PLASTICS AND CHEMISTRY IN AUTOMOBILES

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American Chemistry Council

AMERICA'S PLASTIC MAKERS℠
MAKING SUSTAINABLE CHANGE

Executive Summary

Plastics and other products of chemistry play a central role in enabling modern automobiles to be lighter, safer, and more fuel efficient. As vehicles become increasingly complex and technology-driven, the importance (and value) of chemistry content continues to grow.

The North American automobile manufacturing industry is a significant end-use market for the chemical industry. In 2025, an estimated 15.4 million passenger automobiles and light-duty trucks were produced in the United States, Canada, and Mexico and, with each vehicle containing an average of more than $4,500 in chemistry. Over the past decade, this value has increased by more than $1,300 (41%), reflecting increased material as well as a shift toward higher-value, performance-enhancing chemistries. Growth has been particularly strong in areas such as plastics and polymer composites, synthetic rubber and elastomers, semiconductors and electronic chemicals.

The average weight of an automobile in 2025 was 4,441 pounds, up 87 pounds compared to the previous year, and up more than 400 pounds compared to a decade ago. This trend is driven primarily by a shift in consumer preferences toward larger trucks and SUVs, which now account for approximately two-thirds of production. Plastics and polymer composites, which account for nearly 10% of the weight of an average automobile, help offset the additional weight. At the same time, plastics and polymer composites, as well as other high-value products of chemistry, are critical in the use of modern vehicle technologies such as advanced driver assistance systems and electronics.

The increasing value of chemistry in automobiles reflects broader shifts in the industry, including vehicle connectivity, electrification, and the growing integration of digital technologies. As vehicles incorporate more sensors, electronics, and advanced materials, chemistry is becoming increasingly critical not only to how vehicles are built, but also to how they function. From battery materials and lightweight structural components to electronic chemicals used in semiconductors, many of the innovations in how vehicles are designed, manufactured, and used—both the vehicles of today and those of the future—are made possible by chemistry.

Introduction

Plastics and other products of chemistry are critical to today's automobiles. This report presents a quantitative analysis of the weight and value of chemistry components in an average automobile assembled in North America (United States, Canada, and Mexico).

It should be noted that the materials and components of individual vehicles vary widely. For the purposes of this report, the term "automobile" refers to a class of vehicles including passenger cars (e.g., sedans, wagons, small sport utility vehicles) and light trucks (e.g., pickups, minivans, and larger sport utility vehicles). The term "vehicle" is used interchangeably with "automobile" except when otherwise delineated. Additionally, "production" is used interchangeably with "assembly." In general, the origin of production is based on the location of the vehicle's final assembly point, although individual components of a vehicle may be sourced from multiple locations.

Report methodology and data sources can be found at the end of this report.

Trends in Automobiles

In 2025, the average weight of a North American-manufactured automobile rose by 87 pounds (or 2.0%) to 4,441 pounds – the highest since 1975. In 1975, the average vehicle weighed 4,060 pounds, but by 1980 that figure had dropped by 20% driven by higher gas prices and the introduction of fuel economy efficiency and emissions standards. Vehicle weight averaged around 3,250 pounds through the 1980s and slowly started to increase, with an average weight of 3,600 pounds in the 1990s. Weight continued to inch up in the 2000s and, in 2004, the average vehicle weight surpassed 4,000 pounds for the first time since 1976. The average weight hovered around 4,000 pounds through the 2010s and has increased nearly every year since 2017.

Within vehicle types, the change in average weight is less significant when compared to the combined average. Over the past decade, the weight of an average car (sedan/wagon and smaller SUVs) grew by 8%, and the weight of an average truck (including vans and larger SUVs) increased 3%.

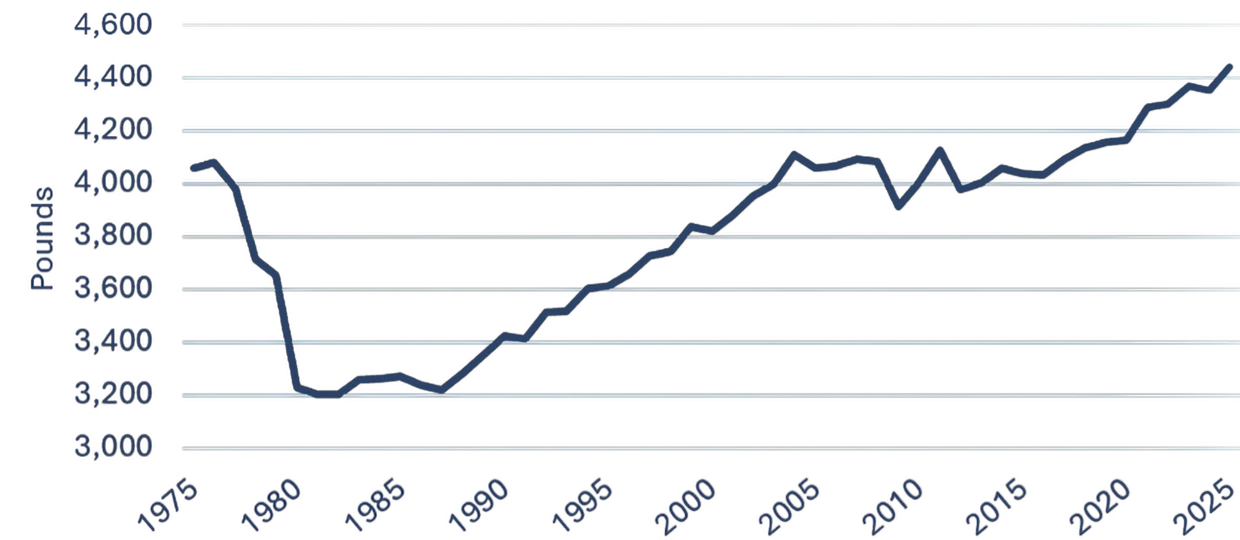


Figure 1. Average Vehicle Weight

Source: EPA Automotive Trends Report

The rise and fall of average vehicle weights over time can be attributed to various factors such as average vehicle size and type, consumer preferences, and material composition. For example, the popularity of minivans, which can be 30% (or more) heavier than a sedan or small SUV, surged in the 1990s and accounted for an average of 10% of vehicle production between 1990 and 2000.

Although minivans did not maintain their market share, the average automobile weight continued to increase in the 2000s as light-duty trucks and SUVs became a larger share of the automotive market. In 2024 (latest available data), trucks (including larger SUVs) accounted for 66% of vehicles produced in the U.S., up more than 50% compared to a decade earlier.

While the shift toward trucks and larger SUVs has been the primary driver of rising average vehicle weight in recent years, materials used in a vehicle also play a key role in its overall weight. Over the years, lightweight materials, such as plastics and polymer composites, have replaced heavier materials, such as steel and other metals. And as vehicles get bigger, the need for lightweight materials is even more important. All told, the fluctuations in average vehicle weight cannot be attributed to a single factor, but rather a multitude of elements reflecting the ever-changing dynamics in the automotive industry.

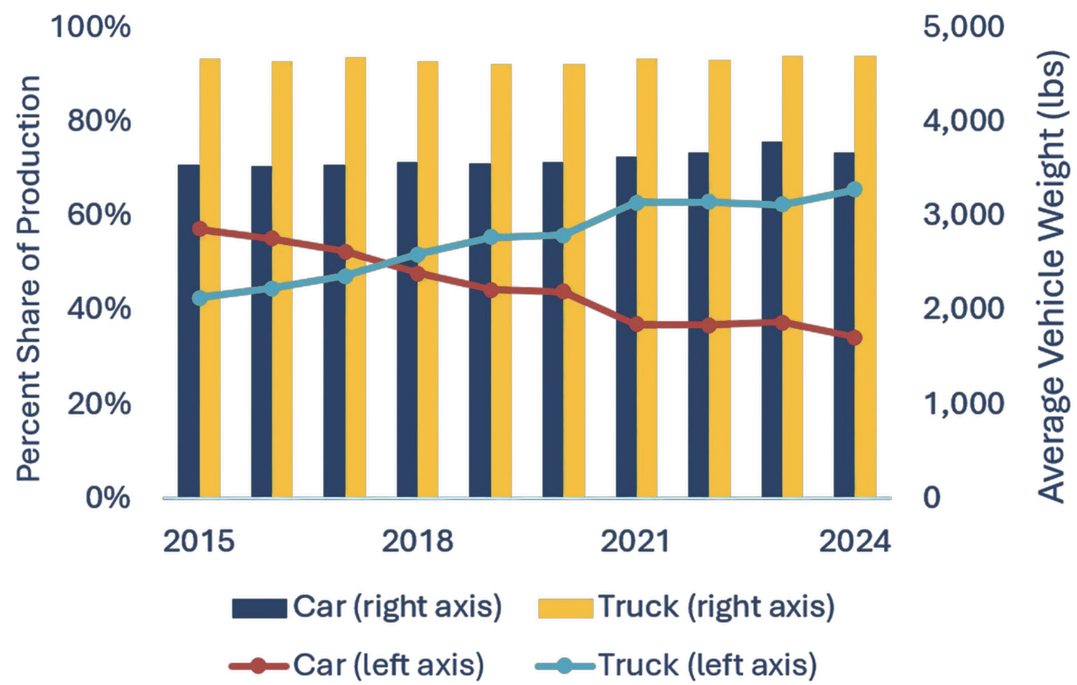


Figure 2. Share of Production and Average Weight by Vehicle Type

Source: EPA, ACC analysis

Automotive Materials

Chemistry in Automobiles

Motor vehicle manufacturing is an important end-use market for the chemical industry, with nearly every component of a modern automobile incorporating or relying on chemistry. Trends in the automobile industry, such as changes in vehicle size and mix, directly influence the quantity, types, and value of chemistry used in each vehicle. Chemistry is a key component of automotive exteriors such as windows and windshields, bumpers, and door handles, as well as interior components like airbags, seatbelts, seating, and dashboards.

In 2025, on average, every automobile manufactured for sale in North America contained $4,518 worth of chemical products and processing materials. Compared to a decade ago, the average chemistry value per vehicle increased 41% (or $1,309). The rising value of chemistry in vehicles over the past decade (and in years prior) is partly due to the increased weight of vehicles on average, and the resulting increased weight of chemical components. But more significantly, it reflects the growing use of specialty chemicals and advanced plastics. As vehicles become more sophisticated, and as consumers look for more features, vehicle manufacturers have increasingly turned to chemistry to deliver performance, safety, and innovation.

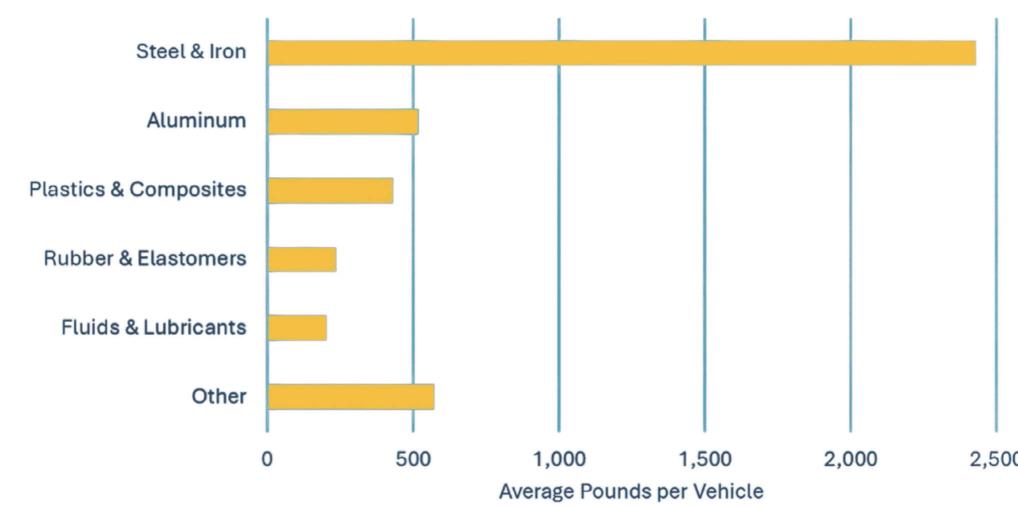


Figure 3. Major Materials in an Automobile (by weight), 2025

Source: ACC Analysis

Plastics and Polymer Composites in Automobiles

Plastics and polymer composites are one of the largest (by weight) categories of chemistry in an automobile. Lightweight plastics and polymer composites play a critical role in today's automobiles, as well as in the transition to next-generation vehicles, such as autonomous (self-driving) vehicles. Plastics and polymer composites enable vehicle weight reduction which can help automakers meet fuel economy standards, while enhancing safety for drivers, passengers, and pedestrians. Autonomous cars and trucks rely on an array of embedded sensors, including cameras, radars, and satellite receptors, all of which are made with plastics.

The average automobile contains 428 pounds of plastics and polymer composites in 2025 (9.6% of a vehicle's total weight). This is up 18% compared to a decade ago. Over a dozen major resins find significant use in automobiles, including on average 102 pounds of polypropylene (PP), 87 pounds of polyurethane foam, 45 pounds of nylon, 34 pounds of polyvinyl chloride (PVC), and 31 pounds of polyethylene (primarily high-density polyethylene, or HDPE).

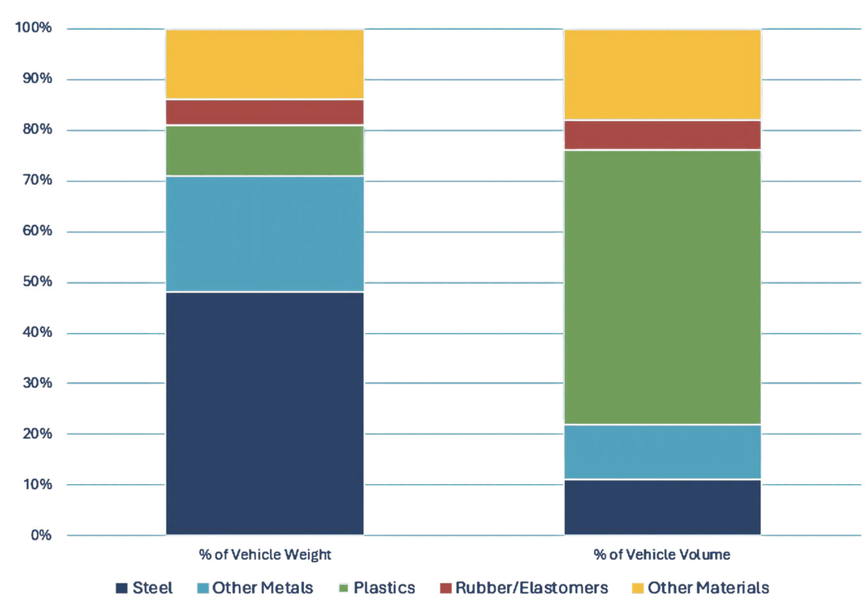


Figure 4. Materials as Percent of Vehicle: Weight vs. Volume, 2025

Source: ACC Analysis

According to ACC calculations, plastics account for over 50% of a vehicle's volume but less than 10% of its weight. Weight reduction in automotive design is a key driver in boosting fuel efficiency, reducing emissions, and lowering operating costs for motorists. The performance of vehicles has improved significantly over the years: according to EPA data, the average horsepower (HP) of model 2025 vehicles was 264, compared to 230 ten years prior and 209 two decades ago. Average fuel efficiency (real-world miles per gallon) reached 26.9 MPG in 2023, more than double the 1975 average. While advancements in engine and drivetrain technologies have contributed, so have innovations in chemistry and lightweight materials.

The following are some examples of how plastics and polymer composites contribute to the safety, performance, and aesthetics of today's vehicles. For more detailed information on the uses and benefits of plastics and polymer composites in automobiles, visit https://plasticmakers.org/innovations/product-innovations/automotive/.

Automotive Exteriors

- Thermoplastic olefins (TPOs), polycarbonates, polyesters, polypropylene, and polyurethanes are used in bumpers for their impact resistance and design flexibility.
- Reinforced plastic bumpers are engineered to absorb impact effectively.

Composites in hoods improve aerodynamics and aesthetics, while plastic panels resist dents, corrosion, and UV damage—making them ideal for doors, hoods, and other exterior components.

Automotive Interiors

- Resins such as ABS, polycarbonate, and polypropylene allow for complex designs in items such as airbag housings and instrument panels and are also used in consoles (e.g., armrests, cup holders, and storage spaces).
- Polyurethane and polyvinyl chloride (PVC) are used in artificial leather in automobiles, allowing for cost-efficient luxury-like finishes.
- Recycled materials, including post-consumer plastics, are increasingly used in automotive textiles.

Safety

- Many of the essential safety features in vehicles are made possible by chemistry and plastics. According to the National Highway Traffic Safety Administration (NHTSA), the use of seat belts (lap and shoulder belts)—which are typically made from polyester—reduces the risk of front seat passenger deaths by 45% in passenger cars.
- Air bags are commonly made from high-strength nylon fabric for its high strength-to-weight ratio, as well as the material's thermal.
- In a crash, fiber-reinforced polymer composites can absorb four times the energy of steel while polypropylene and polyurethane foams and other polymer composites provide additional impact protection.

Windshields, Windows, and Sunroofs

- Modern windshields are multi-layered, often sandwiching a polymer (such as polyvinyl butyral) between two layers of glass, making the windshield thinner, lighter, and less prone to cracking or breaking than tempered glass alone.
- Plastics can provide glare prevention and UV protection, as well as sealing solutions for sunroofs and windows.

Lighting

- Plastics such as polycarbonate can operate at high temperatures, making them desirable materials for exterior lighting such as headlights, fog lights, and taillights.
- On the inside of the vehicle, plastic LEDs and acrylic fiber optic light tubes help make controls and instrument panels more readable.

Electrical

- Heat-resistant plastic components have reduced the use of heavier materials like copper in electrical systems.
- PVC and polyethylene are used to protect and insulate wiring.

Synthetic Rubber and Elastomers in Automobiles

The average automobile contains 235 pounds of synthetic rubber and elastomers, with an additional 75 pounds of natural rubber, in 2025. Olefinic thermoplastic elastomers, such as thermoplastic polyolefins, accounted for 58 pounds of total vehicle weight, followed by styrene-butadiene rubber (SBR) at 49 pounds. Polybutadiene use averaged 27 pounds per vehicle and polyurethane elastomers accounted for another 27 pounds.

While tires account for the largest volume of rubber use in vehicles, synthetic rubber and elastomers are used in a wide range of applications, including seals and gaskets, weatherstripping, mats and flooring, and hoses, among others.

The use of synthetic rubber and elastomers has grown over the past decade, up 23%, while the weight of natural rubber in an average automobile has dropped by 7%. In general, synthetic rubber offers superior qualities compared to natural rubber, particularly in its temperature and abrasion resistance. Additionally, property-enhancing chemical additives can further improve the performance of synthetic rubber and elastomers. Tire manufacturers are also increasing their use of recycled rubber chemicals and synthetic rubber in new tire manufacturing.

Table 1. Plastics & Polymer Composites in an Average Automobile (lbs./vehicle)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Polypropylene	85	88	91	93	93	97	97	100	100	102
Polyurethane Foam	76	76	78	80	81	82	84	85	85	87
Nylon	38	39	39	39	36	40	42	44	46	45
Polyvinyl Chloride	27	28	29	30	30	31	32	33	34	34
Polyethylene	28	29	31	31	32	33	33	33	32	31
Acrylonitrile Butadiene Styrene	22	24	22	21	21	21	22	24	23	24
Polycarbonate	17	18	18	18	19	19	20	22	22	22
Phenolic Resins	11	11	12	13	13	13	14	16	15	13
Polyacetal Resins	8	9	9	9	9	10	9	8	8	10
Polyvinyl Butyral	6	6	6	6	6	7	7	7	7	7
Polybutylene Terephthalate	5	5	5	5	5	6	6	5	5	7
Polymethyl Methacrylate	4	5	5	5	5	5	5	5	5	5
Other Plastics*	36	36	37	38	38	40	40	42	42	40
Total	**363**	**374**	**383**	**389**	**387**	**402**	**410**	**424**	**422**	**428**

**Other Plastics include liquid crystal polymers, high-performance polyamides, polyphenylene ether, unsaturated polyester, and polyphenylene sulfide resins, among other small-volume plastics.*

Table 2. Synthetic Rubber/Elastomers in an Average Automobile (lbs./vehicle)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Thermoplastic Olefins	50	50	51	52	52	53	52	55	55	58
Styrene Butadiene Rubber	40	41	43	43	43	46	46	48	48	49
Polyurethane Elastomers	22	22	23	24	24	25	25	26	26	27
Polybutadiene	21	22	23	23	24	25	25	26	26	27
Ethylene-Propylene Elastomers	19	20	21	21	21	22	22	23	23	24
Butyl Rubber	12	13	13	14	15	16	16	16	17	15
Nitrile Elastomers	6	6	6	6	6	7	7	7	7	7
Other Synthetic Rubber	21	22	23	23	24	25	25	26	29	29
Total	**191**	**197**	**204**	**207**	**208**	**219**	**217**	**228**	**230**	**235**

Other Key Chemistry-Based Materials in Automobiles

In addition to plastics and synthetic rubber, numerous other products of chemistry are used in automobiles, both in the composition of the vehicle itself and in the manufacturing processes.

Fluids and Lubricants

The average vehicle contains 202 pounds of fluids such as lubricants, engine oil, transmission fluid, antifreeze, coolants, brake fluid, and windshield wiper fluids. These types of fluids contain chemistry, such as methanol in windshield wiper fluid, ethylene glycol in antifreeze, propylene glycol in engine coolants, and polyalphaolefins in synthetic lubricants. Automotive fluids often contain performance-enhancing chemical additives as well.

Glass

Today's automobiles contain an average of 103 pounds of glass, an increase of 20% over the past decade. The most common type is soda-lime glass, which is primarily comprised of three chemical compounds: silica, sodium carbonate (soda ash), and calcium carbonate. To enhance performance, automotive glass often incorporates polymer layers and chemical treatments that improve shatter resistance, clarity, and UV protection. Today's vehicles contain more glass than ever before: not only do larger vehicles require larger windshields, side windows, and sunroofs, but the surface area of windshields continues to grow as drivers desire increased visibility. Additionally, glass can be used in dashboards and consoles, which increasingly include chemistry-enabled functionality such as touch screens.

Textiles

The use of textiles (e.g., synthetic fibers, nonwovens, composites) in the average automobile was 93 pounds in 2025, an increase of 13 pounds compared to 2016. The increase is partly attributable to shifting consumer preferences for luxury-like interiors. Textiles are used throughout automobiles; in addition to the visible uses such as upholstery, flooring, and seatbelts, textiles are used in door panels and as reinforcement for tires and belts, among other applications.

Coatings

The typical North American vehicle also contains an average of 43 pounds of coatings, which include primers, topcoats, and protective coatings for underbody components. A wide range of chemistries are used in automotive coating applications including acrylic, melamine, polyurethanes, and thermosetting resins. As a percentage of total weight, coatings have declined slightly as coatings become thinner, and application processes improve, thus reducing waste.

Table 3. Other Key Chemical Products in an Average Automobile (lbs./vehicle)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Textiles	81	86	89	91	90	91	92	93	92	93
Coatings	44	45	41	42	42	45	43	44	43	43
Glass	90	91	93	94	95	98	99	101	101	103
Fluids & Lubricants	194	188	190	183	187	195	198	201	198	202

Metals and Other Automotive Materials

For much of the 20th century, steel was the dominant material used in automobile chassis and body construction due to its strength and durability. However, steel is also dense, and as fuel efficiency became a growing concern in the late 1970s, automakers began replacing some steel components with lighter alternatives. Aluminum, which is up to three times lighter than steel, along with other materials such as magnesium, plastics, and polymer composites, have steadily gained market share, displacing heavier materials like iron and lead.

While steel still accounts for a significant portion of an automobile's weight, mild (low-carbon) steel has increasingly been replaced by lighter grades, such as high-strength steel and advanced high-strength steel (AHSS). In 2010, more than half of the steel in an automobile was mild steel, while high-strength steel and AHSS (combined) represented 39% of total steel. Today, an estimated 70% of an automobile's steel content is high-strength or AHSS, while mild steel accounts for less than one-third. In addition to 2,165 pounds of steel, the average automobile contains 515 pounds of aluminum and 262 pounds of iron, as well as other metals such as zinc, copper and copper alloys, and magnesium.

Plastics and other products of chemistry are often used in conjunction with automotive steel: epoxy and other plastics are used as structural adhesives; coatings are used to protect steel and other metals from heat and weather. Although not quantified in this analysis, chemistry also plays a vital role in the extraction, processing, and refinement of these metals, enabling their use in modern vehicle manufacturing.

Table 4. Metals Content in an Average Automobile (lbs./vehicle)

	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Mild Steel	774	737	709	665	633	631	590	529	537	433
High-Strength Steel	611	655	632	685	712	694	696	656	656	649
AHSS	530	532	585	564	554	694	759	825	841	974
Other Steels & Steel Alloys	122	123	101	101	79	84	63	106	96	108
Steel (Total)	2,038	2,047	2,027	2,015	1,979	2,102	2,108	2,117	2,115	2,165
Aluminum	411	426	438	449	459	480	501	506	511	515
Iron	312	315	313	313	307	268	267	267	263	262
Magnesium	14	16	16	16	17	18	17	18	18	18
Copper and Copper Alloys	37	38	38	39	41	44	51	54	56	57
Zinc	42	43	44	45	46	48	49	50	51	53
Lead	33	31	31	30	29	30	30	30	30	30
Other metals/alloys	66	73	80	82	84	92	87	91	91	97
Metals/Alloys (Total)	**2,953**	**2,988**	**2,987**	**2,987**	**2,962**	**3,082**	**3,109**	**3,132**	**3,135**	**3,197**

Minerals

The automobile industry is a major end-use market for various minerals, such as rare earth elements and platinum group metals (PGMs). Rare earth materials, including cerium and lanthanum are used in automotive emissions control catalysts, while rare earth magnets, including neodymium, dysprosium and terbium are critical components in batteries for electric and hybrid vehicles. The automotive industry is also one of the largest end-use markets for PGMs, which are used in catalytic converters, accounting for more than 60% of the demand for platinum, palladium, and rhodium (combined), according to the International Platinum Group Metals Association.

While the average per-vehicle weight of these materials is extremely small (a few ounces per vehicle), the materials are essential to vehicle operations.

The Value of Chemistry in Automobiles

Chemistry represents a substantial portion of a vehicle's overall value, as noted earlier. The chemistry content includes $681 in plastics and polymer composites, $745 in synthetic rubber and elastomers, $673 in semiconductors and other electronic chemicals, $294 in fluids and lubricants, and $331 in textiles, along with hundreds of dollars' worth of other chemistry.

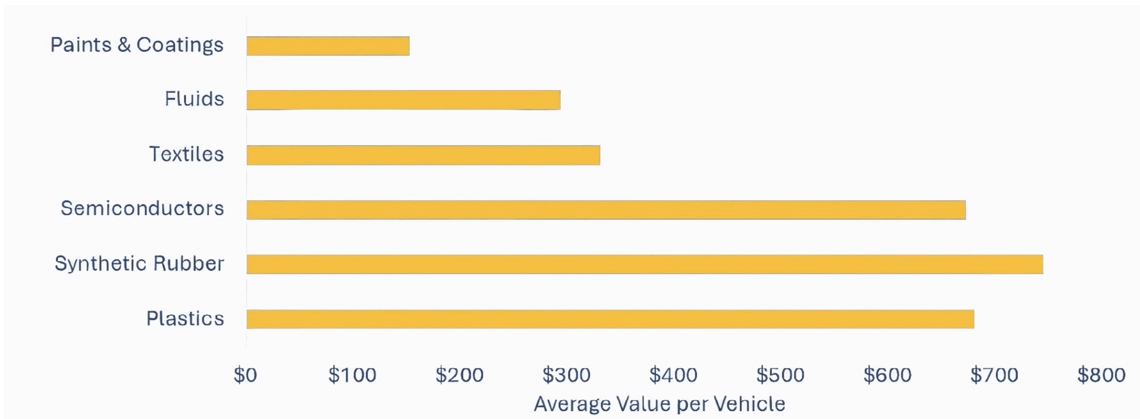


Figure 5. Average Value of Select Chemistries.

Source: ACC Analysis

Table 5. Value of Chemistry in an Average Automobile ($/vehicle)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Synth. Rubber/Elastomers	515	544	560	541	530	681	701	689	725	745
Plastics & Composites	540	571	581	583	577	710	778	694	683	681
Semiconductors & Electronic Chemicals	433	396	450	480	504	540	540	567	634	673
Electronic Chemicals	433	396	450	480	504	540	540	567	634	673
Textiles	214	221	235	237	229	275	311	329	307	331
Fluids & Lubricants	221	240	246	267	320	314	305	294	289	294
Automotive Catalysts	168	170	171	173	175	180	182	179	188	196
Adhesives & Sealants	103	108	111	114	115	136	155	179	180	186
Paints & Coatings	113	116	106	111	112	130	148	150	148	153
Plastics Additives	103	108	111	114	115	136	155	179	180	186
Rubber Processing Chem.	67	64	64	62	60	59	54	72	64	60
Processing and Other Chem*	683	726	763	806	842	921	965	989	944	968
Total Chemistry Value	**$3,209**	**$3,321**	**$3,465**	**$3,571**	**$3,654**	**$4,164**	**$4,389**	**$4,376**	**$4,399**	**$4,518**

*Excludes rubber processing chemicals.

Value of Plastics & Polymer Composites

Over the past decade, the average value of plastics and polymer composites in an average automobile increased 26%. This includes $75 worth of polyurethane foam, $74 of nylon, and $60 of polypropylene. While the overall value tends to correlate with the cumulative weight of these materials, pricing is also influenced by a range of external factors. These include fluctuations in feedstock availability, energy and labor costs, and currency exchange rates. As a result, year-over-year changes in the value of plastics and polymer composites do not always align directly with changes in material usage.

Table 6. Value of Plastics in an Average Automobile ($/vehicle)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Polyurethane Foam	58	59	67	68	63	67	80	75	72	75
Nylon	48	54	65	68	58	62	80	89	93	74
Polypropylene	49	52	61	50	46	94	79	58	65	60
Polycarbonate	30	25	28	27	29	32	38	36	37	40
ABS	14	20	19	14	15	13	27	24	23	29
PVC	19	18	20	21	21	40	36	23	24	26
Polyethylene	19	22	26	25	17	27	27	21	20	18
Other Plastics/Polymers	305	320	296	311	328	375	411	366	349	358
Total Plastics & Polymer Composites	**$540**	**$571**	**$581**	**$583**	**$577**	**$710**	**$778**	**$694**	**$683**	**$681**

Value of Synthetic Rubber and Elastomers

In 2025, the value of synthetic rubber and elastomers in an average automobile included $157 in olefinic thermoplastic elastomers and $96 in polyurethane elastomers. These materials are essential for a wide range of automotive applications, from tires and seals to hoses, gaskets, and vibration-dampening components. Their growing value reflects both increased usage and desirable performance characteristics, such as enhanced resistance to heat and abrasion. Over the past decade, the value of synthetic rubber in vehicles has increased by 48%, while the weight has only increased 23%.

Table 7. Average Value of Synthetic Rubber/Elastomers ($/vehicle)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Olefinic Thermoplastic Elastomers	100	108	107	104	120	127	122	133	141	157
Polyurethane Elastomers	69	66	67	68	72	75	78	83	88	96
Styrene Butadiene Rubber	27	38	40	33	26	52	53	45	42	44
Ethylene-Propylene Elastomers	24	24	26	25	24	26	28	26	28	29
Polybutadiene	18	23	24	19	17	24	27	21	22	20
Butyl Rubber	11	17	17	15	13	26	26	21	23	21
Other Synthetic Rubber	267	269	280	277	259	351	368	360	381	393
Total Synthetic Rubber/Elastomers	**$515**	**$544**	**$560**	**$541**	**$530**	**$681**	**$701**	**$689**	**$725**	**$745**

Other Products of Chemistry

Electronic Chemicals

Chemistry plays an essential role in the manufacturing of semiconductors, printed circuit boards, display materials, and other electronic components which, in turn, enable a wide range of safety and performance functions in automobiles. An average vehicle contains between 1,000-3,000 semiconductor chips and hundreds of different process chemicals are required to manufacture a single semiconductor chip. Chemistry is used in each of the multiple steps of the semiconductor manufacturing process including the making of silicon crystals, cutting and polishing wafers, etching complex circuitry, and improving semiconductor performance. Though used in small volumes on a per-vehicle basis, electronic chemicals tend to have a higher value per pound when compared to other automotive materials.

Features which were previously limited to luxury vehicles, such as advanced driver assistance systems (ADAS), navigation systems, adaptive cruise control, in-vehicle infotainment (IVI) systems, and keyless entry, are made possible by semiconductors and electronic chemicals. While the volume of electronic chemicals in an automobile is small – many are used in the manufacturing process and do not remain in the product – the value of the chemistries is significant and growing. An average vehicle contained $673 in semiconductors and other electronic chemicals in 2025, up 55% compared to just ten years ago.

For more details on the chemistry in semiconductors, see ACC's report *Chemistry in Semiconductors and Electronics.*

Adhesives and Sealants

High-performance adhesives and sealants play a large role in the manufacturing of automobiles, from bonding body panels to attaching trim to sealing windows and doors. Adhesives and sealants made from a range of chemistries including polyurethanes, epoxies, and acrylics, are used in critical applications such enhanced structural integrity and weather resistance.

Processing Chemicals

Chemistry is a critical component to the processing of many of the materials that go into automobiles. While these products are often not present in the finished vehicle, they are integral to the production process: other processing chemicals contributed $968 to the value of chemistry in an average automobile in 2025. This includes industrial gases, which are used in applications such as welding, cutting, and testing vehicle components; metalworking fluids; water treatment chemicals; and textile chemicals, among others.

The Role of Chemistry in Automobiles of the Future

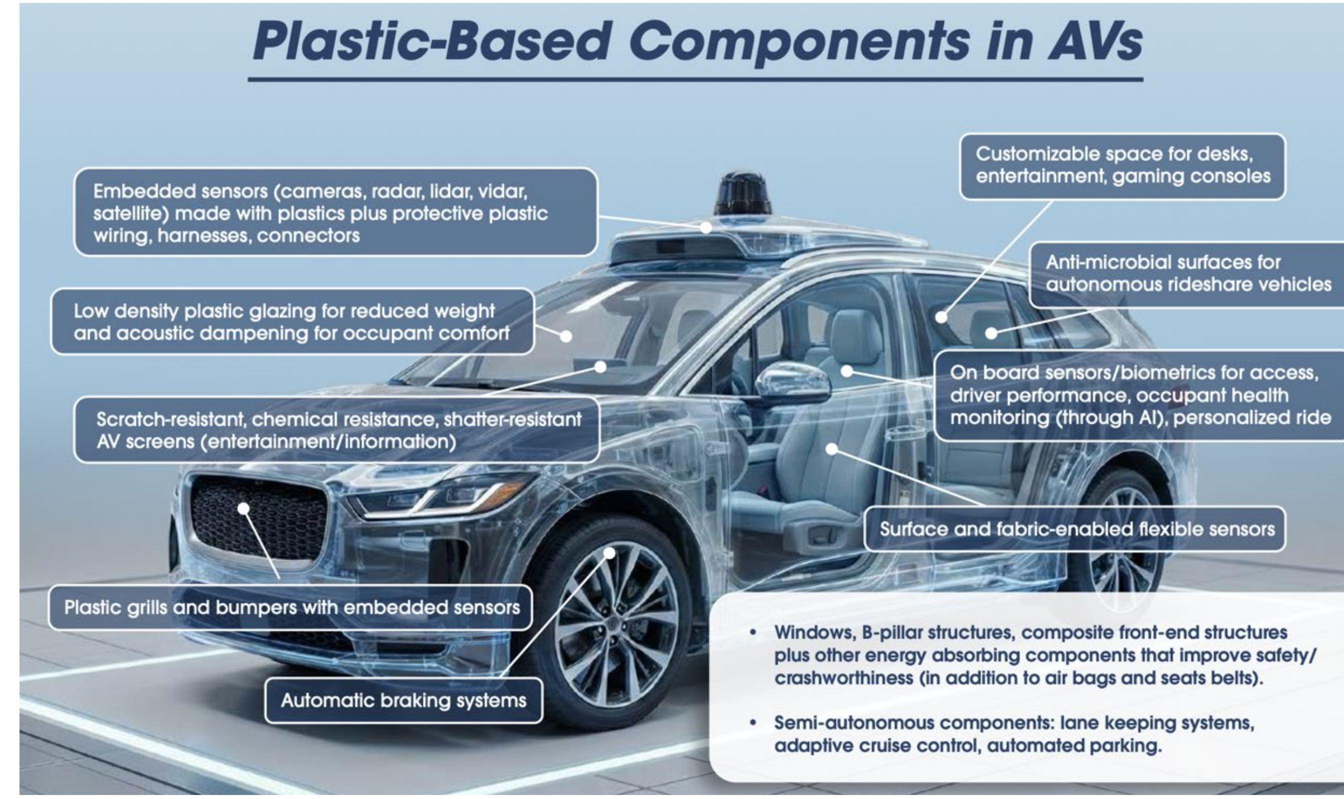
The automotive industry is undergoing a transformation driven by rapid technological advancements and evolving consumer expectations. As vehicles become more autonomous and more connected, chemistry plays an increasingly critical role—not only in how vehicles are built, but in how they function, interact, and adapt to future mobility needs. From advanced materials in structural components to digital integration, chemistry is enabling the next generation of automotive innovation.

Many features that were once exclusive to luxury automobiles—such as advanced driver assistance systems (ADAS), adaptive cruise control, in-vehicle infotainment (IVI), and keyless entry—are now standard in a growing number of vehicles. These technologies are made possible by semiconductors and electronic chemicals. Materials like polycarbonate and ABS are used in camera housings, while silicones protect electronics from heat, moisture, and corrosion.

Autonomous Vehicles

While fully autonomous vehicles have yet to become mainstream, many of today's vehicles include semi-autonomous features, such as lane-keeping systems and adaptive cruise control. These systems rely on a network of sensors, cameras, and processors—all of which depend on chemistry. Autonomous cars and trucks rely on an array of embedded sensors, including cameras, radars, and satellite receptors, all of which are made with plastics. For example, light detection and ranging (LIDAR), along with video detection and ranging (VIDAR) are critical as they help the car navigate and avoid collisions. Plastics also encapsulate and insulate these technologies from radio interference, humidity, dust, and temperature changes to keep them operating safely, which helps keep occupants – and pedestrians - safe.

Lightweight plastic and composites will enable more flexible vehicle interiors and help offset the extra weight of self-driving vehicle sensors, cameras, and transmitters. As technology in self-driving vehicles evolves, chemistry will continue to support innovations in connectivity, safety, and vehicle design.



Electric Vehicles and Infrastructure

Since the launch of the Toyota Prius in 1997, the market for hybrid and fully electric vehicles has grown exponentially. In 2024, over 3 million hybrid and electric vehicles were sold in the U.S., up from just 9,000 in 2000. As EVs and hybrids continue to gain market share, there will be an expanded need for many chemistries and plastics, including those that have only played a minor role in the manufacture of internal combustion engine (ICE) vehicles.

Chemistry is essential to EV performance—from electrolytes and separators in batteries to lightweight structural components that offset battery mass. EV batteries contain hundreds—or thousands—of individual battery cells and can account for 25% (or more) of an EV's weight compared to less than 2% of an ICE vehicle's weight. Plastics offer a high strength-to-weight ratio and corrosion resistance which are critical in the battery enclosures and other heat-sensitive components in electric and hybrid vehicles. Replacing metal components with plastics in EVs aids in weight reduction, reduces wear, provides design flexibility, and helps keep batteries safe during collisions. Carbon fiber, which is often blended with plastic resins such as PVC or epoxy to create carbon fiber reinforced polymers (CFRP), is five times stronger than steel but significantly lighter, making it a good material for structural components of EVs, such as chassis and body panels.

In addition to the chemistry and plastics used directly in electric and hybrid vehicles, chemistry is a key component of the associated infrastructure needed to keep electric vehicles (and plug-in hybrids) on the road. Components such as charger housings, display covers, connectors, and wiring rely on durable, weather-resistant plastics and polymers. Materials like polybutylene terephthalate are used for their electrical insulation and moisture resistance, while polycarbonate is favored for transparent, impact-resistant display panels.

Conclusion

The automotive industry's pursuit of lighter, safer, and more technologically advanced vehicles is increasingly enabled by innovations in chemistry. Over the past decade, both the weight and the value of chemistry in an average automobile have increased, reflecting not only changes in vehicle size and mix, but also the expanding use of high-value chemistries and plastics.

From plastics and polymer composites to synthetic rubber and electronic chemicals, chemistry is integral to the systems that define today's automobiles, including safety features, electronics, and powertrain technologies. Additionally, plastics and polymer composites play a critical role in lightweighting and performance enhancement: despite accounting for less than 10% of vehicle weight, plastics make up around 50% of a vehicle's volume.

Looking ahead, the increase in electric and autonomous vehicles, as well as the expanding use of advanced technologies in other vehicles, indicate the importance that chemistry will only grow.

Taken together, these trends illustrate how chemistry is not only essential to modern vehicles, but also a critical component of automotive performance, functionality, and value. As the automotive industry continues to evolve, the role of chemistry will expand accordingly, shaping the materials, technologies, and capabilities that define the vehicles of the future.

Data and Methodology

This report presents an analysis of the primary materials, particularly the products of chemistry, used in the manufacture of automobiles in North America (the United States, Canada, and Mexico). For the purposes of this analysis, the term "automobile" includes passenger automobiles and light-duty trucks. Since the size, components and features of automobiles vary significantly, this report presents estimated data based on an average automobile. This report includes revisions based on updated data.

Production volumes are based on data from United States Department of Transportation's National Transportation Statistics (NTS), the Canadian Vehicle Manufacturers' Association, and the National Institute of Statistics and Geography (INEGI) supplemented by data and information from the Alliance for Automotive Innovation, the International Organization of Motor Vehicle Manufacturers (OICA), and S&P Global.

Data on materials composition and weight were developed from a range of industry sources including ACC's Plastics Industry Producers Statistics Group, the Aluminum Association, the American Coatings Association, the American Iron and Steel Institute (AISI), Fortune Business Insights, Glass.com, the Association of the Nonwoven Fabrics Industry (INDA), the International Copper Association, the International Organization of Motor Vehicle Manufacturers (OICA), Kloeckner Metals Corporation, Lenntech Water Treatment, Markham Metals, S&P Global, the U.S. Department of Energy, the U.S. Geological Survey (USGS), and the U.S. Tire Manufacturer Association.

Data on the value of chemistry per vehicle were developed based on data and information from sources including ChemAnalyst, Federal Reserve Economic Data, FocusEconomics, NexantECA, S&P Global, the Semiconductor Industry Association (SIA), the U.S. Geological Survey (USGS), and the U.S. International Trade Commission (USITC), as well as various industry and trade publications.

The methodology used to develop weights and values for individual components varied based on the available data. In some instances, there was existing data (or range of data) on the weight and value of a given material in an average automobile. In other instances, data was only available for one aspect (weight or value) and then that data was used to develop the other data point, often using supplemental data. For some materials, only data for the given industry was available; in those instances, the industry level data was compared to the automotive industry data to develop a per-vehicle figure. The final data includes reasonable assumptions and estimates.

For many years, the American Chemistry Council (ACC) published an annual Chemistry and Light Vehicles report, built upon research on automotive high-tech materials initiated during the 1980s by Dr. TK Swift, who has since retired from ACC. The last Chemistry and Light Vehicles report was released in 2021. This report is not an update to the previously published reports; rather, it is a new analysis of the chemistry and other materials used in the manufacture of automobiles using updated data sources and methodology. As such, the tables and figures in this report are not comparable to data included in the Chemistry and Light Vehicles reports.

Considerable effort has been made in the preparation of this publication to provide the best available information. However, neither the ACC nor any of its employees, agents or other assigns makes any warranty, expressed or implied, or assumes any liability or responsibility for any use, or the results of such use, of any information or data disclosed in this material.

ACC's Economics & Data Analytics Department

The Economics & Data Analytics Department provides a full range of statistical and economic analysis and services for ACC and its members and other partners. The group works to improve ACC advocacy impact by providing statistics on the chemical industry as well as preparing information about the economic value and contributions of the chemical industry to the economy and society.

The lead author of this report was Heather Rose-Glowacki, Senior Director, Industry Intelligence & Analysis.

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