

Ralph V. Wilhelm, Jr.
Ph.D.
Curriculum Vitae

Professional Summary

Dr. Wilhelm has over forty-five years of industry experience in the automotive industry beginning his career at General Motors Research Laboratory, eventually holding positions of increasing responsibility with Delphi Delco Electronics Corporation, and currently running an automotive electronics consultancy. Dr. Wilhelm is familiar with automotive electronic component technology and the supply-line management required not only producing suitable automotive components, but supervising the R&D, advanced engineering, forward technology development, sales, and product line management process from automotive suppliers to OEM vehicle manufacturer. He has worked in various technical and leadership roles to develop new products and complex systems from invention to production using both internal invention/development and external partnerships to achieve world-class automotive electronic systems worldwide. In 2001, Dr. Wilhelm founded and established an automotive electronics consultancy focused both on automotive electronics suppliers doing business in North America and also support for intellectual property litigation as an expert witness. Current work is balanced between traditional automotive supplier support and IP litigation support as an expert witness.

His firm, Wilhelm Associates (www.wilhelmassoc.com) has supported suppliers whose “home” countries have included Japan, Taiwan, China, Korea, Canada, United States, Germany, and France as they do business in North America.

Expert Witness Summary:

Recent Expert Witness work has included:

- **Litigation areas such as:**
 - Expert witness reports for invalidity, non-infringement, and obviousness
 - Claim Construction and Markman hearings
 - Reviewing and searching for appropriate prior art
 - IPR documentation (Petitions & Declarations)
 - Depositions and Court Testimony

- **Technical Automotive Areas such as:**
 - Instrument Clusters
 - Automotive primary and secondary displays; liquid crystal displays
 - Center Stack Displays and subassemblies
 - Human Factor Design and guidelines
 - Automotive User Interfaces, wired and wireless communication to handheld devices
 - Automotive sensors & transducers; electro-mechanical systems
 - Vehicle Telematics
 - Infotainment systems, head units, navigation & GPS Systems
 - Software architecture and microprocessors
 - On-board & Off-Board diagnostics and prognostics
 - Complex safety systems
 - Automotive Cameras & multi-camera vision systems
 - Closed loop feedback electronic systems with appropriate sensors, actuators, & algorithms
 - Automotive application of remote & wireless control devices

Expertise

Advanced Mobile Multi Media Automotive Systems	Human Machine Interface issues (HMI) for Automotive Electronics, displays, and Touch, Appearance, Lighting (TAL) devices
Automotive Electrical & Electronic Systems	Display Technology for Automotive Applications
Automotive ADAS & Safety Systems	Integrated Circuits for Automotive Applications
Design, Manufacturing & Distribution of Automotive Components	Navigation & Real Time Traffic Automotive applications
Electric Vehicle components and systems	Telematics and TSPs (call centers)
Expert Witness in Automotive Electronics	Component and Sub-system development

Education

<u>Year</u>	<u>College or University</u>	<u>Degree</u>
1985	University of Illinois	Executive Management Program
1987	University of Michigan	MBA, Operations & Strategy
1972	Rutgers University	Ph.D., Material Science/Ceramic Engineering
1967	Cornell University	B.S. (Electrical Engineering)

Professional Experience

From: 2001
To: Present
Organization: Wilhelm Associates, LLC
Title: President/Founder
Summary: Consulting firm concentrating in automotive electronics, telematics, infotainment, safety systems, systems engineering, and data communications between systems and devices, product/market & international business strategies

- Developing and using methodologies for market assessment, requirements definition, product design, strategy, and implementation
- Firm includes three part-time highly experienced Senior Associates plus other individuals as needed to support customers as needed
- Diverse client base: Japanese, Taiwanese, Chinese, Korean, French, German, Canadian, & US based
- Expert Witness in Automotive Electronics

From: 1997
To: 2001
Organization: Delphi Delco Electronics Corporation
Title: Product Line Mgr., Mobile Multi Media NA
Summary: Responsible for all deliverables for product line: strategy, tactics, technology planning, design, manufacturing, sales and delivery of product to OEM customers

- Responsible for revenue, cost management, profit margin and on-time delivery of products within budget and at required quality
- Won \$2.2 Billion revenue new business over 18 months, across three major product lines and five Vehicle OEMs
- Customers headquartered in Japan, Europe and North America, including GM, Ford, Toyota (Lexus), and Honda (Acura)
- Typical programs done on commercial development cycle of 6 to 15 months from specification to start of production

From: 1994
To: 1997
Organization: Delco Electronics Corp (living in Singapore)
Title: VP Engineering, Delco Electronics Asia/Pacific
Summary: Responsible for all application & design center engineering in seven Asian countries to support worldwide customers.

- Responsible for deliverables for all Asia/Pacific customers worldwide
- Charged with growing employee skill sets available near A/P customer locations to meet their worldwide requirements
- Revenue grew at 30 to 40% CAGR with revenue at \$250 Million in 1996 across 6 product lines, 8 customers, and OEMs in six countries

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- From: 1989
To: 1994
Organization: Delco Electronics Corporation
Title: Director, Advanced Development & Systems Integration (AD/SI)
- Summary: Responsible for creating & leading AD/SI staff, aimed at all R&D and product development for \$5 Billion automotive electronics business worldwide.
- AD/SI grew to 7 departments covering integrated circuit development & fabrication through automotive safety, infotainment, and communication products/systems
 - Budget in 1994 of \$50 Million with over 450 technical personnel worldwide
 - New products/systems in that period included: forward looking radar, obstacle detection, solid state YAW sensors, advanced airbag electronics & sensors, head up displays, RDS audio for North America, infrared based night vision, and telematics systems.
- From: 1984
To: 1989
Organization: Delco Electronics Corporation
Title: Dept. Head, Advanced Instrumentation & Display
- Summary: Responsible for leading an Advanced Engineering Department focused on developing new & creative uses of instrument cluster displays and center stack display assemblies.
- Significant developments included numerous head up displays (HUDs) that included the world's first commercial factory installed HUD for a production vehicle (1989).
 - Other technology and advanced product areas included three dimensional instrument clusters, full instrument clusters made totally of plastic LCDs, and the first production CRT installed in a North American factory installed vehicle.
- From: 1978
To: 1984
Organization: AC Spark Plug Division of General Motors
Title: Supervisor & Department Head, Materials Development
- Summary: Responsible for staffing and leading a technical department that created and produced world class coatings and processes for catalytic converters, exhaust oxygen sensors (EOS), and various metallic substrates for catalysis.
- Coating development done with physical vapor deposition (PVD) resulted in three unique patents for precious metal coatings, driving unique and market-leading EOS performance in the automotive market for closed loop emission control in NA
 - Lead team to scale-up production for thin film sputtering process for EOS sensor coatings

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From: 1971

To: 1978

Organization: General Motors Research Labs (GMR)

Title: Senior Research Scientist

Summary: Participated in research and development targeted at a variety of electronic sensors, transducers, coatings, and smart sensors that included integrated silicon devices for signal processing.

- Effort in the laboratory focused on bulk, thick film, and thin film devices to sense various operating parameters that were of importance in the monitoring & control of internal combustion engines, e.g. temperature, humidity, fuel flow, oxygen partial pressure, etc.
- Basic modeling and process development done at GMR on sputtered platinum/palladium thin film electrodes resulted in materials and process being transferred to GM operating division for successful product launch across all GM vehicles.

U.S. Patents Granted:

Title: Exhaust Electrode Process for Exhaust Gas Oxygen Sensor

Patent Number: 4,244,798

Publication date: January 13, 1981

Inventors: Terry J. Gold, Frederick L. Kennard III, Paul C. Kikuchi, Ralph V. Wilhelm, Jr.

Summary: A method of sputtering a platinum exhaust gas electrode onto a vitrified zirconia thimble for an electrochemical-type exhaust gas oxygen sensor. Porous high surface area platinum films are deposited that have more consistent properties. A platinum target is spaced about 3.0-4.5 cm from the thimble and more than 6 cm from the sputtering anode. A pressure of about 10-20 millitorr is used during sputtering at a DC power of about 13-22 watts/cm² of target area.

Title: Exhaust Sputtering Process for Exhaust Gas Oxygen Sensor

Patent Number: 4,253,931

Publication date: March 3, 1981

Inventors: Terry J. Gold, Kurt D. Humphrey, Keith A. Penney, Robert J. Smith, Randy L. Voto, Ralph V. Wilhelm, Jr.

Summary: A method of sputtering platinum onto a vitrified zirconia thimble to form an exhaust electrode for an electrochemical-type exhaust gas oxygen sensor. The electrode is sputtered under an atmosphere consisting essentially of more than about 50% oxygen and/or nitrogen by volume. Sensors having low symmetrical transition times are produced.

Title: Exhaust Electrode Process for Exhaust Gas Oxygen Sensor

Patent Number: 4,303,490

Publication date: December 1, 1981

Inventors: Terry J. Gold, Frederick L. Kennard III, Paul C. Kikuchi, Ralph V. Wilhelm, Jr.

Summary: A method of sputtering a palladium or palladium-platinum exhaust gas electrode onto a vitrified zirconia thimble for an electrochemical-type exhaust gas oxygen sensor. Porous high surface area films are deposited that have more consistent properties. A sputtering target is spaced about 3.0-4.5 cm from the thimble and more than 6 cm from the sputtering anode. A pressure of about 10-20 millitorr is used during sputtering at a DC power of about 13-22 watts/cm² of target area.

Litigation Support/Expert Witness Experience

Expert Engagement:

Type of Matter: Patent Litigation; potential issues of patent infringement filing between two vehicular suppliers involving electrical componentry and modules; multiple patents and multiple claims.

Law Firms: Domestic Commercial Law Firm

Case Name: Investigation on behalf of vehicular supplier

Services Provided: Investigation on behalf of Plaintiff. Analyzed documents and wrote reports in support of IPR filings.

Disposition: On-going

Date: 2017 to present

Fact Witness:

Type of Matter: Analysis of typical Supplier relationships in automotive marketplace; discussion of norms and expectations around commercial agreements and behaviors.

Law Firms: Domestic Commercial Law Firm

Case Name: Investigation on behalf of automotive supplier

Services Provided: Investigation on behalf of Defendant. Analyzed documents and wrote reports to describe typical automotive supplier relationships.

Disposition: Case Completed.

Date: 2016

Expert Engagement:

Type of Matter: Patent Litigation; potential issues of invalidity and non-infringement involving vehicle audio and infotainment systems plus externally sourced streaming audio; multiple patents and multiple claims

Law Firms: Hartline Dacus Barger Dreyer LLP/Janik Vinnakota LLP

Case Name: Blitzsafe Texas, LLC v Nissan North America, Inc.
Case No. 2:15-CV-1274-JRG-RSP

Services Provided: Investigation on behalf of Defendant. Reports in support of invalidity and non-infringement. Support for Summary Judgment. Case settled prior to trial.

Disposition: Case Completed.

Date: 2016 to 2017

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Expert Engagement:

Type of Matter: Patent Litigation; potential issues of invalidity and non-infringement involving software structure & architecture; multiple patents and multiple claims

Law Firms: International Law Firm

Case Name: Investigation on behalf of vehicle manufacturer

Services Provided: Investigation on behalf of Defendant.

Disposition: On-going

Date: 2016 to present

Expert Engagement:

Type of Matter: Patent Litigation; potential issues of invalidity and non-infringement involving telematics features and OBDII technology; multiple patents and multiple claims

Law Firms: Fitzpatrick, Cella, Harper & Scinto

Case Name: Root Four Imagination Inc. et al v LexisNexis Risk Solutions Inc. Case No. 1:16-cv-03149

Services Provided: Investigation on behalf of Defendant.

Disposition: Case Completed.

Date: 2016

Expert Engagement:

Type of Matter: Patent Litigation; potential issues of invalidity involving two patents and multiple claims in a vehicle display device, rear seat entertainment, wireless transmission of audio, and playback mechanism in a production vehicle

Law Firms: Prebeg, Faucett & Abbott PLLC and Howison & Arnott LLP

Case Name: Johnson Safety, Inc. v VOXX International Corporation; Case IPR2016-01070, IPR2016-01074

Services Provided: Investigation on behalf of Plaintiff. Declarations in support of two IPR Petitions.

Disposition: On-going

Date: 2016 to present

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Expert Engagement:

Type of Matter: Patent Litigation; potential issues of class actions involving advertised features/functions in an in-dash infotainment system in a production vehicle

Law Firms: US-based Law Firms

Case Name: Investigation on behalf of vehicle owners

Services Provided: Investigation on behalf of Plaintiffs. Opinions expressed to client but no formal reports or declarations and no depositions or court testimony.

Disposition: Case is on going but I am supplying no additional support.

Date: 2016

Expert Engagement:

Type of Matter: Patent Litigation; potential issues of invalidity with multiple patent claims concerning control of diesel glow plugs; areas of interest deal with optimization of vehicle operation, engine control, various sensors, actuators, and control electronics

Law Firm: Finnegan, Henderson, Farabow, Garrett & Dunner, LLP

Case Name: UUSI, LLC and Oldnar Corp. v The United States & AM General, LLC; Case No. 12-216 C

Services Provided: Investigation on behalf of Plaintiff. Declaration in support of pending claim construction and Markman hearing; Deposition.

Disposition: On-going

Date: 2016 to present

Expert Engagement:

Type of Matter: Patent Litigation; potential issues of invalidity with multiple patent claims; areas of interest deal with optimization of vehicle operation, engine control, various sensors, actuators, and control electronics

Law Firms: Hogan Lovells LLC, Venable LLP

Case Name: Velocity Patent LLC v Mercedes-Benz USA, LLC; v FCA US LLC, Civil Action No. 1:13-cv-08413, Civil Action No. 1:13-cv-08419

Services Provided: Investigation on behalf of Defendant. Declaration & Deposition in support of Summary Judgment.

Disposition: On-going

Date: 2015 to present

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Expert Engagement:

Type of Matter: Patent Litigation; potential issues of invalidity with multiple patent claims; areas of interest deal with closed loop feedback control of an automotive electronics system using sensors, data processing, and actuators

Law Firm: Fish & Richardson P.C.

Case Name: Adaptive Headlamp Technologies, Inc. v Koito Manufacturing Co., Ltd., Case IPR2016-00079

Services Provided: Investigation on behalf of Defendant. IPR Declaration.

Disposition: Case completed.

Date: 2015 to 2017

Expert Engagement:

Type of Matter: Patent Litigation; potential issues of invalidity and non-infringement, four patents with multiple claims; areas of interest center on technical/system areas such as infotainment, telematics, remote & wireless devices, and communication and supporting technologies such as satellite audio & BlueTooth.

Law Firm: Venable LLP

Case Name: Joao Control & Monitoring Systems, LLC v FCA US LLC, Case No. 4:13-cv-13957-MAG

Services Provided: Investigation on behalf of Defendant. Declarations in support of invalidity & non-infringement; depositions; support for summary judgment.

Disposition: Case completed.

Date: 2015 to 2016

Expert Engagement:

Type of Matter: Patent Litigation; potential issues of invalidity with multiple patent claims; areas of interest include design of critical electronic subsystem for automotive infotainment and telematics systems

Law Firm: Bryan Cave LLP

Case Name: M/A-COM Technologies Solutions Holdings, Inc. v Laird Technologies, Inc., Case Number: C.A. No. 14-181-LPS

Services Provided: Investigation on behalf of Defendant. Expert report. Deposition prior to Markman hearing. Court testimony during Markman Hearing.

Disposition: Case completed.

Date: 2014 to 2015

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Expert Engagement:

Type of Matter: Patent Litigation; potential issues of invalidity with multiple patent claims; areas of interest include automotive cameras, multi-camera vision and reconfigurable displays for the automotive marketplace

Law Firms: Osha Liang LLP; Kirkland & Ellis LLP

Case Name: Magna Electronics v Valeo North America, Case IPR2015-00250, Case IPR2015-00251, Case IPR2015-00252, Case IPR2015-00253, Case IPR2015-01410, Case IPR2015-01413, Case IPR2015-01414, Case IPR2015-01415

Services Provided: Investigation on behalf of Defendant. Multiple Declarations in support of eight IPR Petitions; investigation & analysis of prior art.

Disposition: On-going

Date: 2014 to present

Expert Engagement:

Type of Matter: Patent Litigation; invalidity & non-infringement with multiple patent claims; area of interest covers automotive user interface issues.

Law Firm: Erise IP, P.A.

Case Name: Vehicle Interface Technologies, LLC v Ford Motor Company, Case No: 1:12-cv-01284-RGA

Services Provided: Investigation on behalf of Defendant. Expert reports. Depositions. Support for Summary Judgment.

Disposition: Case completed.

Date: 2014 to 2015

Expert Engagement:

Type of Matter: Patent Litigation; potential issues of invalidity with multiple patent claims; area of interest covers automotive sensors and instrumentation.

Law Firms: Erise IP, P.A., Finnegan LLP, Steptoe & Johnson LLP, Jenner & Block LLP.

Case Name: Vehicle Operation Technologies, LLC v Ford Motor Company, American Honda Motor Co. Inc., BMW of North America LLC, and Nissan North America Inc., Case IPR2014-00594, Case IPR2014-00600, Case IPR2014-00601, Case IPR2014-00602, Case IPR2014-00603

Services Provided: Investigation on behalf of Defendants. Declarations in support of five IPR Petitions. Depositions.

Disposition: Case completed.

Date: 2014 to 2015

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Expert Engagement:

Type of Matter: Patent Litigation; potential issues of invalidity with multiple patent claims; area of interest covers vehicle telematics, automotive sensors, on board and off board diagnostics, prognostics, displays and instrumentation.

Law Firm: Kenyon & Kenyon LLP

Case Name: American Vehicular Sciences LLC v. Toyota Motor Corp., Case IPR2013-00414, Case IPR2013-00415, Case IPR2013-00417

Services Provided: Investigation on behalf of Defendant. Declarations in support of three IPR Petitions. Depositions.

Disposition: Case completed.

Date: 2013 to 2015

Expert Engagement:

Type of Matter: Patent Litigation; potential issues of invalidity with multiple patent claims; area of interest covers automotive user interface issues

Law Firm: Frommer Lawrence & Haug LLP

Case Name: Vehicle Interface Technologies, LLC v Porsche Cars NA, Case IPR2014-00014

Services Provided: Investigation on behalf of Defendant. Declaration in support of IPR Petition.

Disposition: Case completed.

Date: 2013 to 2014

Expert Engagement:

Type of Matter: Patent Litigation; potential issue of invalidity with multiple patent claims

Law Firm: Brooks Kushman P.C.

Case Name: OnStar Corp. v Micral, Inc. et al. Case No. 3:08-cv-2047

Services Provided: Investigation on behalf of plaintiff. Expert report.

Disposition: Case completed

Date: 2009

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Fact Witness:

Type of Matter: Multiple litigation; Large Vehicle Manufacturer versus key supplier; claims of improper design of automotive component in a complex safety system.

Law Firm: Susman Godfrey L.L.P.

Case Name: Ford Motor Company v Texas Instruments

Services Provided: Investigation on behalf of Defendant. Consultation on design standards, analysis of test data and methods; review of public literature; conversations with firm legal staff; discussions with industry experts on system design; comparison to various similar complex safety systems with criteria for design responsibilities and process control in manufacturing; expert opinions offered on system design by automotive group and inherent roles and responsibilities in that effort.

Disposition: Case completed

Date: 2005 to 2008.

Fact Witness:

Type of Matter: Multiple litigations; former employee versus Delphi Delco Electronics Systems; employee claims of improper and prejudicial grounds for releasing him from the company.

Law Firm: Baker and Daniels (Indianapolis, Indiana)

Case Name: Deposed on behalf of Defendant (employee name is confidential)

Services Provided: Testified in court re: grounds for dismissal of employee

Disposition: Case completed

Date: Approximately 1992.

Fact Witness:

Type of Matter: Lead off (and only) witness, Clean Room Manufacturing Company versus AC Spark Plug Division of General Motors; third party company claims of improper and inadequate compensation in the construction of a semiconductor grade Clean Room complex.

Law Firm: Large law firm based in Michigan

Case Name: Deposed on behalf of Defendant

Services Provided: Provided deposition regarding the expectations, dates, process, and the documentation used to judge the fulfillment of the contract and the consequent payment for services.

Disposition: Case completed

Date: Approximately 1983.

Awards, Achievements & Affiliations

AWARDS:

- Vincent Bendix Automotive Electronics Engineering Award for Outstanding Society of Automotive Engineers Paper, 1978
- Arch T. Colwell Merit Award for Outstanding Society of Automotive Engineers Technical Presentation, 1978
- “Boss” Kettering Technical Award (internal GM, 3 to 5 given per year for patents that demonstrate considerable financial advantage to the company) 1979
- Elected Fellow, American Ceramic Society, 1984
- Delphi Innovation Hall of Fame, 1997
- Cornell University, Commitment to Community Service Award, 2009
- Lambda Chi Alpha National Fraternity, Distinguished Service Award, 2010
- Indianapolis Symphony Orchestra Board Volunteer of the Year Award, 2012
- Lambda Chi Alpha Recognition Award for service to the National Fraternity, the local chapter, and the entire Greek Community at Cornell University, 2013
- James H. McLaughlin Interfraternity Service Award, 2015 (by Zeta Psi Fraternity)

ACHIEVEMENTS and AFFILIATIONS:

- Inventor, Thin Film processes and materials for automotive sensors, three US patents granted.
- Member/Fellow, numerous technical societies. (PREVIOUS: Accreditation Board for Engineering and Technology, American Ceramic Society, Society for Information Display; CURRENT: Sigma Xi, Society of Automotive Engineers (SAE), Institute for Electrical and Electronics Engineers (IEEE).)
- Member, Board of Directors, Mecel AB, Amal, Sweden.
- Member, Industrial Advisory Board, Department of Electrical Engineering, Northwestern University.
- Team Director, Cornell University – General Motors Corp. University relations.
- Served as Board Member, Delphi Delco & Kokomo Center Schools Educational Partnership.
- Director, Educational Foundation Board, Lambda Chi Alpha Fraternity.
- Board Member, General Fraternity Board & Exec Committee, Lambda Chi Alpha Fraternity.
- Serving on numerous Cornell University committees & activities, including the Cornell University Council, Fraternity/Sorority Advisory Council chair, Student & Campus Life Advisory Council, numerous reunion committees and ad hoc committees.
- Teaching (2003 to 2007) a single module of a one-semester course in Technical Management (400/500 level) in the College of Engineering at Cornell University, Ithaca, New York.
- Served as accredited member for Ceramic Engineering Education for the Accreditation Board for Engineering & Technology.
- Registered Consultant, Society of Automotive Engineers – Automotive Resources Institute (SAE- ARI)
- Board Member for Finance, Planning, & Steering Committee, Capital Campaign, Nominating, and Personnel at the First Presbyterian Church, Noblesville, Indiana.
- Board Member, Indiana Symphony Society, parent of the Indianapolis Symphony Orchestra. Currently on Executive Committee and other Board operating committees.
- Advisory Board for the Indiana Economic Development Corporation.
- Board Member, Board of Advisors for an Active Safety Institute Consortium.
- Board of Advisors, North American Start-Up with Automotive Safety Systems Products
- Industrial Advisory Board, Engineering Programs, University of Indianapolis.

Publications and Presentations

Author of dozens of technical papers and invited presentations.

For example, invited keynote addresses of merit:

- Invited Keynote speaker (lead off for international meeting), Society for Information Display, San Diego, California, 1990, “The Vision of Future Automotive Display Technology.”
- Invited Keynote (sole speaker), Japanese Designers and Manufacturers of LCD Flat Panel Displays, Kobe, Japan, 1992 (approximate), “The Future of Flat Panel Displays in the Automotive Industry”. (Simultaneous translation into Japanese.)
- Invited Keynote speaker (one of four speakers on one panel), European Automotive Manufacturing Organization, Bern, Switzerland, 1993 (approximate), “World Wide Demand for Commonly designed Automotive Electronic System Platforms.” (Simultaneously translated into four languages)

RALPH V. WILHELM, JR.

16002 Colleton Court

Carmel, Indiana 46033

Work/cell: (317) 508-6866

Fax: (317) 571-0429

Home: (317) 571-0422

E-mail: RalphWilhelm1@gmail.com

Web: www.wilhelmassoc.com