
THE WORLDWIDE ELECTRONICS MANUFACTURING SERVICES MARKET

2022 EDITION

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Chapter 1 Introduction

1.1 Report Objectives and Scope

The objective of this report is to provide a macroeconomic understanding of the worldwide contract manufacturing (CM) services market for interested electronics manufacturing services (EMS) firms, original design manufacturers (ODMs), original equipment manufacturers (OEMs), component manufacturers, equipment suppliers, distributors, consultants, and investment analysts. Throughout this report, CM will refer to the combined industry, whereas EMS and ODM companies are the primary subcontractors.

In this report, 102 contract manufacturers and original design manufacturers are profiled. NVR (and its predecessor Electronic Trend Publications) has followed this market for over twenty-five years, continuously expanding its coverage and market analysis. With each new report, NVR's research methodology, quality of data, and collective knowledge have improved, to the benefit of the reader and the entire industry.

For the last thirty years or more, the generic term “contract manufacturing” has been identified almost solely with a very specific niche within the overall durable goods market—that of electronics equipment. This is ironic, as the notion of “contract manufacturing” could be applied to any industry segment (aerospace, appliances, automotive, construction, etc.) that manufactures finished goods, yet over the last few years it has been exclusively linked to the electronics—specifically the high-tech electronics—market segment. As the electronics manufacturing industry has evolved over the years, the term “electronics manufacturing services” (EMS) has come to be used to refer both to the overall industry and to a specific class of subcontractor.

The current report focuses on the entire CM market, but pays special attention to the production of advanced, state-of-the-art electronics products, which are having a considerable impact on the world today. Indeed, the availability of microprocessor-driven wireless communication devices, handheld computing products, remote sensors, and semiconductor-based technologies is dramatically impacting the way people live. Yet it is probably fair to say that these products would not be so widespread were it not for the emergence of the EMS industry, which has lowered product costs and increased manufacturing efficiency.

The EMS market experienced continuous growth in the fifteen years prior to 2001, when it then underwent a two-year slump and consolidation. In 2003, the market began to recover and grew strongly up to 2009, when it experienced another slump and was flat in 2010. Since

then, the market briefly rebounded and starting in 2011 continued to expand until 2013, when the industry went flat through 2016. Starting in 2017, the market significantly recovered, with relatively high growth of 10.8 percent from the previous year. In 2018, the industry experienced growth of 15 percent and set new records in revenue. There was only nominal growth in 2019 but in 2021, the industry bounced back strongly with 14.8 percent growth.

The purpose of this 2022 edition is to analyze the changes that have taken place over the last year and offer some projections on how the CM market might unfold over the next five years. Inevitably, the EMS and ODM markets experience changes in cycles, inventory, and end-user demand that have always proven to be irregular. Our forecasts are generally linear in design, as no one can accurately predict the future except in general terms. We can only look to the past for guidance and speculate on the impact of the latest technologies and geopolitical events. This report analyzes those changes and discusses the implications of the key dynamics impacting the market in the near future.

1.2 Organization

This report is organized into eight chapters. Chapter 1, “Introduction,” outlines the scope, organization, and methodology for the report. Chapter 2, “Executive Summary,” presents top-level data from throughout the report.

Chapter 3 is titled “Economic Outlook and Worldwide Electronics Industry Forecast.” Key products are forecast in seven major electronics market segments, including computers, communications, consumer, industrial, medical, automotive, and aviation/defense/other transportation.

Chapter 4, “Industry Structure,” analyzes the total EMS industry by region and market segment. Industry statistics are provided with detail on the more than 900 manufacturing facilities by country and company.

Chapter 5, “CM Industry Forecasts, 2021–2026,” forecasts growth in the EMS marketplace from 2021 to 2026. As in Chapter 4, data is presented by 57 individual countries and 46 individual market segments, and over 900 designated manufacturing operations.

Chapter 6, “Financial and Production Benchmarks,” looks at a variety of key metrics in 2021 that can be used to judge the manufacturing efficiency and financial health of the large public EMS companies and ODMs (all with revenue of at least \$100 million a year).

Chapter 7, “Mergers and Acquisitions,” presents information on the many deals that are driving the EMS market. Deals from 2016–2021 are detailed.

Profiles of major EMS companies and ODMs are given in Chapter 8. These profiles provide a look at these companies’ strategies, service offerings, manufacturing facilities, and financial data.

1.3 Assumptions

The following assumptions have been made with regard to information provided in this report:

- Respondents are providing truthful information to the best of their ability.
- Values are mainly provided in current US dollars as converted by the International Monetary Fund, World Outlook Database.
- Wage rates have not been adjusted to reflect the depreciation of the euro or the undervaluation of the Chinese yuan or the New Taiwanese dollar and other currencies.
- All tables presented in this report are subject to small rounding errors. Therefore, column and row numbers, as presented, may not add up exactly to the total presented.

1.4 Definitions

Table 1-1 lists the product segments that are detailed in Chapters 3, 4, and 5 (with slightly varying levels of aggregation). This list is fundamentally the same as that used in related NVR reports.

Several critical terms will be used frequently in this report. They are:

- *PCB Assembly*: For this report, PCB assembly refers to the attachment of various electronic components onto a bare printed circuit board, plus any test activities performed at this level of assembly.
- *PCB Assembly Value*: The value (cost of goods sold, or COGS) of all material, labor, and overhead associated with an assembled printed circuit board
- *Box Assembly*: For this report, box assembly refers to the assembly of one or more printed circuit boards, plus other items such as cable harnesses and enclosures, into a final product (or a largely self-contained electronics assembly that will be embedded into a larger piece of equipment). This also includes any test activities performed at this level of assembly.

- *Box Assembly Value*: The value (COGS) of all material, labor, and overhead of the box assembly, not including the value of the assembled PCBs within the box assembly
- *OEM Assembly*: Electronics assembly performed by the OEM. If assembly is performed by a subcontractor that is held captive by the OEM or in a *keiretsu* arrangement such as exists in Japan, the assembly is considered OEM produced.
- *ODM Assembly*: Electronics assembly performed by an OEM but subcontracted by another OEM. For example, Hewlett-Packard subcontracts the assembly of its printers and computers to Compal Electronics and Quanta Computer—OEMs with their own printer and computer product brands as well.

1.5 Research Methodology

Information for this report was collected from a number of external sources. Primary sources included marketing professionals, manufacturing and engineering directors in contract manufacturing firms, and OEMs. Also, *Manufacturing Market Insider*, a newsletter acquired by NVR on July 1, 2014, has been a valuable source for tracking industry events and specific company activities on a monthly basis. Secondary sources included trade publications such as *Circuits Assembly*, *EMSNow*, *Evertiq.com*, *SMT Magazine*, *EMSNow Daily*, *Business Week*, *The Economist*, and a variety of government economic reports.

For this report, the author had the cooperation of many EMS company employees who answered the questionnaire provided below, in addition to information collected from the *MMI* March 2021 newsletter in which the Top 50 EMS companies worldwide are ranked. These and other efforts helped to size and segment the industry to a degree not previously attained. The author's gratitude is extended to all those gracious enough to have responded to this request for information.

1.6 Field Questionnaire

The following questionnaire format was generally used as a starting point for the primary research conducted for this report.

NVR Contract Manufacturing Company Profile

1. What were your EMS revenues for 2021 (USD)?

2. What percentage of your sales were manufacturing services (EMS) versus your own branded products (ODM)?

3. Please list your plant/facility locations, sizes (sq. ft.), number of SMT lines, and employees.

<u>Location</u>	<u>Plant Size</u>	<u>SMT Lines</u>	<u># of Employees</u>
-----------------	-------------------	------------------	-----------------------

4. What industries and customers does your company serve?

<u>Industry</u>	<u>Percent</u>	<u>End Products</u>	<u>Customers</u>
Automotive	_____	_____	_____
Communications	_____	_____	_____
Computer	_____	_____	_____
Consumer Products	_____	_____	_____
Industrial Products	_____	_____	_____
Medical Products	_____	_____	_____
Defense/Aerospace	_____	_____	_____
Total	100%		

5. Can you estimate your company's revenue for 2022 and its growth by industry?

<u>Industry</u>	<u>Percent Growth</u>
Automotive	_____
Communications	_____
Computer _____	_____
Consumer Products	_____
Industrial Products	_____
Medical Products	_____
Defense/Aerospace	_____
Est. Revenue 2021	\$_____

6. If not provided in question 4 above, please identify your leading customers.

1.7 Market Segments

Table 1-1 Market Segments	
Aerospace/Defense/Other Transportation	Automotive
In-Flight Entertainment Flight Navigation Weapons, Drones C3 Other Transportation Aerospace/Defense	Engine Control Instruments Safety Entertainment
Communications	Consumer
Cellular Handsets Cellular Infrastructure Other Phones Enterprise LANs WLANs DSL/Cable Modems PBX/Other CPE Carrier-Class Equipment Other Telecom	Analog TVs Digital TVs MP3/MP4 Players Smart Home, AV, and Wearables Video Console Games Set-Top Boxes Camcorders DVD Players Digital Cameras Other Consumer
Computer	Industrial
Notebook PCs Desktop PCs Tablets/Readers Servers Workstations Enterprise Storage Systems Flash Drives Monitors Printers Other Computer	Control/Processing Test and Measurement Clean Energy Other Industrial
	Medical
	Medical Diagnostics Therapeutic Monitoring and Surgical