

Orders up +4.9% - First Increase In 13 months Positive Sign for 2020

Regional Performance:

December sales grew YOY in Europe, Japan and China which are encouraging results for the industry.

North America was the only region to achieve growth in 2019. Sales in all other regions are improving.

4Q Industry Result:

Sales in the fourth quarter of 2019 declined -4.7% from prior year to \$15,707 million. For the full-year, sales declined -3.8% to \$64,169 million.

2019 Industry Pricing:

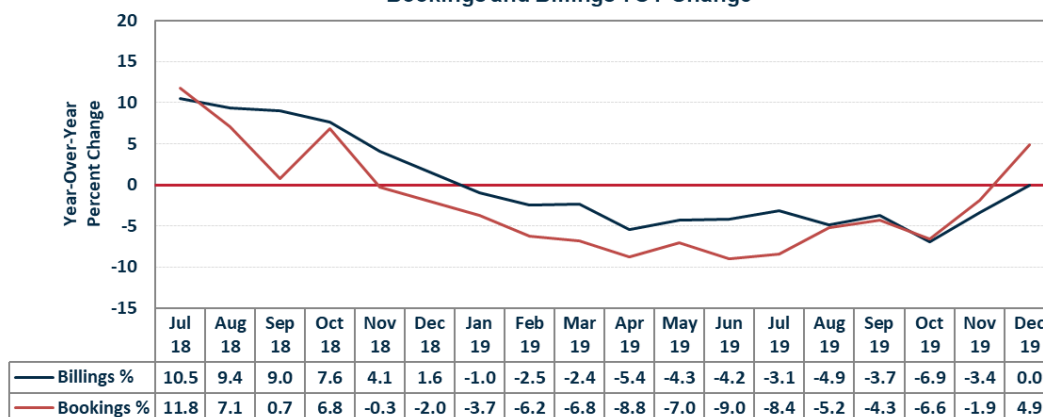
According to the pricing surveys conducted by Bishop & Associates monthly, industry pricing was very stable in 2019.

2020 Outlook:

Bishop projects sales growth of +3.5% in 2020 to \$66,386 million.

December 2019 **bookings** increased +4.9% over December 2018, the first increase in orders in 13 months. December 2019 **billings** were flat from December 2018, ending 11 consecutive months of declines. We believe that this is another positive indicator that connector demand is improving.

Bookings and Billings YOY Change



The BTB ratio in December was 1.05. This is the best book-to-bill ratio since April 2018.

Connector Industry Book-to-Bill



Merger and Acquisition Services Buy & Sell-Side

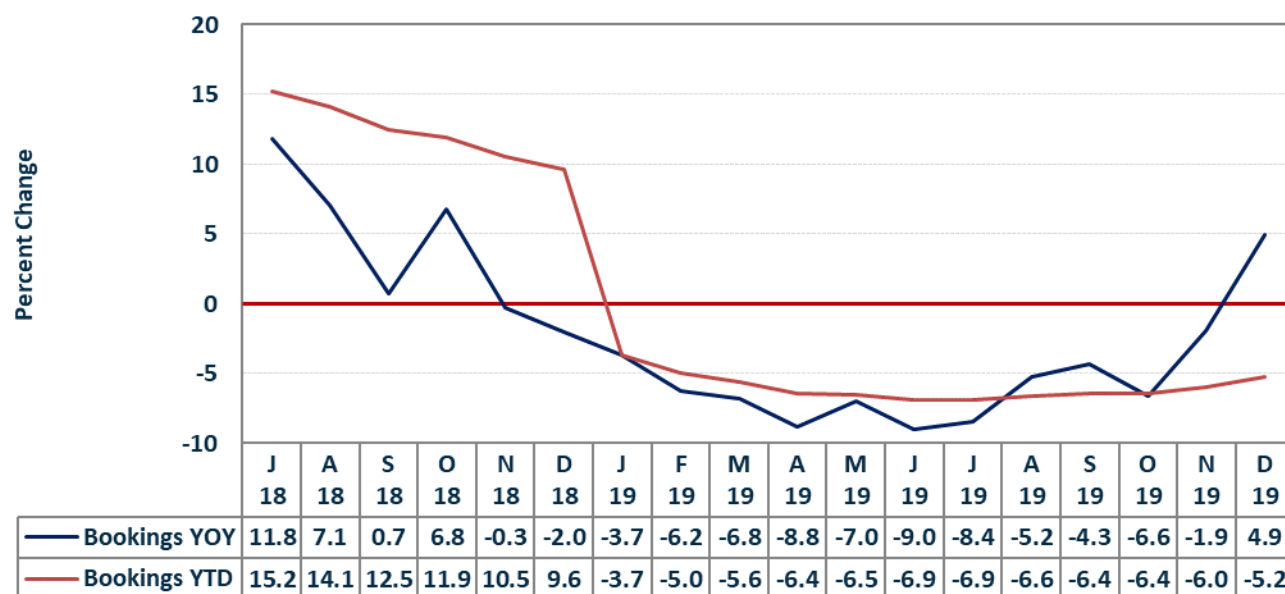
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Booking Highlights and Conclusions

Sequential, Year-Over-Year and Year-To-Date Bookings Percentage Change – 2017/2018/2019

Month	Sequential			Year-Over-Year			Year-To-Date		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
Jan	0.2%	2.8%	1.0%	15.8%	15.5%	-3.7%	15.8%	15.5%	-3.7%
Feb	8.6%	10.6%	7.7%	12.3%	17.5%	-6.2%	13.9%	16.5%	-5.0%
Mar	-4.0%	-3.8%	-4.5%	13.8%	17.7%	-6.8%	13.9%	16.9%	-5.6%
Apr	0.0%	-0.2%	-2.2%	12.2%	17.7%	-8.8%	13.5%	17.1%	-6.4%
May	6.8%	4.9%	6.9%	9.9%	15.7%	-7.0%	12.7%	16.8%	-6.5%
Jun	-2.7%	-7.0%	-8.9%	12.2%	10.6%	-9.0%	12.6%	15.8%	-6.9%
Jul	-1.0%	-0.1%	2.8%	10.1%	11.8%	-8.4%	12.2%	15.2%	-6.9%
Aug	10.7%	6.4%	7.8%	12.0%	7.1%	-5.2%	12.2%	14.1%	-6.6%
Sep	-1.8%	-7.9%	-7.1%	5.6%	0.7%	-4.3%	11.4%	12.5%	-6.4%
Oct	-7.4%	3.0%	0.6%	13.4%	6.8%	-6.6%	11.6%	11.9%	-6.4%
Nov	12.9%	5.5%	10.8%	14.0%	-0.3%	-1.9%	11.9%	10.5%	-6.0%
Dec	-11.8%	-13.6%	-7.5%	12.7%	-2.0%	4.9%	12.0%	9.6%	-5.2%

Bookings - YOY and YTD



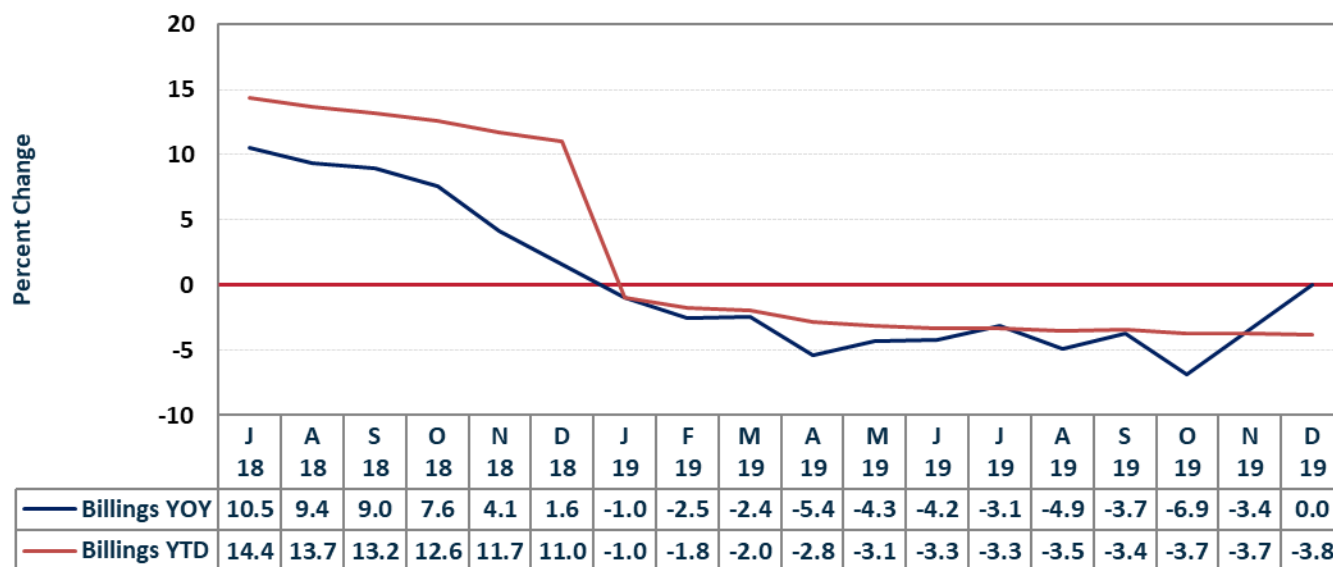
- December 2019 bookings increased +4.9% YOY from December 2018, the first month of growth since October 2018.
- Sequentially, orders decreased -7.5% over the prior month.
- YTD, bookings are down -5.2%.
- The book-to-bill ratio for December was 1.05 and the YTD BTB was 1.00.
- In 4Q19, bookings declined -1.4%.

Billing Highlights and Conclusions

Sequential, Year-Over-Year and Year-To-Date Billings Percentage Change – 2017/2018/2019

Month	Sequential			Year-Over-Year			Year-To-Date		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
Jan	-1.0%	2.9%	0.3%	12.8%	17.2%	-1.0%	12.8%	17.2%	-1.0%
Feb	9.8%	8.4%	6.8%	11.0%	15.6%	-2.5%	11.8%	16.2%	-1.8%
Mar	-2.6%	-3.2%	-3.2%	8.9%	14.8%	-2.4%	10.8%	15.8%	-2.0%
Apr	-3.7%	-2.3%	-3.7%	11.4%	15.7%	-5.4%	11.0%	15.7%	-2.8%
May	10.1%	7.8%	9.0%	11.8%	13.2%	-4.3%	11.2%	15.1%	-3.1%
Jun	-5.8%	-4.4%	-4.2%	8.2%	14.9%	-4.2%	10.6%	15.1%	-3.3%
Jul	0.8%	-3.1%	-2.0%	13.3%	10.5%	-3.1%	11.0%	14.4%	-3.3%
Aug	10.0%	9.0%	7.0%	12.4%	9.4%	-4.9%	11.2%	13.7%	-3.5%
Sep	-3.8%	-4.1%	-2.9%	0.5%	9.0%	-3.7%	9.8%	13.2%	-3.4%
Oct	0.5%	-0.8%	-4.1%	16.1%	7.6%	-6.9%	10.5%	12.6%	-3.7%
Nov	10.1%	6.7%	9.8%	14.3%	4.1%	-3.4%	10.8%	11.7%	3.7%
Dec	-11.9%	-14.2%	-11.1%	12.6%	1.6%	0.0%	11.0%	11.0%	-3.8%

Billings - YOY and YTD



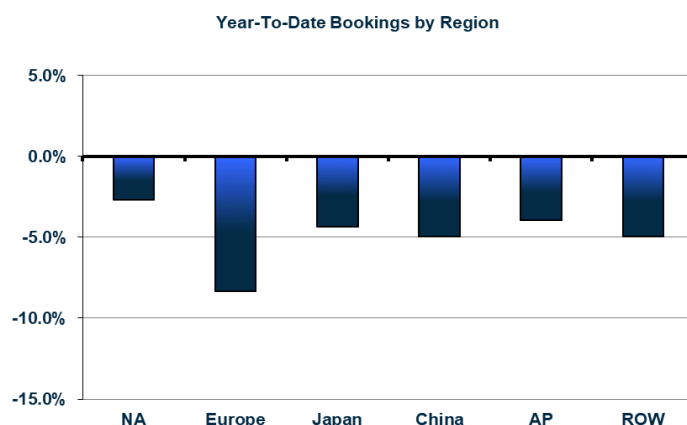
- Billings were flat in December 2019 compared to December 2018 ending 11 consecutive months of sales declines.
- Sequentially, billings decreased -11.1% over the prior month.
- YTD, billings are down -3.8%.
- In 4Q19, billings declined -4.7%.

Regional Performance

The following tables show December 2019 bookings and billings performance by geographic region.

December 2019 Bookings

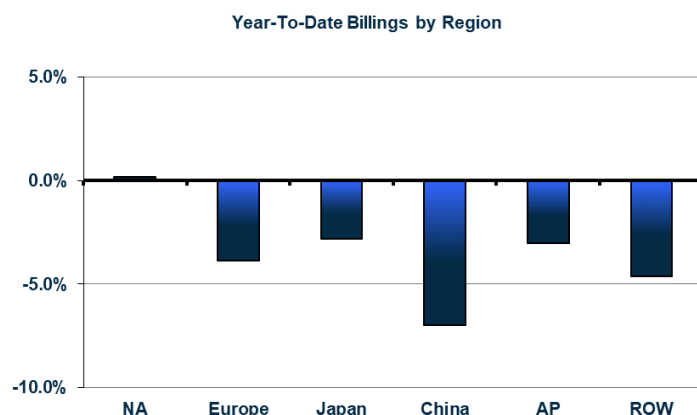
Region	Sequential	YOY	YTD
NA	-5.9%	-0.4%	-2.7%
Europe	-9.2%	8.8%	-8.3%
Japan	0.9%	6.5%	-4.4%
China	-9.4%	11.5%	-4.9%
AP	-7.9%	-1.0%	-3.9%
ROW	-6.2%	-6.6%	-4.9%
Total	-7.5%	4.9%	-5.2%



December orders were up +8.8% in Europe, +6.5% in Japan and +11.5% in China; finally, some positive signs that connector demand is improving.

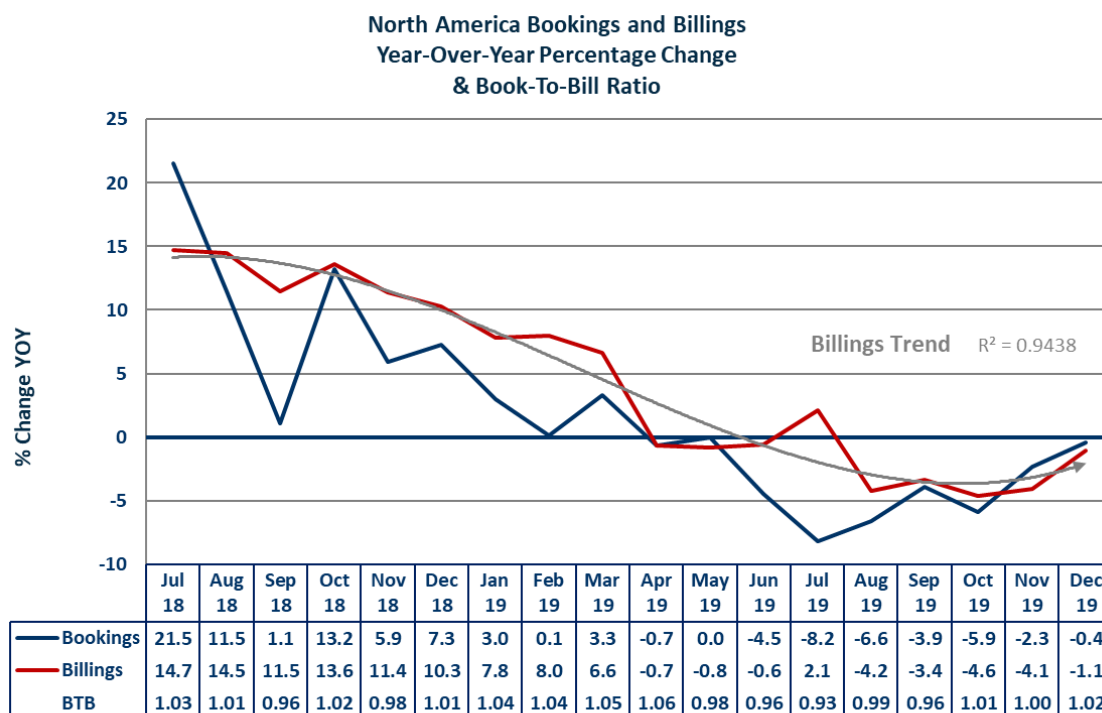
December 2019 Billings

Region	Sequential	YOY	YTD
NA	-8.1%	-1.1%	0.1%
Europe	-21.4%	2.7%	-4.0%
Japan	-7.4%	1.4%	-3.1%
China	-1.0%	1.9%	-7.0%
AP	-16.1%	-5.2%	-2.8%
ROW	-9.8%	-7.0%	-3.8%
Total	-11.1%	0.0%	-3.8%



Europe, Japan, and China all had sales growth in December. This ends months of declining sales in these regions.

North America The following chart displays the year-over-year (YOY) percentage change in bookings and billings for the last 18 months. The monthly BTB ratio is also displayed.



Note: Billing Trend R^2 = Goodness of Fit of data to the trend line, 1.0 is a perfect fit.

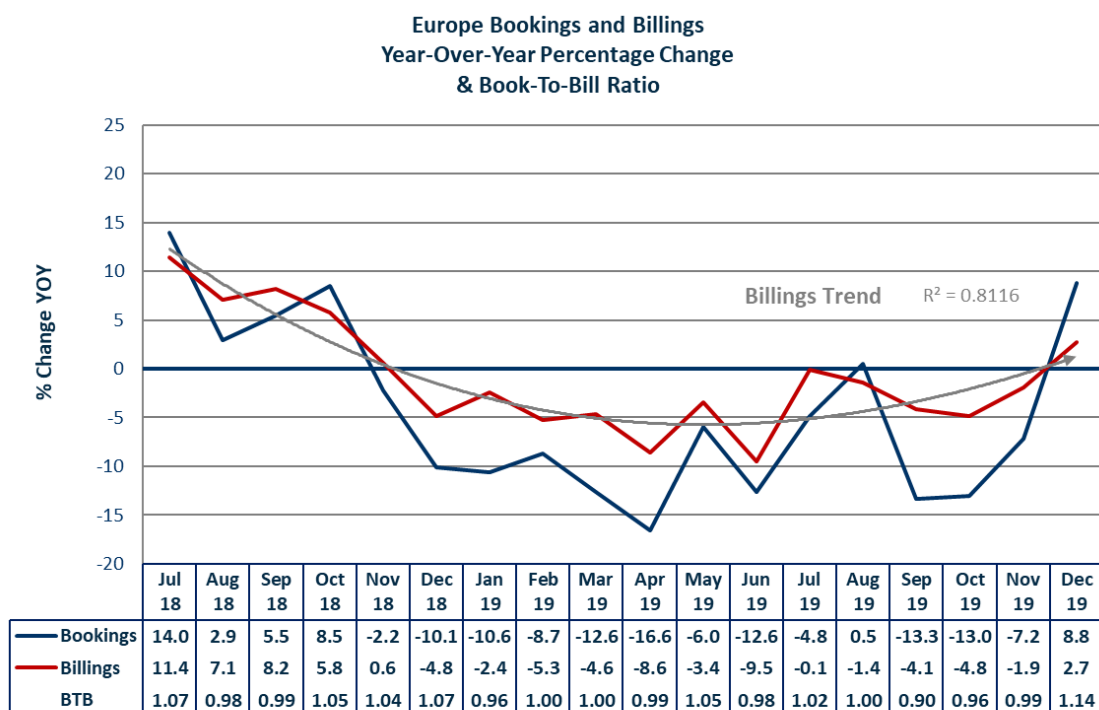
North America Performance

- YOY bookings have contracted, or were flat, for nine consecutive months. For 2019, total sales were up +0.1%.
- US GDP grew 2.3% in 2019 down from 2.9% in 2018.
- US consumer confidence in December was 99.3, on an upward trend since it bottomed at 89.8 in August.
- Industrial production in the US contracted 1.0% in December. This is the fourth consecutive quarter of contraction.
- Retail sales in December increased 0.3% from November. YOY, retail sales were up 5.8%.
- The December US unemployment rate remained at 3.5%, lowest rate employment in decades.
- In December, US auto sales contracted 5.8% according to MarkLines. YTD sales are down 1.3%.
- The manufacturing PMI increased to 52.4 in December, a positive indicator for the US manufacturers.
- Bishop's Connector Confidence Index for North America in 4Q19 is 57.1, up from 42.1 in the prior quarter. The future index increased to 68.8 in 4Q19 from 50.0 in 3Q19. Industry confidence is improving.

Conclusions

- The North American connector industry is doing better than other regions for several reasons. Regardless of some recent ups and downs, financial markets grew strongly in 2019 reaching record levels. In part, this has driven consumer confidence to near record highs. With this high confidence and low interest rates, consumers are spending money and buying goods. Retail sales in the US were up every month YOY in 2019. This resulted in GDP growing 2.3% in 2019.

Europe The following chart displays the year-over-year (YOY) percentage change in bookings and billings for the last 18 months. The monthly BTB ratio is also displayed.



Note: Billing Trend R^2 = Goodness of Fit of data to the trend line, 1.0 is a perfect fit.

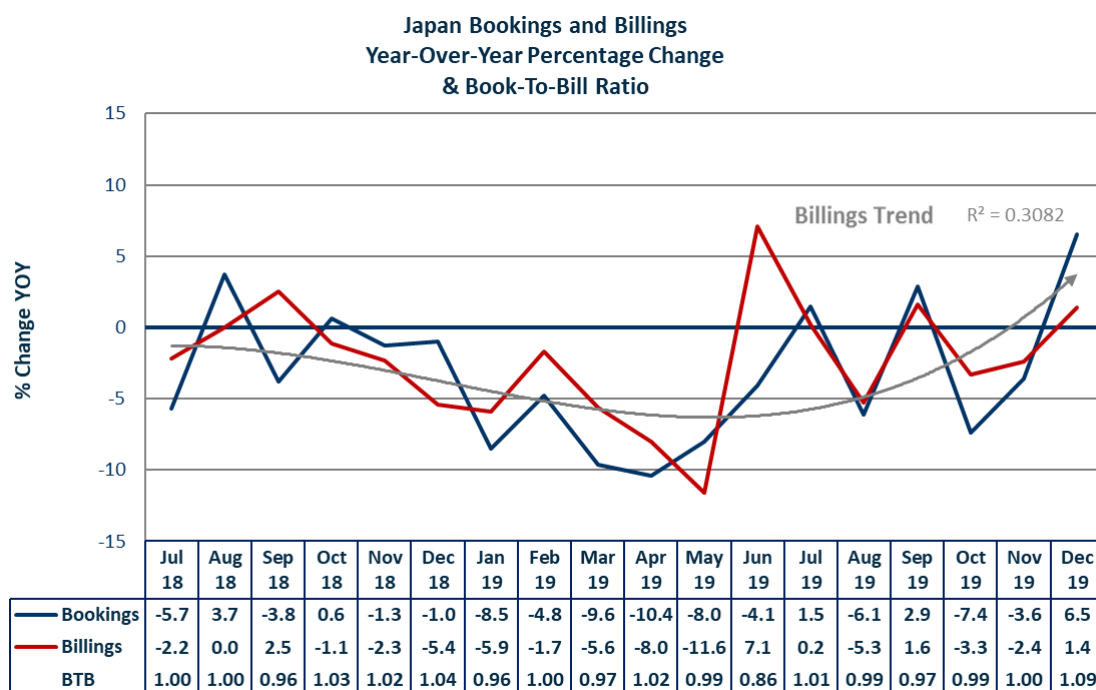
Europe Performance

- Orders and billings both grew in December, a positive indicator for the first quarter of 2020. For 2019, sales were down -4.0% in USD and up 1.0% in local currencies.
- Industrial production declined 1.5% YOY in November, its 13th consecutive monthly decline.
- Retail sales in November were up 2.2% YOY and were down 0.6% sequentially.
- New car sales rose 21% YOY in December. 2019 YTD sales were up 1.2% with this strong performance.
- The Euro Area unemployment rate remained at 7.5% in November, the lowest rate since July 2008.
- Business confidence dropped to -0.25 in December and the manufacturing PMI dropped to 46.3 in December (revised up).
- Consumer confidence in the Eurozone declined to -8.1 in December from -7.2 in the prior month.
- Brexit was passed by the UK parliament and went into effect on 1/31/20.
- Bishop's Connector Confidence Index for Europe in 4Q19 is 50.0, up from 42.1 in the prior quarter. The future index increased to 64.7 in 4Q19 from 42.1 in 3Q19.

Conclusions

- Europe's connector industry performance was negatively affected by currency exchange headwinds, the looming Brexit event, public protests in France, and declining auto sales. Although retail sales were up during the year, it was not enough to drive higher consumer spending and consumer confidence trended down during the year. Industrial production was negative through-out the year. The connector industry did rebound a bit toward the end of the year, and we are expecting growth in 2020.

Japan The following chart displays the year-over-year (YOY) percentage change in bookings and billings for the last 18 months. The monthly BTB ratio is also displayed.



Note: Billing Trend R^2 = Goodness of Fit of data to the trend line, 1.0 is a perfect fit.

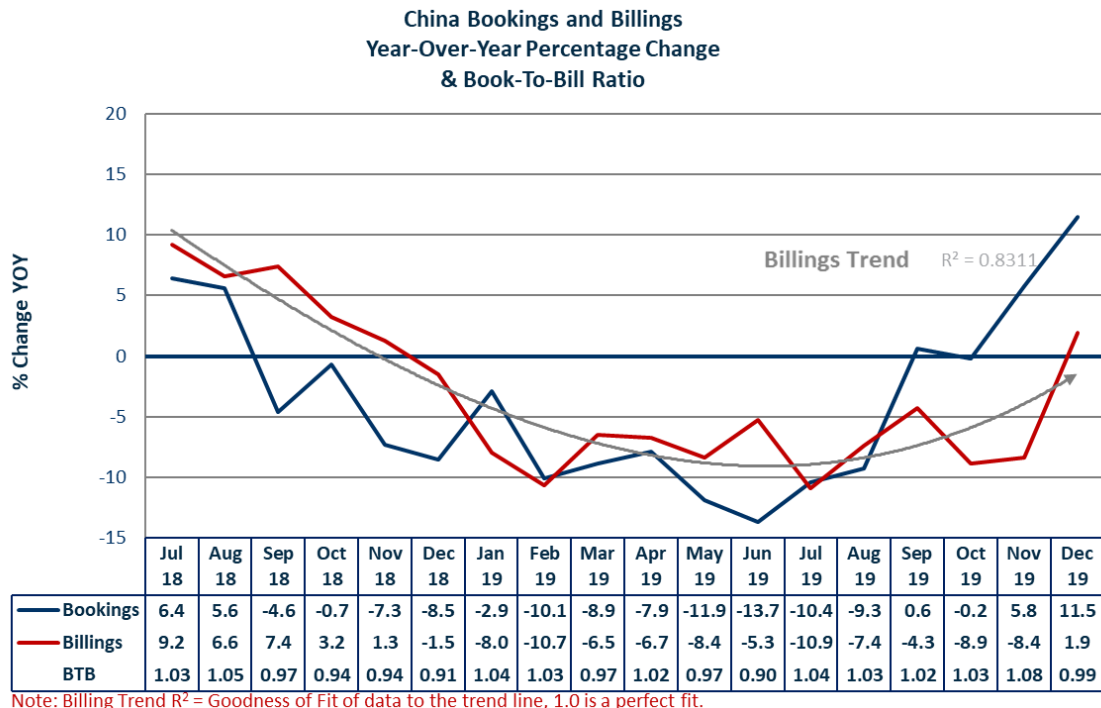
Japan Performance

- YOY orders and sales were positive in December. In local currency, sales were down -4.1% YTD.
- Industrial production contracted 8.2% YOY in November.
- Retail sales contracted 2.1% YOY in November as October's sales tax hike continues to have impact on spending.
- Exports from Japan declined 7.9% in November from the prior year and were down 3.0% sequentially. Japan's trade deficit narrowed sharply to 82 billion yen from 739 billion a year earlier.
- The December manufacturing PMI decreased to 48.4 from 48.8 in the prior month.
- Consumer confidence increased to 39.1 in December from 38.7 in the prior month. This is the fourth month of growing consumer confidence.
- Bishop's Connector Confidence Index for Japan in 4Q19 is 14.3, down from 21.4 in the prior quarter. The future index increased to 42.9 in 4Q19 from 40.0 in the prior quarter.

Conclusions

- Japan's connector market has been stagnant over the last ten years. This is largely the result of significant off-shoring of their manufacturing base including automotive, computers, and connectors. Industrial production was negative for most of 2019. Consumer confidence was near historical lows and consumer spending was muted through-out the year. GDP did recover with an upward trend through 2019. We believe Japan's connector industry will grow YOY in 2020, but it will be partially due to easy comparisons.

China The following chart displays the year-over-year (YOY) percentage change in bookings and billings for the last 18 months. The monthly BTB ratio is also displayed.



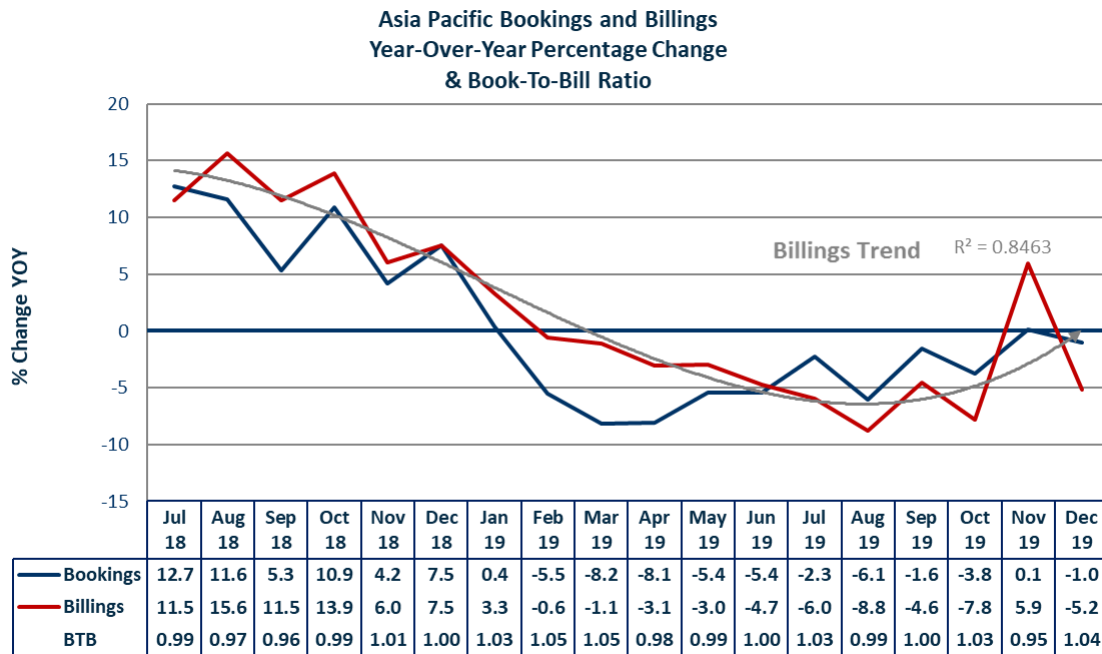
China Performance

- Sales grew for the first time in 12 months. Sales for 2019 were down -7.0% in USD and -3.0% in yuan.
- 4Q19 GDP grew 6.0% YOY and grew 1.5% sequentially.
- Industrial production rose for the third consecutive month to 6.9% YOY in December.
- Retail sales remained at 8.0% YOY in December.
- Vehicle sales continued to shrink in December, down 0.1% YOY. This is the 18th consecutive month of declining sales. For 2019, vehicle sales were down -8.2%.
- Exports increased 7.4% sequentially in December and were up 7.6% YOY, the first increase in five months. China's exports to the US were \$23.18 billion in November – down from \$24.6 billion in November. Sales to the US dropped 12.5% for 2019.
- Business confidence remained stable at 50.2 in December. The PMI fell slightly to 51.5 in December versus 51.8 in November.
- Bishop's Connector Confidence Index for China in 4Q19 is 43.8, up from 26.3 in the prior quarter. The future index increased to 58.8 in 4Q19 from 52.9 in the prior quarter.

Conclusions

- China's connector sales slowed significantly in 2019 as US tariffs went into effect, the world economy slowed, and their economy slowed. Recent progress on the trade talks between China and the US is helping to stabilize their economy. We forecast industry growth for China in 2020, but we expect the first quarter to be down due to the economic effects of the coronavirus.

Asia Pacific The following chart displays the year-over-year (YOY) percentage change in bookings and billings for the last 18 months. The monthly BTB ratio is also displayed.



Note: Billing Trend R^2 = Goodness of Fit of data to the trend line, 1.0 is a perfect fit.

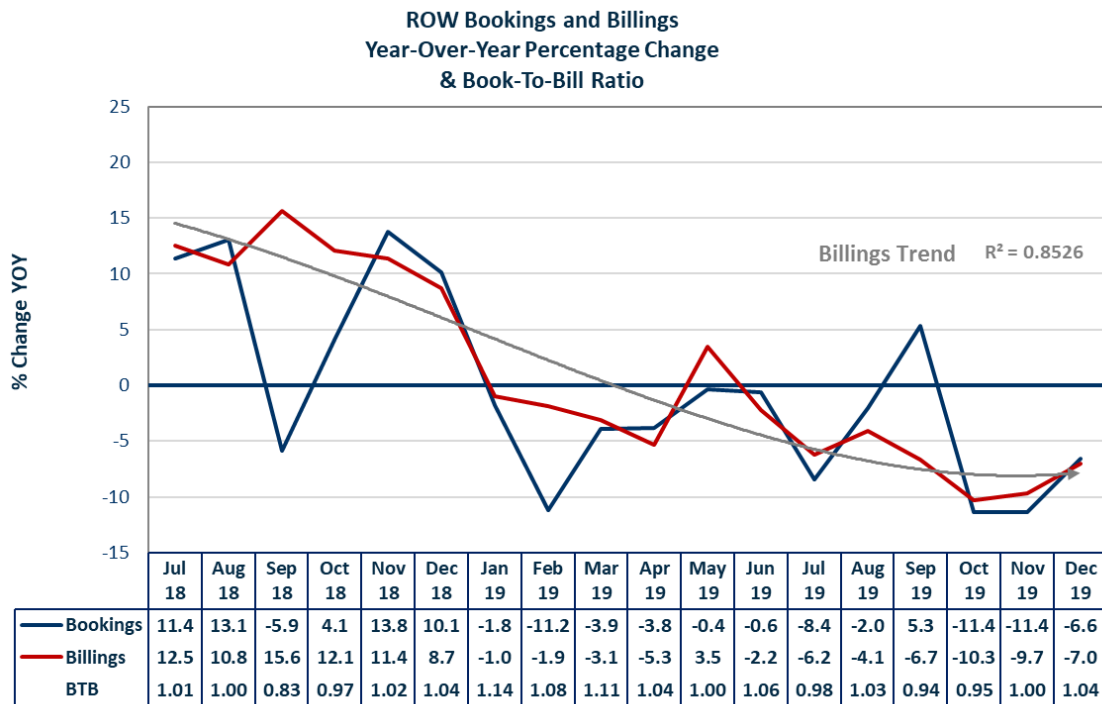
Asia Pacific Performance

- Sales have remained in negative territory for ten out of the last 11 months. Sales were down -2.8% in 2019.
- India's inflation rate increased to 7.35% in December. December exports fell 1.8% year-on-year but were up 5.3% sequentially. The December manufacturing PMI rose to a seven-month high of 52.7.
- South Korea's industrial production dipped slightly 0.3 % YOY in November. November retail sales rose 3.7% YOY. YTD exports decreased 7.0% and, sequentially, exports increased 3.8%. The manufacturing PMI rose to 50.1 in December, an eight-month high.
- Bishop's Connector Confidence Index for Asia Pacific in 4Q19 is 50.0, up from 46.2 in the prior quarter. The future index increased to 78.6 in 4Q19 from 64.3 in the prior quarter.

Conclusions

- Connector industry sales for this region are largely dependent on India's and South Korea's economies. Their economies are generally dependent on exports. India exports are only made up of approximately 10% of goods that would contain connectors and internal consumption in goods such as cars, so they are not a large user of connectors in comparison to other regions. Their consumer spending, however, has more than doubled over the last decade, so internal consumption is increasing much as it has in China, and it should grow substantially as the population becomes more prosperous. South Korea exports, however, account for 50% of their GDP and 56% of these exports are items that contain connectors. Of the 56%, 12% are road vehicles which have very high connector content. South Korea's exports were down 10.3% in 2019 due to the US-China trade issues, Japan's restrictions on exports, Brexit, and the Hong Kong protests. We expect 2020 to be a better year for their connector industry.

Rest of World The following chart displays the year-over-year (YOY) percentage change in bookings and billings for the last 18 months. The monthly BTB ratio is also displayed.



Note: Billing Trend R^2 = Goodness of Fit of data to the trend line, 1.0 is a perfect fit.

Rest of World Performance

- Bookings and billings experienced steep declines in October, November, and December. Both billings and bookings were negative in 11 of the last 12 months. Sales for 2019 declined -3.8%.
- Russia's industrial production increased 2.1% YOY in December. November exports fell 3.7% sequentially. The November trade surplus narrowed to \$12.3 billion. The annual inflation rate fell to 3.0% in December.
- Brazil's industrial production decreased 1.7% YOY in November. Retail sales rose 2.9% YOY in November. The inflation rate increased to 4.31% in December. Business confidence rose to 64.3 in December. The manufacturing PMI dropped to 50.2 in December. The unemployment rate dipped to 11.2% in November.

Conclusions

- Brazil and Russia are currently the 10th and 13th largest economies in the world but represents only 4.6% of the world connector sales. Brazil is an export-oriented economy, but 50% of the exports are raw materials. Transportation equipment and components make up 12% of the exports. Brazil's population is 210 million people, but their 27% poverty level limits the number of consumers that contribute to their GDP. This limits their overall impact on the connector industry. Russia's economy is highly dependent on the export of commodities like oil, natural gas, and metals which represent over 60% of their total exports. Exports of machinery and equipment, items containing connectors, are approximately 7% of their exports. Russia's main imports are machinery, transportation equipment and other equipment. The country uses connectors internally in military/aerospace and transportation applications but imports 12% of their electronics. Their impact on the connector industry is also limited.

4Q19 & Full-Year Connector Industry Results

Industry sales decreased -4.7% YOY in 4Q19 to \$15,707 million. After 11 quarters of growth, starting in third quarter 2016, this is the fourth quarterly decrease.

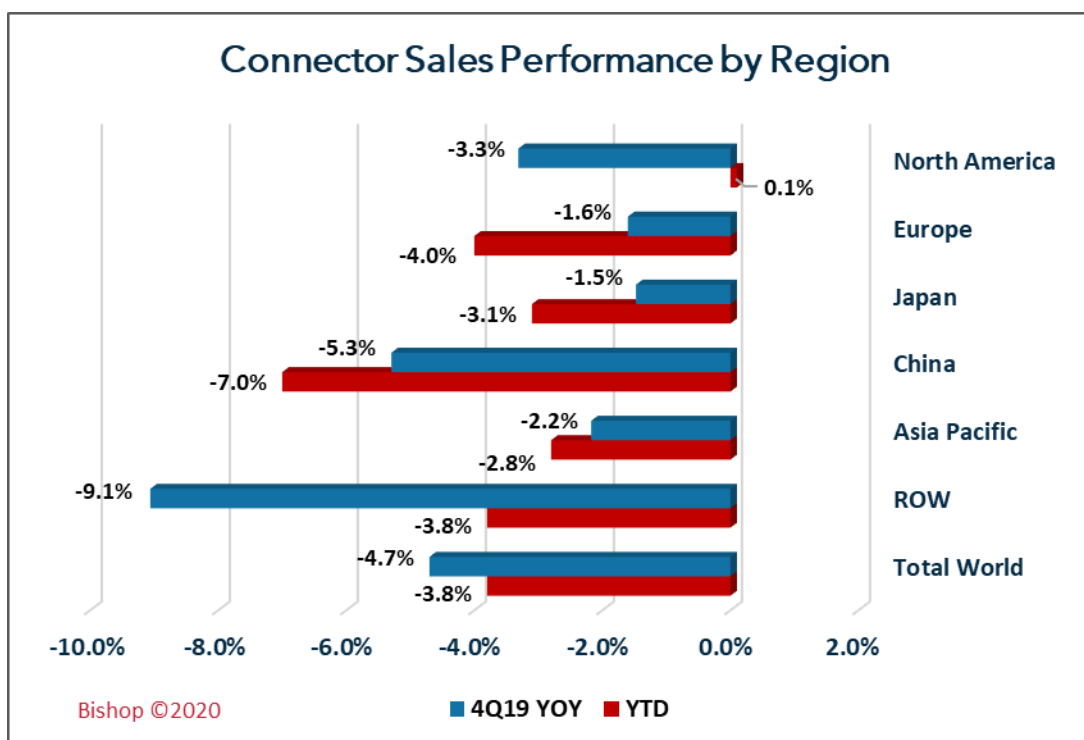
The following table shows industry sales by quarter for 2018, 2019, and 2020 forecast. The Q4 actual was \$1,010 million below prior forecast. With the lower Q4 result, full year actual was \$64,169 million, down -3.8% from prior year.

**Connector Industry Quarterly Sales Results
2018, 2019 and 2020**

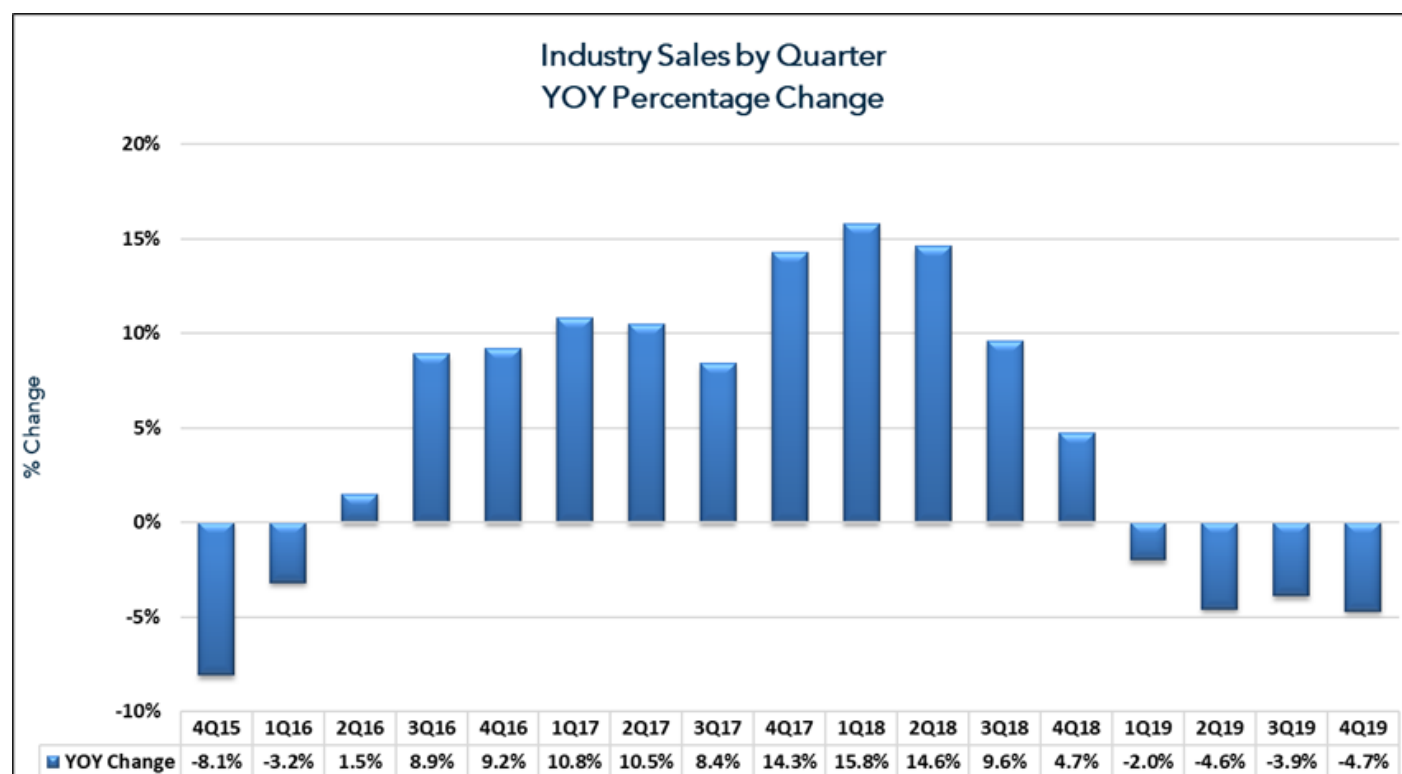
	2018	2019	YOY	2020	YOY
Quarter	Actual	Actual	Change	Forecast	Change
1Q	\$16,212	\$15,890	-2.0%	\$15,800	-0.6%
2Q	\$16,875	\$16,097	-4.6%	\$16,386	1.8%
3Q	\$17,150	\$16,475	-3.9%	\$16,850	2.3%
4Q	\$16,473	\$15,707	-4.7%	\$17,350	10.5%
Total	\$66,710	\$64,169	-3.8%	\$66,386	3.5%

\$ Million, Bishop ©2020

Sales growth/contraction by region in the fourth quarter and YTD figures can be seen in the following chart.



Connector industry sales growth can be seen in the following chart by quarter. The industry had grown for 11 consecutive quarters, almost three years, before starting to contract in the last four quarters.



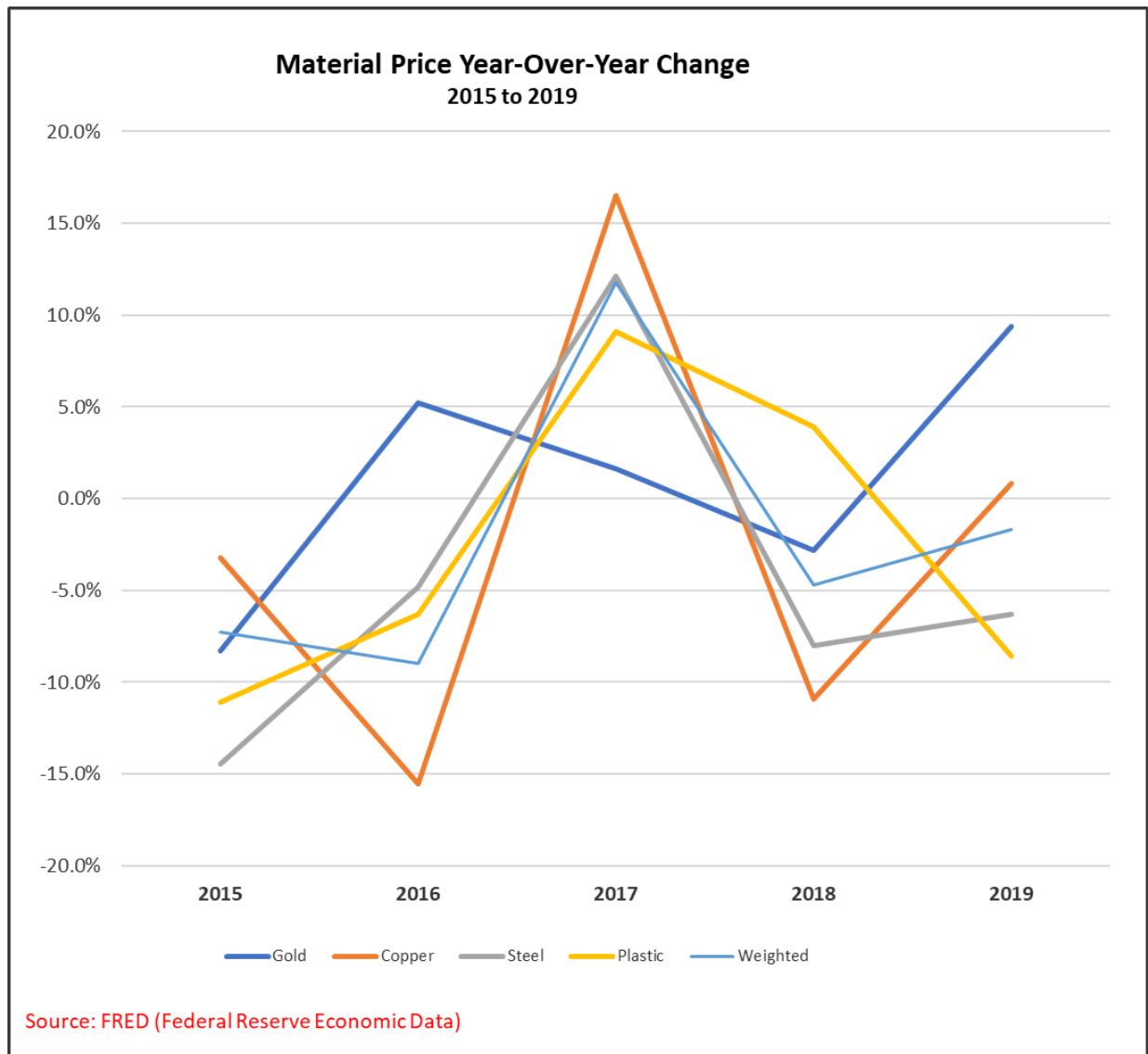
Comments on 2019:

- Sales for 4Q19 were down -4.7% and the full year sales were down -3.8%. The industry contraction was relatively modest in comparison to other downturns. The results were partially driven by trade tariffs and negotiations, and partially driven by an economic slowdown in Europe and China.
- China, the largest region in the connector industry, also had the largest industry downturn, contracting -7.0% in 2019.
- Although sales were negative for all 12 months of the year, the modest contractions generally trended up during the year.
- Booking trended up in the last half of the year and showed growth in December for the first time since December 2019.
- The US financial markets had strong (albiet a bit erratic) growth. The last few months of the year saw the DJIA, the S&P 500, and the NASDAQ reach record highs. This has helped keep consumer confidence and consumers spending high.

2019 Material Costs

Bishop & Associates tracks material costs for gold, copper/brass, steel and thermoplastics used in the manufacturing of connectors. These materials represent 75% of the material cost in a typical connector. Prices on these materials decreased 1.2% YOY in 2019. When weighed by usage in connectors, connector companies saw a decrease in material costs of 1.7%, on the average.

The following chart shows the YOY change in the cost of these materials over the last five years.



The following table shows the YOY change for each material. Copper/brass and thermoplastics make up 80% of the cost of these materials in connectors. Since thermoplastics were down 8.6% and copper/brass was up less than 1%, this negated the cost of gold going up by 9.4%.

2019 YOY Cost Change by Material

Material	YOY Change
Gold	9.4%
Copper/Brass	0.8%
Steel	-6.3%
Thermoplastics	-8.6%
Total Change	-1.7%

It is important to understand that the change in raw material cost will differ based on individual usage of these materials, however, the general trend is downward.

Bishop Comments

- As raw material cost decrease, this generally has a positive influence on profitability. With modestly weaker demand in 2019, the lower cost is probably balanced off by the lower volume.
- Connector pricing was relatively stable in 2019, which should help offset some of the volume decrease.
- Economic growth has stabilized in most regions of the world and looks primed to increase in 2020. This may contribute to some material cost increases in 2020.
- The US trade situation with China has been partially resolved and further negotiations are expected. This could also contribute to mild material cost increases in 2020.

2019 Industry Pricing

According to the pricing surveys conducted by Bishop & Associates monthly, industry pricing was very stable in 2019. As can be seen in the table below, the majority of respondents in November felt pricing had remained the same over the last six months. When you add in “a little increase” and “a little decrease”, the bell curve includes 92% of the respondents. The results are similar when looking out over the next six months.

Change in Connector Prices

Price Change	Last 6 Months	Next 6 Months
<i>Change in Connector Prices</i>		
Increase a lot	4.0%	0.0%
Increase a little	24.0%	36.0%
Stay the same	44.0%	36.0%
Decrease a little	24.0%	24.0%
Decrease a lot	4.0%	4.0%
Total	100.0%	100.0%

Nov	3.000	3.040
Oct	3.033	3.067
Sep	2.886	3.441
Aug	3.125	3.208

Methodology: Increase a lot = 5; Increase a little = 4; Stay the same = 3; Decline a little = 2;
Decline a lot = 1

The following table shows the distribution of responses.

Distribution of Responses

Prices	Last 6 Months	Next 6 Months
Decrease 1-2%	8.0%	8.0%
Decrease 3-4%	24.0%	20.0%
Decrease 5-6%	4.0%	4.0%
Decrease 7-8%	0.0%	0.0%
Decrease 9-10%	0.0%	0.0%
Decrease >10%	0.0%	0.0%
Stay The Same	40.0%	32.0%
Increase 1-2%	4.0%	28.0%
Increase 3-4%	4.0%	4.0%
Increase 5-6%	8.0%	4.0%
Increase 7-8%	0.0%	0.0%
Increase 9-10%	8.0%	0.0%
Increase >10%	0.0%	0.0%
Total	100.0%	100.0%

40% of the respondents felt prices remained the same over the last six months. 32% felt that prices will stay the same over the next six months, and 68% felt prices would remain the same or increase slightly over the next six months.

2019 Mergers & Acquisitions

Once again Amphenol led the industry in acquisitions, completing more acquisitions than any other company in the connector, cable, or cable assembly field in 2019. Acquiring nine companies which collectively represented annualized revenues of approximately \$350 million in 2019, Amphenol has acquired more than 60 companies in the last decade. In fact, in the last five years, Amphenol has spent 9% of sales on acquisitions. According to Adam Norwitt, president and chief executive officer, Amphenol “look(s) for acquisitions that have great people, great products and great position, all of which help you to build a platform for that company to perform better as part of Amphenol.”

Amphenol began with the January acquisition of SSI Control Technologies, the sensor manufacturing division of SSI Technologies, Inc. Based in Janesville, Wisconsin, SSI Control Technologies is a leading designer and manufacturer of sensors and sensing solutions for the global automotive and industrial markets, with annual sales of approximately \$180 million. Employing approximately 900 people worldwide, SSI operates manufacturing facilities in the US and Czech Republic. The acquisition cost Amphenol approximately \$400 million plus a performance-related contingent payment.

Charles Industries, a leading manufacturer of integrated environmental housings and enclosures for wireless, telecom, and broadband service providers, based in Schaumburg, Illinois, joined Amphenol's RF, Optics and Broadband Group in April. That same month, Amphenol ICC acquired Huizhou, China-based Aorora Technology Co., Ltd. A leading supplier to the consumer and automotive markets, Aorora focuses on fine pitch FFC/FPC connectors, floating board-to-board, and micro board-to-board connectors.

In June, Amphenol acquired CONEC Elektronische Bauelemente GmbH, a German manufacturer that focuses on interconnect for the industrial market and Kopek Industries, a China-based supplier of RF passive interconnect components for the broadband market. In July, the company acquired Bernd Richter GmbH, a German manufacturer of high-technology cable assemblies for the medical industry and GJM Group, a Spain-based company of interconnect assemblies for the automotive market.

During the third quarter of 2019, Amphenol acquired UK based Cablescon, a manufacturer and developer of high-performance cable assemblies and control panels, for the aerospace, defense, and commercial sectors and China-based XGiga Communication Technology a designer and manufacturer of active fiber optic interconnect components used primarily in communications infrastructure markets.

TE Connectivity took second place in number of acquisitions in 2019 with four acquisitions. According to John Mitchell, senior vice president and general manager of TE sensors business, the company's first acquisition of 2019 expanded its leadership position in sensor applications. “The acquisition of Alpha Technics is part of our well-established strategy to expand our leadership position in sensor applications,” he said. “This transaction further establishes TE as a sensor technology leader for the medical market.” Now part of TE's Transportation Solutions segment, Alpha Technics was a privately held company with annualized sales of approximately \$20 million.

The May acquisition of Alpha was followed by the June acquisition of the Kissling Group. Headquartered in Wildberg, Germany, Kissling is an industry-leading provider of high-power and high-voltage relays and ruggedized switches for the commercial transportation, industrial, military, and aviation industries as well as other applications.

TE Connectivity's final two acquisitions of 2019 focused on expanding the company's presence in the sensor market, particularly in medical, transportation, and industrial applications. In September, Measurement Specialties Inc., a subsidiary of TE Connectivity Ltd., acquired Silicon Microstructures Inc. (SMI), from Elmos Semiconductor AG. SMI is a developer and manufacturer of MEMS-based pressure sensors offering unique solutions for pressure and flow sensing and both the lowest pressure and smallest

pressure sensors available today. The company empowers invasive medical devices with ultra-small sensors for in vivo pressure measurement.

Following the acquisition of SMI, TE undertook a voluntary public takeover offer for all shares of First Sensor AG, a provider of sensing solutions based in Germany. Listed on the Frankfurt Stock Exchange, First Sensor is a global player in sensor technology that develops and produces standard products and customer-specific solutions for the ever-increasing number of applications in the industrial, medical, and mobility target markets. According to TE, "Completion of the offer will be subject to customary closing conditions, including regulatory approvals, and the offer will not be subject to reaching a minimum acceptance threshold. TE expects to complete this acquisition by mid-2020 at the latest."

Probably the largest acquisition of 2019 involved two separate but very "connected" acquisitions. In March of 2019, TransDigm Group acquired Esterline Technologies Corporation for approximately \$4.0 billion in total consideration, including the assumption of debt. Esterline is a supplier of products to the global aerospace and defense industry, including interconnect solutions marketed under Souriau and Sunbank. Following the July acquisition, Eaton announced a commitment to acquire the Souriau-Sunbank Connection Technologies business of TransDigm Group for \$920 million, which represents a trailing 12-month EBITDA multiple of approximately 12x. With a workforce of approximately 3,200 people, Souriau-Sunbank is a global leader in highly engineered electrical, electronic, and fiber optic interconnect solutions for applications in the aerospace, defense, industrial, and transportation markets. The company, which is headquartered in France, has manufacturing facilities in France, the Dominican Republic, India, Morocco, Mexico, and the United States.

Phoenix Contact Group took over both SKS Kontakttechnik GmbH and Pulsotronic GmbH & Co KG in January of 2019. Based in Niederdorf, Germany, SKS Kontakttechnik offers electrical engineering components and systems, while Pulsotronic manufactures sensor solutions. In March, RF Industries acquired C Enterprises. In May, Belden Brand PPC acquired OPTERNA, a provider of innovative, scalable fiber solutions.

Carlisle Interconnect Technologies announced its acquisition of MicroConnex, a privately held manufacturer of highly engineered microminiature flex circuits for the medical and test & measurement markets, in May. Carlisle also acquired Providien in November, a global supplier of solutions to the medical industry.

In July, private equity investor, Equistone Partners Europe purchased the majority stake in Bulgin from parent company Elektron Technology. Winchester Electronics, a subsidiary of Aptiv, acquired Falmat Inc., a worldwide leader in the engineering and manufacturing of high-performance, mission-critical custom cable solutions.

In August, Radiall strengthened its technology portfolio and enhanced its product offering of power interconnect solutions with the acquisition of Solyneo's assets. Solyneo, a French startup company based in France, specializes in producing prototypes of highly efficient and reliable free-space power transmissions for demanding environments. In December, FDH, a portfolio company of Audax Private Equity, acquired BTC Electronics, a distributor of high-performance connectors and accessories.

Finishing out Bishop's list of 31 acquisitions in 2019: Sager Electronics' acquisition of Technical Power Systems in July, TPC Wire and Cable's acquisition of EZ Form Cable in June and Cicoil LLC in September, Samtec's acquisition of Precision Connector in October, Smiths Interconnect's acquisition of Reflex Photonics in November, Volex's acquisition of GTK Ltd, Beijer Tech's acquisition of Encitech in March, and Avnet's acquisition of French software company Witekio in December.

2020 Outlook

After a moderate decline in 2019, the connector industry is projected to transition back to growth in 2020. The industry is forecast to expand +3.5% in 2020 to \$66,386 million, almost back to the record sales achieved in 2018 of \$66,710 million.

Connector Industry Sales and Forecast by Quarter (2018, 2019, 2020)

	2018	2019	YOY	2020	YOY
Quarter	Actual	Actual	Change	Forecast	Change
1Q	\$16,212	\$15,890	-2.0%	\$15,800	-0.6%
2Q	\$16,875	\$16,097	-4.6%	\$16,386	1.8%
3Q	\$17,150	\$16,475	-3.9%	\$16,850	2.3%
4Q	\$16,473	\$15,707	-4.7%	\$17,350	10.5%
Total	\$66,710	\$64,169	-3.8%	\$66,386	3.5%

\$ Million, Bishop ©2020

We project a modest sales decline in 1Q20 of -0.6%. This slower start to 2020 is due to the ramping-up of the world economies from 2019 levels, and to the potential impact on those economies of the coronavirus outbreak in China and its looming spread worldwide. The second through fourth quarters are expected to return to more normal circumstances and achieve growth beginning in 2Q20 and full year growth of 3.5%.

There are several reasons for the anticipated connector industry's growth in demand in 2020.

- The US financial markets started 2020 with strong growth which is keeping consumer confidence and consumers spending high. The last few months have seen the DJIA, the S&P 500, and the NASDAQ reach record highs.
- The worldwide financial markets are responding to the US markets and to forecasts of improving economic growth in China and Europe.
- Modest, but stable, annualized GDP growth in the top 10 economies is forecast for 2020. The US economy is projected to grow 1.8% (which we believe may be on the conservative side). Europe is projected to grow 1.2%. China is projected to grow 5.6% which may be negatively impacted by the coronavirus.
- Unemployment rates were stable to down in 2019. They are projected to remain stable to down in 2020.
- The US housing market was strong in 2019. It is projected to remain strong in 2020.
- The euro to US dollar exchange rate is anticipated to run 1.11 to 1.09 USD in 2020.
- Inflation in the US and Europe is expected to be 1.9% and 1.4%, respectively.

It is important to note that this forecast is based on the following assumptions:

- No US, China or European recession.
- No significant ill-effect of Brexit on the economies of Europe.
- The impact of the coronavirus virus will be minimal and limited to the first quarter of the year.
- Minimal impact on the electronic connector industry by the establishment of tariffs, especially those on raw materials such as aluminum and steel.
- Currency fluctuations will be minimal.
- Energy prices will remain relatively stable with no unusual high spikes.
- Stable interest rates with few short-term increases, particularly in North America and Europe.
- No major geo-political blow-up in the Ukraine, Middle East, South China Sea or Korean Peninsula.

Connector Industry Forecast

Bishop & Associates has just released the **Connector Industry Forecast**. This eight-chapter report provides an in-depth, and detailed forecast of the worldwide connector industry. In addition to the detailed forecasts for each region of the world (North America, Europe, Japan, China, Asia Pacific, and ROW), an industry overview is included which provides current market trends, including connector confidence level, currency fluctuation effects, and industry sales performance, as well as an outlook narrative.



Worldwide and each regional forecast includes:

Computers & Peripherals

- Mobile Computers
- Desktops
- Servers
- Storage Equipment
- Input/Output Equipment
- Communication LAN Devices
- Other Computer Equipment

Business/Office Equipment

- Retail/POS Equipment
- Imaging Systems
- Other Business/Office Equipment

Instrumentation

- Automatic Test Equipment
- Analytical/Scientific Instruments
- Other Instrumentation

Medical Equipment

- Diagnostic & Imaging Equipment
- Therapeutic Equipment
- Other Medical Equipment

Industrial

- Heavy Equipment
- Industrial Auto & Process Control
- Building & Civil Engineering
- Energy Markets
- Machine Tools, Machinery & Robotics
- Other Equipment

Automotive

- Body Wiring & Power Distribution
- Powertrain
- Comfort, Convenience & Entertainment
- Navigation & Instrumentation
- Safety & Security

Transportation (non-auto)

- Commercial Vehicles
- RVs & Power Sports
- Commercial Air
- Marine
- Rail
- Construction
- Farm & Garden

Military/Aerospace

Telecom/Datacom

- Carrier Network
- Enterprise Network
- Wireless Infrastructure
- Subscriber Equipment
- Other Telecommunications

Consumer

- Personal/Portable Consumer
- Home Video Equipment
- Home Audio Equipment
- Consumer White Goods
- Other Consumer

Other Equipment

2019 – A Shift in Direction!

After two outstanding years, 2017 and 2018, where connector sales grew a strong 11.0% each year, the connector industry hit headwinds in 2019, declining -3.8%. Nowhere near the strength of headwinds witnessed in 2009, where sales declined an astonishing 21.8%, or even 2015 when sales declined 6.1%, the decline in 2019 reduced overall connector sales by over \$2.5 billion.

All regions except North America showed negative growth in 2019. China, which has been the golden child of the electronic connector industry experienced the greatest decline, decreasing X.0%. This is the largest decline in Chinese connector sales since 2009, when sales declined 12.3%. Europe, who has seen two very strong years, with sales increasing 11.6% in 2017 and 14.7% in 2018, saw the next greatest decrease, with sales declining X.X%. The ROW region, who has experienced sales growth in eight of the last ten years, followed Europe with a decline of X.8%.

With sales declining X.1%, Japan follows ROW. Although over the last ten years (2009 through 2019) Japan has experienced a couple of years of outstanding growth, including 2010 when sales grew an astonishing 34.1% and 2017 where sales exceeded the overall industry growth, increasing 11.7%, 2019's decline brings Japan to sales levels just slightly better than those seen in 2009, when sales fell to \$4,565 million.

The Asia Pacific region, which over the last ten years has witnessed steady, but lack luster growth, follows Japan, with sales declining X.8%.

The connector industry's sales by region are noted in the following table.

**Industry Sales Performance by Region
2018 and 2019 with YOY Change**

Region	2018	2019	YOY Change
North America	\$13,869.5	\$XX,XXX.X	X.X%
Europe	\$14,103.4	\$XX,XXX.X	X.X%
Japan	\$5,047.8	\$X,XXX.X	X.X%
China	\$20,933.1	\$XX,XXX.X	X.X%
Asia-Pacific	\$9,708.2	\$X,XXX.X	X.X%
ROW	\$3,048.1	\$X,XXX.X	X.X%
Total World	\$66,710.1	\$64,169.1	-3.8%

\$ Millions

2020 Outlook

We are forecasting 2020 sales to grow +3.5% to \$XX,386.4 million. We anticipate the greatest growth will occur in China, where sales will grow X.3% or approximately \$832 million. The least growth will be in Japan, where sales will grow X.8%.

2020F Connector Forecast by Geographic Region With Percent Change

Region	2019	2020F	Percent Change
North America	\$XX,XXX.X	\$XX,XXX.X	X.X%
Europe	\$XX,XXX.X	\$XX,XXX.X	X.X%
Japan	\$X,XXX.X	\$X,XXX.X	X.X%
China	\$XX,XXX.X	\$XX,XXX.X	X.X%
Asia-Pacific	\$X,XXX.X	\$X,XXX.X	X.X%
ROW	\$X,XXX.X	\$X,XXX.X	X.X%
Total World	\$64,169.1	\$XX,XXX.X	3.5%

\$ Millions

It is important to note that this forecast is based on the following assumptions:

- No US or European recession.
- Minimal impact on the electronic connector industry by the establishment of tariffs, especially those on raw materials such as aluminum and steel.
- Currency fluctuations will be minimal.
- Energy prices will remain relatively stable with no unusual high spikes.
- Stable interest rates with few short-term increases, particularly in North America and Europe.
- No major geo-political blow up in the Ukraine, Middle East, South China Sea or Korean Peninsula.

Connector Industry Forecast

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Chapters 4 Thru 8 Provide the Same Detail Level as Chapter 3

- Chapter 4 – European Connector Forecast
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- Chapter 8 – ROW Connector Forecast

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What's New ?

Bishop & Associates has recently completed several new research reports about the worldwide connector industry. A table of contents for each report can be found at <https://store.bishopinc.com>.

- ❑ **Report F-2020-01** **Connector Industry Forecast (January 2020) NEW**
- ❑ **Report P-606-19** **Connector Types and Technologies Poised for Growth (October 2019) NEW**
- ❑ **Report M-1010-19** **World Automotive Connector Market (August 2019) NEW**
- ❑ **Report C-122-19** **2019 Connector Industry Yearbook (August 2019) NEW**
- ❑ **Report M-121-19** **2019 Top 100 Connector Manufacturers (July 2019) NEW**
- ❑ **Report M-970-19** **World Consumer Market for Connectors - 2019 (June 2019) NEW**
- ❑ **Report M-799-19** **2019 World Cable Assembly Market (May 2019)**
- ❑ **Report M-700-19** **World Connector Market Handbook (March 2019)**
- ❑ **Report CA-785-19** **Top 100 Cable Assembly Companies (February 2019)**
- ❑ **Report M-607-19** **World Industrial Market for Connectors 2019 (January 2019)**
- ❑ **Report M-960-18** **Electronic Industry and Connector Outlook 2018 and Beyond (November 2018)**
- ❑ **Report C-150-18** **History of M&A in the Connector Industry (*Shrinking Footprints: Connector Industry Consolidation 1954-2018*) (October 2018)**
- ❑ **Report P-770-18** **Connector Manufacturers Connect to Sensors (July 2018)**

THE BISHOP REPORT - CONNECTOR INDUSTRY YEARBOOK

An annual subscription to [**THE BISHOP REPORT**](#) (12 issues) is available for \$1,150. As part of your Bishop Report subscription, you have access, through Bishopinc.com, to prior issues of The Bishop Report, News Briefs, Financial Benchmarks, and various connector industry indices. An annual corporate subscription is available for \$2,950, which includes an unlimited number of subscribers and one PDF version of the Yearbook report.

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