



Some raw material suppliers quietly admit that they are sold out through the end of 2024, and paint producers are missing one strategic opportunity after another because their R&D colleagues are spending the lion's share of their time not formulating new products, but finding raw material substitutions so that they can produce existing products.

The State of the U.S. Coatings Industry 2022

The Confluence of High Demand, Restricted Supply, Rising Inflation, Labor Shortages, and Cash Flow Issues

By George R. Pilcher, The ChemQuest Group, Inc.

Who would have guessed, in 2019, that it would be 2022 before the coatings industry began to even resemble what it had looked like during that fine, but in no way remarkable, year? Not that 2022 has proven to be in any way a “normal” year, if we are even able to define such a once clear and cogent term. This is still an unsettling year in which raging inflation, nearly unprecedented rate hikes by the Federal Reserve, the Russian aggression against the sovereign State of Ukraine, and an abrupt change in the American vision of China from “trading partner” to “potential enemy” have kept virtually everybody and everything off balance.

Although the industry recovered in 2021 from a small dip in volume in 2020, the real news is the dramatic increase in value, ~25% over the two-year period, 2020-2022 estimated (2022e), that has resulted from the high cost of crude, ongoing global supply chain issues, shortages, transportation issues/logistics and labor shortages. All have led to galloping inflation that the chairman of the Federal Reserve feels *may* be peaking in August, although it will probably take one to two years to return to the target rate of 2% per year.¹

As we sit here, in mid-2022, most raw material suppliers and coatings producers are faced with a unique situation of historic import: They cannot produce sufficient material to fill all of their orders. Some raw material suppliers quietly admit that they are sold out through the end of 2024, and paint producers are missing one strategic opportunity after another because their R&D colleagues

are spending the lion's share of their time not formulating new products, but finding raw material substitutions so that they can produce existing products, for which they are unable to obtain key raw materials, from pigments and resins to additives and containers. Everything is in short supply and difficult to obtain.

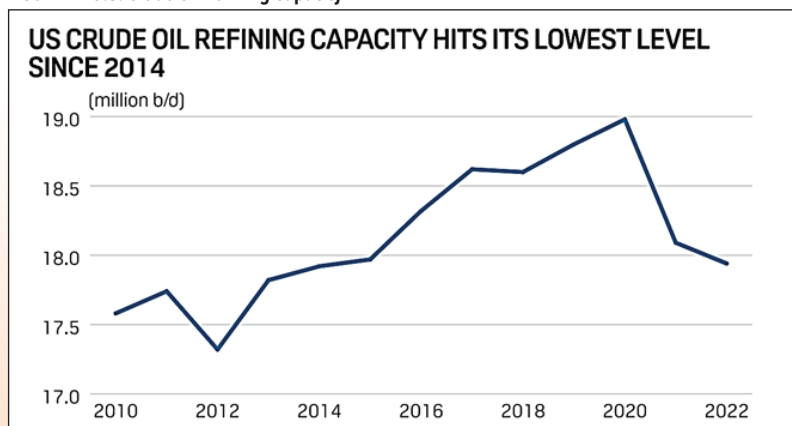
Although things do seem to be easing up a bit as of July 2022, the global supply chains are so fragile that almost anything can disrupt the recovery, whether as a result of Europe's over-reliance on Russian gas and oil, global food shortages caused by the inability of food and other resources to be shipped from Ukraine, another slowdown in China caused by additional outbreaks of COVID-19, ongoing refinery capacity issues in the United States, or any number of other important—albeit less momentous—

aspects of the current chaos in which the entire globe is involved.

While it is true that U.S. refineries “are running at about 94% of operable capacity, the highest since September 2019,”² this is merely a relative, rather than a fully revealing, statistic. In fact, refinery closings due to either lack of demand (in 2020) or damage done by the “Big Freeze” in the Permian Basin (in February 2021) and exacerbated by Hurricane Ida six months later, have caused a reduction in capacity of 5% from 2020 to 2021, and an additional 1% from 2021 to midyear 2022e, as shown in *Figure 1*.

There do not appear, at least as of this writing, to be plans to increase capacity anytime soon, and in April LyondellBasell Industries announced the closing, at the end of 2023, of its 263,776 barrel-per-day (bpd) Houston

FIGURE 1—U.S. Crude Oil Refining Capacity



Source: U.S. Energy Information Administration annual refinery capacity report.

refinery. Two closed petroleum refineries have been converted to renewable diesel production, and serious consideration is being given to similar conversions in the future.

For the long-term national good, this is, of course, excellent news. In the short term, however, declining crude oil refinery capacity is not good news for the U.S. chemical industry,³ which represents more than \$800 billion of the U.S. economy and supports more than 25% of our gross domestic product (GDP), including downstream products for the paints and coatings industry. Many basic raw materials for all types of coatings, whether waterborne or solventborne, 100% solids, powder, or energy-curing systems, are derived from crude oil. We should expect a degree of easing of both supplies and prices of paints and coatings raw materials as we move through the remainder of 2022e and into 2023 forecast (2023f), but only moderate easing.

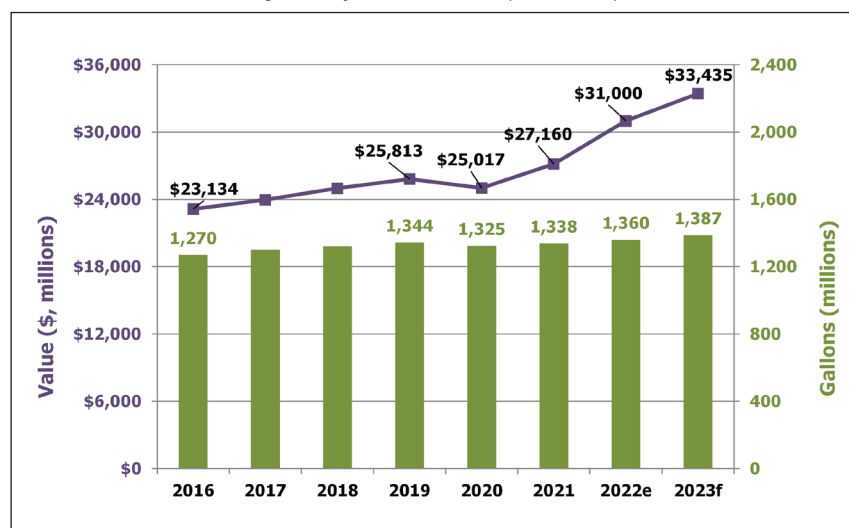
There will continue to be structural global issues that will mitigate against any scenarios in which “things return to normal,” or even to a semblance of normal, whatever that blissful state may look like. The cold hard truth is that the value of durable goods manufacturing shipments is up 11% in mid-2022e, and that total manufacturing shipments value is up 14.8%, but this dramatic increase in value is almost entirely the result of price increases, not volume of goods, which was only up 1.1%, after adjusting for price.⁴

The shortages, high prices, allocations, labor issues, and transportation problems that have led to the current paint and coatings industry headaches are not going away anytime soon—but the worst is likely behind us, and for that, we should all be grateful. So, what *should* the industry expect during 2022?

THE STATE OF THE U.S. PAINT AND COATINGS INDUSTRY, 2021-2023f

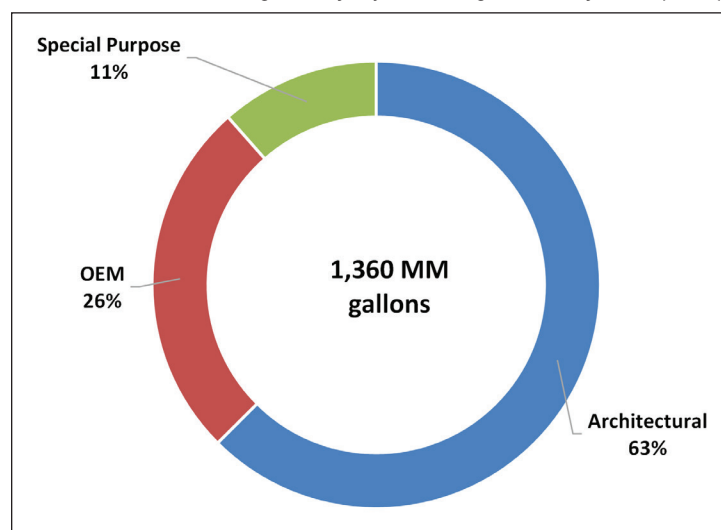
While the manufacturing sector in the United States is only weakly correlated to GDP under normal circumstances, the relationship becomes more pronounced under conditions of extreme economic duress, such as the COVID-19 crisis, subsequent supply chain issues, and the inflationary economic cycle

FIGURE 2—U.S. Paint and Coatings Industry, Volume and Value (2016–2023f)



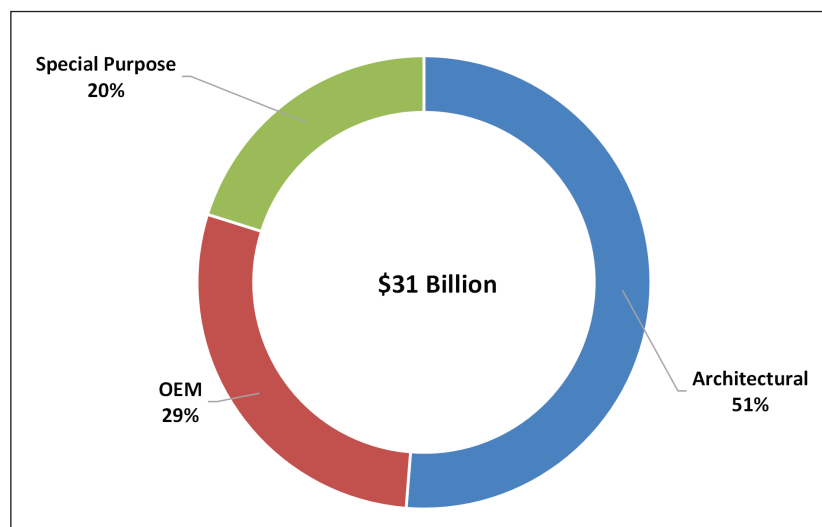
Source: The ChemQuest Group, Inc., estimates

FIGURE 3—U.S. Paint and Coatings Industry Major Market Segmentation, by Volume (2022e)



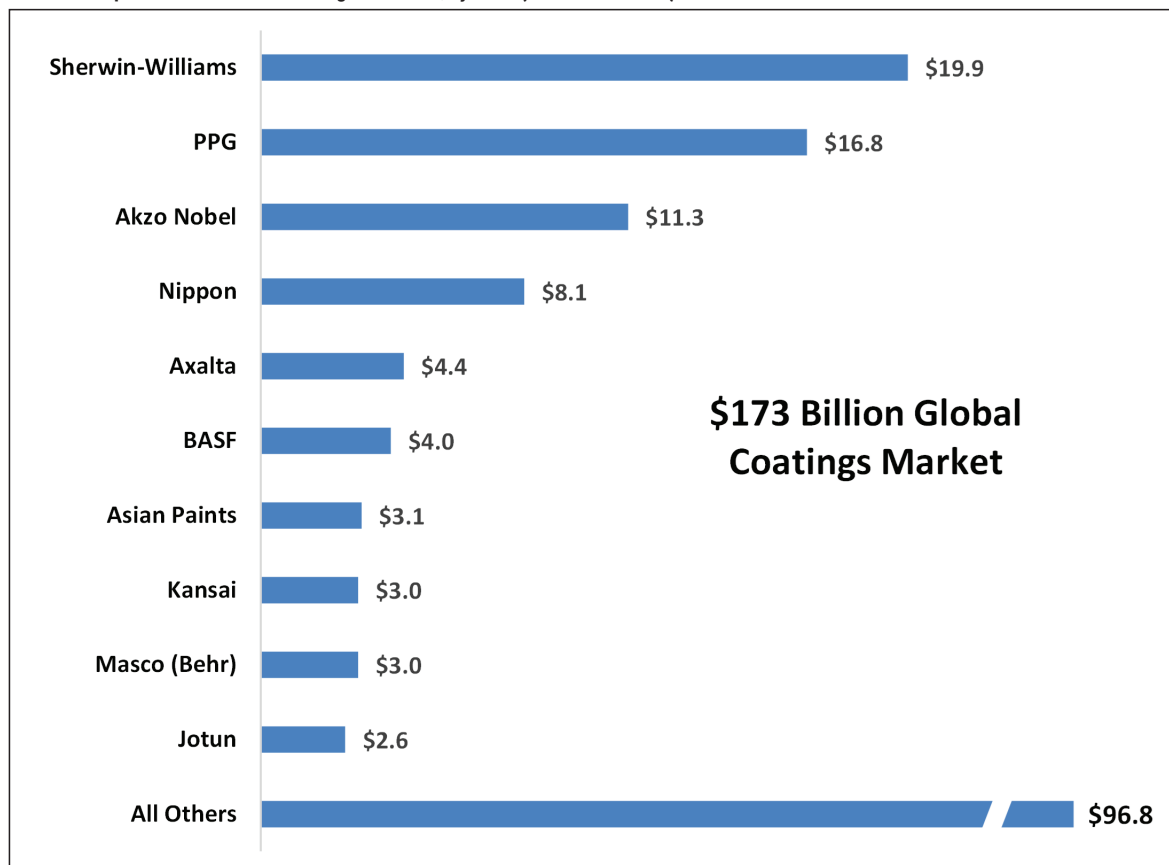
Source: The ChemQuest Group, Inc.

FIGURE 4—U.S. Paint and Coatings Industry Major Market Segmentation, by Value (2022e)



Source: The ChemQuest Group, Inc.

FIGURE 5—Top 10 Global Paint and Coatings Producers, by Value (in \$Billions—2021)



Source: The ChemQuest Group, Inc., estimates

that is currently being experienced. Regarding the “State of the U.S. Paint and Coatings Industry,” it is always important to look at the macroeconomic picture that surrounds all businesses that depend upon the specialty chemical stream for their livelihood.

In turbulent times, GDP data can be confusing. It is most commonly expressed on a quarter-to-quarter basis. When COVID-19 became a household word in Q1 2020, GDP dropped about 5% versus the previous quarter, and then plummeted in Q2 by -33%. Unsurprisingly, it rocketed up in Q3—+34%—as many industries got back to work, but this was hardly an indication that the U.S. economy was out of the woods.

The year 2021 returned to something more “normal looking”—GDP in the range of 3–5%. But that did not last, as inflation took over and the Federal Reserve needed to increase interest rates. GDP for Q1 2022 came in at -1.6%⁵ and was announced on July 29 as -0.9% for the second quarter,⁶ giving us two consecutive quarters of contraction, which indicates a slowdown, but not necessarily a recession. In addition to a

general business slowdown, the industry faces headwinds due to natural gas shortages in Europe, as Russia cuts back supplies to numerous countries, creating the prospect of an energy crisis.

Global supply chain disruptions and port congestion continues. According to Peter Sundara, head of global ocean freight product for the Global Logistics Division at Visy Industries, port congestion will last until *at least* Q1 2023.⁷ Coatings raw material prices may or may not have plateaued as of this writing, but only after truly aggressive increases in 2021, followed by equally aggressive increases in Q1 2022. It is within this context that we now turn to the U.S. coatings industry performance during 2022e so far, and its anticipated performance during the remainder of the year and into 2023f.

The year 2022 is expected to be a mixed year for paint and coatings in the United States. The year 2021 ended with production of 1.3 billion gallons valued at \$27.2 billion, up 0.1% in volume and 8.6% in value from 2020, and the outlook for 2022e suggests full-year production of 1.4 billion gallons valued

at \$31.0 billion, up 1.6% in volume and 14.1% in value over 2021, as shown in *Figures 2–4*.

As a result of aggressive consolidation, the top 10 global coatings firms accounted for 44.0% of global sales in 2021, up from 43.5% in 2020. Taking this one step further, the top three global players account for 63.0% of the top 10 coatings firms’ sales in 2021, which is up from 62.4% in 2020 (*Figure 5*).

ARCHITECTURAL PAINTS

Architectural coatings sales are highly correlated with the health of the housing/construction market. The architectural paints segment currently accounts for 63% of the volume and 51% of the value, within the U.S. coatings industry, as shown in *Figures 3 and 4*.

Because of a variety of factors, not the least of which were the severe supply chain issues in 2021 accompanied by raw material price increases, architectural coatings grew 3.7% in value in 2021, compared to 2020, but the volume *decreased* by 2.1%. We anticipate a return to volume growth during 2022e

and estimate an increase of 1.3% in volume and an increase in value of 13.5% for 2022e, as shown in *Figure 6*.

The percentage of professionally applied (PRO-applied) paint had continued to increase, unabated, since 2009, reaching a relationship of 63–64% professional (PRO) to 36–37% do-it-yourself (DIY) in 2019, the highest that this ratio has been since 2006 (*Figure 7*).

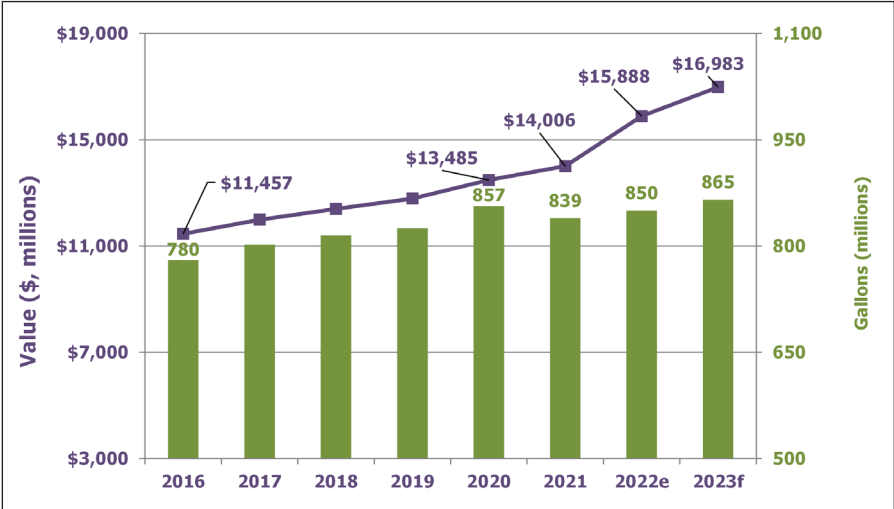
Going forward into 2020, we had expected this relationship to stabilize, but the COVID-19 effect caused the PRO share to nosedive from 64% to 58% between 2019 and 2020 as homebound consumers decided to purchase paint and apply it themselves, rather than hiring a PRO to do it for them. Following the flurry of homeowner painting activity in 2020, the ratio of DIY:PRO ended up at 40%:60% for 2021.

As COVID waned (or at least its mortality declined, as a result of vaccines), we expected DIY activity to decrease, and PRO activity to increase—and this is precisely what began happening in mid-May of this year. The rate of increase, however, will depend upon when the effects of COVID-19 are fully mitigated, when the majority of businesses either return to work or decide that a certain percentage of

working time can be done from home, to what degree the behavior of homeowners has become permanently altered, and how long the post-pandemic economic upturn lasts. As of early July, it seems reasonable to anticipate that the ratio of DIY:PRO for 2022 will end the year around 38%:62%, and PRO will continue trending up toward 62–63% during 2022–2023.

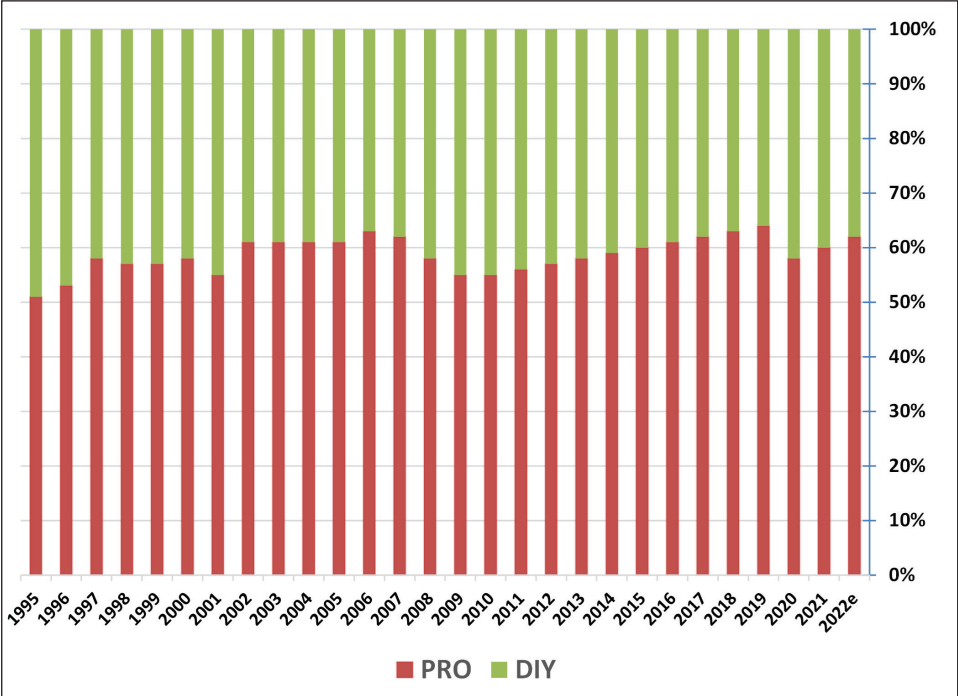
A major driver of the architectural coatings segment is construction, which is closely correlated to coatings volume. Because construction in the United States in 2021 continued its prolonged recovery from the unprecedented low point experienced in 2011, this was good news for architectural paints and coatings. Year-over-year growth in construction

FIGURE 6—U.S. Architectural Coatings Market Segment, Volume and Value (2016–2023f)



Source: The ChemQuest Group, Inc., estimates

FIGURE 7—U.S. Architectural Coatings, PRO vs. DIY (1995–2022e)



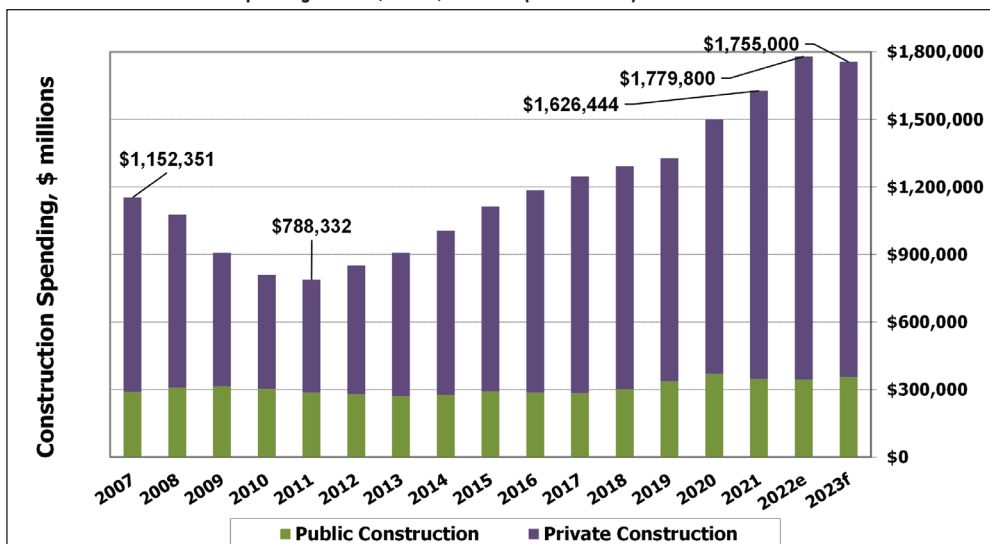
Source: The ChemQuest Group, Inc.

spending for 2021 was 8.6% and is anticipated to increase by an additional 4.2% during 2022e, for a total of \$1.78 trillion. Because of an expected slowing of the economy, coupled with higher interest rates and the steep growth in the cost of housing, we expect to see a downturn in construction spending in 2023f, albeit a very slight one, as shown in *Figure 8*.

Another driver for the architectural coatings segment is remodeling, activity that is monitored by the Joint Center for Housing Studies of Harvard University's Leading Indicator of Remodeling Activity (LIRA). As shown in *Figure 9*, 2018 and 2019 were strong for remodeling, but began to slow toward the end of 2019 when compared to the very active growth in the earlier period.

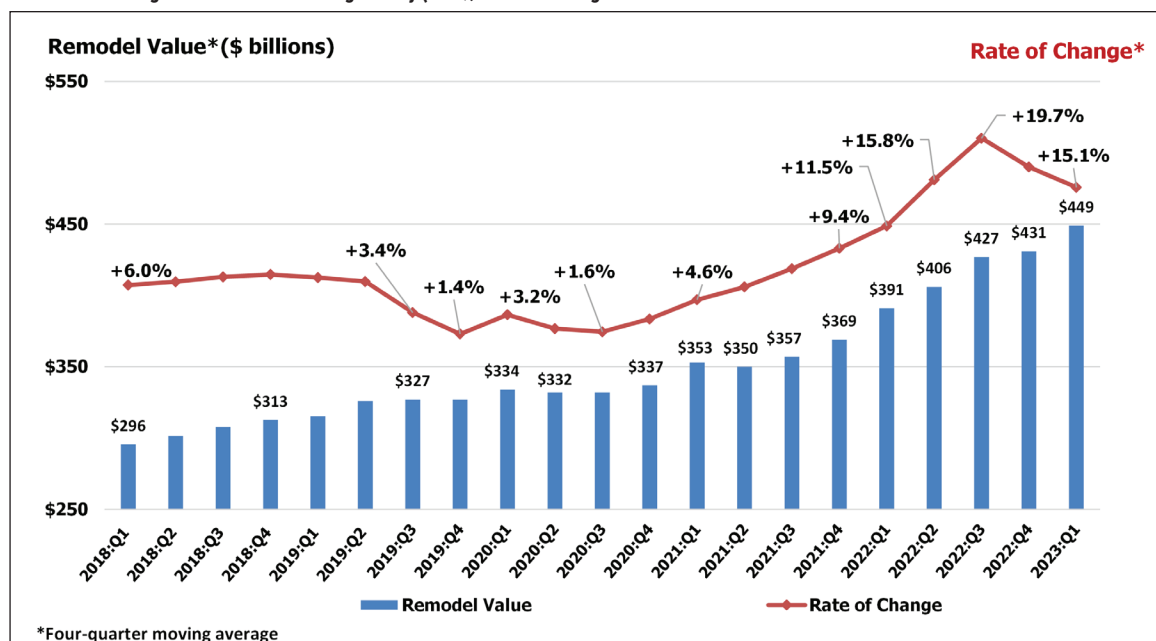
Growth picked up in 2020 with home-owner remodeling activity, and growth during 2021 was robust—and is expected to improve significantly during 2022e. Harvard expects the growth rate of remodeling to slow around Q3 2022, but actual remodeling dollars remains robust at \$400+ billion (*Figure 9*).

FIGURE 8—U.S. Construction Spending: Private, Public, and Total (2007–2023f)



Source: The ChemQuest Group, Inc.

FIGURE 9—Leading Indicator of Remodeling Activity (LIRA), Q1 2018 through Q1 2023f



*Four-quarter moving average

Source: Joint Center for Housing Studies of Harvard University

INDUSTRIAL OEM

The industrial OEM segment is comprised of more than a dozen sub-segments, of which appliances, HVAC, fireplaces, microwaves, automotive OEM (including rigid and flexible automotive exterior trim systems, brake systems, et al.), coil coatings, wood furniture and cabinets, and metal furniture and fixtures are a few representative coatings areas (Figure 10). The industrial OEM segment tends to be driven by a variety of factors, as a result of such a diversity of goods, although most are influenced by the macroeconomic environment, and especially by industrial production.

The U.S. industrial OEM segment grew in value by 13.8% in 2021 (6.8% volume; +7.0% price), generating \$7.8 billion in sales (~345 million gallons). The current 2022e forecast is for an increase

of 13.5% in value and 2.3% in volume, with pricing increasing by 11.2%, resulting in \$8.9 billion in sales on 353 million gallons, as shown in Figure 11.

The year 2021 was not stellar for the automotive sub-segment (defined as the total of domestic production, transplants, and imports of automobiles, light trucks, vans, and SUVs). The industry made a quick recovery from April 2020, when production was essentially halted as COVID-19 lockdowns went into full force. Production peaked at 12.0 million builds in July 2020 measured at a seasonally adjusted annualized rate (SAAR) but declined during the next year, dropping to 7.8 million builds in September 2021 (SAAR). Supply chain issues and, notably, shortages of semi-conductor microchips, which constrained production by an estimated 7.7 million units on a global basis,⁸

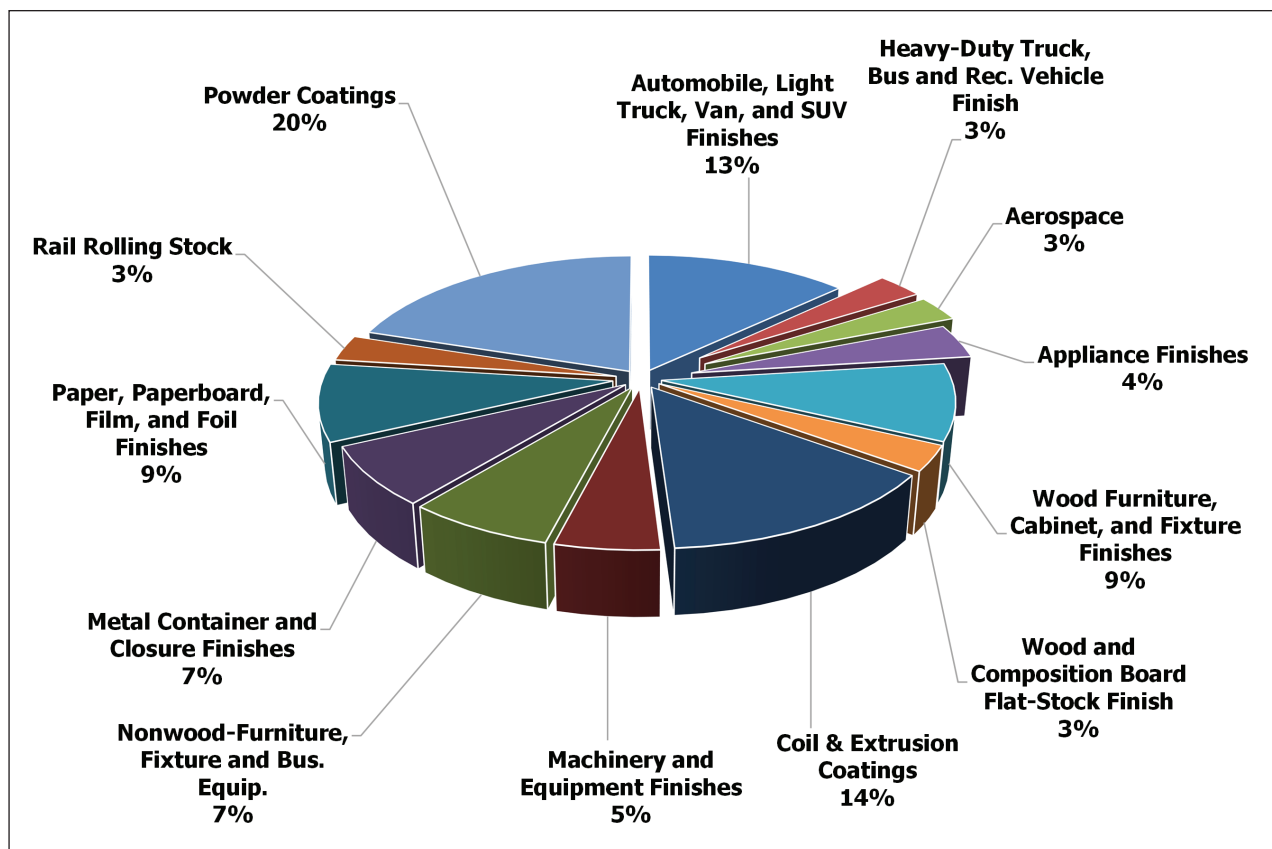
explain this drop-off. From September 2021 to present, builds grew to 10.5 million per month and appear to be stabilizing at that level. Although this is positive news, the United States was producing about 12 million units per month in the 2013–2017 period, so there is significant room for growth (Figure 12).

The “COVID-19 Factor,” sky-high gasoline prices, supply chain issues, high interest rates ... the list goes on, all indicating that it will be some time before U.S. light vehicle production returns to its halcyon days.

Factory-applied coatings are divided over a number of markets, with two exceptions:

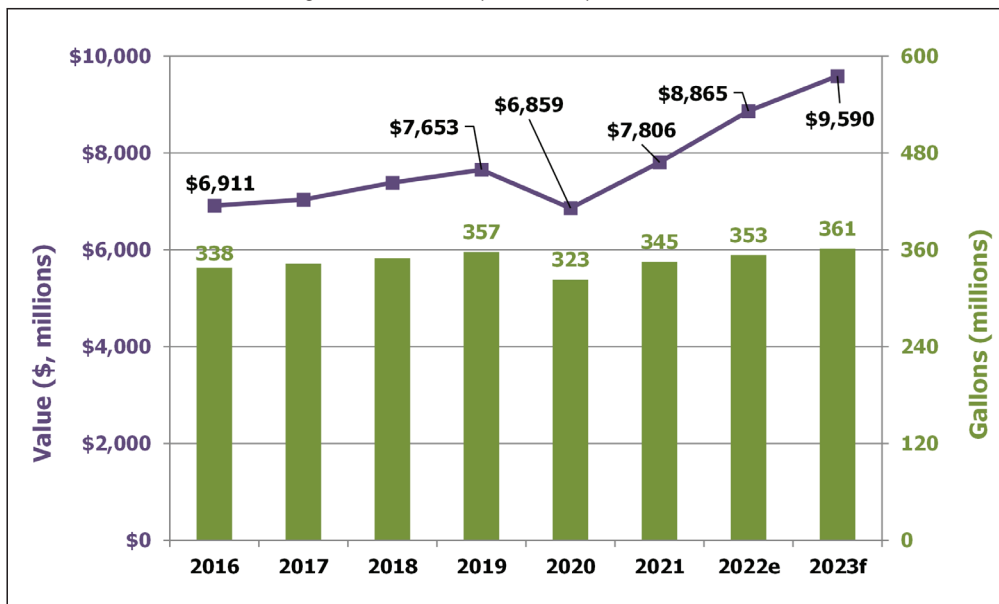
- Twenty percent of the OEM market is comprised of various powder coatings. This is an important coatings technology, but it is not a market.

FIGURE 10—Major Sub-segments of the U.S. Industrial OEM Coatings Market Segment, by Value (2022e)



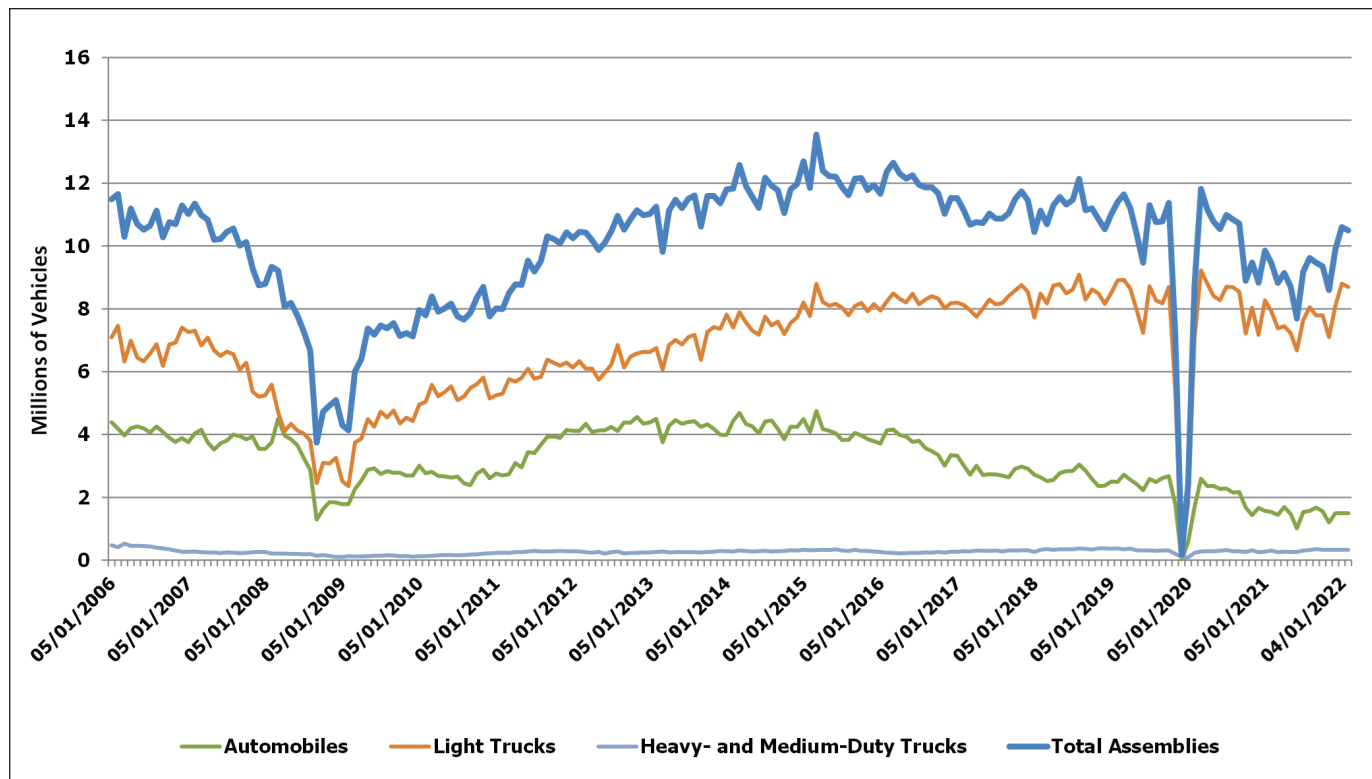
Source: The ChemQuest Group, Inc., estimates

FIGURE 11—U.S. Industrial OEM Coatings, Volume and Value (2015–2023f)



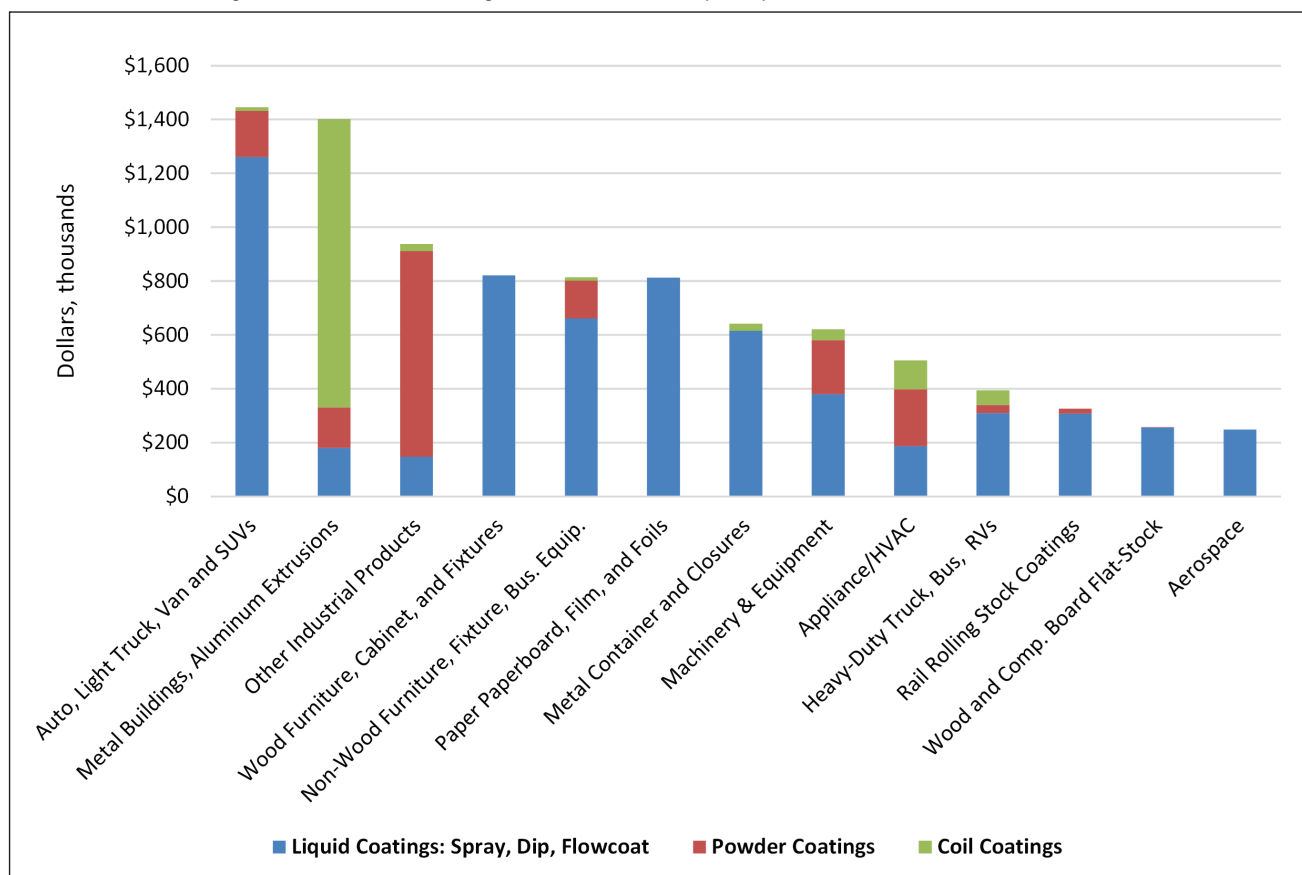
Sources: The ChemQuest Group, Inc., estimates

FIGURE 12—Monthly U.S. Total Motor Vehicle Assemblies (2006–May 2022)



Source: The ChemQuest Group, Inc.

FIGURE 13—U.S. OEM Coatings, with Powder and Coil Coatings Distributed into Markets (2022e)



Powder coatings are used in many markets (e.g., metal furniture, appliances, extruded metal, automotive underbody, etc.), and have largely replaced solventborne liquid coatings in “job shop” applications.

- Fourteen percent of the OEM market is shown as coil coatings and extrusions. Coil coating is an application technique, and the major—but not the exclusive—use of coil coatings is for building products. Spray-painted aluminum extrusions are most often used as a building product in conjunction with coil-coated metal, which is why this category is combined with coil coatings. It would be helpful, however, to see the market segments where powder coatings and coil coatings are used, and *Figure 13* provides this view, along with all other OEM markets.

Trends in the industrial OEM market segment are driven by the desire for:

- Reshoring certain products to reduce dependency upon imported materials
- Creating operational efficiencies (increased productivity/reduced labor/decreased cycle times)
- Increased sustainability (reduced CO₂ footprint and product end-of-life [EOL] reuse/disposal); and continual innovation (infrared reflectance/noise vibration/insulation), et al.
- Robust functionality—ability to coat mixed-material substrates, composites, alloys, and other non-traditional surfaces
- Innovation—self-healing and self-cleaning coatings, self-stratifying coatings, pollution-eating properties, et al.
- Design and Customization—increasing interest in made-to-order coatings to provide consumer engagement and for the industrial coatings company to differentiate on services.

SPECIAL PURPOSE COATINGS

Automotive refinishing, industrial maintenance/protective coatings, traffic-marking paints, marine coatings, and aerosol paints comprise the major end-markets for special purpose coatings, as shown in *Figure 14*. The special purpose coatings market segment serves far fewer end-market segments and sub-segments than industrial OEM coatings, but—as an overall segment—typically commands higher margins than industrial OEM coatings.

In 2021, special purpose coatings grew in value at a rate of 14.4% (6.2% in volume; 8.2% in price) and contributed \$5.3 billion (~154 million gallons) of the \$27.2 billion generated by the U.S. paint and coatings industry.

In 2022, we are expecting an increase in value of special purpose coatings, from \$5.3 billion to \$6.2 billion, as volume increases from 154 million to 156 million gallons (*Figure 15*). This represents a forecast sales dollar increase of 16.8%

(1.2% in volume and 15.6% in price). In 2023f, we are forecasting \$6.9 billion on 161 million gallons, for an increase in value of 9.9% and in volume of 3.2%.

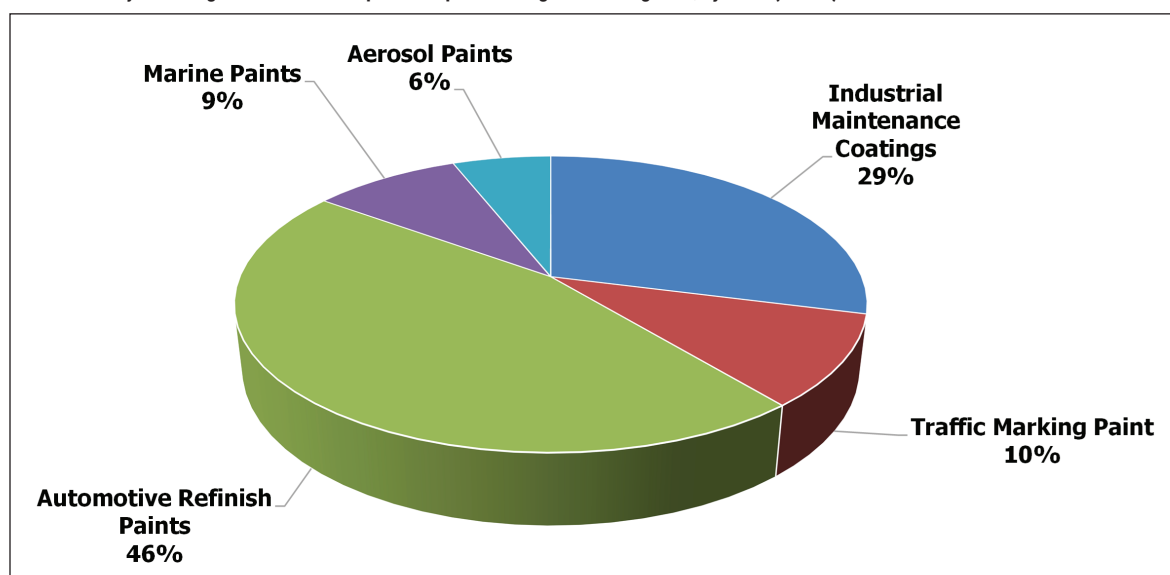
Because the largest segments comprising special-purpose coatings are automotive refinish coatings and industrial maintenance/protective coatings, this segment tends to track accident rates, automotive sales, size of the car parc (total number of registered vehicles

in use at any given time), and total miles driven (refinish paints)—as well as industrial construction, infrastructure refurbishment, and crude oil prices (protective coatings).

Automotive refinish coatings sales are typically teetering on the brink of growth versus decline, depending upon of a number of conflicting factors in the ascendancy at any given time. Factors that tend to reduce automotive refinish

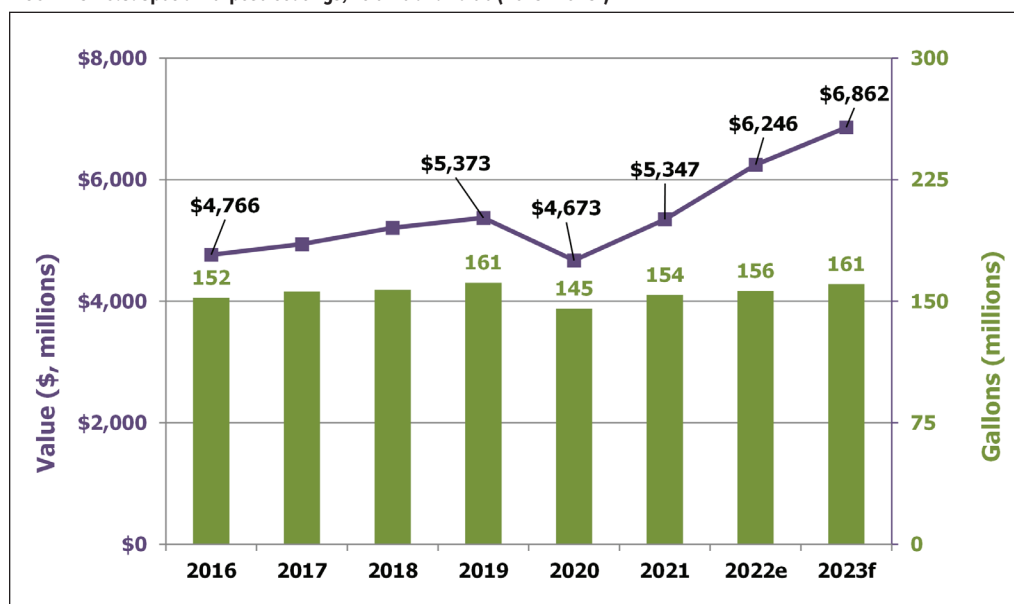
coatings sales include, but are not limited to, improved education of the populace with regard to safer driving habits and the advent of safer, “smarter” cars that help in accident avoidance and damage mitigation with an assortment of devices from energy-absorbing bumpers to back-up cameras, adjacent vehicle indicators, and automatic controls that keep cars from accidentally crossing the center line.

FIGURE 14—Major Sub-segments of the U.S. Special Purpose Coatings Market Segment, by Value (2022e)



Source: The ChemQuest Group, Inc., estimates

FIGURE 15—U.S. Special Purpose Coatings, Volume and Value (2015–2023f)



Source: The ChemQuest Group, Inc.

These are always countered to some degree by factors that favor increased usage of automotive refinish coatings—factors such as drivers talking, texting, and glancing at GPS screens while driving; the increase in disposable income; changing lifestyle and buying behavior; and demand for luxury vehicles, including crossovers and SUVs. (Luxury car owners tend to have scratches and minor dings repaired more readily than non-luxury vehicle owners.)

U.S. sales of automotive refinish paints were \$2.4 billion on 39 million gallons in 2021 and are projected to increase in 2022e to \$2.8 billion on 40 million gallons. Automotive refinish coatings are directly tied to the accident rates, and indirectly to the total number of miles driven.

For 2023f, we are projecting sales of \$3.2 billion on 41 million gallons. With the passage of time, however, we anticipate that the various factors that affect the use of automotive refinish coatings will begin to favor fewer accidents and other “need to repaint” scenarios, and this market will begin trending downward at an estimated 0.1–0.5% per year in volume during the period 2025–2029.

The industrial maintenance (I/M) and protective coatings market segment represented 38 million gallons valued at slightly under \$1.6 billion in 2021, an increase from 2020 of 6.6% by volume and 14.6% by value. I/M and protective coatings consumption is directly tied to construction, maintenance of medium- and heavy-duty facilities such as petrochemical and wastewater treatment plants, infrastructure, and oil and gas (O&G) production—and indirectly to global crude oil prices, which ranged from \$55 to \$65/barrel in 2019, and \$17 to \$60/barrel in 2020.

The price of West Texas Intermediate ranged from \$48 to \$78/barrel throughout 2021 and peaked at \$120/barrel on both March 8 and June 8, 2022, but seemed to be trending downward, hitting \$96/barrel on July 14. We are predicting an increase in volume of protective coatings of 2% and an increase in value of 17%, due to a variety of overall economic factors, but at least partially due to the unexpected increase of crude oil to a 2022e range centering on \$100/barrel.⁹

SUMMING UP

When all is said and done, the year 2021 wasn't all that bad for the U.S. coatings industry, despite all of the headaches that were part and parcel of doing business for the entire year—value was up 8.6% in value, even though volume had barely changed (+0.1%). Because pricing clearly outpaced volume, it is perhaps tempting to assume that coatings producers were able to keep ahead of raw material increases at an appropriate pace, but this may or may not be the case, and almost certainly varied on a producer-by-producer basis.

For 2022e, we estimate total U.S. paints and coatings volume and value to increase by 1.6% and 14.1%, respectively. The U.S. coatings industry, with an estimated value of \$31.0 billion on 1.4 billion gallons in 2022e, remains large and relatively healthy—and the outlook for 2023f suggests that growth will continue, albeit with slower value growth than 2022e. Our crystal ball is currently suggesting that we should see a 2% growth in volume and a 7.9% growth in value in 2023f. Things are clearly headed “back to normal,” although it is unlikely to be the same “normal” that prevailed in 2019.

The “New Normal” or “At the end of the day, what does it all mean?”

In January 2020, all seemed normal, and then COVID-19 hit, with its lockdowns and a plunging economy, followed by the amazingly rapid development of vaccines that were administered widely just one year after COVID-19 arrived in the United States. During 2020, the forced experiment of working remotely proved to be mostly successful. Traffic on the “L.A. freeway” was reduced, along with travel times. Consequently, Angelenos, who never speak in terms of the distance between points A and B, but rather the time that it would take to trek from A to B at any given time of day, began speaking about “20 minutes in COVID time.” A “new normal” had taken hold.

In 2021, as the world was clawing itself back to work, decades of creating complex supply chains suddenly—and dramatically—demonstrated the downside of complexity. Critical imports were

not reaching U.S. ports, and, when they did, there was insufficient intermodal capacity to move those materials from a port to a plant. Demand quickly outpaced supply and shipping prices rose as a result, which forced raw materials to increase in price rapidly. Coatings manufacturers were forced to raise their prices. This condition is still upon us. Another “new normal.” Then Russia invaded Ukraine, and when that happened. . . .the oil market became seriously unstable (not that it is ever truly stable), prices rose, and supplies were once again constrained. World GDP is expected to drop as a result, and many expect a recession to be right around the corner. Most developed countries, having poured trillions of dollars into their economies during the COVID-19 period to minimize the economic pain many of their people were experiencing, now need to raise interest rates to control inflation. This is never a good thing for those attempting to jump into the housing market or buying a car, but it is about the only tool available for a central bank to use to push inflation down to the target value of about 2%. Interest rates will eventually come down, as will oil prices, but it will take some time. Enter the newest “new normal.” Expect an even newer “new normal” in 2023–2024.

How do we develop strategies when the target keeps moving?

For starters, we must learn from “former normals”—we must recognize that the principal value of history is that it generates lessons, typically along with the tools and ideas to learn from those lessons how to create a better future.

The global supply chain issues that have been experienced over the past 18 months were *exposed* by the global pandemic but were not caused by it. We have been living dangerously close to the edge for many years without acknowledging it, and there are still dominoes poised to fall that will prolong the industry's difficulties—orders for larger-than-usual amounts placed for longer-than-usual lead times in order to deal with the global supply chain issues are now being canceled in response to both current and anticipated cash flow issues. In response, suppliers are cutting back on production to avoid their own

cash flow issues. And so the global supply chain issue continues. . . .

The various global supply chains lack fundamental resilience and will only *appear* to improve in 2023. “Appearing to improve,” however, is not the same thing as actually improving. Certainly, some steps are underway, to varying degrees, by individual governments and businesses within the manufacturing sector, to bring greater resilience to the overall process. Much needs to be rethought, however, with regard to:

- Sourcing methods, both numerical and geographical
- Ordering Procedures—“Just in Time” (JIT) can only work for a single link in the value chain, and that has proven to be its “weak link” (“JIT procurement practices are a thing of the past”)¹⁰
- Patterns and timing
- The relationship between “make and ship” and “make and hold”
- Logistics, both intra-regional and global
- Cost of energy
- Many other aspects of the concept represented by the term “supply chain”

If we have learned nothing else from the past two years, it should be our fervent hope that we have learned the value of having a *business strategy*. Make no mistake—we cannot just *talk* about creating a strategy; we must create one for every business in the paints and coatings market supply chain.

While we cannot ignore the temptation to focus on tactical solutions for whatever problems the “new normal” presents us with, because we must each address current events and deliver the financial performance demanded by our investors—we absolutely must be using our recent history to guide the creation of a strategy that will move us “back from the edge” so that future surprise events won’t have such a debilitating effect on our individual companies and on the U.S. economy in general.

Yes, of course, the target is moving, just like when the various “bubbles” broke (housing, tech), or when the various recessions hit in the 1970s, 1980s, 1990s, and The Great Recession of 2008–2009. But a concise, carefully considered, and clearly articulated strategy for the future will enable raw material suppliers and coatings producers to weather whatever future “new normals” will come our way.

Ultimately, having a strategy—and implementing that strategy—is of paramount importance, because this is what will separate the winners from the losers—it is pretty much that simple. Whether these companies create their strategies and new products “in-house” or work with outside partners—strategic business and/or technology consultants, independent laboratories, universities, or all four—should be seriously and carefully considered, because we live and work in a changing world where in-house assets are increasingly challenged and easily overwhelmed, and external firms are able to bring extensive knowledge of multiple fields

in specialty chemicals to bear on the advancement and cross-fertilize of technology at both raw material suppliers and coatings producers. ❖

References

1. Financial Times. <https://www.ft.com/content/d7f8eac6-40c4-4d0c-a9ee-e45d8f8b3472>. May 3, 2022. (Subscription required.)
2. Seba, Erwin. “U.S. oil refining capacity down in 2021 for second year -EIA.” <https://www.reuters.com/business/energy/us-oil-refining-capacity-drops-2021-2d-straight-year-eia-2022-06-21/> (accessed July 22, 2022).
3. Cybersecurity and Infrastructure Security Agency website. Chemical Sector Profile. www.cisa.gov/sites/default/files/publications/Chemical-Sector-Profile_Final%20508.pdf (accessed July 22, 2022).
4. American Coatings Association, Industry Pulse: Industrial Coatings, 2022 Q2. July 5, 2022.
5. Bureau of Economic Analysis website. www.bea.gov.
6. Xinhua News Agency. <https://english.news.cn/20220729/f64ceae559a643f6811a7b0566c730ca/c.html#> (accessed Aug 2, 2022).
7. Lerh, Jeslyn. “Global port congestion, high shipping rates to last into 2023—execs.” <https://www.reuters.com/business/global-port-congestion-high-shipping-rates-last-into-2023-exec-2022-06-16/> (accessed July 22, 2022).
8. Jin, Hyunjo. “Automakers, chip firms differ on when semiconductor shortage will abate.” <https://www.reuters.com/business/autos-transportation/automakers-chip-firms-differ-when-semiconductor-shortage-will-abate-2022-02-04/> (accessed July 22, 2022).
9. U.S. Energy Information Administration, <https://www.eia.gov/outlooks/steo/marketreview/crude.php>
10. Abrams, E.F. “The View from the Other Side,” PPCJ, June 2022, 10-11.

GEORGE R. PILCHER is vice president at The ChemQuest Group, ChemQuest Technology Institute, and ChemQuest Powder Coating Research, with headquarters in Cincinnati, OH. For more information, visit www.chemquest.com or call 513-569-7555