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How Advanced Vehicle Scoring Models Are Transforming Commercial Auto Insurance Pricing

As commercial auto losses continue to challenge insurers, actuaries are leveraging massive datasets and sophisticated scoring systems to bring unprecedented precision to vehicle risk assessment and pricing.

By: Pinnacle Actuarial Resources Inc. | September 2025

The commercial auto insurance market has faced persistent challenges in recent years, with rising claim costs and evolving vehicle technology creating pricing uncertainty. According to industry data, commercial auto combined ratios have exceeded 100 percent for multiple consecutive years, highlighting the need for more sophisticated risk assessment tools. Now, actuaries are evolving advanced vehicle scoring models that analyze hundreds of data points to help insurers better understand and price the specific risks associated with individual vehicles.

"The vehicle symbol is a summary variable that tells you about the vehicle characteristics. It represents what we know about a car based solely on how it's built," said Gary Wang, Senior Consulting Actuary at Pinnacle Actuarial Resources. "It indicates how risky this car is when it's out on the road."

"VBS stands for vehicle build score, which can be thought of as a model for vehicle characteristics," Wang explained. "This tool's greatest values are completeness and accuracy. It allows insurers to better understand the specific characteristics of the vehicles they are insuring."

The Vehicle Build Score (VBS) was developed collaboratively by Pinnacle and vehicle data company CARFAX. The VBS represents an ongoing evolution in how insurers assess vehicle risk. Unlike traditional rating methods that rely on broad vehicle categories, this scoring system creates a comprehensive risk profile for each specific vehicle configuration.

The scoring methodology evaluates vehicles across multiple dimensions, starting with fundamental

Gary Wang, Senior Consulting Actuary, Pinnacle Actuarial Resources

characteristics and extending to advanced safety features. "It's really everything you can measure and know about a car. It starts with the most basic: what kind of car body style — is it a sedan, a van, a truck — to how heavy and how big it is," Wang said. "Once you have that foundation, then it's about the performance characteristics. The VBS also evaluates various warning and alert systems and other safety features that exist on the vehicle that help make it safer to drive."

The system assigns numeric scores that function similarly to academic grades, providing insurers with an intuitive way to understand relative risk levels. "Some vehicles may perform better in one category than another, but vehicles at similar overall risk levels would receive comparable scores," Wang noted. "A vehicle that scores very well — equivalent to an 'A' grade — would be classified as low risk, while one that's struggling — equivalent to a 'C' or 'D' — would be considered higher risk."

Harnessing Unprecedented Data Volume for Precision Pricing

There has been a notable, perhaps revolutionary, transformation in available vehicle data. Actuaries now have access to billions of records and hundreds of variables that provide granular insights into vehicle performance and risk characteristics.

"The VBS tool leverages Pinnacle's extensive actuarial and analytics experience and carefully curated data from CARFAX. We work with over 400 raw variables that CARFAX gathers and aggregates," Wang said. "We further engineer these variables using our institutional understanding of cars."

This data engineering process creates composite variables that capture complex risk factors. For instance, to assess a vehicle's handling capabilities, actuaries combine multiple data points about turning radius, cornering ability, and stability controls. "The result is a dataset comprising the original 400+ variables plus additional engineered variables that are combinations of the raw data points," Wang explained.

The VBS utilizes an automobile's full 17-digit vehicle identification number (VIN) data, helping bring unprecedented specificity to risk assessment. "What's new about this feature is that by using the 17-digit VIN and the data we can capture on the window sticker in the build sheet associated with a specific vehicle, we are building a sharper resolution of what we know about the car," Wang said.

Connected vehicles are creating even more opportunities for data-driven insights. "Connected vehicles are definitely creating more data than we've ever seen before," Wang noted. "This presents interesting opportunities for actuaries and the insurance industry to evolve our analytical approaches."

The practical application of this data extends to evaluating specific safety technologies that have proliferated

in recent years. “If you think about cars just ten years ago versus today, the number of warnings and assistance systems is impressive,” Wang said. These are features like adaptive cruise control, forward collision warning, and lane keeping assist that all contribute to the overall risk profile of a vehicle.

Driving Safer Roads and More Sustainable Insurance Markets

The impact of advanced vehicle scoring tools, like the VBS, extends beyond pricing accuracy to potentially reduce overall auto risk and control insurance costs. By precisely identifying and pricing risk factors, insurers can create incentives for safer vehicle choices and technologies.

The scoring system also helps underwriters make more informed decisions by quantifying what they intuitively understand about vehicles. “What we do with symbols and scores is really try to quantify what underwriters likely intuitively know already,” Wang explained. “We’re helping them get a better picture.”

This enhanced understanding is particularly important for commercial auto insurance, where the stakes and potential losses are higher. “Optimistically, I believe the commercial auto market will improve,” Wang said. “As vehicles evolve, engineers are building them with safety as a priority, which indirectly benefits insurers through fewer accidents and reduced losses.”

The technology’s rapid evolution presents both opportunities and challenges. Modern vehicles can now receive over-the-air updates that enhance safety features without any action from the owner. “Manufacturers can now push software improvements directly to vehicles, enhancing safety features and warning systems remotely,” Wang noted. “You could go to bed and wake up to a safer vehicle than you had the day before.”

Pinnacle Actuarial Resources has been at the forefront of developing these sophisticated scoring models for approximately a decade. The company’s approach combines deep actuarial expertise with cutting-edge data analysis to help insurers navigate the complexities of modern vehicle risk assessment. “The key lies in understanding the differences between trucks and cars used for commercial purposes,” Wang said. “The more information we gather about commercial vehicles on the road, their performance, and the resulting losses from drivers using these vehicles, the better our understanding becomes.”

Looking ahead, the continued evolution of vehicle technology and data availability promises even more refined risk assessment capabilities. As insurers gain access to real-time vehicle performance data and safety system effectiveness metrics, pricing models will become increasingly precise and responsive to actual risk factors.

“The Vehicle Build Score will not become a number that’s applied and forgotten,” Wang said. “Instead, it should generate meaningful dialogue between underwriters and actuaries about specific vehicle safety and risk characteristics. These discussions can further refine underwriters’ expertise as they evaluate vehicles in the field.”

Gary Wang will be co-hosting a webinar discussing the details of the Vehicle Build Score on December 4, 2025, at 2 p.m. (Eastern). You can register here.

To learn more, visit https://www.pinnacleactuaries.com/.

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