

Performance and Trends in the Global Connector Industry

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Bishop & Associates, Inc.

Global Connector Industry

- ❖ Bishop & Associates, Inc.
- ❖ Global Connector 2023 and 2024 Industry Performance.
- ❖ Global Connector Industry Trends.
- ❖ Global Connector 2024 Industry Review.

Global Connector Industry 2024

Bishop & Associates, Inc.

- ❖ Incorporated in 1985
- ❖ Market research firm that specializes in the global electronic connector and cable assembly market.
- ❖ Publishes the monthly newsletter, *The Bishop Report* in addition to news briefs, industry updates, several off-the-shelf market studies analyzing regional and global markets, connector companies and products, and technology trends.

Global Connector Industry

Global 2023 & 2024 Connector Industry Overview

Global Connector Industry

5.8% Growth in 2024

2023 and 2024F Connector Sales by Region with YOY % Change and Market Share by Region

Region	2023	2024F	YOY Percent Change	2024 Percent Market Share
North America	\$18,840.8	\$20,313.5	7.8%	23.5%
Europe	\$17,992.7	\$18,582.6	3.3%	21.5%
Japan	\$4,683.7	\$4,822.2	3.0%	5.6%
China	\$24,977.1	\$26,606.2	6.5%	30.7%
Asia Pacific	\$11,310.0	\$12,113.2	7.1%	14.0%
ROW	\$4,049.8	\$4,164.1	2.8%	4.8%
Total World	\$81,854.1	\$86,601.8	5.8%	100.0%

\$ Millions

Global Connector Market

Percent Market Share by Region

2000 to 2024F

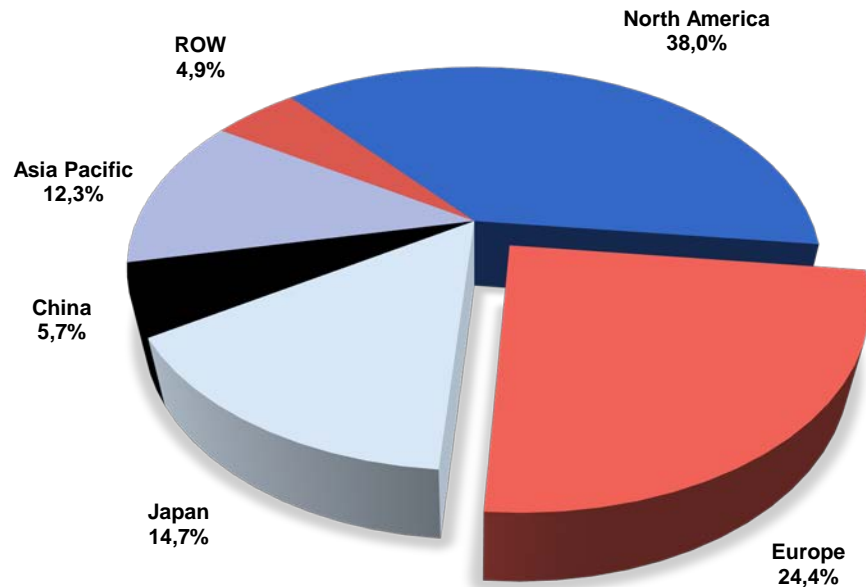
Year	North America	Europe	Japan	China	Asia Pacific	ROW
2000	38.0%	24.4%	14.7%	5.7%	12.3%	4.9%
2005	26.8%	25.0%	13.8%	16.8%	11.9%	5.7%
2010	19.4%	22.0%	12.8%	25.8%	14.4%	5.6%
2015	21.6%	20.1%	9.1%	28.3%	16.5%	4.4%
2016	21.4%	20.3%	8.1%	30.4%	15.3%	4.5%
2017	20.6%	20.5%	8.2%	31.7%	14.5%	4.5%
2018	20.8%	21.1%	7.6%	31.4%	14.6%	4.6%
2019	21.6%	21.1%	7.6%	30.4%	14.7%	4.6%
2020	21.5%	20.5%	7.1%	32.2%	14.4%	4.4%
2021	21.1%	20.9%	6.8%	32.0%	14.6%	4.6%
2022	22.5%	20.6%	6.2%	31.5%	14.5%	4.8%
2023	23.0%	22.0%	5.7%	30.5%	13.8%	4.9%
2024F	23.5%	21.5%	5.6%	30.7%	14.0%	4.8%

Global Connector Market

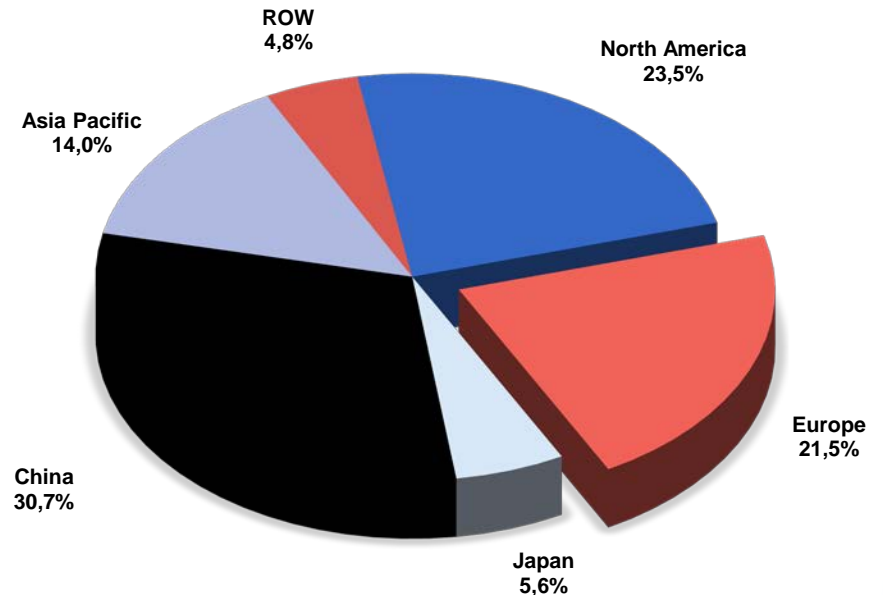
Percent Market Share by Region

2000 vs. 2024

2000



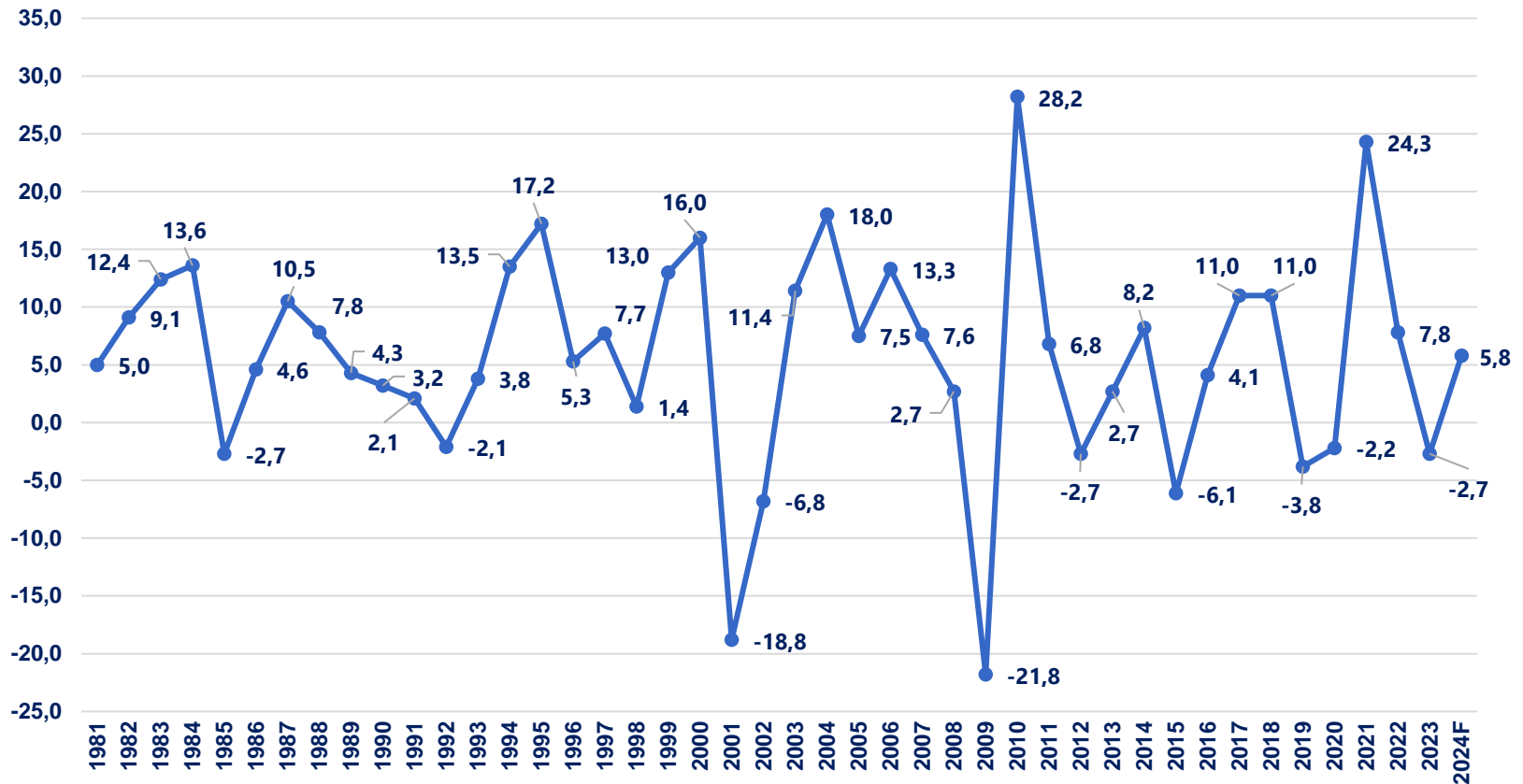
2024



Global Connector Market

Year-to-Year Change in Sales

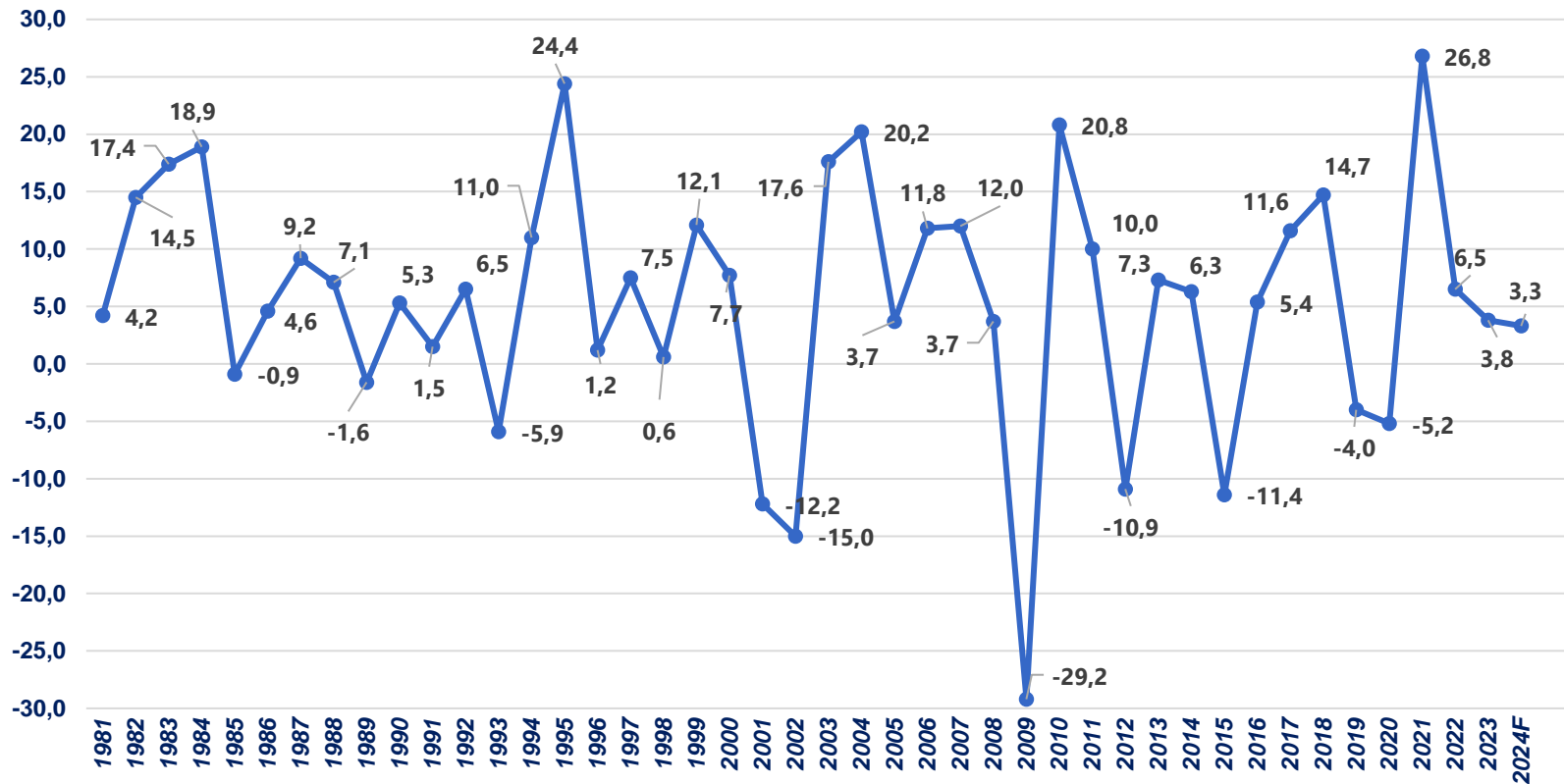
1981-2024F



European Connector Market

Year-to-Year Change in Sales

1981-2024F



Global Connector Market

Total World Connector Sales by Equipment Sector 2023 to 2024F with Percent Change

Equipment Sector	2023	2024F	Percent Change
Computers & Peripherals	\$9,979.5	\$10,262.4	2.8%
Business/Office Equipment	\$875.4	\$894.7	2.2%
Instrumentation	\$2,364.8	\$2,445.0	3.4%
Medical	\$2,659.7	\$2,767.4	4.0%
Industrial	\$10,742.3	\$11,403.8	6.2%
Automotive	\$18,502.7	\$19,647.5	6.2%
Transportation	\$5,857.4	\$6,155.6	5.1%
Military/Aerospace	\$5,092.7	\$5,411.6	6.3%
Telecom/Datacom	\$18,991.4	\$20,480.4	7.8%
Consumer	\$3,744.4	\$3,949.9	5.5%
Other Equipment	\$3,043.8	\$3,183.5	4.6%
Total World	\$81,854.1	\$86,601.8	5.8%

\$ Millions

Market Sector Definitions: www.bishopinc.com

Global Connector Market

European World Connector Sales by Equipment Sector 2023 to 2024F with Percent Change

Equipment Sector	2023	2024F	Percent Change
Computers & Peripherals	\$480.2	\$488.8	1.8%
Business/Office Equipment	\$136.7	\$136.6	-0.1%
Instrumentation	\$677.7	\$693.4	2.3%
Medical	\$891.8	\$918.5	3.0%
Industrial	\$3,747.5	\$3,874.4	3.4%
Automotive	\$6,098.1	\$6,294.3	3.2%
Transportation	\$1,653.7	\$1,709.2	3.4%
Military/Aerospace	\$1,233.5	\$1,292.6	4.8%
Telecom/Datacom	\$2,224.4	\$2,305.9	3.7%
Consumer	\$238.2	\$243.3	2.1%
Other Equipment	\$610.9	\$623.6	2.1%
Total World	\$17,992.7	\$18,580.6	3.3%

\$ Millions

Global Connector Market

Billing Performance Through September

Region	Sequential	Year-over-Year	Year-to-Date
North America	-7.0%	4.7%	4.2%
Europe	1.6%	-4.9%	-2.9%
Japan	-0.5%	-6.6%	-16.8%
China	-3.7%	11.0%	10.7%
Asia Pacific	-0.4%	23.7%	15.8%
ROW	-0.5%	6.7%	1.4%
Total World	3.0%	5.1%	3.9%

Billing performance as shown above is indicative of changes in the original forecast by regional, market, and product sectors as will be discussed later in this presentation. Overall forecast right on target!

Global Connector Industry

Key Technology Trends

Note: These are not in order of importance

Global Connector Industry

Key Technology Trends

❖ Growth in artificial intelligence (AI)

- This includes growth in active optical and copper cables and high-speed connectors, copper and/or fiber. PECFF & PCIe CEM industry form factors.

❖ Mandates to reduce power consumption

- European Union is slated to reduce energy consumption by 11.7% by 2030. Italy on track to reach its 2030 targets for emission reduction and energy efficiency. In the U.S., a variety of federal regulations on appliances and individual state mandates.

❖ Development of level 5 autonomous transportation

- Presently China is investing the most in autonomous autos, but other countries are looking at autonomous public transportation.

Note: These are not in order of importance

Global Connector Industry

Key Technology Trends (continued)

❖ Electric Vehicles

- Although anticipated to have record sales in some regions, growth has slowed down substantially. This is due to lack of infrastructure and problems with lithium batteries.

❖ Continued Development in the Science of Robotics

- Next seven to eight years, use of robotics is expected to be a Key driver in AI and ML (machine learning), both trending towards making robots more autonomous.
- Increase in use of cobots. Cost of entry has also declined, allowing small to medium business to incorporate them.
- Introduction of soft robotics, robots made from flexible materials that mimic human organisms.

Global Connector Industry

Key Technology Trends (continued)

❖ Expanded Use of PCI Express®

- Gen 6.0 continues to be adopted, while a draft of PCIe 7.0 has been released. 7.0 doubles bus transfer speed and is anticipated to be key in next generation AI/ML.

❖ Co-packaged Optics

- Found to meet the requirements of high interconnection speed, improved bandwidth density and low power consumptions, something important in data centers and in AI applications

❖ Linear Optics – Long Distance Variation of Co-packaged Optics

- Switch ASIC's serdes directly drives the module optics, removing the need for the module's DSP chip. This cuts the module's power consumption by half.

Global Connector Industry

Key Technology Trends (continued)

❖ Continued Adoption of Renewable Energy

- Will drive the need for ruggedized connectors to transmit power efficiently in solar, wind, and hydro power applications. Also re-exploring nuclear power generation.

❖ Increased Development of User-Recognition Mating Systems

- Use of magnetic, LED, vibration or a combination of these technologies to assist mating in difficult to reach places and high reliability applications.

❖ Increased Interest in Wireless Power Transfer

- Desired for convenience, but not yet practical. Low range and efficiency, slower, higher cost, limited security and not as effective in high-power applications like electric vehicle wireless.

Global Connector Industry

Key Technology Trends (continued)

❖ Use of Predictive Engineering for Product Design

- Data driven approach that uses computers and simulations to create a digital twin. Used to improve product design and development time as well as predict how a product will work/function.

❖ Liquid Cooling

- More energy efficient, reducing noise, cost and pollution. Increased demand for connectors and assemblies in immersion cooled systems.

❖ Silicon Photonics

- AI workloads and machine learning is increasing the cost and performance advantages of silicon photonics

Global Connector Industry

Key Technology Trends (continued)

❖ Miniaturization

- The need for smaller, lighter and more energy efficient devices is creating a demand for these same characteristic in connectors.

❖ Faster Data Rates

- Driven by the widespread adoption of “digital twins”.
- It has been predicted that by 2030, datacom infrastructure will be operating at twice the current rate of 112 Gbps, forcing the need for 224 Gbps-PAM 4 products.

❖ Network Automation

- Streamlining of network operations for improved efficiency, reliability, and reduction of human errors.

Global Connector Industry Review

❖ Connector Prices

- Last six months, increased slightly.
- Next six months, continue to increase moderately.

❖ Connector Raw Material Prices

- Increase in Raw Materials and Overhead Charges
6% Weighted Increase YOY 2nd Qtr.
- Key concern surrounding trade restrictions.

❖ Lead Times

- Since the beginning of the year, lead times have dropped approximately one week (8 weeks to 7 weeks). Anticipated to increase only slightly through the balance of 2024.

❖ Connector Confidence

- 49.7 down from 2nd quarter. ≥ 50 positive
- Present is 43.7 Future is 56.5.

Global Connector Industry Review (continued)

❖ Currency Fluctuations

- Influencing Europe's performance. Also, Japan in 2024.
- In September, in US dollars, Europe's connector performance was - 4.9% but +3.9% in local currency (Euros).

❖ Backlog in Weeks

- End of 3Q24, backlog was at 11.4 weeks.
- Lowest backlog of 2024. During year, backlog ranged from a low of 11.4 weeks to a high of 14.1 weeks.

❖ Acquisitions

- Continue to shape the Industry, 12 through first nine months of 2024.
- Amphenol key acquirer (87 not including CommScope), followed by TE and Molex.

Global Connector Industry Review (continued)

❖ Fourth Quarter Outlook

- 4Q24 high single-digit to low double-digit year-over-year growth.
- Full year 2024 anticipated to be as forecasted with the only change being in individual regional performance.

❖ Best Performing Markets

- **Military** – Weapon stock replenishment, increase in emerging threats including cyber attacks. Growth in communications, aviation, and ground vehicles. SWaP directive.
- **IT/Data/Computer/Telecom** – Driven by strong demand for products used in AI applications & data center expansions, as well as machine learning, robotics, and 6G.
- **Commercial Aviation** – Although 2024 is the end of recovery years, demand still outweighs production.

Global Connector Industry Review (continued)

❖ Worst Performing Markets

- **Automotive** – Previously pent-up demand has been satisfied, high interest rates, and economic uncertainty heavily weighing on current demand. Performance in this sector also influences the industrial sector, which is also not performing as anticipated.
- **Industrial** – Greatly affected by the poor performance in the automotive sector, particularly in Europe.
- **Consumer** – White goods market has slowed. High interest rates, less disposable income, gov't regulations, and less brand loyalty. Expected to pickup in the next 5-years, with continued adoption of smart appliances.