ChemQuest’s Bright Outlook on Margins

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Please see page 35 for rating definitions, important disclosures and required analyst certifications.
All estimates/forecasts are as of 07/19/16 unless otherwise stated.

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Key Points

- We were pleased to host the ChemQuest Group (CQ) for our 17th annual Paints, Coatings, & Adhesives conference call. CEO Dan Murad provided insight into the $140B coatings industry, including an overview of market conditions, trends, and growth forecasts, at an estimated 5% compound annual growth rate (CAGR) through 2020E. Among the key highlights is the expectation that margins will further strengthen amid a more stable growth environment, supported by recovering end markets and raw material benefits. Consolidation continues to be a key theme as the SHW-VAL acquisition is expected to close without major regulatory pushback. The top three coatings firms (PPG, SHW, AkzoNobel) account for 63% of the top 10 coatings firms sales, up from 48% 10 years ago (expected to reach 70% when SHW and VAL combine).

- Winners and...Others. Overall, the tone remains upbeat for such coatings producers as PPG, SHW, and VAL, and less favorable for Benjamin Moore (BRK-B) and TiO2 producers, in our view. In addition, AXTA was also called out as a bright spot in autos as Mr. Murad expects the company to improve margin, with wet-on-wet applications gaining popularity. PPG is present in all of the distribution channels and we expect it to benefit from the various growth scenarios. Within architectural, there is a shift from “do-it-yourself” to enlisting the help of professionals “do-it-for-me,” a positive trend for SHW’s company-owned stores. Mr. Murad was less optimistic on the independent-store model, which Benjamin Moore typically follows, as major retailers and niche players gain market share. Another trend concerned TiO2, where he commented on pricing in 2016 not rebounding significantly from that of 2015, affecting such companies as CC, HUN, KRO, and TROX.

- Architectural Recovery Continues. Within the $11.2B U.S. Architectural Coatings segment, sales are forecast to rise 4.0% in 2016E, including volume growth of 3.5%, coupled with margin improvement. As a result of increased price (mainly) and volume, the total value of coatings has increased more than 22% above 2004 levels. SHW is the segment leader, followed by PPG. Regarding trends, CQ sees a continued shift toward zero volatile organic compound (VOC) formulations, driven by regulations. The contractor applied paints continue to outpace, while convenience paints (2-in-1 paint and primer products, faster dry, etc.) are also performing well. Dan highlighted that the growth in multi-family homes, with home ownership 65% (25-year low) and the average home size at less than 2,200 sq. ft. (below the peak of 2,250 sq. ft.), partially due to preferences of millennials.

- Industrial Original Equipment Manufacturer (OEM) Coatings Led by Auto. Heavily reliant on auto sales and durable goods, sales grew 5.0% in 2015, mainly from volume (up 4.7%). Light vehicle sales increased for the fifth consecutive year and are forecast to top 17MM units during 2016E. While the continued recovery of manufacturing in the United States is being negatively affected by the stronger dollar, lower raw materials should provide an offset. CQ highlighted such major trends as products that create operational efficiencies (increase productivity/provide wet-on-wet applications), increase sustainability (reduce CO2 footprint), and provide innovation (BPA replacement/infrared reflectance/noise vibration). With such trends as light-weighting, there is an increased need for functionality across multiple substrates (see page 7 of our 6/26 note, PPG: Much Better Than The Last Twosome At Oakmont).

- Special Purpose Hurt by Oil and Gas. Lower oil prices have put a dent in O&G activity, leading to Special Purpose coatings volume posting a modest decline in 2015. Auto refinsh trends remain positive, with miles driven increased as a result of lower oil prices, leading to higher demand for refinsh. Despite the risks to refinsh including new safety systems in cars (collision avoidance), consolidation of body shops, and insurance changes, CQ does not expect a major change in accident rates in the long term. Nonetheless, CQ believes value will outweigh volume if there were a dip in accidents. Consistent with the 2015 outlook, volume is expected to be down 1-2% in 2016. Recovery in O&G is not expected in the near term, exploration continues to experience a slowdown, and weak domestic infrastructure spending continues to weigh on Special Purpose coatings growth.

- Sealants Expected to Outpace Adhesives in 2016. Adhesives ($46.3B) and Sealants ($6.5B) generated north of $50B in sales during 2015, with Asia, North America, and Europe each representing about 30%. Construction accounts for the largest end market at 42%, followed by packaging, at 22%. Adhesives volume was up low single digits, while price was roughly flat. For sealants, volume around 3% was compounded by slightly higher pricing. While volume remains below peak levels for both categories, value exceeded the 2007 highs. End market trends in 2015 were fairly positive as packaging, transportation, construction, and tapes grew, while consumer and product assembly were flat. For 2016, CQ forecasts 1.5-2.5% higher volume, with an increase in value of 2-3%. Sealants are expected to outpace adhesives again, a consequence of its position in construction and transportation (which make up 95% of sealant demand). While Henkel is the dominant supplier (roughly 3x the size of No. 2 player MMM), we would not be surprised to see further consolidation (see Arkema’s acquisition of Bostik).
Introduction

This report is a more detailed follow-up to our June 27 “quick note” on key takeaways from the ChemQuest conference call. We include further details on architectural, original equipment manufacturers, and Special Purpose coatings businesses, as well as the adhesives and sealants industry.

We were pleased to host the ChemQuest Group (CQ) for our 17th annual Paints, Coatings, & Adhesives conference call. CEO Dan Murad provided insight into the $140B coatings industry, including an overview of market conditions, trends, and growth forecasts (an estimated 5% CAGR through 2020E). Among the key highlights is the expectation that margins will further strengthen amid a more stable growth environment, supported by recovering end markets and raw material benefits. Consolidation continues to be a key theme, with the SHW acquisition of VAL a major step.

Overall, the tone remains upbeat for such coatings producers as PPG, SHW, and VAL, and less favorable for Benjamin Moore (BRK-B) and TiO₂ producers, in our view. In addition, AXTA was also called out as a bright spot in autos as Mr. Murad expects the company to improve margin, with wet-on-wet applications gaining popularity. PPG is present in all of the distribution channels and is expected to benefit from the various growth scenarios. Within Architectural Coatings, there is a shift from “do-it-yourself” (DIY) to enlisting the help of professionals “do-it-for-me,” a positive trend for SHW’s company-owned stores. Mr. Murad also commented on the SHW/VAL acquisition, stating that he expects no major antitrust issues, due to the complementary natures of their businesses, a big plus for VAL. Mr. Murad was less optimistic on the independent-store model, which Benjamin Moore typically follows, as major retailers and niche players gain market share. Another trend concerned TiO₂, where he commented on pricing in 2016 not rebounding significantly from that of 2015, affecting such companies as CC, HUN, KRO, and TROX.

Overall coatings volume has recovered from the 2009 recession, but pricing has been somewhat anemic of late.

Exhibit 1. Coatings Volume And Price Trend, 1997-2016E

Looking across the three major types of coatings, sales growth was highest for both Architectural Coatings and original equipment manufacturers (OEM) in 2015, at 5.0%. The former segment (2015 volume +4%; price +1%) is affected by such trends as (1) the shift toward VOC formulations following regulations on thresholds; (2) the growth in multi-family outpacing single family homes with home ownership at 65% (a 25-year low); and (3) average home size of less than 2,200 sq. ft. (down from the peak of 2,250 sq ft), partially due to preferences of Millennials. The latter segment (2015 volume +4.7%; price +0.3%) benefits from increased light vehicle sales and is affected by the need for products that create operational efficiencies (productivity/provide wet-on-wet applications), increase sustainability (reduce CO2 footprint), and provide innovation (BPA replacement/infrared reflectance/noise vibration). Special Purpose was weakest, with overall sales down 7% (2015 volume -6%; price -1%), largely due to lower oil prices’ impact on O&G activity. For 2016E, growth is expected to be led by OEM at 4%, with price up slightly in all three segments.
Exhibit 2. Sales Growth Across Coatings Types

Source for both charts: The ChemQuest Group estimates and Wells Fargo Securities, LLC.
Macroeconomic Backdrop

The global macroeconomic environment has been muted in recent years and is characterized as “steady, slow growth,” by most accounts. North America has shown moderate growth since recessionary levels in 2009, while more optimism is building around Europe. The depreciation of the euro and lower oil are expected to create a more favorable backdrop for the region. Growth in Asia has moderated, with companies painting a less optimistic picture of late. In the United States, 2015 GDP grew 2.4% (10th year of less than 3% growth) and is forecast to increase 2.0% for 2016 (according to Wells Fargo Securities economists). With encouraging signs from construction and income growth for U.S. consumers, 2016 global GDP is forecast at 3.2%.

Major End Markets

Construction

Within the United States, construction continues to recover from trough levels, but is still below peak conditions, suggesting further growth potential for Architectural Coatings. Total construction spending has been on the rebound since 2011, including yr/yr growth of 7% in 2013, 10% in 2014, and 11% in 2015, reaching about $1.10T. This string of increases follows five years of declines that drove activity down 32% from the 2006 peak of about $1.17T.


The recovery in construction continues to be driven by private spending, up 12.5%, while public spending is up 5.7%. Since the biggest annual decline in total construction in 2009, private spending has increased 37% in aggregate, which compares to a 7% decline in public spending.

Exhibit 4. Yr/Yr Change in Construction Spending, 1994-2015

Source: The ChemQuest Group and Wells Fargo Securities, LLC
Wells Fargo economists forecast 2016 housing starts to reach 1.27 MM units, up 14% from 1.11 million units in 2015. The seasonally adjusted annual rate (SAAR) of housing starts for May rang in at 1.64MM, up 9.5% yr/yr, but down 0.3% sequentially.

**Exhibit 5. Housing Starts and Completions, 1994 to Present**

Compared to housing starts, existing home sales are a more relevant indicator and driver of coatings demand; 75-80% of coatings are tied to existing home sales and remodeling, with the balance being new homes. In Q1’16, existing home sales were up 7% yr/yr, compared to new home sales up 1%. Comparing 2015 to 2014, existing home sales and new home sales increased 6% and 15%, respectively.

**Exhibit 6. Existing Home Sales and New Home Sales, 2000-Present**

Remodeling activity continues to advance and is predicted to increase 8.6% by the end of the year and then further accelerate to 9.7% by the Q1’2017, according to the Harvard Joint Center for Housing Studies. Following a share shift to the DIY market during 2006-09, professional contractor share is once again on the upswing.
Exhibit 7. Homeowner Improvements, Q1 2007-Q3 2016E

Source: U.S. Census Bureau and The ChemQuest Group estimates

Transportation

Infrastructure spending and auto-related trends are important drivers for both the OEM and Special Purpose coatings segments. For the latter, automotive refinish accounts for more than one-third of sales. Auto and light-truck sales have recovered nicely from a trough of about 9.5MM units in early 2009, having reached a seasonally adjusted rate of about 17.4MM units as of May 2016.

Exhibit 8. Light-Vehicle Sales versus Auto Production, 2005 to Present

Source: Bureau of Economic Analysis and Wells Fargo Securities, LLC

Industrial

Industrial production in the United States continues to improve following the recent nadir reached in 2009. In Q1, industrial production declined an average of 2% yr/yr, while capacity utilization declined 3% to the mid-70% area. Recovery in this area would bode well for industrial OEM coatings, which benefits from strength in U.S. manufacturing.
Exhibit 9. Industrial Production and Capacity Utilization, 2001 to Present

Source: U.S. Census Bureau and Wells Fargo Securities, LLC
Paints and Coatings

Market Overview

Since the turn of the century (actually, millennium!), coatings have shown relatively steady growth of about 2%. The paints and coatings industry can be categorized into three markets: Architectural (aka: decorative), OEM, and Special Purpose. Architectural Coatings have been a clear outperformer, growing at a 3.7% compound annual growth rate (2000-2015 CAGR). Special Purpose and OEM coatings have grown at a 0.8% CAGR for the same time period. Architectural and OEM coatings are expected to have another “solid” 2016. This is contrary to the outlook on Special Purpose coatings given that recovery in O&G is not expected in the near term, exploration continues to experience a slowdown, and weak domestic infrastructure spending continues to weigh on Special Purpose coatings growth.


In the United States, about 50% of the $22B U.S. coatings sector is made up of Architectural Coatings. Over the past two years, U.S. new home sales are up 25%, while existing home sales are up 13%. New home sales typically contribute 25% of demand for coatings, while existing home sales really drive coatings growth, contributing 75%. In non-residential construction, CQ noted volumes 20-30% below peak levels, primarily due to a slowdown of government spending. OEM is next at about one-third, followed by Special Purpose, close to 20%. In terms of U.S. outlook, CQ forecast architectural volume to reach 776MM gallons ($11.2B in value) by 2016, exceeding the peak 2007 level, and OEM volume to increase to 395MM gallons ($7.2B). Special Purpose volume is tracking down slightly and is forecast at 150MM gallons ($4.1B) in 2016E.


In the United States, about 50% of the $22B U.S. coatings sector is made up of Architectural Coatings. Over the past two years, U.S. new home sales are up 25%, while existing home sales are up 13%. New home sales typically contribute 25% of demand for coatings, while existing home sales really drive coatings growth, contributing 75%. In non-residential construction, CQ noted volumes 20-30% below peak levels, primarily due to a slowdown of government spending. OEM is next at about one-third, followed by Special Purpose, close to 20%. In terms of U.S. outlook, CQ forecast architectural volume to reach 776MM gallons ($11.2B in value) by 2016, exceeding the peak 2007 level, and OEM volume to increase to 395MM gallons ($7.2B). Special Purpose volume is tracking down slightly and is forecast at 150MM gallons ($4.1B) in 2016E.
The global breakdown differs from that of the United States as architectural accounted for a smaller piece of the pie in other regions. Specifically, architectural accounted for 38% of sales on a global basis, significantly less than the 51% it represents in the United States. OEM, also at 38%, accounted for a larger portion of demand worldwide, compared to 31% in the United States. Finally, Special Purpose sales accounted for 24% of global paint sales, but only 18% in the United States.

**Exhibit 12. Paints and Coatings End Market Breakdown by Value, 2015**

![Chart showing end market breakdown by value](chart_image)

Source for both charts: The ChemQuest Group (left), SHW (right), and Wells Fargo Securities, LLC

By region, Asia is the leading coatings consumer, accounting for about 40% of global demand, followed by Europe, at about 26%, and North America, at about 19%.

**Exhibit 13. Global Coatings Regional Breakdown, 2015**

![Chart showing regional breakdown](chart_image)

Source: The ChemQuest Group and Wells Fargo Securities, LLC
Leading Producers

Exhibit 14 lists the top ten global coatings companies by sales for 2015 (accounting for about 47% of global sales), with some historical perspective. The top three coatings firms (PPG, SHW, AkzoNobel) account for 63% of the top 10 coatings firms sales, up from 48% 10 years ago, and are expected to reach 70% when SHW and VAL combine. Over the past 12 years, the landscape of coatings companies has changed significantly; PPG has gone from being the third-largest global coatings player to a clear leader, with SHW beating AKZO for the No. 2 position in 2015.

Exhibit 14. Top Ten Global Coatings Companies by Sales

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<thead>
<tr>
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<tbody>
<tr>
<td>PPG</td>
<td>4.8</td>
<td>10.1</td>
<td>14.3</td>
<td>15.3</td>
</tr>
<tr>
<td>Sherwin Williams</td>
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<td>11.1</td>
<td>11.3</td>
</tr>
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<td>AkzoNobel</td>
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<td>14.2</td>
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<td>11.1</td>
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<td>3.3</td>
<td>4.5</td>
<td>4.4</td>
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<td>Axalta</td>
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<td>4.1</td>
<td>4.4</td>
<td>4.1</td>
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<tr>
<td>Nippon Paint</td>
<td>1.9</td>
<td>2.0</td>
<td>2.8</td>
<td>3.9</td>
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<tr>
<td>BASF</td>
<td>2.4</td>
<td>3.3</td>
<td>3.8</td>
<td>3.5</td>
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<tr>
<td>Kansai Paint</td>
<td>-</td>
<td>1.9</td>
<td>2.9</td>
<td>2.9</td>
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<tr>
<td>Jotun</td>
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<td>1.6</td>
<td>2.0</td>
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<tr>
<td>Masco</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2.0</td>
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</table>

Source: The ChemQuest Group and Wells Fargo Securities, LLC

Consolidation continues to be a popular theme in the coatings industry, changing the landscape and market share of participants over the past decade. Among the more noteworthy transactions include SHW acquiring Comex’s North American assets, DD divesting Performance Coatings to Carlyle, AkzoNobel divesting its North American architectural paints business to PPG, VAL acquiring Ace Hardware’s paint manufacturing assets, and PPG acquiring Comex’s Mexican assets. With the impending consolidation of SHW and VAL, we expect the combined entity to surpass PPG, absent potential acquisition activity by PPG.


By end market, PPG is the only global player that participates in all major categories. Following the 2012 sale of AkzoNobel’s North American Architectural Coatings business to PPG, Akzo ranks within the top 3 global coatings positions across all markets (except for auto OEM, as it does not participate). Although SHW is No. 1 on the architectural front, it is No. 4+ in most other markets and does not participate in auto OEM or packaging (subject to change following the acquisition of VAL). AXTA remains a market leader in auto with growth initiatives in Asia.

Source for both charts: PPG, ChemQuest, and Wells Fargo Securities, LLC
SHW is the No. 1 architectural paint supplier globally, with the highest brand awareness. PPG ranks No. 2, with Olympic being its most recognizable brand, but the Akzo deal also added the popular Glidden brand. In 1999, Masco acquired Behr, which is sold exclusively at Home Depot. Behr produces interior products (paints, primers, and faux and decorative finishes), as well as exterior products. Berkshire Hathaway owns Benjamin Moore, which participates through a large independent retail network. VAL is another industry leader, with its largest customer being Lowe’s.

Comparing the margins of major coatings producers, PPG has remained the leader among its competitors, sporting a 19% margin in strictly coatings. AXTA is a close second with 18% margin, while remaining competitors SHW, VAL, Akzo, and RPM all range between 13% and 16%.

Recent results across major coatings companies show different trends. For Q1 specifically, PPG saw EBIT grow 11% sequentially, while AXTA, SHW, and Akzo saw declines of 15%, 13%, and 9%, respectively. Yr/yr, SHW’s EBIT margin expanded 210 bps, while PPG’s grew by 100 bps. SHW’s improvement was driven by better architectural trends in the United States, with new stores up 9.4%. Both companies still see their raw material basket declining, although TiO₂ is of more debate right now.
Exhibit 18. Recent Coatings Results

Source: Company reports and Wells Fargo Securities, LLC

In terms of outlook, we noted in our 6/26 PPG: Much Better Than The Last Twosome At Oakmont that “with comparisons easier in the back half of the year, we expect 2H’16 to deliver 2-4% volume growth” for PPG along with improved margins linked to cost controls and lower raw materials. SHW management noted on its Q1 call that Q2 sales are forecast up low to mid-single digits yr/yr, with the entire year expected to be up about 1-3%. AXTA, assuming certain macroeconomic factors (3.1% global GDP, 3.0% industrial production, and 3.2% auto build growth) is targeting sales up 4-6% for 2016E, excluding FX.
Industry Margin and Raw Materials

The cost structure for a U.S. coatings company has been relatively unchanged over the past few years. On average, raw materials increased 1% in 2015, to 44-52% of sales, and were down from the earlier years of TiO$_2$ inflation, showing some recovery compared to 2014 cost. Other major raw materials include acrylics, phenol, and other pigments. With approximately a 70% drop in Brent oil since the peak in June 2014 and TiO$_2$ prices tame, we remain of the view that raw material benefits will continue to contribute to earnings throughout the rest of 2016. Gross margin was in the low-30% area a decade ago, but is now in the upper 30% to low 40%. In 2015, EBIT margin ranged from 10% to 20%, up 300 bps from the high end of 2014.


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<td>Sales</td>
<td>100%</td>
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<tr>
<td>Cost of Goods Sold</td>
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<td>Raw Materials</td>
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<td>Labor</td>
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<td>5%</td>
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<td>Energy</td>
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<td>2%</td>
<td>2%</td>
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<tr>
<td>Overhead, Taxes, Ins., Dep., Pkg.</td>
<td>6%</td>
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<td>6%</td>
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<td>6%</td>
<td>6%</td>
<td>7%</td>
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<tr>
<td>Total</td>
<td>57-65%</td>
<td>56-64%</td>
<td>58-66%</td>
<td>58-66%</td>
<td>60-66%</td>
<td>58-62%</td>
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<td>Gross Margin</td>
<td>35-43%</td>
<td>36-44%</td>
<td>34-42%</td>
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<tr>
<td>SG&amp;A</td>
<td>19-34%</td>
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<td>EBIT</td>
<td>10-20%</td>
<td>10-17%</td>
<td>8-15%</td>
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<td>6-15%</td>
<td>11-17%</td>
<td>7-12%</td>
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</table>

Source: The ChemQuest Group estimates and Wells Fargo Securities, LLC

Exhibit 20 shows the expected breakdown of the various raw materials found in a typical can of paint for 2016. In 2015, resins/latex represented about 38% of the total cost, followed by pigments, at about 27%.

Exhibit 20. Raw Materials Input Per Unit of Coatings (Percentage of Cost), 2016E vs. 2015

<table>
<thead>
<tr>
<th>Industry *</th>
<th>Resins/Latex (41%)</th>
<th>Acrylic (Latex Paints)</th>
<th>Alkyd (Oil Paints)</th>
<th>Epoxy (Epoxy Paints)</th>
<th>Pigments (25%)</th>
<th>Titanium Dioxide</th>
<th>Pigments</th>
<th>Paint Fillers</th>
<th>Extenders</th>
<th>Containers (14%)</th>
<th>Metal or Plastic</th>
<th>Additives (12%)</th>
<th>-3 to -5%</th>
<th>Solvents (8%)</th>
<th>-6 to -9%</th>
</tr>
</thead>
</table>

*This represents the average cost range for the Coatings Industry. It does not reflect the cost for an individual Coatings Company. This cost could be lower or higher based on company size, market position, etc.

Source: SHW

During 2012-14, pigments input was driven by mix as solvent prices declined and new low-VOC resin systems utilized latex binders, driving higher pigment use. A look at the coatings cost structure in Exhibit 21 shows that pigments trended upward during 2012-14 despite the considerable decline in TiO$_2$ prices. However, further TiO$_2$ price drops finally depressed cost in 2015, causing the input per unit percentage to drop from 2013-14 levels.
Historically, price increases typically lagged raw material inputs by 3-6 months, resulting in margin squeezes in inflationary environments. The producer price index (PPI) and purchasing managers index (PMI) for coatings dated back to February 2004 have about an 80% correlation. However, we have seen this relationship break down as the correlation is closer to 10% over the past five years. Consistent with our theory on margin expansion, material declines have led to meaningful margin expansion during 2014-15. We expect this to continue during 2016.

Raw material inflation, namely in TiO$_2$, was a major headwind in 2011 (up 39%). However, costs began to moderate in 2012 and reversed course as prices fell 10.5% yr/yr. Price appeared to be stabilizing during 2014, but took another step down on a surplus of Chinese supply and lackluster demand. During PPG’s Q1’16 earnings call, the company commented on Q2 prices rising. CEO Michael McGarry quoted additional capacity in China and Mexico, coupled with weakened demand from Europe and Latin America as contributors to a “balanced market.” Meanwhile, SHW commented on price flattening, while increases were catching up with smaller customers. Although we expect an increase in price for Q2, we expect pricing to still be tame in comparison to historical levels. PPG is turning toward Chinese supply (Henan Billions) along with substitution methods. Argex is another potential TiO$_2$ supplier using differentiated technology, although its commercialization is somewhat in doubt. With the trend in Architectural Coatings moving toward customer convenience, the composition of paint is unlikely to move to include materially less TiO$_2$. This is due to “all-in-one” formulations requiring more opacity.

However, paint producers have been effective at raising prices with a significant step-up post 2010 in response to higher raws (see Exhibit 22). Price increases accelerated in 2012, and have since been steady at a moderate level despite more volatile raw materials. The gap between the PPI and PMI is at its highest point over the past 10+ years. (Does anyone hear margin expansion?) The higher average prices sold today are 22% above those of 2004. Mr. Murad commented that in comparison to the last few years, paint companies have done a good job of keeping pace with inflation in their pricing (see Exhibit 23).
Manufacturing costs and raw material inputs vary for *Architectural Coatings* and industrial coatings. Architectural paints use more TiO₂, as decorative paints require more opacity. Industrial coatings use a larger amount of other such raws as resins, latex, solvents, and pigments. In terms of packaging, architectural is typically sold in 1 gallon paint cans and 5 gallon buckets, while industrial coatings are mainly sold in 2,000-liter totes.

Source: PPG
Architectural Coatings

In 2015, U.S. Architectural Coatings generated $11.2B in sales (up 5.0% yr/yr), representing 750MM gallons by volume (up 4.0%) and 1.0% higher prices. Overall, architectural is 50% of the entire coatings business. For 2016, CQ forecasts sales growth of 3.9%, including 3.5% higher volume and a 40bps price increase. The predicted volume increase would exceed the peak of 2007 volume.

Exhibit 25. Architectural Coatings Yr/Yr Volume and Price Trends, 1997-Present

The end-market breakdown in 2015 was similar to years past, with interior paints accounting for the bulk of demand, at 75% of sales. The exterior paints end market is a distant second, at about 13%. The remainder includes stains, clears, lacquers, varnishes, and other categories. Major producers include SHW, PPG, Behr (Masco), Benjamin Moore, VAL, and AkzoNobel (ex-North America).


Regionally, Asia accounts for 37% of sales, with Europe and the Middle East, at 30%. North and South America together are the third largest, at 29%. Over the past 7 years, Asia has been growing as a percent of total demand, due to faster economic growth. Consequently, the Americas and Europe make up a smaller percentage of the pie today.
Exhibit 27. Architectural Coatings Demand by Region by Percentage of Sales, 2009 vs. 2016

Source for both charts: SHW and Wells Fargo Securities, LLC

Regardless of region, Architectural Coatings sales are largely driven by the residential market. In the United States, the residential market currently accounts for a larger portion of sales as the nonresidential market has yet to show meaningful recovery, though it is improving.

Exhibit 28. Architectural Market Breakdown by Type

Source for both charts: SHW, PPG, and Wells Fargo Securities, LLC

Over the past several years (and punctuated during the recession), there has been a moderate shift back toward higher cost professional contractors, representing 59% of the market in 2015. The majority of DIY purchases occur through such home centers as Home Depot and Lowe's. Paint stores are a distant second, at 15%, and mass merchants account for 14% of sales. In contrast, contractors make a majority of their purchases at paint stores.

Source: SHW and Wells Fargo Securities, LLC

Exhibit 30. U.S. Channel Share

Source for both charts: SHW and Wells Fargo Securities, LLC

Globally, the *Architectural Coatings* customer mix is evenly distributed, for the most part. Independent distributors and company-owned stores each account for about one-third of sales, and such regional home centers as Lowe’s, Home Depot, and Bunnings, account for slightly less (30%). CQ commented on market share shifting from independent retailers to major retailers. We believe this would favor such companies as SHW and PPG, and work against the benefit of such companies as Benjamin Moore.
Exhibit 31. Global Architectural Coatings, Customer Mix

Source: PPG and Wells Fargo Securities, LLC

There has been a continuation of trends in Architectural Coatings, which we have discussed in years gone by. In 2015, the DIY/contractor mix was about 40/60; a reversal from 1980 levels. During the recession, there was a modest shift toward DIY as cost-conscious homeowners chose to forego the higher outlay associated with hiring professionals, but has since normalized. With Baby Boomers aging and a growing attitude away from DIY, contractor help is increasingly sought after.

Another trend that has been popular is zero volatile organic compound (VOC) formulations. Despite what the name implies, “zero-VOC” is not completely devoid of VOC as a small amount is added when color is blended with the base coats at the retailer level. Manufacturers are moving to a zero-VOC colorant/tinting system, as they try to stay ahead of industry standards.

Emphasis is also being placed on convenience. Opportunities to save time or the number of painting steps are being developed, with a prime example being “paint and primer in one.” Manufacturers are formulating paints that dry faster or reduce surface preparation to paint. Finally, manufacturers are focusing more on developing specialty product lines. For example, SHW created a “Paint Shield™” formula, which kills bacteria on contact within 2 hours. This trend is linked to the maturity of the industry, creating a need for unique products.

All these changes help add value to products beyond what traditional painting provides, lending support to higher average selling prices, regardless of the level of raw material inflation/deflation.
**Industrial OEM Coatings**

Much of what drives demand in industrial coatings end markets relies on the macroeconomic environment and industrial production. Recently, a slowdown in Ag and mining has taken the heavy duty equipment market lower. Despite this drag, activity from other end markets is expected to drive growth near a 5% CAGR through 2020 reaching $50.4B. The fastest-growing region is Asia Pacific as it continues to see bursts of economic and GDP growth. China represents about 50% of industrial coatings consumption, comparable with Asia Pacific’s 40% contribution to global coatings sales.

**Exhibit 32. Industrial Coatings Market Outlook by Region, 2016E - 2020E**

![Chart showing industrial coatings market outlook by region from 2015 to 2020E, with projections and CAGRs for each region.](source: AXTA)

Of the industrial applications relevant to coatings, general use is the largest category—sized at more than half of the market, followed by coil, at 16%. O&G has been shrinking as a percentage of the market, due to low oil prices pressuring investments in upstream projects. Meanwhile, growth in electrical insulation could offset some of this via growth in alternative energy sources for the long term (i.e., wind power, electric transportation).
Paints, Coatings & Adhesives: CQ’s Bright Outlook on Margins

Exhibit 33. Global Industrial Coatings Market Opportunity ($28B), by market

Source: Axalta, and Wells Fargo Securities, LLC

Powder coatings is the largest industrial OEM category, at about 25% of sales, followed by transportation (auto, truck, etc.), at about 15%. The average SAAR auto/light truck grew 5.6% yr/yr, and growth is forecast to continue through 2016. Industrial coatings can serve functional (hardness, corrosion resistance) and decorative purposes in such household objects as refrigerators, HVAC, fireplaces, microwaves, and vacuum cleaners, and in such automotive parts as bumpers, axles, brake systems, and rigid and flexible exterior trim systems. They can also be used in electronic devices including mobile phones, laptops, and tablets.

Exhibit 34. Industrial OEM Coatings End Markets, 2015

Source: The ChemQuest Group and Wells Fargo Securities, LLC

In 2015, industrial coatings generated $7B in sales (or 380MM gallons by volume). After posting sales growth of 5% in 2015, industrial OEM coatings are forecast to increase 4% in 2016, predominantly driven by volume. As of 2015, volume was 8% below the most recent peak seen in 2005.
Major producers in OEM coatings include AkzoNobel, PPG, VAL, AXTA, and SHW. In the past few years, consolidation has been a key theme, with the top six players currently making up nearly 50% of the market, up from 28% in 2005.

More than 45% of industrial coatings sales are in Asia, followed by nearly 30% in Europe.

Source: The ChemQuest Group and Wells Fargo Securities, LLC
There are four technology offerings in industrial coatings, including liquid, powder, pretreatment, and electrocoat. Liquid, which consists of traditional primers and topcoats, is by far the largest, accounting for more than 75% and continues to outpace competing technologies. Powder, for which a solid coating is applied by electrostatic spray, follows at about 15%. Pretreatment and electrocoat are about 5% each; the former includes cleaners and phosphate chemicals to condition metal before paint is applied, while the latter applies coatings by electrically charged immersion.

**Exhibit 38. Industrial Coatings Demand by Technology, 2015**

![Pie chart showing industrial coatings demand by technology, 2015: Liquid 80%, Powder 12%, Pretreatment 5%, Electrocoat 3%]

Source: PPG and Wells Fargo Securities, LLC

All major coatings producers offer liquid solutions, many offer powder, a handful offer E-coat, and only PPG offers pretreatment and all four. Pretreatment is a primary technical solution in appliances, auto parts, general finishes, and heavy duty equipment.

**Exhibit 39. Competitive Technology Profile**

<table>
<thead>
<tr>
<th>Supplier</th>
<th>North America</th>
<th>Europe</th>
<th>Asia Pacific</th>
<th>South America</th>
</tr>
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<tbody>
<tr>
<td>PPG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AkzoNobel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valspar</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sherwin-Williams</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Axalta (Carlyle)</td>
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<td></td>
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</tr>
<tr>
<td>Beckers</td>
<td></td>
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</tr>
</tbody>
</table>

Source: PPG

Some notable trends in industrial coatings include the desire for products that improve operational efficiencies (increase productivity/reduce labor/lower cycle times), increase sustainability (reduce CO2 footprint), and provide innovation (coatings that provide insulation, withstand high heat, and provide vapor transmission). For example, there has been growth in wet-on-wet applications, which help reduce drying times.
Special Purpose Coatings

In 2015, the Special Purpose coatings segment generated $4.1 B in U.S. sales (or 152MM gallons), with volume down 6% and pricing down 1%. For 2016, CQ forecasts sales to be flat, with prices up 1.5%. As predicted, 2015 was the first year with negative volume growth since 2009, largely due to weaker O&G activity.

Special Purpose coatings serve far fewer end markets than those served by industrial OEM coatings, but typically carry higher margin. Major end markets for Special Purpose coatings include automotive refinish, industrial maintenance, and traffic-marking paints. Aerosol and marine paints are the remaining end markets, with the latter seeing particularly subdued demand in recent years with the decline in shipbuilding activity. Key producers include PPG, AXTA (formerly DD), RPM, SHW, AkzoNobel, and BASF.

Exhibit 40. Special Purpose Yr/Yr Price and Volume Trends, 1997-Present

Source: The ChemQuest Group and Wells Fargo Securities, LLC

Exhibit 41. Special Purpose Coatings End Markets, 2015

Source: The ChemQuest Group and Wells Fargo Securities, LLC

Vehicle miles traveled (VMT) is an important metric for auto refinish, as repair/refinish activity picks up with increased driving (which means more accidents!). VMT typically slows in the early months of the year as cold weather curbs travel, partially offset by icy conditions increasing accidents. In 2016, adverse weather limited driving in January and February, with VMT falling 8% and 4% month over month, respectively. With the thawing in March, driving activity has reaccelerated and VMT rebounded 18% over February. Miles traveled in April tracked flat over the month prior. Despite the onset of new safety systems, Mr. Murad commented that accident rates are likely to stay close to the typically reported 500K/year. While new technology has enabled better safety systems, “distracted driving” is still a factor (for example, texting while driving; we’ve previously cited as “OMG”
affected). In addition, more SUVs on the road allows for treating bigger surface areas (large vehicles are about 48% of vehicles on the road).

**Exhibit 42. Vehicle Miles Traveled, January 2008 to April 2016**

[Graph showing vehicle miles traveled from January 2008 to April 2016]

Source: U.S. Department of Transportation and Wells Fargo Securities, LLC

Over the past few years, growth in *Special Purpose* coatings has been challenged by limited infrastructure spending and slower automotive refinish activity. In 2014, we saw a reversal, with public spending up 2% following five years of declines. Mr. Murad noted that overall, infrastructure spending has slowed significantly. O&G remains the most significant headwind in 2016. Longer term, aging U.S. infrastructure should be addressed in the not too distant future, which could provide significant tailwinds. However, there are risks to refinish, including new safety systems in cars (collision avoidance), consolidation of body shops, and insurance changes.

The protective and marine market is estimated to be **$11B** globally (about 65% protective and 35% marine). Nearly 60% of sales are from Asia, reflecting the relocation of marine activity to South Korea and elsewhere. PPG and others have stated that marine new-build activity has been weak for the past few years, including lagging Korean shipbuilding activity. According to Wells Fargo Securities analyst Michael Webber, overall shipbuilding activity has slowed considerably, with a number larger Korean yards and Chinese yards need to restructure or merge in order to handle the impact of smaller vessel backlogs. In fact, less than 30 shipyards secured fresh business in H12016 (across all vessel segments), compared to 2007, when 220 shipyards were active with new orders.

**Exhibit 43. Protective and Marine Sales by Region, 2015**

[Graph showing protective and marine sales by region]

Source: SHW and Wells Fargo Securities, LLC
Exhibit 44. Number of World Ships Contracting, 1996-2016 YTD

Source: Clarkson Research Services Limited and Wells Fargo Securities, LLC
Adhesives and Sealants

Market Overview

In 2015, the global adhesives and sealants industry generated $52.8B in sales, with adhesives accounting for about $46B and sealants for about $7B. North American sales and volume have trended upward since the 2009 recession, at a 6.6% and 2.2% CAGR, respectively. For 2016, CQ projects overall value for adhesives to grow 2.5%, and 4.0% for sealants.

Exhibit 45. North American Adhesives and Sealants Industry, 1997-Present

E=Estimate
Source for both charts: The ChemQuest Group and Wells Fargo Securities, LLC
Regionally, Asia, Europe, and North America each represent 31% for adhesives and sealants.

**Exhibit 46. Global Adhesives and Sealants Sales by Region, 2015**

Source: Company reports and Wells Fargo Securities, LLC

The top adhesives producers are shown in Exhibit 47 with a comparison between the 2005 and 2015 landscape. Over the past decade, Henkel has retained its leading position and nearly doubled its revenue. Contrary to the coatings market, where top players have similar market shares, the leader here far outpaces its nearest competitor.

**Exhibit 47. Top Adhesives Producers by Sales, 2015 Versus 2005**

Source for both charts: The ChemQuest Group and Wells Fargo Securities, LLC

The major markets for adhesives/sealants are construction (42%) and packaging (22%). Transportation and product assembly are the next largest.

In construction, improved building standards are among the demand drivers. Adhesives in general have been gaining at the expense of metal fasteners, due in part to the light-weighting trend. Finally, adhesives also offer such desired traits as flexibility, ease of repair, and strength.

The increasing presence of adhesives and sealants in the transportation industry is driven in part by fuel efficiency. Manufacturers continue to replace metals with plastics, composites, and lighter metals. These products cannot be put together with traditional mechanical fastening, and instead require adhesives to assemble various layers. At the same time, these adhesives must provide heat shielding and have enough strength to replace mechanical fasteners, etc. Adhesives make up 15% of the market for vehicle assembly, according to DOW, and its BETAMATE continues to be an exemplary adhesives product. Since its introduction more than 15 years ago, more than 7B meters of BETAMATE have been applied.

In 2015, packaging, transportation and tapes showed improvement, while other end markets were flat. Packaging trended upward, due to growth in beverages, namely beer and energy drinks, and food. The transportation end market saw gains from light truck builds, while aerospace was steady. The tapes end market was up on better transportation and construction.

Exhibit 49. Adhesives End-Market Performance, 2015

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<tr>
<th>SECTOR</th>
<th>TREND</th>
<th>COMMENT</th>
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<tr>
<td>Packaging</td>
<td>↑</td>
<td>Food and beverage up slightly, beer and energy drinks up while carbonated beverage continues to decline</td>
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<tr>
<td>Transportation</td>
<td>↑</td>
<td>Auto and Light Truck builds strong, aerospace flat but moving towards adhesive bonding with composite substrates over aluminum</td>
</tr>
<tr>
<td>Construction</td>
<td>↑</td>
<td>New construction growing at its fastest rate since 2009</td>
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<tr>
<td>Consumer</td>
<td></td>
<td>Consumer adhesives flat</td>
</tr>
<tr>
<td>Tapes</td>
<td>↑</td>
<td>Improvement in transportation, construction tapes, flat in electronics</td>
</tr>
<tr>
<td>Product Assembly</td>
<td></td>
<td>Domestic industrial production under pressure from the strong dollar</td>
</tr>
</tbody>
</table>

Source: The ChemQuest Group
Industry Margin

Raw materials are the largest component of costs, representing 53-63% of cost of goods sold, compared to 44-52% in the coatings industry. Adhesives typically use higher molecular weight products, which generally include dependence on crude oil input. Similar to coatings producers, adhesives producers have been successful in passing through raw material price increases and should benefit with declines in raw materials. In addition, producers have rationalized and shed less strategic customers, which midsize players have picked up.


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<td>2-3%</td>
<td>5-7%</td>
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<td>Energy</td>
<td>1%</td>
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<td>6%</td>
<td>6%</td>
<td>6%</td>
<td>5%</td>
<td>5-7%</td>
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<tr>
<td>Total</td>
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<td>63-73%</td>
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<td>Gross Margin</td>
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<td>EBIT</td>
<td>6-22%</td>
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Source: The ChemQuest Group and Wells Fargo Securities, LLC

Adhesives pricing increased steadily until 2014, though recent pricing shows flatness reflecting consumer spending. In 2009, despite the recession, continued pricing momentum, coupled with lower resin costs, helped margin expansion. However, since then, costs have trended slightly higher, with margin relatively consistent since 2011.

Exhibit 51. Adhesives and Resin PPI and Cost Index (Indexed to 2007)

Source: The ChemQuest Group and Wells Fargo Securities, LLC

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<td>Jeff Farmer, CFA</td>
<td>Vivek Agrawal</td>
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<td><strong>Retail</strong></td>
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<td><strong>Master Limited Partnerships</strong></td>
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<td>Eric Shiu</td>
<td>Yanan Zhu</td>
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<td>Zachary Cantor</td>
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