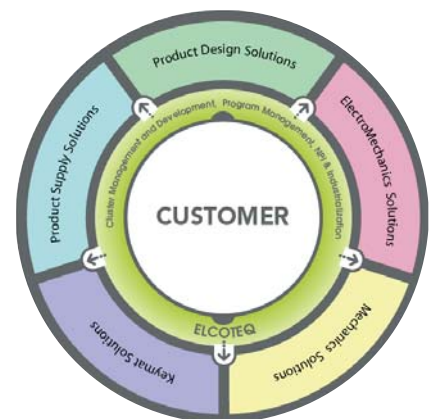


FIGURE 1: The Virtual Cluster model.

ny with a highly competitive value proposition for almost any OEM customer.

One EMS company's answer: a Virtual Cluster service solution. A Virtual Cluster is a team of world-class, highly specialized experts assembled to provide a seamless product creation solution focused on cost reduction and time-to-market velocity. It's a cooperative product creation initiative between OEM, EMS provider and key supply-chain component and/or service suppliers. The makeup of the cluster depends on the scope of work and product specification, but can include:

- Electrical design.
- Industrial design.
- Plastics tooling and production.
- Sheet metal tooling and production.
- Interconnect solutions.
- Test and manufacturing.
- Logistics and repair.

In the Virtual Cluster model, the Cluster Leader (in this case the EMS provider) is responsible for selecting best-in-class component technology providers as partners. Compare this to the traditional EMS strategy of vertically integrated capabilities, which results in internal resources that are not generally best-in-class. **Figure 1** illustrates how the Virtual Cluster model works.

With the OEM customer at the center, the EMS supplier is the Cluster Leader, much like a general contractor coordinating the construction of a custom home. The Cluster Leader and Product Creation Team essentially assume the role and responsibility of the OEM's project engineering organization.

The Cluster Leader owns:

- The product specification.
- The master project development schedule.
- The management responsibility of the cluster partners and their development schedules.
- Product cost targets.
- Project variances.
- Tooling strategy and schedules.
- Test development strategy and schedules.
- Product qualification strategy and schedules.
- NPI strategy and schedules.
- Production manufacturing strategy and schedules.

The Virtual Cluster aims to provide a comprehensive engineering, supply chain, manufacturing, distribution and product support solution that optimizes the product

creation process, reducing the OEM's R&D expenses, product production and distribution costs, and after-sales support costs.

### Contractually Aligned

There are two approaches to implementing full-service, outsourced design and manufacturing: vertically integrate all required capabilities into a single company, or form a virtual solution of world-class cluster partners that together can provide a seamless product creation solution.



Individually, these virtual cluster partners provide only specialized components of the total solution. Together they can innovate, solve problems and further optimize process creation, reducing cost and time-to-volume. Individually, they compete for new business based on their own particular merits and value propositions. As a team, their value propositions are enhanced and their opportunities to win new business greatly improved. An expanded alternate sales channel is effectively developed.

The Virtual Cluster is more than just a loosely aligned group of component and service providers; it is a formal contractual partnership. Cluster partners have committed to collaborate as a team; they win together and lose together. The more innovative and aggressive they are, the more success there will be. They must also make certain investments in the virtual cluster partnership. The partners have committed in many cases to collocate where it makes sense to improve collaboration, improve communications and share overhead support costs if possible. They have agreed to extend preferential pricing, share intellectual property and provide favorable business terms and conditions. Each cluster partner is required to dedicate a sponsoring executive to direct and proactively manage the cluster steering committee. They are also required to dedicate engineering, quality, planning, IT and production resources.

This virtual integration team of key suppliers works together, project by project, to drive cost reduction and increase velocity to the product-creation process by focusing on best-in-class innovation, cooperation and focus (Figure 2).

## Redirecting Resources

A certain amount of risk is associated with any change in the product creation process. OEMs balance risk with potential benefits. In this model, an OEM could outsource design, project management and portions of supply-chain management. By outsourcing some or all of the product-creation process, an OEM can:

- Reduce internal R&D costs.
- Reduce internal supplier support costs.
- Reduce engineering overhead and associated support functions.
- Reallocate key technical resources.
- Achieve faster time-to-volume.
- Reduce production and distribution costs by sharing services.
- Eliminate incoming inspection and provide improved supply-chain strategies.
- Improve planning (simultaneous cluster planning vs. tiered planning).

The extent of cost savings derived by the OEM depends on the amount of collaborative engineering it performs and the amount of internal resources that can be redirected to other functions (Table 1). An OEM could potentially reduce its R&D and project engineering costs by as much as 50%.

Outsourcing the product-creation process and associated supply-chain interface permits the OEM to focus on its core



FIGURE 2: Cluster collaboration drives innovation, cost reduction and time-to-volume velocity.

----- Outsource Models -----				
	OEM	CDM	ODM	Virtual Cluster
Project Engineering	OEM	Shared	ODM	VC
Supply Chain Management	OEM	Shared	ODM	VC
Electrical Design	OEM	Shared	ODM	VC
Industrial Design	OEM	Shared	ODM	VC
Mechanical Design	OEM	Shared	ODM	VC
Electro-mechanical Design	OEM	Shared	ODM	VC
Application Software	OEM	OEM	ODM	VC
Qualification Testing	OEM	OEM	Shared	Shared

TABLE 1: Cost savings rise as process ownership migrates from an internal vertical integration model to a virtual integration (Virtual Cluster) model.

competencies. The costs of internal new product development teams and key supply-chain management initiatives get shifted to the EMS provider. By shifting product creation to an outsource partner, the OEM can reallocate key technical resources to other areas of the business, substantially reducing the need for more overhead.

Through the Virtual Cluster model, an EMS company can offer best-in-class solutions without incurring the additional cost and overhead inherent with acquisitions. Their value and services are more flexible and adaptable to support multiple customers and multiple products. While most EMS companies attempt to provide a range of design, manufacturing, distribution and after-market repair solutions, few have the experience required to provide complete design solutions and resources to manage the entire project engineering process. These companies need to shift their core focus from manufacturing and test to invest in supply-chain engineering. The OEM is looking for the EMS supplier to take over more than just design; they want EMS suppliers to manage the entire product creation process including project engineering. The Virtual Cluster model aligns specialists that can provide seamless product creation while addressing all major cost drivers. ■

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*Bill Coker is vice president of sales and marketing, Elcoteq America (elcoteq.com) and a member of the CIRCUITS ASSEMBLY Editorial Review Board; bill.coker@elcoteq.com.*