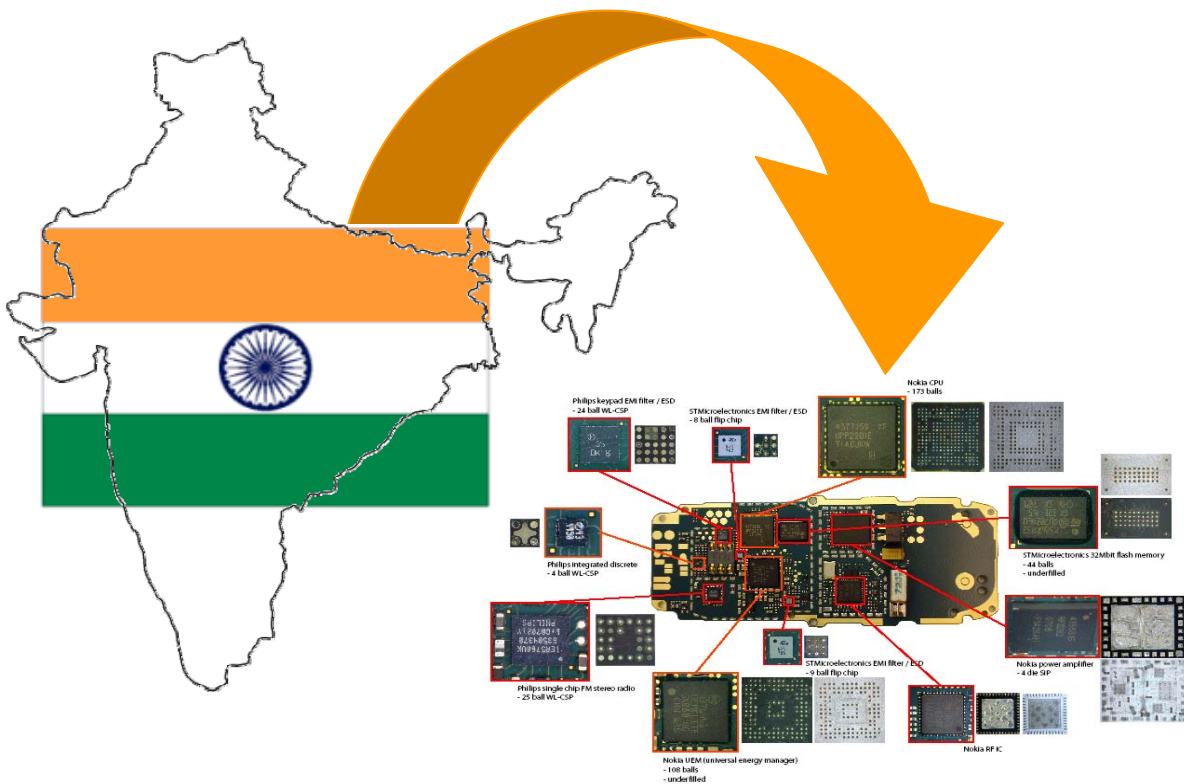




**TechSearch International, Inc.**  
Technology Licensing and Consulting

# India: The Next Stop for Packaging Assembly and Materials Manufacturing



**Authors: Timothy G. Lenihan and E. Jan Vardaman**

**Published: November 2007**

---

4801 Spicewood Springs Road, Suite 150, Austin Texas 78759  
Tel: 512-373-8887 • Fax: 512-372-8889 • Email: [TSi@techsearchinc.com](mailto:TSi@techsearchinc.com)

## Table of Contents

Executive Summary	9
Introduction	9
Overview	10
<b>1. The Indian Situation</b>	<b>12</b>
1.1 Overview	12
1.2 Why Invest in India?	14
1.3 Infrastructure	17
1.4 Indian Government Investment Incentives	19
1.5 Education	20
1.6 Labor Outlook	21
1.7 Professional Organizations	23
<b>2. Indian Electronics Markets</b>	<b>25</b>
2.1 Telecommunications	29
2.2 Consumer Electronics	37
2.3 PC's	41
2.4 Automotive	45
2.5 R&D Outsourcing	46
<b>3. Semiconductor Market Segments</b>	<b>50</b>
3.1 EMS/Contract Manufacturing	50
3.2 Electronic Design	59
3.3 Components	61
3.4 Semiconductor Manufacturing	64
3.5 Storage Technologies	72
3.6 Material Suppliers	73
<b>4. Doing Business in India - A Primer</b>	<b>74</b>
<b>5. Future Prospects for Assembly and Materials Manufacturing</b>	<b>79</b>
<b>Appendix A: Other Companies of Interest</b>	<b>81</b>
<b>Appendix B: Map of India</b>	<b>83</b>
<b>Appendix C: Companies by Type/Location</b>	<b>84</b>
<b>Appendix D: Company Contact Information</b>	<b>96</b>
<b>Appendix E: Professional Organization Contact Information</b>	<b>126</b>
<b>References</b>	<b>128</b>

# Executive Summary

## Introduction

The following report is a brief overview of the Indian assembly and material manufacturing industries including observations from a recent trip to India to study these emerging areas. Five cities were visited, with seven companies and two electronics associations interviewed. The groups interviewed comprised a cross-section of existing electronics manufacturers (domestic and international) and companies with announced plans for expansion (including semiconductor fabrication manufacturing). As India is a new market for many in the electronics manufacturing arena, this report is really a snapshot in time as there are almost daily announcements of new companies entering and starting in India. To understand the emerging assembly and materials manufacturing situation a broader base of information on the companies and the current capabilities is covered in this report.

Semiconductor packaging assembly and materials manufacturing infrastructure is defined as component and system manufacturers, contract manufacturing service providers, and manufacturing equipment suppliers. Component and system manufacturers include both foreign (outside India) and domestic companies that have manufacturing operations in India. Contract manufacturers include Electronic Manufacturing Service (EMS) providers, assembly material manufacturers, and a new breed of companies called OMS providers. Manufacturing equipment suppliers are both foreign and domestic companies that provide machines and services used by the semiconductor packaging and materials manufacturers in India.

Markets surveyed include contract manufacturing, consumer, PC's, semiconductor manufacturing, and telecommunications. A review of the improvements in education, infrastructure, and R&D capabilities is also discussed.

This report will cover in detail the Indian electronics markets and the increasing role of electronics manufactures. It also includes a broader range of companies in India using these products, their locations, key contacts, and the support organizations helping companies enter the Indian market.

**Note of Graphs and Tables:** The data used in this report has been taken from many sources and there were wide variations in the estimates projecting future growth. Some of the data used dates back to 2005 but is still relevant to understanding the current assembly and materials manufacturing situation in India. As there was wide variations in the source data, one should use any conclusions derived for establishing trends versus absolute values. None of the sources used in this report took into account the cyclical nature of the electronics industry and the world's stock markets. With that stated, even if the Indian market grows at half to 2/3's of the projected rate, it would still be a market worth looking at as the long term potential for growth is very good.

Where currency conversions from Rupees to US \$ was performed, the conversion rate was assumed to be 45 Rupees to the dollar. For Euro conversions, 1.35 US dollars to 1 Euro was used.

## **Overview**

Recent Indian Government incentives for semiconductor manufacturing and assembly are leading to a major thrust in assembly and test capacity in India. Companies are turning to India for low-cost and scaleable manufacturing assembly solutions.

The demand for semiconductor packaging assembly and materials manufacturing in India is being driven by consumer demand and for export revenue. The Indian electronics industry is estimated to be > \$30 billion today, growing to > \$70 billion by 2010 and > \$150 billion by 2015. With a middle class of more than 300 million people, the electronics market growth is projected to grow at more than 20% per year through 2015.

India has been deluged by a wave of multinational Electronics Manufacturing Services (EMS) firms such as Flextronics, Jabil Circuit Inc., Elcoteq, Solectron-Centum, Sanmina SCI, and Foxconn Electronics who have set up local operations to supply telecommunications and consumer electronic equipment to Original Equipment Manufacturers (OEMs) for the Indian market.

The fastest growing electronics market in India is telecommunications. Key players in the cell phone segment are Nokia, Motorola, Nortel, Ericsson, LG,

Samsung and ITI-Alcatel. Companies providing telecom equipment are Siemens, Lucent and Huawei Technologies and ZTE of China.

One of India's strengths is its ability to turn out low-volume production for a large variety of parts in which the engineering content is high. This is achieved using vertically integrated manufacturing units that are much smaller than those in China. It is estimated that manufactured product outsourcing from India could be as large as \$10 billion in 2007 and \$50 billion by 2015. In the last few years, manufacturing outsourcing from India has been growing at around \$1 billion a year.