

Snapshot of the SMT Inspection Equipment Market

By Keith Robinson

The inspection equipment market is just beginning to take off, as can be seen by the increasing number of vendors. In 2000, world revenues for the SMT inspection equipment market reached \$343.8 million.

One of the SMT capital equipment markets expected to have a very bright future is SMT inspection equipment. Some SMT equipment markets already are considered mature markets, such as soldering equipment, while the inspection equipment market is just beginning to take off. This can be seen by the increasing number of vendors entering this market: in 2000 world revenues for the SMT inspection equipment market reached \$343.8 million.

MVI Equipment Market

The first market to be evaluated will be the manual vision inspection (MVI) equipment market. MVI equipment was the first form of inspection equipment in the electronics assembly industry. The market for MVI equipment has seen its share of decline in the electronics industry because it is limited compared to other inspection equipment such as automated optical inspection (AOI) and X-ray. The MVI process also is slow, which limits assembly throughput, thus decreasing production yields for electronics assembly manufacturers. Additionally, MVI equipment is limited in inspecting advanced packages such as ball grid arrays (BGA).

Operator fatigue is another major concern for electronics assembly manufacturers when purchasing MVI equipment. If an operator is at a station for long periods of time, fatigue becomes a major factor and the operator begins to miss faults. Once that occurs, the investment in the operator and MVI equipment becomes a liability for assemblers. To combat this challenge, some electronics assembly manufacturers have reduced shift times for their operators and provide longer breaks, which has helped MVI maintain its presence in some markets.

Although many have predicted the death of the MVI equipment market, there remain some signs of growth. A major restraint for other SMT inspection equipment is the high price. MVI equipment provides a cost-effective solution for electronics assemblers. Because MVI is less expensive, it is used widely in the consumer electronics industries in Asia. Assemblers in Asia operating on slim profit margins can improve their quality control with MVI equipment. The MVI market also has benefited from the perception that some automated inspection technologies do not perform well. This has helped rekindle sales for MVI equipment in some markets.



AOI Equipment Market

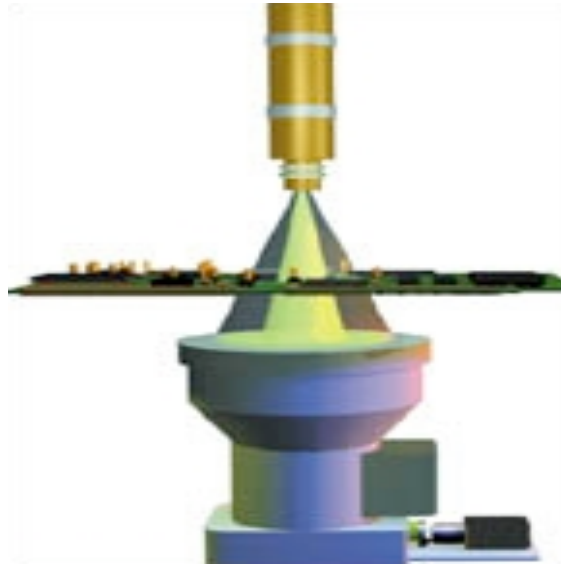
The AOI market has much potential. AOI inspection can take place at several stages on the SMT line. Historically, inspection takes place after reflow, but it is believed that several faults can be traced back to the screen printer. By inspecting after the screen printer, rework and repair is less costly (i.e., before more value is placed on the printed circuit board [PCB]). Another station seeing increased inspection is post-placement. In 2000, 20.8 percent of new sales for AOI were used for post-screen printing, 21.3 percent for post-placement and 57.9 percent for post-reflow. It is expected that the post-screen printing and post-placement market segments will continue growing as more assemblers inspect earlier in the process.

Although there have been several new competitors entering the SMT AOI equipment market, the competitive landscape has stayed steady. It is expected that more of the large sized SMT capital equipment manufacturers will pursue this market as a means to provide a complete SMT solution for their customers. Large company impact is expected to be minimal. They are expected to have the same impact that they had on the SMT screen printer equipment market. The current market leaders in the AOI market are expected to have the same success because inspection is their primary focus.

Laser Inspection Equipment Market

The laser inspection equipment market is another market segment that is seeing increased interest. Laser inspection equipment performs well when inspecting solder paste height and width. As more assemblers are paying closer attention to solder paste height and width, the laser inspection market has grown strongly. Yet, a drawback to using laser technology is that it is limited in detecting faults. Laser inspection primarily is effective in measuring solder paste volume.

It is expected that this market segment will continue experiencing solid growth in the next five years as more manufacturers evaluate assemblies before reflow. There are a limited number of players in the SMT laser inspection equipment market. The technology is expensive to develop, forcing some manufacturers not to compete in this market.



X-ray Inspection Equipment Market

The X-ray SMT inspection equipment market is experiencing strong growth. Increased use of advanced packages in the electronics industry drives this growth. The primary advanced package that has helped propel the X-ray inspection equipment market is the BGA. BGA solder joints are hidden and can be inspected only by X-ray inspection equipment. AOI, laser inspection and MVI equipment cannot penetrate components to view solder defects associated with BGAs effectively. X-ray inspection equipment can penetrate electronic components to view solder joints. It is expected that the X-ray inspection equipment market will continue growing as other advanced packages, such as chip scale packages (CSP) and flip chips gain popularity.

One drawback for growth in the X-ray inspection equipment market has been its high price. While prices are expected to decline for SMT X-ray inspection equipment, some electronics assemblers are not sure how much of an impact advanced packages will have in their industry, thus limiting X-ray inspection equipment's use. However, the industry experiencing the strongest growth for advanced packages has been the telecommunications industry.

The competitive landscape in the X-ray inspection equipment market also has a limited number of players because of the high cost of equipment development. It will be interesting how the competitive landscape unfolds in this market because some companies have been very successful with X-ray inspection equipment product lines.

Market Opportunities

One benefit SMT inspection equipment manufacturers will gain is increased interest in lead-free solder. Assemblies using lead-free solder require more inspection. The temperature profiles are different between lead-free and lead bearing solders. Lead-free solder must be heated at higher temperatures to bond components to the PCB. Higher temperatures may damage electronic components, making inspection even more important. Those focusing on electronics assembly manufacturers using lead-free solder are expected to have new market growth opportunities in the SMT inspection and test equipment market.

The electronics manufacturing services (EMS) provider market offers a strong upside for inspection equipment manufacturers. OEMs continue outsourcing their assemblies and EMS providers require more equipment to keep up with demand. OEMs also require that their subcontractors inspect and provide them with the data. Some OEMs are performing batch inspection of assemblies received from EMS providers to ensure quality control. Manufacturers focusing on the EMS market have been experiencing strong growth during the past two years.

Integrating inspection with other SMT equipment is a threat for the standalone inspection equipment market, but provides market opportunities for others. Currently, SMT manufacturing equipment that integrates inspection does not perform well. Also, integrating inspection and other SMT equipment makes for slower production, which pushes assemblers away from combined systems. It is expected once SMT equipment incorporating inspection improves its process, it will be a major contender in the SMT inspection equipment market. This will, in turn, provide more growth opportunities for vendors in this market.

Conclusion

For the SMT inspection equipment market to reach its potential, one challenge must be addressed: the perception that earlier models of automated inspection equipment did not perform to market expectations. Some of the earlier generations of automated inspection equipment failed in the field, and these early failures destroyed the confidence of electronics assembly manufacturers in automated inspection equipment. This lack of confidence has restrained the sales of automated inspection equipment among assemblers. To this day, several assemblers have idle equipment (that never did see much use) in their facilities. SMT inspection equipment manufacturers will have to work harder in the future to educate potential customers about their equipment, and of the benefits of newer equipment as opposed to older models.