

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MARYLAND**

**PAICE LLC and THE ABELL FOUNDATION,
INC.,**

Plaintiffs,

v.

**BAYERISCHE MOTOREN WERKE, A.G.
BMW OF NORTH AMERICA, LLC**

Defendants.

C.A. No. _____

JURY TRIAL DEMANDED

COMPLAINT

1. Plaintiffs Paice LLC (“Paice”) and The Abell Foundation, Inc. (“Abell”) (collectively referred to as the “Plaintiffs”) by and through their attorneys bring this Complaint for patent infringement and demand for jury trial against Defendants Bayerische Motoren Werke AG and BMW of North America, LLC (collectively, “BMW”) and allege as follows:

OVERVIEW

2. This is an action by Paice (Power Assisted Internal Combustion Engine), a small Maryland-based company that invented groundbreaking hybrid vehicle technology, and Abell, a Baltimore-based charitable organization dedicated to fighting urban poverty and finding solutions to intractable problems confronting Maryland residents. Consistent with its mission, Abell has invested millions of dollars to support Paice's efforts to develop and promote its innovative hybrid electric technology that improves fuel efficiency and lowers emissions, while maintaining superior driving performance. Paice and Abell are co-owners of multiple foundational patents related to hybrid technology. Paice’s technology has now been licensed by many major automakers, including Toyota, Ford, Hyundai, Kia, Honda, and others.

3. In the face of universal industry recognition for Paice's patents, BMW has continued to sell hybrid vehicles throughout the United States without compensating Paice and Abell for the very foundational hybrid technology that is critical to the success of so many hybrid vehicles on the road today, including BMW's. And BMW is well aware that it is trampling on the rights of Paice and Abell who are no strangers to BMW. Long ago when BMW was entrenched manufacturing environmentally harmful diesel-based vehicles along with its German counterparts, Paice demonstrated to BMW that Paice's technology made it possible to build a commercially viable hybrid vehicle that would be fuel-efficient, cost-effective, and produce low-emissions without sacrificing driving performance.

4. Since the early 2000's, Paice taught BMW its patented technology through numerous interactions, including in-person discussions and sharing of technical materials, with BMW's senior management and engineers. Like many other large auto manufacturers who have now taken a license to Paice's patents, BMW eventually dismissed Paice after learning what it could about Paice's technology. And despite its misguided focus on diesel, BMW, like all other auto manufacturers, eventually began selling hybrid vehicles in order to complete globally and satisfy U.S. environmental regulations. But unlike its competitors, BMW has refused to compensate Paice and Abell for Paice's patented technology. To this day, BMW continues to knowingly infringe Paice's patents by selling hybrid vehicles without a license. As more and more automakers have licensed Paice's patents over the last decade, BMW now finds itself as one of the last few holdouts, continuing to sell hybrid vehicles that violate Paice's patent rights. BMW has deliberately ignored Paice's and Abell's requests to negotiate a license in good faith. All the while, BMW has closely monitored Paice and its patents. Given BMW's refusal to

license in good faith, Paice and Abell are forced to bring this action against BMW to hold it accountable for its knowing and ongoing infringement of Paice's patents.

NATURE OF THE ACTION

5. This action for patent infringement arises under the laws of the United States, Title 35 of the United States Code, 35 U.S.C. § 1 et seq.

THE PARTIES

6. Paice LLC is a Delaware limited liability company with its principal place of business at 111 South Calvert Street, Suite 2310, Baltimore, Maryland. Originally established in 1992 by Paice inventor, Dr. Alex J. Severinsky, Paice develops and promotes innovative hybrid electric vehicle technology that improves fuel efficiency and lowers emissions, while maintaining superior driving performance. That same year, Paice was accepted into the University of Maryland's incubator program, which was created to foster growth of promising start-up companies in the Maryland community.

7. The Abell Foundation, Inc. is a Maryland corporation located at 111 South Calvert Street, Suite 2300, Baltimore, Maryland. Abell is a non-profit charitable organization dedicated to fighting urban poverty and finding solutions to intractable problems confronting Maryland residents. Over the past 60 years, Abell has contributed more than \$300 million to support worthwhile causes across Maryland. It focuses on caring for the underserved and underprivileged through education, healthcare, and human services initiatives. In addition, Abell is dedicated to promoting national social objectives, such as increasing energy efficiency and producing alternative energy, and invests in companies with innovative technologies in these areas. Abell also invests in promising local companies—including those focused on environmental issues—with the goal of creating jobs and reinvesting any earnings back into the

communities it serves. In 1998, Abell was introduced to Paice through former U.S. Senator Joseph Tydings and the University of Maryland's Technology Advancement Program. The University of Maryland's Technology Advancement Program was modeled after highly successful programs at Stanford University, Harvard University, MIT, Caltech and other highly regarded institutions of higher learning.

8. On information and belief, Bayerische Motoren Werke AG is a German company with a principal place of business at Petuelring 130 D-80788, Munich, Germany.

9. On information and belief, BMW of North America, LLC is a limited liability company organized and existing under the laws of the State of Delaware with a principal place of business located at 300 Chestnut Ridge Road, Woodcliff Lake, New Jersey, 07677. Defendant BMW of North America, LLC can be served with process through its registered agent, The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801.

JURISDICTION AND VENUE

10. This is a civil action for patent infringement arising under the Patent Laws of the United States, Title 35 of the United States Code. Subject matter jurisdiction over the asserted causes of actions before this Court is, therefore, proper and founded upon 28 U.S.C. §§ 1331 and 1338.

11. This Court has personal jurisdiction over BMW because, among other things, BMW has infringed and caused infringement of Plaintiffs' patents in Maryland and within this judicial district through a nationwide channel of distribution in the United States. Moreover, upon information and belief, BMW has purposefully and voluntarily placed infringing devices in the stream of commerce with the knowledge and expectation that the same will end up in, and be

marketed, sold, and purchased in, Maryland and within this judicial district. For example, upon information and belief, BMW has entered into a business relationship with its dealers whereby BMW manufactures infringing devices for its dealers to sell these infringing devices throughout the United States, including in Maryland. Moreover, BMW of North America, LLC maintains a Vehicle Distribution Center at the Port of Baltimore, which is an established place of business in this judicial district.

12. Venue is proper in this Court under 28 U.S.C. §§ 1391(b), 1391(c), and 1400(b). Venue is proper in this judicial district for BMW of North America, LLC pursuant to 28 U.S.C. § 1400(b) because it has committed acts of infringement in this judicial district as set forth above. In addition, BMW of North America, LLC has a regular and established place of business in this judicial district. For example, on information and belief, BMW has a Vehicle Distribution Center at 2700 Broening Highway Baltimore, MD 21222, which is a regular and established place of business in this judicial district.¹ For example, on information and belief, the Vehicle Distribution Center is a place of business because BMW of North America uses it for, among other things, customer service and sales support. *See id.* And on information and belief, BMW of North America owns, leases, or otherwise exercises possession or control of the Vehicle Distribution Center.²

13. Venue is also proper in this judicial district for Bayerische Motoren Werke AG pursuant to 28 U.S.C. § 1391(c)(3) because it is not a resident in the United States, and therefore may be sued in any judicial district.

¹ *See, e.g.*, Exhibit D, BMW Opens its Newest Vehicle Distribution Center at the Port of Baltimore.

² *See id.*

PATENTS IN SUIT

14. Paice and Abell are co-owners by assignment of all right, title, and interest in and to United States Patent No. 7,104,347 (“the ’347 patent”). The ’347 patent is entitled “Hybrid Vehicles” and lists Alex J. Severinsky and Theodore Louckes as inventors. The U.S. Patent Office issued the ’347 patent on September 12, 2006. A true and correct copy of the ’347 patent is attached hereto as Exhibit A.

15. Paice and Abell are co-owners by assignment of all right, title, and interest in and to United States Patent No. 7,237,634 (“the ’634 patent”). The ’634 patent is entitled “Hybrid Vehicles” and lists Alex J. Severinsky and Theodore Louckes as inventors. The U.S. Patent Office issued the ’634 patent on July 3, 2007. A true and correct copy of the ’634 patent is attached hereto as Exhibit B.

16. Paice and Abell are co-owners by assignment of all right, title, and interest in and to United States Patent No. 8,630,761 (“the ’761 patent”). The ’761 patent is entitled “Hybrid Vehicles” and lists Alex J. Severinsky and Theodore Louckes as inventors. The U.S. Patent Office issued the ’761 patent on January 14, 2014. A true and correct copy of the ’761 patent is attached hereto as Exhibit C.

17. The ’347, ’634, and ’761 patents are referred to collectively as the “Paice patents.”

PAICE BACKGROUND

18. Paice is the creation of inventor Dr. Alex Severinsky, a well-respected and award-winning electrical engineer. Dr. Severinsky received a Ph.D. in electrical engineering in 1975 and left the Soviet Union for the United States in 1978, shortly before America struggled through the second oil embargo. Having escaped standing in long lines to buy food in the Soviet Union, Dr. Severinsky marveled that people in the U.S. were lining up for gasoline. He soon began looking for ways to reduce America’s dependence on foreign oil. He studied a range of methods

of vehicle propulsion and concluded that a powertrain utilizing both internal combustion engine and electric motor power had the greatest potential for reducing fuel consumption without sacrificing vehicle performance.

19. In 1992, Dr. Severinsky formed Paice (Power Assisted Internal Combustion Engine), and as a result of its inventive endeavors, Paice holds a number of foundational patents related to hybrid vehicles. Paice has been awarded a total of 30 U.S. and foreign patents. Paice's first patent, U.S. Patent No. 5,343,970 ("the '970 patent"), was issued in 1994, based on a filing date in 1992. The Asserted Patents are all in the family of patents related to U.S. Patent No. 6,209,672 ("the '672 patent"), which contains over a dozen U.S. patents stemming from applications originally filed in 1998. They are directed to hybrid vehicle technologies including hybrid topologies and methods of control to optimize vehicle performance, fuel economy, and emissions efficiency.

20. In October 1999, Paice successfully demonstrated the benefits of its patented technology at Roush Industries, a U.S. engineering firm. Dynamometer testing of a Paice hybrid powertrain prototype showed that Paice's technology resulted in an improvement of 20 miles per gallon (MPG) over a vehicle using a conventional gasoline engine. In fact, Paice's prototype achieved a mileage that was 16.5 MPG greater than existing fuel economy standards (CAFE). Paice's prototype achieved this improvement in fuel economy without sacrificing vehicle performance and while significantly reducing harmful emissions. Further, the levels of regulated emissions produced by Paice's prototype, such as nitrogen oxides (NO_x), hydrocarbons (HC), and carbon monoxide (CO), were so low that Paice had to acquire the most sensitive testing equipment available to detect the emissions. Paice's technology achieved regulated emissions levels 95 percent below existing standards.

PAICE'S WORK WITH LEADING AUTOMAKERS & INDUSTRY RECOGNITION

21. Between 1999 and 2004, Paice worked with and/or provided information to Ford, GM, VW, BMW, DaimlerChrysler and other major automakers, and their suppliers to introduce the emissions and fuel economy advantages of using Paice's patented technology and to persuade them to license it. During this period, Paice presented its hybrid vehicle teachings at conferences where it appeared on panels with Toyota and Ford, and authored technical papers published by the Society of Automotive Engineers (SAE). In addition, Paice twice testified at Congressional hearings alongside major auto companies in 2001 and 2002 regarding the reform of the CAFE standards.

22. The immense potential of Paice's technology has been recognized by some of the most prominent automotive engineers and engineering societies. Among the first was Robert Templin, a U.S. auto industry icon famous for his work as chief engineer of Cadillac and technical director of General Motors Research Laboratory. Mr. Templin devoted the remainder of his life to Paice by serving as a member of the Paice Board of Directors for more than 15 years until his death in 2009. Additionally, Dr. Severinsky was assisted in inventing the Asserted Patents by the late Theodore Louckes, an automotive engineer who spent 40 years at General Motors and was Chief Engineer of Oldsmobile. Mr. Louckes served as Paice's Chief Operating Officer from 1998 through 2005. Dr. Severinsky was also awarded the prestigious Thomas A. Edison Patent Award from the American Society of Mechanical Engineers in 2009, and inducted into the University of Maryland Clark School of Engineering's Innovation Hall of Fame in 2008 for his pioneering work in developing hybrid technology.

23. Moreover, Paice's hybrid patents have been recognized as the most important in the automotive industry. Griffith Hack, an Australian law firm specializing in intellectual

property, conducted an independent analysis of 58,000 hybrid vehicle technology patents in 2009-2010 and identified the most dominant hybrid vehicle patents in the world. Acknowledging Paice's cutting-edge work, the Griffith Hack study concluded that Paice owns four of the world's ten most dominant hybrid vehicle patents—more than Toyota, Ford, and Honda combined. Paice's '672 Patent (from which all of the Asserted Patents claim priority) was ranked #1, and three other Paice patents were ranked #2, #4 and #7. Before it was brought to Paice's attention by a media report, the Paice team had no knowledge of Griffith Hack, nor its patent ranking system.

PAICE FORCED INTO LITIGATION

24. Paice's technology has now been licensed by many major automakers, including Toyota, Ford, Hyundai, Kia, Honda, and other licensees.³ Paice's licensees include some of the world's largest automakers and together account for the majority of all hybrid vehicle sales in the U.S. Many of these companies spent years corresponding with Paice, scrutinizing Paice's patents, presenting on technical panels with Paice, or working closely with Paice's engineers to learn all they could about Paice's technology. Paice, a small company with limited resources, was forced to enter into successive litigation campaigns against most of them. Others, such as Honda, have agreed to license Paice's technology without litigation.⁴

THE PAICE AND BMW RELATIONSHIP

25. BMW is well acquainted with Paice and its patents. Paice and BMW began their relationship in the early 2000s, with Paice engineers working to demonstrate their technology to BMW. At the time, BMW readily expressed interest in Paice's technology because BMW was still pushing its diesel technology and was years behind other leading automakers that were

³ See <http://www.paicehybrid.com/licensing-agreements/>.

⁴ *Id.*

actively pursuing hybrids. Paice diligently interfaced with BMW, sending the company at its request, information on its technology, patents and cost advantages. BMW expressed interest from both its North American and German headquarters. BMW's interest in Paice peaked in 2004. At that time, Paice had been providing rounds and rounds of detailed computer modeling and design specifications for BMW's fellow German automakers, VW and Daimler. Not wanting to be left behind, Hans Glonner, head of BMW's hybrid technology, requested that Paice provide BMW with all of Paice's detailed technical information.

26. Upon information and belief, BMW also sought access to Paice's technology in quieter ways. For example, BMW began working with a European agent of Paice's, culminating in BMW acquiring that agent's patents. Those patents were chock full of material learned by the agent from Paice; unsurprisingly, those patents came later than Paice's patents. Yet, despite these maneuvers to learn Paice's technology, BMW chose not to pursue a business relationship with Paice, choosing instead a different, more costly path—a path that would lead them back to Paice.

27. As the decade progressed, BMW's need for Paice's technology continued to increase. BMW like its German compatriots continued to pursue diesel engines, which use less fuel than traditional gasoline engines but produce more harmful NOx emissions. But as gas prices began to rise in the 2000s and environmental regulations intensified, BMW saw the writing on the wall. BMW's competitors started releasing hybrid vehicles that offered superior fuel efficiency without sacrificing vehicle performance just like Paice's patented technology demonstrated years earlier. Late to the hybrid game, BMW joined a Two Mode hybrid alliance with DaimlerChrysler and General Motors in 2005. Paice had numerous meetings with General Motors and DaimlerChrysler in the early 2000s including providing DaimlerChrysler its

computer modeling and control algorithms. This two-mode alliance quickly dissolved in 2009, with the automakers noting that the two-mode system was too expensive and had no future.⁵ The following year, BMW released its only vehicle with this costly system, the BMW X6 SUV, and shortly pulled it from the market. But within the next few years, BMW began employing Paice's critical teachings, adding hybrid and plug-in hybrid models to its vehicle line-up with notable success.

28. While BMW has continued selling its hybrid vehicles without regard for Paice's and Abell's patent rights, BMW has never forgotten Paice. Upon information and belief, BMW has closely monitored Paice's website, which identifies Paice's patents, licensees, and ongoing litigations. Moreover, several of Paice patents (including US, foreign, and patent publications) are listed on the face of various patents filed by BMW. Upon information and belief, BMW has also been aware of Paice and its patents via Paice's highly publicized litigation against companies like Toyota, Hyundai, and others. For example, Paice obtained jury verdicts for patent infringement against Toyota in 2005 and Hyundai and Kia in 2014. In the latter case, Paice asserted, among other patents, the '347 and '634 patents, and the jury found all claims were valid and infringed. The jury awarded Paice damages amounting to \$200 a car.

29. BMW has also deliberately ignored Paice's and Abell's requests to negotiate a license in good faith. On February 6, 2019, Paice and Abell contacted BMW's General Counsel, Dr. Jürgen Reul, inviting BMW to discuss licensing Paice's patents. In that communication, Paice indicated that BMW's hybrid vehicles (*e.g.*, the 330e iPerformance, 530e iPerformance, 740e xDrive iPerformance, i8 Roadster Plug-in, ActiveHybrid 3, ActiveHybrid 5, ActiveHybrid

⁵ Krust, Matthew. "BMW, Daimler, GM hybrid alliance nears end." *Automotive News Europe*. July 14, 2009.

7, and Mini Countryman Plug-in hybrid) infringe, among other patents, at least one claim from U.S. Patent Nos. 7,104,347, 7,237,634, and 8,630,761. Paice and Abell received no response.

30. On July 11, 2019, Paice and Abell again contacted Dr. Reul in an attempt to agree to a patent license without litigation. Again, Paice and Abell received no response.

COUNT I

Infringement of U.S. Patent No. 7,104,347

31. Plaintiffs reallege and incorporate herein by reference the allegations in paragraphs 2-30 above. As described below, BMW has infringed and continues to infringe the '347 patent. BMW has infringed and continues to infringe, for example, at least claim 24 of the '347 patent under 35 U.S.C. § 271(a), by making, using, offering for sale or selling within the United States, or importing into the United States hybrid vehicles (including any cars, sport utility vehicles, or light duty trucks) such as the 330e iPerformance, 530e iPerformance, 740e xDrive iPerformance, i8 Roadster Plug-in, ActiveHybrid 3, ActiveHybrid 5, ActiveHybrid 7, and Mini Countryman Plug-in (collectively, the "'347 Accused Products") that infringe the '347 patent either literally or under the doctrine of equivalents.

32. Among the claims of the '347 patent, claim 24 (dependent on claim 23) recites as follows:

23. A method of control of a hybrid vehicle,

said vehicle comprising an internal combustion engine capable of efficiently producing

torque at loads between a lower level SP and a maximum torque output MTO,

a battery, and one or more electric motors being capable of providing output torque

responsive to supplied current, and of generating electrical current responsive to applied

torque,

said engine being controllably connected to wheels of said vehicle for applying propulsive torque thereto and to said at least one motor for applying torque thereto, said method comprising the steps of:

determining the instantaneous torque RL required to propel said vehicle responsive to an operator command;

monitoring the state of charge of said battery; employing said at least one electric motor to propel said vehicle when the torque RL required to do so is less than said lower level SP;

employing said engine to propel said vehicle when the torque RL required to do so is between said lower level SP and MTO;

employing both said at least one electric motor and said engine to propel said vehicle when the torque RL required to do so is more than MTO;

and employing said engine to propel said vehicle when the torque RL required to do so is less than said lower level SP and using the torque between RL and SP to drive said at least one electric motor to charge said battery when the state of charge of said battery indicates the desirability of doing so;

and wherein the torque produced by said engine when operated at said setpoint (SP) is substantially less than the maximum torque output (MTO) of said engine.

24. The method of claim 23, comprising

the further step of employing said controller to monitor patterns of vehicle operation over time and vary said setpoint SP accordingly.

33. For example, and without limitation, one or more of the '347 Accused Products meets the limitations of claim 24 (and independent claim 23 from which it depends) of the '347 patent. For example, on information and belief, the '347 Accused Products comprise an internal

combustion engine capable of efficiently producing torque at loads between a lower level SP and a maximum torque output MTO, a battery, and one or more electric motors being capable of providing output torque responsive to supplied current, and of generating electrical current responsive to applied torque, said engine being controllably connected to wheels of said vehicle for applying propulsive torque thereto and to said at least one motor for applying torque thereto. For example, the '347 Accused Products have both a "combustion engine" and "synchronous electric motor" connected to the road wheels and a "lithium-ion high-voltage battery."⁶ Upon information and belief, the "combustion engine runs efficiently" between a setpoint and the maximum torque output (MTO) of the engine and provides torque to the road wheels (for propelling the vehicle "under greater acceleration and at higher speeds").⁷ The combustion engine also provides torque to the synchronous electric motor (for charging the lithium ion high-voltage battery, for example, in "SAVE BATTERY mode").⁸ The synchronous electric motor provides output torque in response to supplied current in "electric mode" and generates electric current in response to supplied torque in "SAVE BATTERY mode."⁹

⁶ Exhibit E, BMW eDrive Technology. Setting a new benchmark for efficiency.

⁷ *Id.*

⁸ *Id.*

⁹ *Id.*

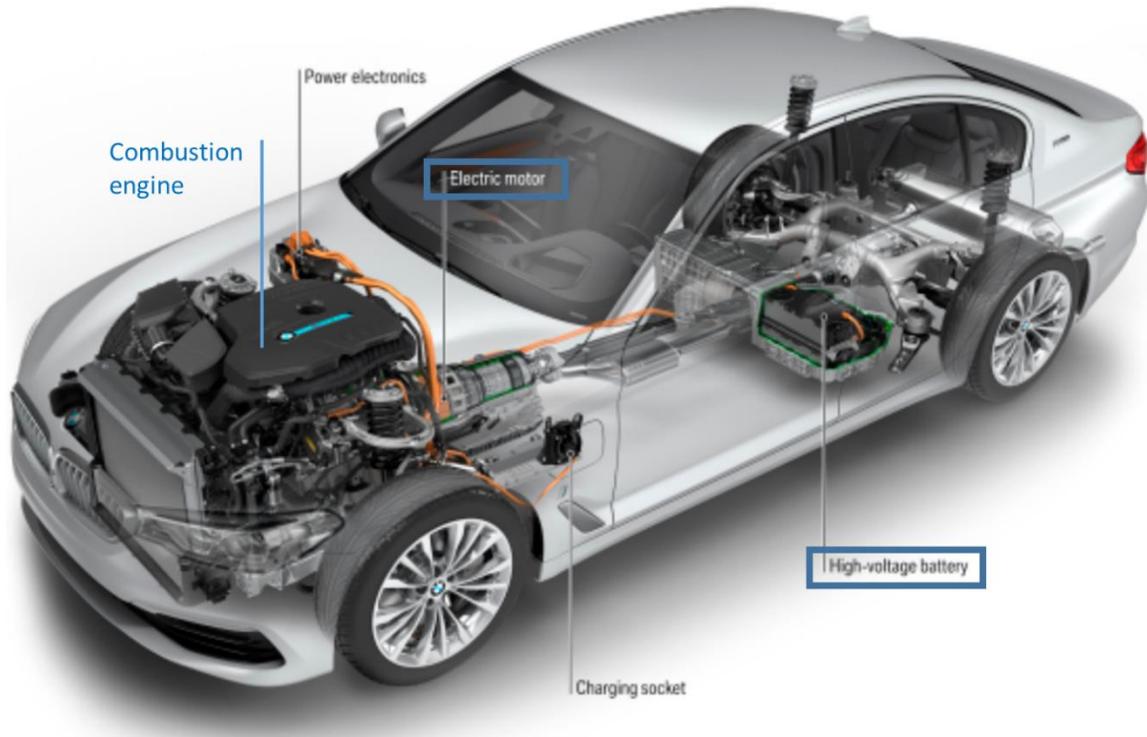


Exhibit I, BMW to introduce BMW 530e iPerformance plug-in hybrid at Detroit show (annotations shown in blue).

34. On information and belief, the '347 Accused Products also determine the instantaneous road load (RL) required to propel the hybrid vehicle responsive to an operator command and monitor the state of charge of said battery. For example and on information and belief, the '347 Accused Products employ “intelligent energy management ensur[ing] the combustion engine and electric motor work together to maximum effect in all driving situations,” which is based on, among other things, road load and the state of charge of the battery.¹⁰ On information and belief, the '347 Accused Products also operate at least one electric motor to propel the hybrid vehicle when the RL required to do so is less than a lower level setpoint (SP). For example and on information and belief, the '347 Accused Products have a synchronous

¹⁰ *Id.*

electric motor for propelling the vehicle and employ only the electric motor in an “electric mode under low and moderate speeds,” which on information and belief takes place when road load is less than a lower level setpoint.¹¹ On information and belief, the ’347 Accused Products also operate an internal combustion engine of the hybrid vehicle to propel the hybrid vehicle when the RL required to do so is between the lower level SP and a maximum torque output (MTO). For example and on information and belief, the ’347 Accused Products have a combustion engine and employ the combustion engine “[u]nder greater acceleration and at higher speeds,” which on information and belief takes place when road load is between the lower level setpoint and MTO.¹² On information and belief, the ’347 Accused Products also operate both the at least one electric motor and the engine to propel the hybrid vehicle when the torque RL required to do so is more than the MTO. For example and on information and belief, the ’347 Accused Products employ the synchronous electric motor and combustion engine to employ a “boost function” that “maximize[s] the car’s dynamic performance” when, on information and belief, road load is more than MTO.¹³ On information and belief, the ’347 Accused Products also employ said engine to propel said vehicle when the torque RL required to do so is less than said lower level SP and use the torque between RL and SP to drive said at least one electric motor to charge said battery when the state of charge of said battery indicates the desirability of doing so; and wherein the torque produced by said engine when operated at said setpoint (SP) is substantially less than the maximum torque output (MTO) of said engine. For example and on information and belief, in “BATTERY SAVE mode,” the ’347 Accused Products employ the combustion engine even when the road load is below the setpoint such that the engine propels the

¹¹ *Id.*

¹² *Id.*

¹³ *Id.*

vehicle and the torque between the road load and the setpoint substantially less than MTO is used to charge the battery using the synchronous electric motor.

35. On information and belief, the '347 Accused Products also monitor patterns of vehicle operation over time and vary the SP accordingly. For example and on information and belief, the '347 Accused Products employ “Proactive Driving Assistant” and “ADAPTIVE” modes of operation to “manage the response of the two drive units” by, among other things, collecting and analyzing historical information regarding vehicle operation to monitor patterns of vehicle operation over time to vary the setpoint.¹⁴

36. As another example, BMW has infringed and continues to infringe claim 38 of the '347 patent under 35 U.S.C. § 271(a), by making, using, offering for sale or selling within the United States, or importing into the United States at least one of the '347 Accused Products that infringe the '347 patent either literally or under the doctrine of equivalents.

37. For example, claim 38 (also dependent on claim 23) recites as follows:
The method of claim 23, wherein a clutch connects a first output shaft of or driven by said engine and/or first motor with a second output shaft of or driven by said second motor connected to said wheels, and wherein the speeds of said engine and/or first motor and of said second motor are controlled such that when said clutch is engaged the speeds of the first and second output shafts are substantially equal, whereby said shafts may be connected by a non-slipping clutch.

38. For example, and without limitation, one or more of the '347 Accused Products meets the limitations of claim 38 (and independent claim 23 from which it depends as set forth above) of the '347 patent. On information and belief, at least one of the '347 Accused Products include a clutch that connects a first output shaft of or driven by said engine and/or first motor

¹⁴ Exhibit F, The all-new BMW 330e iPerformance; Exhibit G, 2017 BMW 740e xDrive iPerformance Press Kit.

with a second output shaft of or driven by said second motor connected to said wheels. For example and on information and belief, at least one of the '347 Accused Products has an 8-speed automatic transmission from ZF¹⁵ with an engine disconnect clutch (K0) that sits between the combustion engine and synchronous electric motor and connects an output shaft of the internal combustion engine and an output shaft of the synchronous electric motor.¹⁶

39. On information and belief, at least one of the '347 Accused Products controls the speeds of said engine and/or first motor and of said second motor such that when said clutch is engaged the speeds of the first and second output shafts are substantially equal, whereby said shafts may be connected by a non-slipping clutch. For example and on information and belief, at least one of the '347 Accused Vehicles includes a controller that controls the speeds of the combustion engine and the synchronous electric motor such that their speeds are substantially equal when the disconnect clutch (K0) is engaged, for example, when the combustion engine is connected to the driveline by way of the disconnect clutch (K0).¹⁷ On information and belief the controller controls the speeds of the combustion engine and the synchronous electric motor to be substantially equal such that the shafts may be connected by a non-slipping clutch.¹⁸

40. In view of the facts alleged above, BMW has knowledge of the asserted patents, including the '347 patent, and its products' infringement. At the very least, BMW received notice of infringement of the '347 patent by virtue of Plaintiffs' filing a complaint in this case.

41. BMW has actively induced and continues to induce the infringement by others, including its customers, of the '347 patent under 35 U.S.C. § 271(b) by, among other things,

¹⁵ See Exhibit H, BMW's iPerformance plug-in hybrid electric vehicle (PHEV) powertrain architecture.

¹⁶ See *id.*; ZF 8HP automatic transmission for passenger cars, available at <https://www.youtube.com/watch?v=MAynBpfrSv8>.

¹⁷ *Id.*

¹⁸ *Id.*

manufacturing, selling, offering for sale within the United States and/or importing into the United States the '347 Accused Products and providing materials and instructions for operation of the same, with the specific intent and knowledge that the hybrid vehicles, materials and instructions direct, teach, or assist others to infringe the '347 patent by using or operating the hybrid vehicles in a manner that directly infringes the '347 patent. For example, BMW provides materials as well as user manuals that tout the hybrid vehicle technology and instructions on how to operate BMW hybrid vehicles. BMW's customers directly infringe the '347 patent by using (*e.g.*, driving) the '347 Accused Products.

42. BMW has contributed and continues to contribute to the infringement by others, including its customers, of the '347 patent under 35 U.S.C. § 271(c) by, among other things, manufacturing, selling, offering for sale within the United States and/or importing into the United the '347 Accused Products for use in practicing the patented inventions of the '347 patent, knowing that the hybrid vehicles and components are especially made or adapted for use in infringement of the '347 patent, embody a material part of the inventions claimed in the '347 patent, and are not staple articles of commerce suitable for substantial non-infringing use. BMW's customers directly infringe the '347 patent by using (*e.g.*, driving) the '347 Accused Products.

43. As a result of BMW's past and continued unlawful infringement of the '347 patent, Plaintiffs have suffered and will continue to suffer damage. Plaintiffs are entitled to recover damages adequate to compensate for that infringement in an amount that will be ascertained at trial, but in no event less than a reasonable royalty.

44. On information and belief, BMW's acts of infringement have been willful and are made with knowledge of Plaintiffs' rights in the '347 patent. As stated and alleged above, Paice

disclosed to BMW its patented technology as early as 2000 vis-à-vis in-person discussions and technological information. Paice and Abell have more recently contacted BMW in an attempt to engage in good faith licensing negotiations concerning BMW's infringement of the '347 patent. BMW did not respond to Paice and Abell and has continued to infringe the '347 patent unabated by Paice's and Abell's request and with knowledge of the '347 patent and its infringement of the same. Such acts constitute willful and deliberate infringement, entitling Plaintiffs to enhanced damages and reasonable attorney fees.

COUNT II

Infringement of U.S. Patent No. 7,237,634

45. Plaintiffs reallege and incorporate herein by reference the allegations in paragraphs 2-44 above. As described below, BMW has infringed and continues to infringe, for example, at least claim 33 of the '634 patent under 35 U.S.C. § 271(a), by making, using, offering for sale or selling within the United States, or importing into the United States hybrid vehicles (including any cars, sport utility vehicles, or light duty trucks) such as the 330e iPerformance, 530e iPerformance, 740e xDrive iPerformance, i8 Roadster Plug-in, ActiveHybrid 3, ActiveHybrid 5, ActiveHybrid 7, and Mini Countryman Plug-in (collectively, the "'634 Accused Products") that infringe the '634 patent either literally or under the doctrine of equivalents.

46. Among the claims of the '634 patent, claim 33 recites as follows:

A method for controlling a hybrid vehicle, comprising:

determining instantaneous road load (RL) required to propel the hybrid vehicle

responsive to an operator command;

operating at least one electric motor to propel the hybrid vehicle when the RL required to

do so is less than a setpoint (SP);

operating an internal combustion engine of the hybrid vehicle to propel the hybrid vehicle when the RL required to do so is between the SP and a maximum torque output (MTO) of the engine, wherein the engine is operable to efficiently produce torque above the SP, and wherein the SP is substantially less than the MTO;

operating both the at least one electric motor and the engine to propel the hybrid vehicle when the torque RL required to do so is more than the MTO;

and monitoring patterns of vehicle operation over time and varying the SP accordingly.

47. For example, and without limitation, one or more of the '634 Accused Products meets the limitations of claim 33 of the '634 patent. For example, on information and belief, the '634 Accused Products employ a method of controlling a hybrid vehicle comprising determining instantaneous road load (RL) required to propel the hybrid vehicle responsive to an operator command. For example and on information and belief, the '634 Accused Products employ “intelligent energy management ensur[ing] the combustion engine and electric motor work together to maximum effect in all driving situations,” which is based on, among other things, road load.¹⁹ On information and belief, the '634 Accused Products also operate at least one electric motor to propel the hybrid vehicle when the RL required to do so is less than a setpoint (SP). For example and on information and belief, the '634 Accused Products have a “synchronous electric motor” for propelling the vehicle and employ only the electric motor in an “electric mode under low and moderate speeds,” which on information and belief takes place when road load is less than a setpoint.²⁰ On information and belief, the '634 Accused Products also operate an internal combustion engine of the hybrid vehicle to propel the hybrid vehicle when the RL required to do so is between the SP and a maximum torque output (MTO) of the

¹⁹ Exhibit E, BMW eDrive Technology. Setting a new benchmark for efficiency.

²⁰ *Id.*

engine, wherein the engine is operable to efficiently produce torque above the SP, and wherein the SP is substantially less than the MTO. For example and on information and belief, the '634 Accused Products have a “combustion engine” and employ the combustion engine “[u]nder greater acceleration and at higher speeds,” which on information and belief takes place when road load is between the setpoint and MTO.²¹ Upon information and belief, the “combustion engine runs efficiently” between a setpoint (that is substantially less than MTO) and MTO.²²

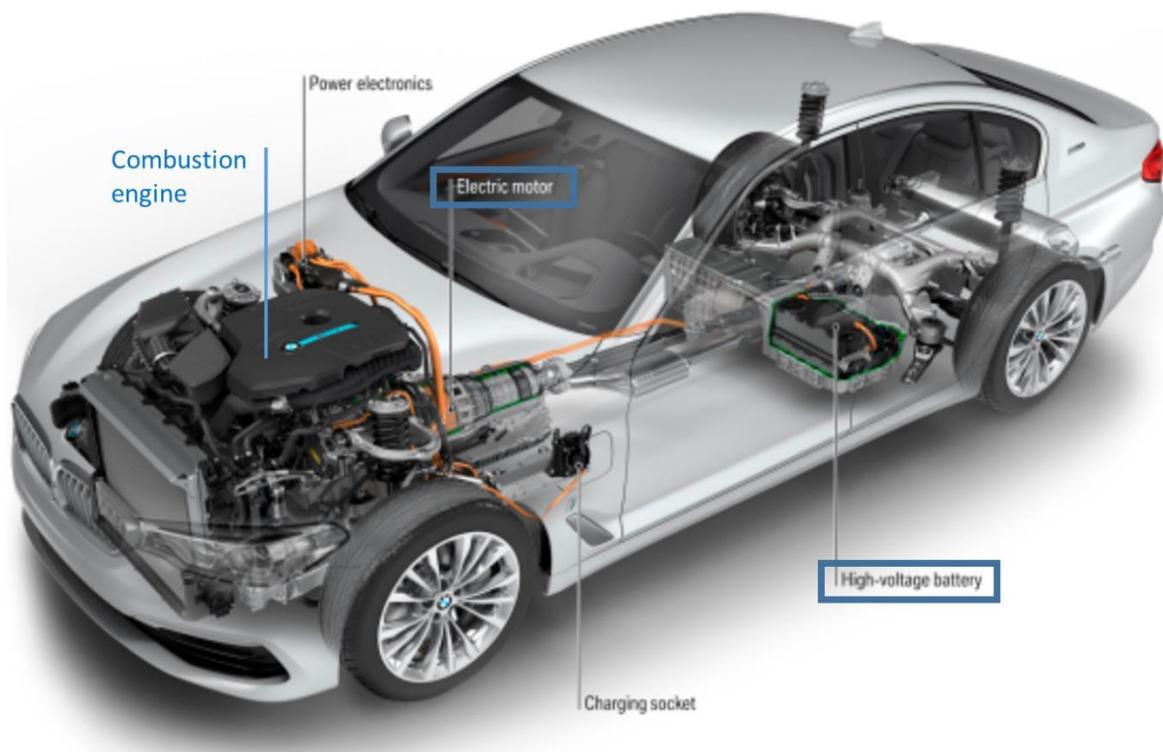


Exhibit I, BMW to introduce BMW 530e iPerformance plug-in hybrid at Detroit show (annotations shown in blue).

48. On information and belief, the '634 Accused Products also operate both the at least one electric motor and the engine to propel the hybrid vehicle when the torque RL required to do

²¹ *Id.*

²² *Id.*

so is more than the MTO. For example and on information and belief, the '634 Accused Products employ the synchronous electric motor and combustion engine to employ a “boost function” that “maximize[s] the car’s dynamic performance,” that takes place, on information and belief, when road load is more than MTO.²³ On information and belief, the '634 Accused Products also monitor patterns of vehicle operation over time and vary the SP accordingly. For example and on information and belief, the '634 Accused Products employ “Proactive Driving Assistant” and “ADAPTIVE” modes of operation to “manage the response of the two drive units” by, among other things, collecting and analyzing historical information regarding vehicle operation to monitor patterns of vehicle operation over time to vary the setpoint.²⁴

49. In view of the facts alleged above, BMW has knowledge of the asserted patents, including the '634 patent, and its products' infringement.

50. BMW has actively induced and continues to induce the infringement by others, including its customers, of the '634 patent under 35 U.S.C. § 271(b) by, among other things, manufacturing, selling, offering for sale within the United States and/or importing into the United States the '634 Accused Products and providing materials and instructions for operation of the same, with the specific intent and knowledge that the hybrid vehicles, materials and instructions direct, teach, or assist others to infringe the '634 patent by using or operating the hybrid vehicles in a manner that directly infringes the '634 patent. For example, BMW provides materials as well as user manuals that tout the hybrid vehicle technology and instructions on how to operate BMW hybrid vehicles. BMW's customers directly infringe the '634 patent by using (*e.g.*, driving) the '634 Accused Products.

²³ *Id.*

²⁴ Exhibit F, The all-new BMW 330e iPerformance; Exhibit G, 2017 BMW 740e xDrive iPerformance Press Kit.

51. BMW has contributed and continues to contribute to the infringement by others, including its customers, of the '634 patent under 35 U.S.C. § 271(c) by, among other things, manufacturing, selling, offering for sale within the United States and/or importing into the United States the '634 Accused Products for use in practicing the patented inventions of the '634 patent, knowing that the hybrid vehicles and components are especially made or adapted for use in infringement of the '634 patent, embody a material part of the inventions claimed in the '634 patent, and are not staple articles of commerce suitable for substantial non-infringing use. BMW's customers directly infringe the '634 patent by using (*e.g.*, driving) the '634 Accused Products.

52. As a result of BMW's past and continued unlawful infringement of the '634 patent, Plaintiffs have suffered and will continue to suffer damage. Plaintiffs are entitled to recover damages adequate to compensate for that infringement in an amount that will be ascertained at trial, but in no event less than a reasonable royalty.

53. On information and belief, BMW's acts of infringement have been willful and are made with knowledge of Plaintiffs' rights in the '634 patent. As stated and alleged above, Paice disclosed to BMW its patented technology as early as 2000 vis-à-vis in-person discussions and technological information. Paice and Abell have more recently contacted BMW in an attempt to engage in good faith licensing negotiations concerning BMW's infringement of the '634 patent. BMW did not respond to Paice and Abell and has continued to infringe the '634 patent unabated by Paice's and Abell's request and with knowledge of the '634 patent and its infringement of the same. Such acts constitute willful and deliberate infringement, entitling Plaintiffs to enhanced damages and reasonable attorney fees.

COUNT III

Infringement of U.S. Patent No. 8,630,761

54. Plaintiffs reallege and incorporate herein by reference the allegations in paragraphs 2-53 above. As described below, BMW has infringed and continues to infringe the '761 patent, for example, at least claim 2 of the '761 patent under 35 U.S.C. § 271(a), by making, using, offering for sale or selling within the United States, or importing into the United States hybrid vehicles (including any cars, sport utility vehicles, or light duty trucks) such as the 330e iPerformance, 530e iPerformance, 740e xDrive iPerformance, i8 Roadster Plug-in, ActiveHybrid 3, ActiveHybrid 5, ActiveHybrid 7, and Mini Countryman Plug-in (collectively, the "'761 Accused Products") that infringe the '761 patent either literally or under the doctrine of equivalents.

55. Among the claims of the '761 patent, claim 2 (dependent on claim 1) recites as follows:

1. A method of operation of a hybrid vehicle, comprising steps of:
 - storing and supplying electrical power from a battery bank,
 - applying torque to road wheels of said hybrid vehicle from one or both of an internal combustion engine and at least one traction motor,
 - and controlling flow of torque between said internal combustion engine, said at least one traction motor, and said road wheels, and controlling flow of electrical power between said battery bank and said at least one traction motor employing a controller,
 - and wherein said controller derives a predicted near-term pattern of operation of said hybrid vehicle by monitoring operation of said hybrid vehicle;

and controls operation of said at least one traction motor and said internal combustion engine for propulsion of said hybrid vehicle responsive to said derived near-term predicted pattern of operation of said hybrid vehicle.

2. The method of claim 1,

wherein said derived predicted pattern of operation comprises at least one repetitive pattern of operation of said hybrid vehicle.

56. For example, and without limitation, one or more of the '761 Accused Products meets the limitations of claim 2 of the '761 patent. For example, on information and belief, the '761 Accused Products store and supply electrical power from a battery bank. For example, the '761 Accused Products have a "lithium-ion high-voltage battery" for storing and supplying electrical energy.²⁵ On information and belief, the '761 Accused Products also apply torque to road wheels of the hybrid vehicle from one or both of an internal combustion engine and at least one traction motor. For example, the '761 Accused Products have a "synchronous electric motor" and a "combustion engine" for applying torque to the road wheels.²⁶

²⁵ Exhibit E, BMW eDrive Technology. Setting a new benchmark for efficiency.

²⁶ *Id.*

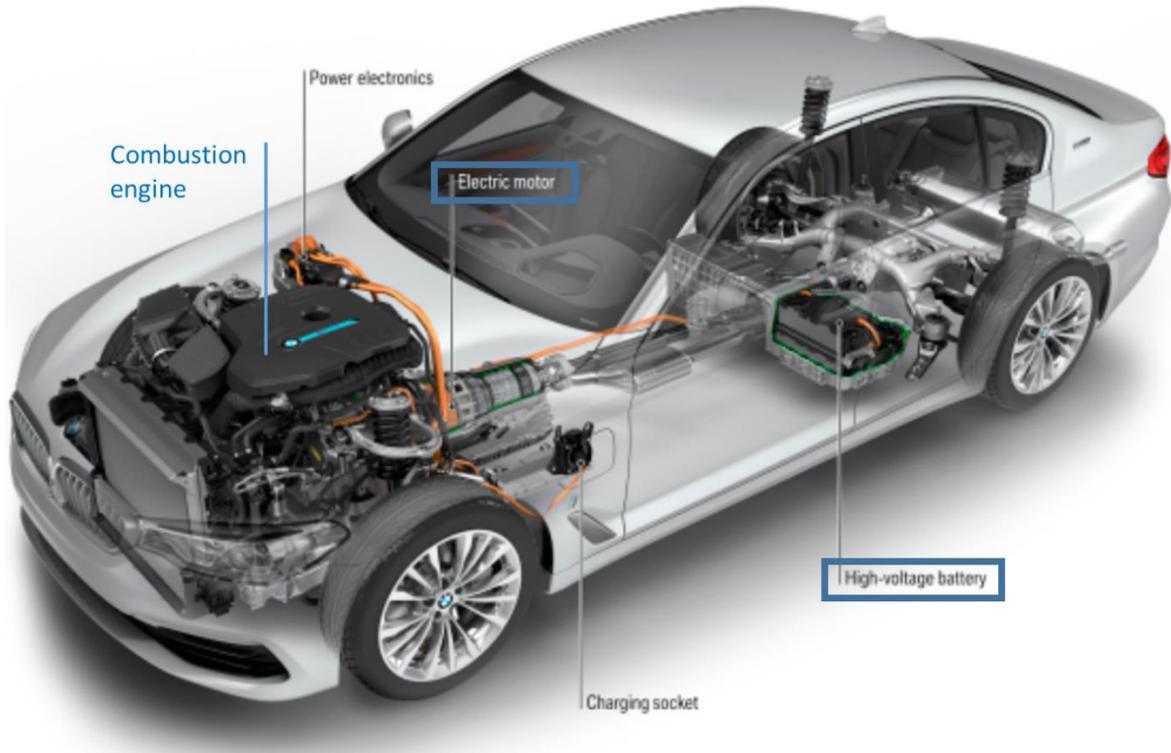


Exhibit I, BMW to introduce BMW 530e iPerformance plug-in hybrid at Detroit show (annotations shown in blue).

57. On information and belief, the '761 Accused Products also control flow of torque between the internal combustion engine, the at least one traction motor, and the road wheels, and controlling flow of electrical power between the battery bank and the at least one traction motor employing a controller. For example, the '761 Accused Products have a controller that employs “intelligent energy management ensur[ing] the combustion engine and electric motor work together to maximum effect in all driving situations” by controlling the flow of torque between the combustion engine synchronous electric motor, and the road wheels, and by controlling the flow of electrical power between the synchronous electric motor and the lithium-ion high-voltage battery.²⁷ On information and belief, the '761 Accused Products have a controller that derives a

²⁷ *Id.*

predicted near-term pattern of operation of said hybrid vehicle by monitoring operation of said hybrid vehicle. For example and on information and belief, the '761 Accused Products have a controller that employs "Proactive Driving Assistant" and "ADAPTIVE" modes of operation to "manage the response of the two drive units" by, among other things, collecting and analyzing historical information regarding vehicle operation to derive a predicted near-term pattern of operation of the hybrid vehicle by monitoring the hybrid vehicle.²⁸ On information and belief, the '761 Accused Products control operation of the at least one traction motor and said internal combustion engine for propulsion of the hybrid vehicle responsive to said derived near-term predicted pattern of operation of the hybrid vehicle. For example and on information and belief, the '761 Accused Products have a controller that employs "Proactive Driving Assistant" and "ADAPTIVE" modes of operation to "manage the response of the two drive units" by, among other things, controlling operation of the electric motor and the internal combustion engine for propulsion of the hybrid vehicle based on the derived near-term predicted pattern of operation of the hybrid vehicle.²⁹ On information and belief, the derived predicted pattern of operation in the '761 Accused Products comprises at least one repetitive pattern of operation of said hybrid vehicle. For example and on information and belief, the predicted near term pattern of operation derived by the '761 Accused Products by collecting and analyzing historical information regarding vehicle operation in "Proactive Driving Assistant" and "ADAPTIVE" modes are repetitive patterns of operation.³⁰

58. In view of the facts alleged above, BMW has knowledge of the asserted patents, including the '761 patent, and its products' infringement.

²⁸ Exhibit F, The all-new BMW 330e iPerformance; Exhibit G, 2017 BMW 740e xDrive iPerformance Press Kit.

²⁹ Exhibit F, The all-new BMW 330e iPerformance; Exhibit G, 2017 BMW 740e xDrive iPerformance Press Kit.

³⁰ Exhibit F, The all-new BMW 330e iPerformance; Exhibit G, 2017 BMW 740e xDrive iPerformance Press Kit.

59. BMW has actively induced and continues to induce the infringement by others, including its customers, of the '761 patent under 35 U.S.C. § 271(b) by, among other things, manufacturing, selling, offering for sale within the United States and/or importing into the United States the '761 Accused Products and providing materials and instructions for operation of the same, with the specific intent and knowledge that the hybrid vehicles, materials and instructions direct, teach, or assist others to infringe the '761 patent by using or operating the hybrid vehicles in a manner that directly infringes the '761 patent. For example, BMW provides materials as well as user manuals that tout the hybrid vehicle technology and instructions on how to operate BMW hybrid vehicles. BMW's customers directly infringe the '761 patent by using (*e.g.*, driving) the '761 Accused Products.

60. BMW has contributed and continues to contribute to the infringement by others, including its customers, of the '761 patent under 35 U.S.C. § 271(c) by, among other things, manufacturing, selling, offering for sale within the United States and/or importing into the United States hybrid the '761 Accused Products for use in practicing the patented inventions of the '761 patent, knowing that the hybrid vehicles and components are especially made or adapted for use in infringement of the '761 patent, embody a material part of the inventions claimed in the '761 patent, and are not staple articles of commerce suitable for substantial non-infringing use. BMW's customers directly infringe the '761 patent by using (*e.g.*, driving) the '761 Accused Products.

61. As a result of BMW's past and continued unlawful infringement of the '761 patent, Plaintiffs have suffered and will continue to suffer damage. Plaintiffs are entitled to recover damages adequate to compensate for that infringement in an amount that will be ascertained at trial, but in no event less than a reasonable royalty.

62. On information and belief, BMW's acts of infringement have been willful and are made with knowledge of Plaintiffs' rights in the '761 patent. As stated and alleged above, Paice disclosed to BMW its patented technology as early as 2000 vis-à-vis in-person discussions and technological information. Paice and Abell have more recently contacted BMW in an attempt to engage in good faith licensing negotiations concerning BMW's infringement of the '761 patent. BMW did not respond to Paice and Abell and has continued to infringe the '761 patent unabated by Paice's and Abell's request and with knowledge of the '761 patent and its infringement of the same. Such acts constitute willful and deliberate infringement, entitling Plaintiffs to enhanced damages and reasonable attorney fees.

JURY DEMAND

Pursuant to Federal Rule of Civil Procedure 38, Plaintiffs demand a trial by jury on all issues so triable.

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs Paice and Abell respectfully request the following relief:

- 1) A judgment that the '347, '634, and '761 patents have been infringed by BMW;
- 2) Awarding Paice and Abell damages adequate to compensate for BMW's past, current, and future infringement, pre- and post-judgment interest as allowed by law, costs, and all other damages permitted by 35 U.S.C. § 284;
- 3) Declaring that this case is an exceptional one under 35 U.S.C. § 285, and awarding Paice and Abell their reasonable attorneys' fees;
- 4) Awarding Paice and Abell such further, necessary and proper relief as this Court may deem just and reasonable.

Dated: November 21, 2019

Respectfully submitted,

/s/ James P. Ulwick

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