BRUNO LEQUESNE, Ph.D., Fellow IEEE

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E-MOTORS CONSULTING, LLC

Providing Solutions for Electric Machine Design, Electromagnetism, and the Electrification of Transportation

Bruno Lequesne, an engineer with background at General Motors, Delphi, and Eaton, all in the design and application of electromagnetic and electro-mechanical systems, particularly for transportation, is offering his vast expertise to facilitate the advancement of electrical technology. His focus is both on technology development and patent services.

His business venture, E-Motors Consulting, LLC, offers consulting services based on 30 years of experience in magnetics, electric machine design, linear actuators and automotive electrification. It can provide your company with analysis, design and prototyping of electromagnetic systems, electric machines and drives. A particular strength of this consulting business is new technology development, assessment, and investigation, as well as intellectual property preparation and defense. It can team with you for technology roadmapping and strategizing in the application of electric energy conversion, particularly in the transportation field, and the integration of electric and mechanical systems.

E-Motors Consulting, LLC, can perform:

- Magnetic analysis.
- Design of electric machines and linear actuators.
- Development of new concepts and products.
- Technology roadmapping and strategizing, discerning new trends.
- Expert witness work and patent development.
- Intellectual property assessment and strategizing.
- Teaching and mentoring in these fields.

EDUCATION:

PhD in Electrical Engineering, 1984, Missouri University of Science and Technology.

- Dissertation: "Some Aspects of the Operation of Doubly-Fed Induction Machines."

Certified Engineer Degree, 1978, Ecole Supérieure d'Electricité (now CentraleSupélec), Paris, France.

- Major: Electrical Engineering.

ZF, Ex. 1003

PROFESSIONAL EXPERIENCE:

2-2014 to present **E-Motors Consulting, LLC**, Menomonee Falls,WI: Owner and President

- Performing technology roadmapping and investigation in electro-mechanical and electric drive systems, particularly for transportation applications, as well as electric machine design, electromagnetic analysis, and actuator development.
- Clients in various industrial fields: Transportation, aerospace, renewable energy and general industry.
- **Expert witness** with deposition and court experience:
  - Seven cases to date, including two depositions and one testimony at trial. Six cases were patent litigations and one was a warranty dispute.

4-2016 to present University of Wisconsin-Milwaukee, Adjunct Professor, Electrical Engineering

6-2014 to present Marquette University, Research Professor

2-2016 to 1-2020 North Carolina State University, Adjunct Professor, Electrical Engineering

2010 to 2014 **Eaton**, Milwaukee, WI: Principal Engineer, Corporate Research & Technology

- In charge of developing innovation programs, particularly for hybrid and off-road vehicles, as well as industrial drives.

2009 to 2010 **University of Alabama**, Tuscaloosa, AL: Senior Research Engineer, Center for Advanced Vehicle Technologies

- In charge of developing a multi-disciplinary research program in the vehicular, transportation, and automotive fields.

2006 – 2009 **Delphi Powertrain**, Auburn Hills, MI:

- In charge of advanced electromechanical technology development for engines, for the fuel injector, valvetrain, and sensors business units of Delphi Powertrain.
- Led a group of 4 engineers plus technician. The group developed fuel systems, sensors, and novel electromechanical valvetrain systems (cam phasers and continuously variable).

1999 – 2006 **Delphi Research Laboratories**, Shelby Twp, MI: Senior Staff Research Engineer

Delphi Research Labs was created as a spin off from the GM R&D Center on 1/1/1999.

- Manage, develop and implement a variety of automotive advanced engineering projects, many of which have resulted in patents and award-winning publications and are used in mass-production.
- Responsible for the development, analysis, design and experimental evaluation of new electrical systems and components for automotive applications.
- Key technical areas: Automotive electric systems, electric machines and drives, sensors, system design and control.
- Project examples: Valvetrain systems, electric cam phasers, electromagnetic engine-valve actuation system; Starter-generator and mild hybrid systems; Electric brake and power-steering systems for x-by-wire; Fault tolerant systems; Fault diagnostics in drives; Force and pressure sensors, angular and linear position sensors.

1984 - 1999 **General Motors Research and Development Center**, Warren, MI
1998 – 1999 Senior Staff Research Engineer
1987 – 1998 Staff Research Engineer
1984 – 1987 Senior Research Engineer

1979 – 1981 **Ecole Supérieure d'Electricité**, Paris, France: Research Engineer

EXPERT WITNESS EXPERIENCE:

- Inter Partes case, on going, 2022.
- Ocado v. Autostore Technlogy AS, European Patent office, 2021.
- Crandall Technologies LLC v. Greatcall, Inc., infringement case, 2019.
- MPC Inc. v. Standex Electronics Inc., warranty dispute, 2019.
- Patent litigation case concerning electric motors for automotive applications, 2018.
- AM General, LLC v. UUSI, LLC, 4 IPR cases: Deposition, 2016-2017.
- SD3, LLC v. US PTO: Deposition and testimony at trial (US District Court), 2016.

PROFESSIONAL AFFILIATIONS AND ACTIVITIES:

- **Chair, IEEE Transportation Electrification Community, 2019-2022** (2 two-year term)
- Chair, IEEE PES/IAS PowerAfrica Conference Steering Committee (2022-2023)
- Chair, IEEE Transportation Technologies Award Committee (2017-2019)
- Steering committee member, IEEE Transportation Electrification Community, 2015-2018 (Long Range Planning Committee chair, 2016-2018)
- **President, IEEE Industry Applications Society, 2011-2012**
- Executive Board member, IEEE Industry Applications Society, 2004-2014
- Co-chair, 2014 International Transportation Electrification Conference
- President-elect, IEEE Industry Applications Society, 2009-2010
- Chair, Industry Applications Society Annual Meeting, 2009 and 2010
- Vice-president, IEEE Industry Applications Society, 2007-2008
- Treasurer, IEEE Industry Applications Society, 2004-2006
- Chairman, 2002-2003, Electric Machines Committee of the IEEE Industry Application Society
- Chairman, 2000-2004, Review Committee for IEEE Fellow candidates, IEEE-Industry Application Society
- Paper review chair, 2002-2003, Electric Machines Committee of IEEE-IAS
- Paper reviewer, Industrial Drives Committee of IEEE-IAS
- Member and Paper reviewer, Society of Automotive Engineers

ADVISORY BOARDS:

- Illinois Institute of Technolgy, External Advisory Board, ECE Dept. (2018 to present)
- Marquette University, Industrial Advisory Board, ECE Dept.ent (2017 to present)

AWARDS:
Details are provided in the Appendix.

IEEE, SAE and PACE awards:

IEEE Nikola Tesla Award, 2016, Citation "For contributions to the design and analysis of actuators, sensors, and motors for automotive applications" (announced June 23rd, 2015).
Fellow, IEEE, 1997, Citation: "For contributions to the development of electromechanical actuators for automotive applications".
IEEE Industry Applications Society, Industrial Power Conversion Systems Department Gerald Kliman Innovator Award, 2007.
IEEE Industry Applications Society, Second Prize Transactions Paper Awards: 2016 and 1996.
IEEE Industry Applications Society, Electric Machines Committee, Best Paper Awards:
6 awards, in 2005, 1996,1992, 1991, 1989, and 1987.
Society of Automotive Engineers:

- SAE Vincent Bendix Automotive Electronics Engineering Award, 2006.
- SAE Arch T. Colwell Award, 2000.
- Excellence in Oral Presentation, 1998.

PACE Award, finalist, 2005: Part of Delphi's Rotary Position Sensor team.

Delphi and General Motors Awards:

- Boss Kettering Award, 3 times, in 2007, 1998, and 1994.
- Inducted into the Delphi Hall of Fame, Sept. 1999; Platinum level, Sept. 2001.
- McCuen Award, 2 times, in 1997 and 1994.
- Campbell Award, 1993.

PUBLICATIONS:
Details are provided in the Appendix.

PATENTS: 54 granted; several patent applications.

JOURNAL ARTICLES:

- Refereed Journals: 26 papers.
- SAE: 6 papers.
- Conference papers (not published in transactions): 9 papers.

SEMINARS AND PUBLIC ENGAGEMENTS
Listed in Appendix

LANGUAGES:

- French: Native
- German: Reading ability

CITIZENSHIP:

- Naturalized US citizen

DETAILED LIST OF AWARDS, PATENTS AND PUBLICATIONS

AWARDS:

IEEE Nikola Tesla Award:

- 2016, Citation "For contributions to the design and analysis of actuators, sensors, and motors for automotive applications" (announced June 23rd, 2015).
  The Nikola Tesla Award is one of IEEE's 33 Field Awards, given to one individual (or one team up to three people), each year. The award scope is: "For outstanding contributions to the generation and utilization of electric power."

Fellow, IEEE:

- 1997, Citation: "For contributions to the development of electromechanical actuators for automotive applications".

IEEE Industry Applications Society, Industrial Power Conversion Systems Department Gerald Kliman Innovator Award

- 2007, Citation: "For contributions to the development of novel electromagnetic sensors and actuators for automotive applications."

IEEE Industry Applications Society Transactions Prize Paper Awards:

- 2016, Second Prize, for: "A Fast Mechanical Switch for Medium-Voltage Hybrid DC and AC Circuit Breakers" (with 4 co-authors).
- 1996, Second Prize, for: "Permanent Magnet Linear Motors for Short Strokes".

IEEE Industry Applications Society, Electric Machines Committee, Best Paper Awards:

- 2005, Second Prize for: "Classification and remediation of electrical faults in the switched reluctance drive".
- 1996, Third Prize for: "Eddy Current Machines with Permanent Magnets and Solid Rotors".
- 1992, Third Prize for: "Permanent Magnet Linear Motors for Short Strokes".
- 1991, Second Prize for: "Magnetic Velocity Sensors".
- 1989, Second Prize for: "Fast Acting, Long Stroke Solenoids with Two Springs".
- 1987, First Prize for: "Finite Element Analysis of a Constant Force Solenoid for Fluid-Flow Control".

Society of Automotive Engineers:

- 2006 SAE Vincent Bendix Automotive Electronics Engineering Award, for SAE Paper 2006-01-0296, "The Potential of Switched Reluctance Motor Technology for Electro-Mechanical Brake Applications".
- 2000 SAE Arch T. Colwell Award, for SAE Paper 980169, "Magnetic Crankshaft and Camshaft Position Sensor with a Complementary Geometry".
- Excellence in Oral Presentation, 1998, for: "Magnetic Crankshaft and Camshaft Position Sensors with a Complementary Geometry".

PACE Award:

- 2005 PACE award: Part of Delphi's Rotary Position Sensor team, a 2005 finalist for this award (http://www.us.capgemini.com/news/current_news.asp?ID=425&PR year=2004).
  The Automotive News PACE Awards program honors automotive industry participants who have embraced innovation or adapted and reinvented themselves to keep abreast of the constantly rising performance bar of the OEM/customer. This prestigious program sets the standard for innovation and excellence and has become a significant industry credential.

Delphi and General Motors Awards:

- Boss Kettering Award, 2007, for "Sine motor and control for electric power steering systems".
  The Boss Kettering award recognizes those GM/Delphi employees whose commercialized, patented ideas have provided identifiable, substantial benefits to the Company.
- Runner-up, Boss Kettering award, 2006, for "Rotary Position Sensor".
- Inducted into the Delphi Hall of Fame, Sept. 1999; Platinum level, Sept. 2001.
  The Delphi Hall of Fame recognizes Delphi innovators and inventors. Less than 10 Delphi employees have reached the Platinum level, the highest distinction in the Hall of Fame.
- Boss Kettering Award, 1998, for "Accuwheel: High accuracy encoder for crank and cam sensors ".
- Boss Kettering Award, 1994, for "Magnetic field sensors".
- McCuen Award, 1997, for "Accuwheel, a high accuracy encoder for crank and cam sensors".
- McCuen Award, 1994, for "Magistor, a magnetic position sensing system used for crankshaft position sensing in ignition systems".
  The McCuen award is given to GM researchers whose extraordinary accomplishments have had a significant impact on the success of the Corporation.
- Campbell Award, 1993, for "The optimization of electromechanical devices using closed-form solutions".
  The Campbell award is given to GM researchers for original, theoretical and outstanding contributions to pure or applied science.

PATENTS: 54 granted, 3 patents allowed but not issued, 17 Defensive Publications, several peovisional patent applications.

Motor design:

1. US Patent No. 11,424,652 (8/2022) "Lubricant supported electric motor including magnetic rotor centering" (with 3 co-authors). *This patent introduces an innovative self-supporting lubricated airgap, for instance for in-wheel traction motors.*

Industrial drives:

2. US Patent No. 10,056,851 (8/2018) "System and method for induction motor speed estimation using a soft starter system" (with 5 co-authors). *This patent (as well as #9,160,257) covers a method to automatically detect starting parameters for industrial soft starters.*

3. US Patent No. 9,425,702 (8/2016) "System and method for safe switching in an AC-to-AC converter," 08/23/2014 (with 3 co-authors). *This patent as well as #3 and #5 below describe a novel topology for AC-to-AC power conversion which dispenses with the need for a rectifier or large capacitors*.
4. US Patent No. 9,298,204 (3/2016) "AC-to-AC power converter and method of operation thereof for soft starting motors and other applications," (with 3 co-authors).
5. US Patent No. 9,160,257 (10/2015) "Soft starter system and method of operating same," (with 5 co-authors).
6. US Patent No. 8,947,030 (2/2015) "Low switch count AC-to-AC power converter," (with 3 co-authors).

<u>Electric cam phasers, 3 patents</u>:

7. US Patent No. 7,475,661 (1/2009), "Cam phaser having a differential bevel gear system," with 1 co-author.
8. US Patent No. 7,421,991 (9/2008), "Brake-actuated vane-type camshaft phaser," with 1 co-author.
9. US Patent No. 7,421,990 (9/2008), "Harmonic drive camshaft phaser," with 1 co-author. *These 3 patents cover innovative electric cam phasing concepts*.

<u>Motor control, 2 patents:</u>

10. US Patent No. 7,095,206 (8/2006), "Switched reluctance motor control with partially disabled operation capability ," with 3 co-authors. *This is a fault recovery control strategy for switched reluctance machines.*
11. US Patent No. 7,042,189 (5/2006), "Controlling an electric motor," with 4 co-authors. *This applies to electric brakes. The main point is to limit the speed of the motor to provide rapid brake reversal during ABS maneuvers.*

<u>Electric power steering, 2 patents</u>:

12. US Patent No. 6,498,451 (12/2002), "Torque-ripple free electric power steering drive," with 5 co-authors. *This concept, for low torque ripple operation of* electric power steering *motors, forms the basis of Delphi high-performance power steering systems. Currently in production (1,100 units/day)*
13. US Patent No. 6,329,782 (12/2001), "Method and apparatus for robust generation of an index pulse for an electric power steering system," with 2 co-authors. *This patent provides a low cost solution to motor position sensing especially for electric power steering*.

<u>Force, pressure and torque sensors, 8 patents:</u>

14. US Patent No. 7,523,671 (4/2009), "Apparatus, system and method for measuring stress," with 3 co-authors. Magnetostrictive force sensor with special ring configuration and related electronic circuit for use inside an electric brake system.
15. US Patent No. 7,454,978 (11/2008), "Versatile strain sensor employing magnetostrictive electrical conductors," with 2 co-authors. Magnetostrictive strain sensor with leveraged configuration for adjustable, large signal generation.

16. US Patent No. 7,362,096 (4/2008), "Robust detection of strain with temperature correction," with 6 co-authors. Algorithm and method to eliminate temperature dependence from magnetostrictive force measurement. Invention based on physical understanding and mathematical representation of issue.
17. US Patent No. 7,234,361 (6/2007), "Magnetostrictive strain sensor (Airgap control)," with 3 co-authors. Design to eliminate influence of airgap variations in magnetostrictive force sensors.
18. US Patent No. 7,210,360 (5/2007), "Apparatus for sensing position and/or torque," with 5 co-authors. Low cost, robust torque sensor design especially for power steering.
19. US Patent No. 7,146,866 (12/2006), "Magnetostrictive strain sensor and method," with 3 co-authors. Uses coil resistance instead of inductance for a magnetostrictive sensor.
20. US Patent No. 7,104,137 (9/2006), "Magnetostrictive fluid-pressure sensor," with 3 co-authors. Applies magnetostrictive principles to pressure sensing.
21. US Patent No. 6,993,983 (2/2006), "Universal magnetostrictive force sensor," with 4 co-authors. This patent and several patent applications cover the practical application of magnetostriction to force sensing, for various automotive applications.

<u>Position sensors, 28 patents:</u>

22. US Patent No. 7,009,384 (3/2006), "Sensor assembly combining signals with enhanced asymmetry for detecting direction of rotation of an object," with 3 co-authors. Detects both position and direction of rotation of a sensor wheel at reduced cost.
23. US Patent No. 6,992,480 (1/2006), "Combined incremental and linear magnetic sensor," with 4 co-authors. Simple method to extend the resolution of a magnetic sensor with linear interpolation.
24. US Patent No. 6,992,479 (1/2006), "Magnetic sensor array configuration for measuring a position and method of operating same," with 2 co-authors. Can detect the position of a magnetic trace for instance sputtered on a circuit board.
25. US Patent No. 6,894,486 (5/2005), "Magnetic encoder with double frequency output," with 2 co-authors.
26. US Patent No. 6,873,151 (3/2005), "Sensor assembly for sensing angular position," with 2 co-authors. Robust configuration for analog angular position sensor.
27. US Patent No. 6,650,110 (11/2003), "Target wheel sensor assembly for producing an asymmetric signal and for determining the direction of motion of the wheel based on the signal shape," with 2 co-authors.
28. US Patent No. 6,639,399 (10/2003), "Target wheel sensor assembly for determining position and direction of motion of a rotating target wheel," with 2 co-authors.
29. US Patent No. 6,614,223 (9/2003), " Analog angle encoder having a single piece magnet assembly surrounding an air gap," with 3 co-authors. Low-cost assembly for angle sensor described in US Patent 6,489,761. Used as a vehicle body height sensor; start of production, 2003, 1.5 million units scheduled to be built from 2004 onwards.
30. US Patent No. 6,577,123 (6/2003), " Linear position sensor assembly ," with 2 co-authors. Simple design to obtain a linear signal from a magnetic sensor.
31. US Patent No. 6, 566,867 (5/2003), " Binary encoded crankshaft target wheel with single VR sensor," with 1 co-author.

32. US Patent No. 6,489,761 (12/2002), "Magnetic arrangement for an analog angle encoder," with 3 co-authors. Low cost angle sensor. Used as a vehicle body height sensor; start of production, 2003, 1.5 million units scheduled to be built from 2004 onwards.
33. US Patent No. 6,320,374 (11/2001), "Crankshaft Position and Direction Sensing System," with 1 co-author.
34. US Patent No. 6,268,721 (7/2001), " Low Cost Binary Encoded Crankshaft Position Sensor," with 3 co-authors.
35. US Patent No. 5,916,459 (6/1999), "Method of matching magnetoresistors in a sensor assembly," with 3 co-authors.
36. US Patent No. 5,754,042 (5/1998), "Magnetoresistive Encoder for Tracking the Angular Position of a Rotating Ferromagnetic Target Wheel," with 2 co-authors.
37. US Patent No. 5,731,702 (3/1998), "High Accuracy Angle Based Rotation Sensor with Time Based Back-up," with 3 co-authors.
38. US Patent No. 5,714,883 (2/1998), "Rotational Sensor Including Axially Adjacent Targets One of Which Having Invariant Permeability the Other Having Varying Permeability as they Rotate," with T. Schroeder.
39. US Patent No. 5,668,471 (9/1997), "Rotational Sensor with Robust Axial Tolerance," with T. Schroeder.
40. US Patent No. 5,570,016 (10/1996), "Method and Apparatus for Detecting Crankshaft Angular Position," 2nd of 6 authors.
41. US Patent No. 5,216,405 (6/1993): "Package for the Magnetic Field Sensitive Device," 2nd of 7 authors.
42. US Patent No. 4,926,122 (5/1990), "High Sensitivity Magnetic Circuit" co-author with T. Schroeder. These last nine patents describe new magnetic position sensors. These sensors have been in production since 1995 on GM pick-up trucks and more recently on Corvettes, commercial trucks, etc., where they are used in particular for crankshaft and camshaft angular position sensing.
43. US Patent No. 5,315,245 (5/1994), "Sensor Assembly Having Embedded Wires within a Powder Metal Core and a Method Therefor" (with 3 co-authors).
44. US Patent No. 5,210,493 (5/1993), "Method for Embedding Wires within a Powder Metal Core and Sensor Assembly Produced by such a Method," (with 3 co-authors). These two patents describe the use of powder-metal molding techniques for cost reduction in magnetic sensor manufacturing.
45. US Patent No. 5,508,611 (4/1996), "Ultrathin Magnetoresistive Sensor Package" (with 2 co-authors). Describes a special packaging of sensors that improves sensitivity and lowers cost.
46. US Patent No. 5,492,571 (2/1996), "Thermomagnetic Encoding Method and Articles" (with 4 co-authors).
47. US Patent No. 5,492,572 (2/1996), "Method for Thermomagnetic Encoding of Permanent Magnet Materials" (with 3 co-authors). These two patents cover a novel method of patterning the field of permanent magnets for sensing purposes.
48. US Patent No. 5,491,633 (2/1996), "Position Sensor for Eletromechanical Suspension" (with 2 co-authors). Describes a position sensor for active suspension.
49. US Patent No. 5,196,821 (3/1993), "Integrated Magnetic Field Sensor" (with 4 co-authors). Improves sensor sensitivity by modifying the semiconductor lay-out.

Engine-valve actuators (linear actuators), 5 patents:

50. US Patent No. 5,598,814 (2/1997) "Method and apparatus for electrically driving engine Valves" (with 3 co-authors).
51. US Patent No. 5,494,007 (2/1996) "Method and apparatus for electrically driving engine Valves" (with 2 co-authors).
52. US Patent No. 5,327,856 (7/1994) "Method and apparatus for electrically driving engine Valves" (with 3 co-authors). These three patents describe a new electro-mechanical engine-valve actuation system.
53. US Patent No. 4,829,947 (5/1989) "Variable lift operation of bistable electromechanical Poppet Valve Actuator" (sole author).
54. US Patent No. 4,779,582 (10/1988) "Bistable electromechanical valve actuator" (sole author). Both of these patents offer new configurations and modes of operation for linear actuators with two springs, for engine valve actuation.

PUBLICATIONS - REFEREED JOURNALS

Nota: This list does not include the "President's Column" articles in the IEEE Industry Applications Magazine, written bi-monthly in 2011 and 2012 as president of the organization.

1. B. Lequesne, T. Holp, S. Schmalz, M. Slepian, H. Wang, "Frequency-domain analysis and design of Thomson-coil actuators," Accepted for publication in IEEE Trans. on IA (2023), (presented in part at the 2021 IEEE Energy Conversion Congress and Exposition (ECCE), pp. 4081-4088).

2. Q. Ma, A. EL-Refaie, B. Lequesne, "Low-cost interior permanent magnet machine with multiple magnet types," IEEE Trans. on IA, vol. 56, no. 2, pp. 1452-1463, March-April 2020 (presented in part at the 2019 IEEE International Electric Machines & Drives Conference (IEMDC)).

3. C. Peng, L. Mackey, I. Husain, A. Huang. W. Yu, B. Lequesne, R. Briggs, "Active damping of ultra-fast mechanical switches for hybrid AC and DC circuit breakers," IEEE Trans. on IA, Vol. 53, No. 6, Nov./Dec. 2017, pp. 5354-4364 (presented at the 8th IEEE Energy Conversion Congress & Expo, Milwaukee, WI, September 2016).

4. C. Peng, I. Husain, A. Huang. B. Lequesne, R. Briggs, "A fast mechanical switch for medium voltage hybrid DC and AC circuit breakers," IEEE Trans. on IA, Vol. 52, No. 4, July/Aug. 2016, pp. 2911-2916 (presented at the 7th IEEE Energy Conversion Congress & Expo, Montréal, PQ, Canada, September 2015). *IAS Society Transactions Prize Paper Award, 2nd prize, 2016.*

5. B. Lequesne, "Automotive electrification: The non-hybrid story," Invited paper, IEEE Transactions on Transportation Electrification, Vol. 1, No. 1, June 2015, pp. 40-53.

6. B. Lequesne, "EV/HEV Technology: Are we there yet?," Invited Viewpoint Column, IEEE Electrification Magazine, June 2014.

7. A.M. Omekanda, B. Lequesne, H. Klode, S. Gopalakrishnan, I. Husain, "Switched Reluctance versus Permanent Magnet – A Comparison in the Context of Electric Brakes," IEEE Industry Applications Magazine, Vol. 15, No. 4, July/Aug. 2009, pp. 35-43 (presented at the 41th IEEE Industry Applications Annual Meeting, 8-12 Oct. 2006).

8. A. Khalil, S. Underwood, I. Husain, H. Klode, B. Lequesne, S. Gopalakrishnan, A.M. Omekanda, "Four-Quadrant Pulse Injection and Sliding-Mode-Observer-Based Sensorless Operation of a Switched Reluctance Machine Over Entire Speed Range Including Zero Speed," IEEE Trans. on IA, Vol. 43, No. 3, May/June 2007, pp. 714-723 (presented at the 40th IEEE Industry Applications Annual Meeting, Hong Kong, China, 2-6 Oct. 2005).

9. S. Rajagopalan, T. G. Habetler, R. G. Harley, T. Sebastian, B. Lequesne, "Current/Voltage Based Detection of Faults in Gears Coupled to Electric Motors," IEEE Trans. on IA, Vol. 42, No. 6, Nov./Dec. 2006, pp. 1412-1420 (presented at International Electric Machines and Drives Conference (IEMDC '05), San Antonio, TX, May 15-18, 2005).

10. S. Gopalakrishnan, A. Omekanda, B. Lequesne, "Classification and Remediation of Electrical Faults in the Switched Reluctance Drive," IEEE Trans. on IA, Vol. 42, No. 2, Mar./Apr. 2006, pp. 479-486 (presented at the 40th IEEE Industry Applications Annual Meeting, Hong Kong, China, 2-6 Oct. 2005). *IAS-Electric Machines Committee Best Paper Award, 2nd prize, 2005.*

11. A. Khalil, I. Husain, S.A. Hossain, S. Gopalakrishnan, A. Omekanda, B. Lequesne, H. Klode, "A Hybrid Sensorless SRM Drive with Eight- and Six-Switch Converter Topologies," IEEE Trans. on IA, Vol. 41, No. 6, Nov./Dec. 2005 (presented at the 39th IEEE Industry Applications Annual Meeting, Seattle, WA, USA, 3-7 Oct. 2004).

12. B. Lequesne, S. Gopalakrishnan, A. Omekanda, "Winding Short-Circuits in the Switched Reluctance Drive," IEEE Trans. on IA, Vol. 41, No. 5, Sept./Oct. 2005 (presented at the 4th Symposium on Diagnostics for Electric Machines, Power Electronics and Drives, Atlanta, GA, USA, 24-26 Aug. 2003).

13. S. Underwood, A. Khalil, I. Husain, H. Klode, B. Lequesne, S. Gopalakrishnan, A. Omekanda, "Switched Reluctance Motor Based Electromechanical Brake-by-Wire System," Int. J. Vehicle Autonomous Systems, Vol. 2, Nos. 3/4, 2004.

14. S. Hossain, I. Husain, H. Klode, B. Lequesne, A. Omekanda, S. Gopalakrishnan, "Four-Quadrant and Zero-Speed Sensorless Control of a Switched Reluctance Motor," IEEE Trans. on IA, Sept./Oct. 2003, Vol. 39, No. 5, pp. 1343-1349 (presented at the 36th IEEE Industry Applications Annual Meeting, Chicago, IL, USA, Oct. 2001).

15. S. Chen, B. Lequesne, R. Henry, Y. Xue, J. J. Ronning, "Design and Testing of a Belt-Driven Induction Starter-Generator," IEEE Trans. on IA, Nov./Dec. 2002, Vol. 38, No. 6, pp. 1525-1533 (presented at the IEEE International Electric Machines and Drives Conference (IEMDC '01), Cambridge, MA, USA, June 2001).

16. B. Lequesne, "Design Optimization of Two-Spring Linear Actuators," European Transactions on Electric Power, Vol. 9, No. 6, Nov/Dec 1999 (Presented at the 1994 International Conference on Electric Machines (ICEM), Paris, France, Sept. 1994).

17. B. Lequesne and T. Schroeder, "High Accuracy Magnetic Position Encoder Concept," IEEE Trans. on IA, Vol. 35, No. 3, May/June 1999 (presented at the 33th IEEE Industry Applications Annual Meeting, St Louis, MO, USA, Oct. 1998).

18. B. Lequesne, B. Liu and T. Nehl, "Eddy Current Machines with Permanent Magnets and Solid Rotors," IEEE Trans. on IA, Vol. 33, No. 5, Sept./Oct. 1997 (presented at the 31st IEEE Industry Applications Annual Meeting, San Diego, CA, USA, Oct. 1996). *IAS-Electric Machines Committee Best Paper Award, 3rd prize, 1996.*

19. B. Lequesne, A. Pawlak and T. Schroeder, "Magnetic Velocity Sensors," IEEE Trans. on IA, Vol. 32, No. 5, Sept/Oct 1996 (presented at the 26th IEEE Industry Applications Annual Meeting, Dearborn, MI, USA, Oct. 1991). *IAS-Electric Machines Committee Best Paper Award, 2nd prize, 1991.*

20. B. Lequesne, "Permanent Magnet Linear Motors for Short Strokes," IEEE Trans. on IA, Vol. 32, No. 1, Jan/Feb 1996 (presented at the 27th IEEE Industry Applications Annual Meeting, Houston, TX, USA, Oct. 1992). *IAS Society Transactions Prize Paper Award, 2nd prize, 1996, and IAS-Electric Machines Committee Best Paper Award, 3rd prize, 1992.*

21. T. Nehl, B. Lequesne and 4 others, "Nonlinear 2D Finite Element Modeling of PM Eddy Current Couplings and Brakes," IEEE Trans. on Magn., Vol. 30, No. 5, Sept. 1994.

22. B. Lequesne, "Fast-Acting, Long Stroke Solenoids with Two Springs," IEEE Trans. on IA, Vol. 26, No. 5, Sept/Oct 1990 (presented at the 24th IEEE Industry Applications Annual Meeting, San Diego, CA, USA, Oct. 1989). *IAS-Electric Machines Committee Best Paper Award, 2nd prize, 1989.*

23. B. Lequesne, "Fast Acting, Long Stroke Bistable Solenoids with Moving Permanent Magnets," IEEE Trans. on IA, Vol. 26, No. 3, May/June 1990 (presented at the 23rd IEEE Industry Applications Annual Meeting, Pittsburgh, PA, USA, Oct. 1988).

24. B. Lequesne, "Dynamic Model of Solenoids under Impact Excitation, Including Motion and Eddy Currents," IEEE Trans. on Magn., Vol. 26, No. 2, March 1990.

25. B. Lequesne, "Finite Element Analysis of a Constant Force Solenoid for Fluid Flow Control," IEEE Trans. on IA, Vol. 24, No. 4, July/Aug. 1988 (presented at the 22nd IEEE Industry Applications Annual Meeting, Atlanta, GA, USA, Oct. 1987). *IAS-Electric Machines Committee Best Paper Award, 1st prize, 1987.*

26. B. Lequesne and A. Miles, "Generalized Root Loci Theory for the Static Scherbius Drive," IEEE Trans. on PAS, Vol. PAS-103, No. 6, June 1984 (presented at the 1983 IEEE Power Engineering Society Conference, Los Angeles, CA,USA).

PUBLICATIONS - SAE PAPERS AND CONFERENCE PAPERS

Nota: Papers first presented at a conference (before IEEE IAS policy change in 2018) and subsequently published in Transactions are listed above and are not duplicated below as Conference papers.

27. B. Lequesne, T. Holp, S. Schmalz, M. Slepian, H. Wang, "Frequency-domain analysis and design of Thomson-coil actuators," Proc. of the 2021 IEEE Energy Conversion Congress and Exposition (ECCE), pp. 4081-4088, Oct. 10-14, 2021.

28. Q. Ma, A. EL-Refaie, B. Lequesne, "Low-cost interior permannent magnet machine with a blend of magnet types," Proc. of the 2019 IEEE International Electric Machines & Drives Conference (IEMDC), San Diego, CA, May 12-15, 2019.

29. A.I. Abbas, T. Sakamoto, M.S. Saravani, R.S. Amano., J. Millevolte, B. Lequesne, "Optimization of Kaplan hydro-turbine at very low head with rim-driven generator," Proc. of the ASME 2017 Power & Energy Conference and Exhibition, ICOPE2017, June 26-30, 2017, Charlotte, NC (Paper PowerEnergy2017-3564).

30. T. El-Gammal, Y.-H Yen, R.S. Amano, J. Millevolte, R.J. Mueller, B. Lequesne, "Numerical investigations on intake tube design of micro-Kaplan hydro turbine system," Proc. of the ASME 2016 Fluids Engineering Division Summer Meeting, July 10-14, Washington, DC (Paper FEDSM2016-7569).

31. Y.-H Yen, T. El-Gammal, R.S. Amano, J. Millevolte, R.J. Mueller, B. Lequesne, "Numerical optimization of micro-Kaplan hydro turbine system," Proc. of the ASME 2016 Fluids Engineering Division Summer Meeting, July 10-14, Washington, DC (Paper FEDSM2016-7575).

32. C. Peng, A. Huang, I. Husain, B. Lequesne, R. Briggs, "Drive circuits for ultra-fast and reliable actuation of Thompson coil actuators used in hybrid AC and DC circuit breakers," Proc. of the 2016 IEEE-APEC Conference, Long Beach, CA, March 20-14, 2016.

33. H. Klode, A. M. Omekanda, B. Lequesne, S. Gopalakrishnan, A. Khalil, S. Underwood, I. Husain, "The potential of switched reluctance motor technology for electro-mechanical brake applications," SAE Paper No. 2006-01-0296, 2006 SAE World Congress, Detroit, MI, April 3-6, 2006. *Received the SAE Vincent Bendix Automotive Electronics Engineering Award, 2006.*

34. S. Hossain, I. Husain, H. Klode, B. Lequesne, A. Omekanda, "Four-quadrant control of a switched reluctance motor for a highly dynamic actuator load," Proc. of the 2002 IEEE-APEC Conference, Dallas, TX, March 10-14, 2002.

35. R. Henry, B. Lequesne, S. Chen, J. J. Ronning, Y. Xue, "Belt-Driven Starter-Generator for Future 42-Volt Systems," SAE Paper No. 2001-01-0728, 2001 SAE World Congress, Detroit, MI, March 5-8, 2001.

36. B. Lequesne and T. Schroeder, "Magnetic Crankshaft and Camshaft Position Sensors with a Complementary Geometry," SAE Paper 980169 (1998). Published in SAE Transactions - Journal of engines. *Received both the 2000 SAE Arch T. Colwell Award and an Excellence in Oral Presentation Award.*

37. R. Henry and B. Lequesne, "A Novel, Fully Flexible, Electro-Mechanical Engine Valve Actuation System," SAE Paper 970249 (1997).

38. M. Theobald, B. Lequesne & R. Henry, "Control of Engine Load via Electromagnetic Valve Actuators," SAE Paper No. 940816 (1994).

39. J. Bradley, T. Perry, R. Teets, J. Sell, T. Schroeder and B. Lequesne, "Magnecode: Laser-Beam Encoding of Permanent Magnets for Automotive Position and Speed Sensors," SAE Paper No. 940633 (1994).

40. B. Lequesne and A. Miles, "Closed-Loop Dynamic Response of a Static Scherbius Drive," Proceedings of the 1986 IEEE Power Engineering Society Conference, Vancouver, BC, Canada.

41. T. Augais, N. Lartigue and B. Lequesne, "Novel Theory for the Modelisation of Eddy Current Machines," 1980 International Conference on Electric Machines (ICEM) Athens, Greece, Sept. 1980.

SEMINARS, INVITED TALKS AND PUBLIC ENGAGEMENTS

The list below lists various speaking engagements concerning Dr. Lequesne's technical expertise. This list does not include: 1) presentations associated with a technical paper, already listed above, 2) presentations made on behalf of the IEEE-IAS or IEEE-TEC as president or board member.

10-29-2019 – Colloquium, Marquette University - Topic: Electric machines for automotive propulsion: History and future.
05-09-2019 – Invited keynote speaker, International Transportation Electrification Conference Asia-Pacific (ITEC-AP), Jeju Island, Korea – Topic: Electric machines for automotive propulsion: History and future.
04-23-2018 – Seminar, Marquette University, ECE Dept. – Topic: Automotive motors – Focus on traction applications.
10-05-2016 – Invited presentation, Coil Winding, Insulation & Electrical Manufacturing Exhibition (CWIEME), Chicago, IL – Topic: Automotive motors: Recent accomplishments and challenges ahead.
09-22-2016 – Presentation at Special Session on "Advanced industrial development related to electrical machines" at 2016 IEEE Energy Conversion Conference & Exhibition (ECCE), Milwaukee, WI – Topic: Automotive motors: Recent accomplishments and challenges ahead.
11-05-2015 – Seminar, Milwaukee IEEE Section Meeting – Topic: Automotive electrification: The non-hybrid story.
10-06-2015 – Panel moderator, Coil Winding, Insulation & Electrical Manufacturing Exhibition (CWIEME), Chicago, IL.

06-15-2015 – Invited keynote speaker, International Transportation Electrification Conference (ITEC), Dearborn, Michigan – Topic: Automotive electrification: The non-hybrid story.
05-13-2015 – Invited presentation, Electrical Manufacturing & Coil Winding Expo – Topic: Linear actuators: A very diverse landscape.
10-01-2014 – Invited presentation, Coil Winding, Insulation & Electrical Manufacturing Exhibition (CWIEME), Chicago, IL – Topic: Innovations and developments in the electrification of transportation: Overview of the latest technical and market developments in e-mobility in North America and beyond.
07-25-2014 – Panelist, IEEE Symposium on Power Electronics & Machines for Wind and Water Applications (PEMWA), Milwaukee WI – Topic: Electric machines and power electronics for renewable energy systems.
06-17-2014 – Panel organizer and moderator, IEEE International Transportation Electrification Conference (ITEC) conference, Dearborn, MI – Topic: 48V: Architecture and challenges.
06-17-2014 – Panel organizer and moderator, IEEE International Transportation Electrification Conference (ITEC) conference, Dearborn, MI – Topic: Urban public transportation: Buses, tramways, metro, light rail, where is the future?
05-14-2014 – Invited presentation, Electrical Manufacturing & Coil Winding Expo – Topic: Automotive motors: Past accomplishments and challenges ahead.
03-25-2014 – Seminar, Marquette University, Milwaukee, WI – Topic: Transportation electrification: An overview with special considerations for commercial and off-road vehicles.
10-29-2013 – Keynote speaker, International Conference on Electrical Machines and Systems (ICEMS), Busan, Korea – Topic: Challenges to the electrification of commercial and off-road vehicles.
09-27-2013 – Seminar, IEEE Milwaukee Section and University of Wisconsin - Milwaukee, Milwaukee, WI – Topic: Transportation electrification: An overview with special considerations for commercial and off-road vehicles.
09-12-2012– Panel organizer and moderator, 3rd IEEE International Symposium on Sensorless Control for Electrical Drives (SLED 2012), Milwaukee, WI – Topic: Sensorless drives: A view from industry.
01-26-2012 – Seminar, IEEE Rock River Valley Section – Topic: Hybrid and electric vehicles: Where are we and where are we going?
11-18-2011 – Seminar, IEEE Milwaukee Section Graduate of the Last Decade Group, Milwaukee, WI – Topic: A career in the automotive industry: How to enjoy an industry's roller coaster ride.
09-20-2011 – Panelist, IEEE Energy Conversion Conference & Exhibition (ECCE), Phoenix, AZ – Topic: Vehicle electrification technologies, today and tomorrow.
10-30-2009 – Panelist, Blackburn Academic Symposium, the University of Alablama – Topic: Your future mobility: What will you be driving in 25 years?