Connector Imperatives to Support Next Generation Electronic Equipment

Computer, Telecom & Automotive Markets

Bishop and Associates has just released a new eight-chapter research report analyzing **Connector Imperatives to Support Next Generation Electronic Equipment**. This new report identifies emerging electrical, mechanical and economic attributes of connectors anticipated by the electronic system design community as well as provide examples of new products connector suppliers have released or are developing in order to address these emerging needs. The report is focused on three industry segments that are experiencing the most rapid and dramatic changes, and represent some of the most fertile markets for innovation in connector technology (Computers, Telecom and Automotive). Statistics are presented showing historical and forecast connector shipments for the years 2005, 2006, 2007 and 2011.

The key objectives of this new report are to identify specific attributes of electronic connectors as reported by the connector using community, and to compare them with new development work as well as recently released connectors from the connector manufacturing industry. Product extensions of existing features as well as new capabilities are reviewed.

Some Of The Issues Explored In This Report

- Are connectors currently available on the market today capable of providing performance adequate to support systems for the foreseeable future?
- What new connector attributes or features will be required that may not exist today? When must these be in place? Will customers be willing to pay for these features?
- How has advanced transceiver chip technology enabled connectors to extend their design bandwidth?
- What role will emerging industry standards organizations and special interest groups play in influencing connector design, development and implementation in the future?
- Which electronic products or market segments are driving the need for higher connector performance? Why?
- What is the timetable required for new enhanced feature connectors to meet volume production requirements?
- What are the U.S. domestic, European, and Asian connector market values today and forecasts for connectors in the computer, telecom and automotive markets?
- Will new connector technologies being developed by small independent companies be able to influence system design using non-traditional interfaces or system packaging schemes?
- What are the greatest connector challenges now being faced by next generation system design engineers? What new products or technologies are connector users identifying as being critical to the successful development of their new systems?
- What new interconnect technologies now in the concept or development stage; have the potential to change traditional connector paradigms?
- Will contract manufacturers take over an increasing responsibility for actual system design? How will the use of EMS / ODMs in the manufacturing / design process influence the migration of new interconnect technology into new systems? How will that change the OEM/connector vendor relationship?

- Is the plated through hole in a PCB reaching a high-speed performance limit? Will surface mounted connectors or some other technology become the high-speed PCB interface of choice?
- How must power connectors evolve in order to address the growing thermal management issue? What new products have been introduced to address these needs?
- Is the process by which new connectors are developed and introduced changing? How, why?
- How has the lead-free and other environmental initiatives influenced connector design, performance, and cost?
- Will new materials and manufacturing processes developed from nanotechnology play a significant role in next generation connector designs?
- How are connector manufacturers marketing their new interfaces given the movement of design engineering to offshore locations? How is technical support being provided on a global 24/7 basis?
- Is the connector-using community ready to make major paradigm shifts regarding interconnect technology and architecture?
- Which connector suppliers are perceived as leading the industry in new interconnect technology?
- How will connector companies protect their intellectual property as the manufacturing and design migration to offshore locations increases?
- How are leading connector companies responding to customer demand for a viable second source on all critical interconnects?
- How will the expansion of wireless technology influence the use of traditional copper connectors?

The first iteration of this report was published in March of 2005, and identified a series of anticipated industry interconnect needs to support the next generation of electronic equipment within the computer, telecom and automotive market segments. In many cases, new connectors were either in development or recently introduced to address these needs. Now, nearly three years later, many of the same requirements remain the primary focus of systems designers. Targets in each metric have ratcheted up to support increased system performance. Continuing challenges in system bandwidth, signal density, and power management remain key concerns as all three spiral upwards, while pressures to reduce product cost and design cycle time make the selection of the most effective connector system a critical step early in design process. The results of extensive interviews with connector manufacturers and users in preparation for this report revealed that many of these key metrics have remained the same. Only the performance targets in terms of signal integrity, contacts per PCB inch, and amps per cubic inch continue to rise. Many of the recently introduced connectors outlined in this report reflect the recognition of these trends.

Although the electronic equipment market is perceived as a dynamic rapidly evolving segment, the desire to remain within an established comfort zone and minimize risk continues to have a powerful influence on the adoption rate of new component technology. Both connector manufacturers, as well as users, are trying to establish a fine balance between pushing the envelope to achieve their next generation equipment performance goals and cost constraints created by a highly competitive market. Several comments received during the research phase suggest that system design is now often being done by low margin ODMs who are focused on reducing risk, and that many OEMs no longer have the internal resources to even evaluate new technology. A host of new connectors have been introduced over the past three years that reflect this carefully measured pace of advancement.

Some old things are new again. The need to understand the basics of contact physics continues to be an issue as senior designers who have personally experienced the negative effects of such interconnect phenomenon as fretting corrosion, the formation of inter-metallic layers between dissimilar contact materials, and tin whiskers continue to retire or are laid off in downsizings. Although system problems due to the failure of a connector continue to be a relatively rare occurrence, product failures attributed to the interconnect are being revisited among the crop of new engineers who have little training or experience in connection technology. The replacement of gold with alternative non-noble plating, elimination of the nickel underplating, and the selection of an inappropriate contact design for the application were reported and illustrate the potential for failure.

Significant concern was expressed about a potential decline in system reliability as product manufacturing and more recently product design migrates to offshore locations. The impact of improper design and selection of inappropriate materials driven more by cost reduction, introduces an entirely new level of concern in insuring product reliability. More than one interviewee indicated that their company has either re-evaluated their design and manufacturing verification process, or actually brought their product manufacturing back to the U.S.

New products are reaching the market at an accelerating rate. Hand held consumer products that offer communications, entertainment and Internet access illustrate the faster, smaller, and cheaper trend. Advanced applications in such diverse markets as industrial control, medical imaging, and security, which utilize Internet access, continue to drive the need to upgrade the infrastructure of the network. The electronic content of automobiles is exploding, as drivers demand their car become an extension of the communication, computing and entertainment features available in their home. Additional navigational, diagnostic and safety equipment together with electronic management of every major component within the car further extend electronic content.

This relentless pace of new product introduction guarantees that the pressure to develop advanced interconnection systems will continue. Existing connector families will be fine tuned to address higher speed circuits, while entirely new interconnects will be introduced that address greater packaging flexibility and current density.

World Computer / Peripheral Connector Market By Geographic Region

Region	2006	2007E	Percent Change	2011E	2009/2011 CAGR
North America	$1,222.0	$1,136.0	-7.0%	$1,006.0	-3.8%
Europe	$662.0	$674.0	1.8%	$620.0	-1.3%
Japan	$893.0	$939.0	5.2%	$1,070.0	3.7%
China	$3,068.0	$3,611.0	17.7%	$6,407.0	15.9%
Asia Pacific	$2,034.0	$2,101.0	3.3%	$2,910.0	7.4%
ROW	$208.0	$244.0	17.3%	$419.0	15.0%
Total	**$8,087.0**	**$8,705.0**	**7.6%**	**$12,432.0**	**9.0%**

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Computer, Telecom & Automotive Markets

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Research Report T-990-08, ***Connector Imperatives to Support Next Generation Electronic Equipment*** is available for $3,500. If you would like additional information about this report, or would like to place an order, please complete the following information and fax or mail it to Bishop & Associates, Inc. You may also place your order on our website: www.connectorindustry.com. Additional print copies of this report are available for $350.

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