

## **Curriculum Vitae**

**Charles E. Benedict, Ph.D., P.E.**

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Dr. Benedict is an electro-mechanical engineer specializing in design and development of electronic, mechanical and electro-mechanical machinery and equipment, such as material handling systems, automated assembly machines, weaving and tufting machines, sub-systems as well as commercial and consumer products. He holds many patents for the equipment and products he has developed and manufactured. He has also qualified as an expert in vehicular accident reconstruction, biomechanics, occupant kinematics, fire cause and explosion origin analysis of structures as well as vehicles, construction and processing accidents, people movers, material handling equipment and conveyors, in addition to other electro-mechanical systems, product failure analysis involving product development and machine design. Dr. Benedict has also served as an expert in patent infringement cases involving automotive sub-systems such as light controls, material handling equipment, consumer products and other electro-mechanical products and equipment.

He has developed and manufactured products and equipment for the U.S. Air Force, U.S. Navy, U.S. Military Sealift Command, U.S. Army, Proctor and Gamble Co., General Electric Co., AT Cross Company Co, Honeywell Corp., Westinghouse Company Corp., Olin Corp. and others. His extensive experience in developing products and machine systems has qualified him as an expert in analyzing a multitude of product, system and machine failures.

During his graduate program he worked with his major professor in using his research in the dynamics and kinematics of linkage and mechanical systems to develop artificial knee joints and knee braces which replicated the actual knee rotation of the knees for athletes and others. He has performed biomechanical analysis to determine the injury mechanism associated with injuries suffered by occupants of vehicles as well as accidents where the individual has been injured by falls or by being struck by moving objects of various kinds. He has been qualified as a biomechanical engineer in many state and federal courts and upheld as a qualified biomechanical engineer by the District Court of Appeals in Florida. He works closely with biomedical engineers and medical doctors to provide them with the forces and mechanical injury mechanism acting on the human body where injuries occur.

As a graduate student, he worked as a consultant to Proctor and Gamble, assisting them in solving and correcting major kinematic and dynamic problems with their soap manufacturing machinery and equipment.

He began his career as a graduate engineer in 1971, designing machinery and products and performing accident reconstruction of vehicles and construction of all kinds as well as for product, machinery failures and defects. He became a registered professional engineer (PE) in Florida in 1974. He holds many awards for his engineering design and analysis.

He has been qualified as an expert in biomechanics, occupant kinematics, accident reconstruction, product and machine design, patent infringement and safety as well as fire and explosion origin in federal and/or state courts of Florida, Georgia, Alabama, Mississippi, Louisiana, Maryland, Oregon, New Mexico, Wisconsin, South Carolina, California, Texas, West Virginia, Oklahoma, Missouri, Ohio, and others.

Dr. Benedict began his career as an engineering technician, with a private consulting engineering firm while he was in high school, working weekends and summers, performing land surveying to the level of instrument man and party chief, documenting and designing roadways, underground utilities, as well as sewage treatment systems. He continued working as an engineering technician during most of his tenure at Florida State University. During his studies at FSU he took courses in engineering in the Engineering Science Department. During the summer of 1958 he worked on the precision survey crew at the Glen Canyon Dam in Arizona which was responsible for continually monitoring the plane-of-centers for the dam and powerhouse, vertical slope of the keyways and the centerlines of the access and diversion tunnels, spillways and the single arch vehicle bridge span across the canyon. He also performed high scaling for vertical surveying down the 750 high canyon walls.

When he graduated from FSU in 1963 he worked for Florida Gas Transmission Company (Aka Houston Texas Gas & Oil Corporation) in Gainesville Florida as a Measurement Technician. He had worked for the Houston Texas Gas & Oil Corporation during the summer of 1959 at their Wiggins, Mississippi compressor station where he learned about the transmission of natural gas. During his five years with FGTC he maintained gate stations where gas was delivered to customers including municipalities, power plants and industrial customers as well as the same equipment at the Hydrocarbons plant. This involved testing and calibrating orifice and positive displacement meters as well as maintaining the pressure regulators used to reduce the line pressure to the customers required delivery pressures. It also involved maintaining the odorant (methyl mercaptan/methanethiol) and alcohol injecting equipment. He operated and maintained the Brooker Test Lab where the gas was analyzed for the BTU content, specific gravity and hydrate levels before and after passing through the Cold Oil Absorption Hydrocarbons plant (located adjacent to the Brooker compressor station) where water, butane, propane and natural gasoline were removed and processed from the incoming gas stream. The gas left the plant as dry gas (i.e. ethane and methane only). The responsibilities also included securing the gate stations during hurricanes and two major line breaks caused by private companies puncturing the previously marked lines, causing massive interruptions to the gas delivery and physical damage and death. While at FGTC he designed, built and successfully tested a unique, mechanically actuated streamline flow, high pressure regulator which eliminated the use of the failure prone, hydraulically actuated, compressible, butyl rubber used to vary the flow rate through the regulator. His High Honors project for his Bachelor's degree at the University of Florida involved analyzing and simulating the operation of this regulator.

In May of 1968 he resigned from FGTC and enrolled in the University of Florida and obtained a BS in Mechanical Engineering with High Honors, an MS and PhD. in Mechanical Engineering with a specialty in Machine Design, Kinematics and Dynamics of Mechanical Systems and Biomechanics. He was inducted into Omicron Delta Kappa with academic and leadership honors. He was also awarded a three year National Defense Education Act (NDEA) fellowship for his graduate studies. During his tenure at the UF he continued working for FGTC on a contract basis, changing the charts daily and maintaining the four gate stations in Gainesville, Florida.

Upon graduation from the University of Florida, Dr. Benedict joined Wayne H. Coloney Company (WHCC) to establish their product and machine design division. One of the first

Projects that Dr. Benedict undertook after graduation with his doctorate was to solve a \$40MM problem FGTC had with their large 2,200 horse power compressor engines where the crank shafts and main bearing blocks were failing from the dynamic overloading which the engine manufacturer could not solve. The project was a success and the failures ceased. As principle designer, chief operating officer and ultimately president of WHCC, he guided the company's growth from 5 employees with annual revenues of \$250,000 to 135 employees in 1981 with annual revenues of \$26,000,000. While there, he performed consulting engineering design services for companies in the textile industry, battery manufacturing, medical equipment, rubber product manufacturing and many other industrial disciplines. He was instrumental in the design, development and manufacture of the entire Ground Support Equipment (GSE) system for uploading/downloading the GAU-8 ammunition into the A-10 aircraft to meet its fifteen minute hot turn requirement. He developed the ammunition loading system for the Ford Aeronutronics DIVAD System (Sergeant York System). He also developed the first-ever credit card-activated fuel accounting system for the USAF, a system that is the foundation for all present credit card-operated fuel pumps in service in the world. He started up and operated three separate manufacturing plants.

During his ten years with WHCC he continued performing civil engineering design and construction supervision of roadways, sewage treatment plants and land development. As a registered professional engineer he served as the consulting city engineer for four small cities in the northern and panhandle parts of Florida. He and his partner designed and utilized a then new engineering product, dried bacteria culture (DBC), for improving municipal sewage treatment plant operation and for treating and digesting oily waste at bus and truck maintenance terminals. Use of the DBC exceeded the Florida Department of Environmental Regulation and EPA water quality requirements during the 1970's and 80's.

Dr. Benedict began performing accident reconstructions in late 1971 and has continued doing so since. He reconstructs vehicle accidents involving automobiles, large trucks, motorcycles, bicycles, boats, ATVs, personal watercraft (PWCs) among other types of vehicles. Prior to and during the ATC & ATV CPSC investigation and settlement he investigated, analyzed testified in over seventy (70) 3&4 wheel accidents using his advanced dynamics knowledge to pinpoint the defects in both vehicles. He is still contacted from time to time on these accidents. He has also determined the cause for fuel and mechanical failures in helicopters and small aircraft which caused them to crash. He was certified as a fire origin and explosion investigator for many years and has and still performs many fire and explosion investigations for clients. He has testified in over 1,000 depositions and over 200 trials in both federal and state courts in numerous states in the US.

As a result of his experience in preparing patent application documents and initial specifications and claims for patent prosecutors to write the numerous applications for the myriad of products, equipment and systems he has designed, he is knowledgeable about patent law and the patent process. He has served as an expert in a number of patent infringement litigation cases including litigation as a plaintiff and as a defendant for patents owned by BEC. He has prepared "claim construction" documents for Markman hearings, claim comparisons for infringement issues, given depositions and appeared in federal courts.

During his graduate program he worked with his major professor in using his research in the dynamics and kinematics of linkage and mechanical systems to develop artificial knee joints and knee braces which replicated the actual knee rotation of the knees for athletes and others. He has performed biomechanical analysis to determine the injury mechanism associated with injuries suffered by occupants of automobiles as well as accidents where the individual has been injured by falling or by being struck by moving objects of various kinds since the early 80's. He uses surveillance tapes to analyze falls by individuals as well as for falling objects onto individuals by using stop frame analysis and enhancement. He has been qualified as a biomechanical engineer in many state and federal courts and upheld as a qualified biomechanical engineer by the First District Court of Appeals in Florida. He works closely with biomedical engineers and medical doctors to provide them with the forces and mechanical injury mechanisms which cause injuries to the human body.

In 1981, Dr. Benedict left WHCC to establish Benedict Engineering Company (BEC). As BEC's president, he consults in the areas of research, design, development, and production of products and machine systems including material handling equipment, as well as accident reconstruction, product failure and defect analysis. Dr. Benedict holds over 100 patents, including those for the A-10 ammunition handling and loading system, the multi-directional material handling system for the Military Sealift Command (MSC) and the SBIR funded Vertical AGV for NAVSEA to use on aircraft carriers. He has extensive experience in dynamics, kinematics, product design, machine design, and other electro-mechanical system designs. A partial list of the companies for whom he has developed machinery and equipment include Card Company, Fieldcrest Mills, Draper Corporation (aka Rockwell International), the U.S. Air Force, General Electric Company (GAU 8 Gun), General Electric's Battery Business Division, A.T. Cross Company, Proctor & Gamble, Aero Jet Ordnance, Honeywell Ordnance Division, and the Olin Corporation. In 1989, Dr. Benedict performed extensive research and study on NAVSEA supply-ship material-handling requirements by meeting with NAVSEA headquarters personnel in Washington D.C. and Earle, N.J. He submitted an unsolicited proposal for a MHE system to solve the problem of supply ship deck overloading during transport of cruise missile containers. He has also participated in design review meetings with PHST-Earle and NAVSEA-Washington on the requirements for automating the material handling equipment (MHE) for the new ADC(X) supply ship. He is the originator and chief engineer for the design, development, fabrication, and successful demonstration of an HRVHMM (Vertical Automatic Guided Vehicle) for the CVN(21) program (USS Reagan Aircraft Carrier) and for a pre-positioning overhead material handling system for 20-foot ISO containers on LMSR class ships for the Military Sealift Command (MSC).

As a result of his education and experience in designing and developing a wide range of numerous products and machine systems, establishing and operating multi-million dollar manufacturing facilities to produce and market some of the products and systems he has designed and developed, he has analyzed product, machinery and equipment failures involving design and manufacturing defects including vehicles, commercial and consumer products, machinery, equipment, roadways, railroad accidents including railroad crossings and construction. In addition, he has developed, tested and patented numerous components for use with automobiles including Automated Light Switch Systems, Non-Inertial Release Restraint Buckles and a Cam Phase Change Mechanism.

Publications and Professional Activities – Dr. Benedict has authored or co-authored more than 20 publications, has patents for over 100 products and machine systems, and is a member of the American Board of Forensic Examiners (life member), American Society of Mechanical Engineers, American Society of Safety Engineers, American Society for Testing and Materials, Florida Engineering Society, National Safety Council, National Society of Professional Engineers, Engineering and Technology Service to Industry, Past Board of Directors

(Engineering Advisory Council – University of Florida), External Advisory Board member of the UF Mechanical and Aerospace Engineering Department, Society of Automotive Engineers, Tau Beta Pi, Phi Kappa Phi, Pi Tau Sigma and Omicron Delta Kappa. He has also been the recipient of the General Lewis Brereton Award for Significant Contributions to United States Aerospace (1978), the Florida Engineering Society Design Excellence Award (twice) and an Outstanding Alumnus of the Mechanical and Aerospace Engineering Department of the University of Florida

## EDUCATION

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- 1971**                    **Doctor of Philosophy in Mechanical Engineering  
by NDEA Title IV Fellowship**  
Minor, Electrical Engineering  
University of Florida, Gainesville, FL
- 1969**                    **Master of Science in Mechanical Engineering**  
University of Florida, Gainesville, FL
- 1968**                    **Bachelor of Science in Mechanical Engineering**  
With High Honors  
University of Florida, Gainesville, FL
- 1963**                    **Bachelor of Science in Mathematics**  
Minor, Engineering Science  
Florida State University, Tallahassee, FL

## PROFESSIONAL EXPERIENCE

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- 1984 to present**      **BEC Companies, Inc.**  
**(Formerly Benedict Engineering Company, Inc.), Tallahassee, FL**  
President and CEO
- BEC Industries, LLC, Tallahassee, FL**  
CEO and General Manager
- BEC Consulting, LLC, Tallahassee, FL**  
CEO and Consultant

<b>1982 to 1984</b>	<b>Benedict &amp; Associates, Inc., Tallahassee, FL</b> President
<b>1971 to 1981</b>	<b>Wayne H. Coloney Company, Inc., Tallahassee, FL</b>
1978 to 1981	President
1973 to 1977	Vice President
1972 to 1973	Manager, Forensic Engineering and Machine Design Division
1971 to 1972	Mechanical Engineering Consultant
<b>1964 to 1968</b>	<b>Florida Gas Transmission Company, Gainesville, FL</b> Measurement Technician
<b>1953 to 1963</b>	<b>Barrett, Daffin, Coloney &amp; Bishop, Tallahassee, FL</b> Engineering Technician

## LICENSES, REGISTRATIONS & CERTIFICATIONS

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No. 17229	State of Florida Professional Engineer
No. 26378-E	State of Alabama Professional Engineer
No. 23491	State of South Carolina Professional Engineer
No. 23538	State of Georgia Professional Engineer
No. 117455	State of Texas Professional Engineer
No. 1228	Board Certified Forensic Examiner

## PROFESSIONAL ASSOCIATIONS

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- American College of Forensic Examiners, Fellow, I.D. #1228
- American Society of Mechanical Engineers, Fellow
- American Society of Safety Engineers
- American Society for Testing Materials
- Florida Engineering Society
- Governors Club, Founding Member
- National Defense Transportation Association
- National Fire Protection Association
- National Safety Council
- National Society of Professional Engineers
- President's Association Affiliated with American Management Association
- Society of Automotive Engineers
- Tau Beta Pi, Phi Kappa Phi, Pi Tau Sigma, Omicron Delta Kappa

## **PAST PROFESSIONAL ASSOCIATIONS**

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- American Society of Agricultural Engineers
- American Boat and Yacht Council
- American Concrete Council
- Association for the Advancement of Automotive Medicine
- National Fire Prevention Association

## **COURSEWORK/CONTINUING EDUCATION**

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|------|---|
| 2013 | “Claims Defense Update 2013”<br>Henderson, Franklin, Starnes & Holt, PA, Tampa, FL  |
| 2011 | “Safe Operation of Powered Industrial Truck”<br>BEC Consulting, Tallahassee, FL   |
| 2004 | “Analysis of Collisions Involving Pedestrians or Bicyclists”<br>Collision Safety Institute, Tallahassee, FL   |
| 2000 | “Commercial Vehicle Inspection and Collision Investigation”<br>Texas A&M University, Tallahassee, FL  |
| 2000 | “Advanced Vehicle Inspection and Collision Investigation”<br>Texas A&M University, Tallahassee, FL  |
| 1991 | “SAE Motor Vehicle Accident Reconstruction Seminar”<br>Dr. Rudolph Limpert, Tallahassee, FL   |
| 1990 | “Crash Reconstruction Purpose and Principles”<br>Association for the Advancement Automotive Medicine, Orlando, FL   |
| 1990 | “Crash Performance Standards and the Biomechanics of Impact: What Are<br>the Relationships?”<br>Association for the Advancement of Automotive Medicine, Orlando, FL |
| 1987 | “Motorcycle Dynamics and Accident Avoidance”<br>Michelin Safety Group, Watkins Glenn, New York  |
| 1986 | “Accident Avoidance and Tire Blow-Out Control and Dynamics”<br>Michelin Safety Group, Carson City, NV   |

## **PUBLICATIONS**

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Benedict, C.E. and Gary K. Matthew. "Selection And Optimization Of A Mechanism To Drive An Orange Tree Canopy Shaker." Paper presented at the New Wave of Technology Workshop at the University of Texas, August 2010.

Buchner, G.B. and C.E. Benedict. "Finding, Understanding and Utilizing the Coefficient of Friction." Paper presented at the ATLA National College of Advocacy Conference, 1995.

Benedict, C.E. and D. Tesar. "Model Formulation of Complex Mechanisms with Multiple Inputs: Part II – The Dynamic Model." Paper presented at the Transactions of the Winter ASME Meeting, 1977.

Benedict, C.E. and D. Tesar. "Model Formulation of Complex Mechanisms with Multiple Inputs: Part I – Geometry." Paper presented at the Transactions of the Winter ASME Meeting, 1977.

Benedict, C.E. and D. Tesar. "The Use of Influence Coefficients in Treating the Dynamics of Machine Problems." Proceedings of the Applied Mechanisms Conference, Paper No. 43, 1973.

Benedict, C.E. "Dynamic Response Analysis of Complex Mechanisms Systems with Multiple Inputs." Ph.D. diss., University of Florida, 1971.

Benedict, C.E., D. Tesar and G.K. Matthew. "Torque Balancing of Machines by Sub-Unit Cam Systems." Proceedings of the Applied Mechanisms Conference, 1971.

Benedict, C.E. and D. Tesar. "Dynamic Response of a Mechanical System Containing a Coulomb Friction Force." Transactions of the International Federation of Theory of Machines and Mechanisms, 1971.

Benedict, C.E. and D. Tesar. "Dynamic Response Analysis of Quasi-Rigid Mechanical Systems Using Kinematic Influence Coefficients." *International Journal of Mechanisms*, 1971.

Benedict, C.E. and J.S. Smith. "Design by Second Order Derivative Specifications." *Mechanical Engineering News*, Feb, 1971.

Benedict, C.E. and D. Tesar. "Optimal Torque Balance for a Complex Stamping and Indexing Machine." Paper presented at the ASME Mechanisms Conference, 1970.

Benedict, C.E. and D. Tesar. "Analysis of a Mechanical System Using Kinematic Influence Coefficients." Paper presented at the Applied Mechanisms Conference, Oklahoma State University, 1969.

Benedict, C.E. "Dynamic Response Analysis of Real Mechanical Systems Using Kinematic Influence Coefficients." Master's thesis, University of Florida, 1969.

Benedict, C.E. "Response Analysis and Optimization of Parameters of a Spring Loaded High Pressure Gas Regulator." High Honors Project, University of Florida, 1968.

## **PRESENTATIONS**

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Benedict, Charles E. "Biomechanics of Motor Vehicle Accidents." Lynn University Course on Biomechanical Trauma, Miami, FL, May 17, 2002.

Benedict, Charles E. "Accident Reconstruction, Collision Dynamics and Injury Mechanisms." Lynn University Course on Biomechanical Trauma, Miami, FL, October 18, 1996.

Benedict, Charles E. "Accident Reconstruction, Collision Dynamics and Injury Mechanisms." Lynn University Course on Biomechanical Trauma, Miami, FL, May 10, 1995.

Benedict, Charles E. "Accident Reconstruction: Capturing the Jury's Attention." Risk Insurance Management Society Conference, Naples, FL, August 18, 1995.

Benedict, Charles E. "Finding, Understanding and Utilizing the Coefficient of Friction." Association of Trial Lawyers of America, National College of Advocacy Conference, Dallas, TX, September 23, 1995.

Benedict, Charles E. "Accident Reconstruction, Collision Dynamics and Injury Mechanisms." Lynn University Course on Biomechanical Trauma, Miami, FL, January 20, 1994.

Benedict, Charles E. "The Coloney Ammunition Loading System." American Defense Preparedness Association – Loading, Assembly & Packing Ammunition Technology, 1978.

Benedict, Charles E. "Dynamics of Machinery." NSF Workshop, Oklahoma State University, 1971.

## **PATENTS & PATENTS PENDING**

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Benedict, Charles E., Brian G. Pfeifer, Christian A. Yates, Richard E. Lackinger, et al., "Port Storage and Distribution System for International Shipping Containers" Hong Kong Patent No. HK1144185, filed March 2, 2007 and issued February 6, 2015.

Benedict, Charles E., Brian G. Pfeifer, Christian A. Yates, Scott K. Bladen, et al, "Material Handling and Storage/Warehouse System" U.S. Patent No. 8,628,289, filed August 12, 2010 and issued January 14, 2014.

Benedict, Charles E., Scott K. Bladen, James R. Dobbs, et al, "Automated Shipboard X-Y Track Material Handling and Storage Method" U.S. Patent No. 8,408,863, filed April 26, 2010 and issued April 2, 2013.

- Benedict, Charles E., Scott K. Bladen, James R. Dobbs, et al., "Port Storage & Distribution System for International Shipping Containers." U.S. Patent No. 8,206,074, filed July 9, 2010 and issued June 26, 2012.
- Benedict, Charles E., Scott K. Bladen, James R. Dobbs, et al. "Overhead Vehicle Storage System." Canadian Patent No. 2,664,184, filed March 30, 2009 and issued January 3, 2012.
- Benedict, Charles E., Scott K. Bladen, James R. Dobbs, et al. "Automated Material Handling System with Load Transportation Vehicles." US Patent No. 7,931,431, filed September 5, 2006 and issued April 26, 2011.
- Benedict, Charles E., Scott K. Bladen, James R. Dobbs, et al. "Overhead Vehicle Storage System." US Patent No. 7,909,558 B2, filed May 2, 2007 and issued March 22, 2011.
- Benedict, Charles E., Scott K. Bladen, James R. Dobbs, et al. "Overhead Boat Storage System." US Patent No. 7,850,412 B2, filed May 2, 2007 and issued December 14, 2010.
- Benedict, Charles E. and Gary K. Matthew, "Linkage Drive Mechanism for Citrus Harvesters." U.S. Provisional Patent Application No. 61/377997, filed August 30, 2010.
- Benedict, Charles E., Scott K. Bladen, James R. Dobbs, et al., "Automated Automotive Vehicle Parking/Storage System." U.S. Patent Application No. 12/855017, filed August 12, 2010.
- Benedict, Charles E., Scott K. Bladen, James R. Dobbs, et al. "Port Storage and Distribution System for International Shipping Containers." U.S. Patent No. 7,753,637, filed March 1, 2007 and issued July 13, 2010.
- Benedict; Charles E. "Non-Inertial Release Safety Restraint Belt Buckle Systems." U.S. Patent No. 7,225,511, filed December 17, 2004, and issued June 5, 2007.
- Benedict, Charles E., Scott K. Bladen, James R. Dobbs, et al. "Warehouse Storage System." U.S. Patent Application No. 11/743585, filed May 2, 2007.
- Benedict; Charles E. "Permanent and Semi-Permanent Groyne Structures and Method for Shoreline and Land Mass Reclamation." U.S. Patent No. 6,932,539, filed January 20, 2004, and issued August 23, 2005.
- Benedict; Charles E., Corbett; Stephen R., Yates; Christian and Boeshaghi; Farhad. "Safety Guard for Band Saws." U.S. Patent No. 6,857,347, filed March 18, 2003, and issued February 22, 2005.
- Benedict; Charles E., Thompson; William P., Corbett; Stephen R., Dobbs; James R. and Bladen; Scott K. "Track Mounted Stanchion and Clamp Assemblies for Storage and Dunnage Systems." U.S. Patent No. 6,749,383, filed January 9, 2002, and issued June 15, 2004.

Benedict; Charles E., James R. Dobbs, Christian A. Yates, and Perry L. Ponder. "Adjustable Porous Structures and Method for Shoreline and Land Mass Reclamation." U.S. Patent No. 6,722,817, filed November 18, 2002, and issued April 20, 2004.

Benedict; Charles E. "Non-Inertial Release Safety Restraint Belt Buckle Systems." U.S. Patent No. 7,263,749, filed March 31, 2004, and issued September 4, 2007.

Benedict; Charles E., Brian G. Pfeifer, Christian A. Yates, and Scott K. Bladen. "Automated Shipboard Material Handling and Storage System." U.S. Patent 7,708,514, filed March 31, 2004, and issued May 4, 2010.

Benedict; Charles E., William P. Thompson, Stephen R. Corbett, James R. Dobbs, and Scott K. Bladen. "Stanchion and Clamp Assemblies for Storage and Dunnage Systems." U.S. Patent No. 6,705,812, filed January 9, 2002, and issued March 16, 2004.

Benedict; Charles E., James R. Dobbs, and Perry L. Ponder. "Permanent and Semi-Permanent Groyne Structure and Method for Shoreline and Land Mass Reclamation." Japanese Patent No. 3,983,675, filed May 9, 2002, and issued July 13, 2007.

Booeshaghi; Farhad, Charles E. Benedict, Stephen R. Corbett, Christian A. Yates, et al. "Pivotal Guards for Power Hand Tools with Rotating Discs." U.S. Patent No. 6,699,114, filed April 26, 2002, and issued March 2, 2004.

Benedict; Charles E. "Non-Inertial Release Safety Restraint Belt Buckle Systems." U.S. Patent No. 7,073,235, filed February 3, 2004 and issued July 11, 2006.

Benedict; Charles E. "Non-Inertial Release Safety Restraint Belt Buckle Systems." U.S. Patent No. 7,146,692, filed September 25, 2003 and issued December 12, 2006.

Benedict; Charles E., James R. Dobbs, and Perry L. Ponder. "Permanent and Semi-Permanent Groyne Structures and Method for Shoreline and Land Mass Reclamation." U. S. Patent No. 6,558,075, filed May 10, 2001, and issued May 6, 2003.

Benedict; Charles E. "Automated Material Handling System with Motorized Transfer Vehicles." U.S. Patent No. 7,101,139, filed May 6, 2003 and issued September 5, 2006.

Benedict; Charles E. "Non-Inertial Release Safety Restraint Belt Buckle System." U.S. Patent No. 6,539,595, filed June 29, 2001, and issued April 1, 2003.

Benedict; Charles E. and Donald M. Stumpf. "Vehicle Light, Windshield Wiper Control System." Canadian Patent No. 2,141,819, filed August 3, 1992, and issued February 11, 2003.

Benedict; Charles E., James R. Dobbs, Christian A. Yates, and Perry L. Ponder. "Adjustable Porous Structures and Method for Shoreline and Land Mass Reclamation." U. S. Patent No. 6,481,926, filed April 9, 2001, and issued November 19, 2002.

Benedict; Charles E. and Donald M. Stumpf. "Vehicle Light, Windshield Wiper Control System." Canadian Patent No. 2,115,169, filed August 3, 1992, and issued November 12, 2002.

Benedict; Charles E. "Doorstop." U.S. Patent No. 6,120,072 filed June 28, 1999, and issued September 19, 2000.

Benedict; Charles E., Douglas A. Newcomer, Gregory W. Hatcher, Timothy M. Cheek, and Douglas R. Stahl. "Safety Guard Stop for Power Saws." U. S. Patent No. 6,119,569, filed June 30, 1997, and issued September 19, 2000.

Benedict; Charles E. "Temperature Responsive Fluid Flow Controllers. U.S. Patent No. 5,984,195, filed May 15, 1997, and issued November 16, 1999.

Benedict; Charles E. "Temperature Responsive Valves and Method of Regulating Fluid Flow There through." U.S. Patent No. 5,967,409, filed May 11, 1998, and issued October 19, 1999.

Benedict; Charles E., Douglas A. Newcomer, Gregory W. Hatcher, Timothy M. Cheek, and Douglas R. Stahl. "Miter Saw Blade Guards." U.S. Patent No. 5,950,514, filed February 28, 1997, and issued September 14, 1999

Benedict; Charles E. "Adjustable Porous Groynes and Method for Shoreline Reclamation." U.S. Patent No. 5,944,443, filed February 23, 1998, and issued August 31, 1999

Benedict; Charles E. "Pool Skimmer Screens." U.S. Patent No. 5,935,450, filed December 4, 1997, and issued August 10, 1999.

Benedict; Charles E., Douglas A. Newcomer, Gregory W. Hatcher, Timothy M. Cheek, and Douglas R. Stahl. "Radial Arm Saw Blade Guard." U.S. Patent No. 5,918,522, filed June 27, 1997, and issued July 6, 1999.

Benedict; Charles E. "Double Relay Light Switching System for Providing Daytime Running Lights for Vehicles." U.S. Patent No. 5,912,534, filed March 17, 1997, and issued June 15, 1999.

Benedict; Charles E. and Patrick Mullins. "Automatic Vehicle Light Relay Switching System for Providing Daytime Running Lights." U.S. Patent No. 5,886,471, filed March 17, 1997, and issued March 23, 1999.

Mullins; Patrick S., Victor C. Cordiano, and Charles E. Benedict. "Automatic Daytime Running Light System." Canadian Patent No. 2,121,015, filed April 11, 1994, and issued October 13, 1998.

Lay; Alvin Loise and Charles E. Benedict. "Spare Wheel Assembly for Trailers." U. S. Patent No. 5,813,687, filed April 8, 1996, and issued September 29, 1998.

Benedict; Charles E. "Biodegradable Groynes." U.S. Patent No. 5,807,024, filed June 17, 1996, and issued September 15, 1998.

Benedict; Charles E. "Temperature Responsive Fluid Flow Controllers." U.S. Patent No. 5,803,354, filed June 18, 1996, and issued September 8, 1998.

Benedict; Charles E., Spencer; L. Clay and Beggs, IV; Thomas J. "Adjustable Porous Groynes and Method for Shoreline Reclamation." U.S. Patent No. 5,720,573, filed January 3, 1996, and issued February 24, 1998.

Chezem; Jim A., Charles E. Benedict, and Arthur Williams. "Door Stop." U.S. Patent No. 5,673,952, filed August 22, 1995, and issued October 7, 1997.

Benedict; Charles E. 1995. "Flow Control Valve Assembly." U.S. Patent No. 5,634,491, filed October 23, 1995, and issued June 3, 1997.

Mullins; Patrick, Charles E. Benedict, and Jay S. Tiedeberg. "Automated Ambient Condition Responsive Daytime Running Light System." U.S. Patent No. 5,614,788, filed August 1, 1995, and issued March 25, 1997.

Mullins; Patrick S., Victor C. Cordiano, and Charles E. Benedict. "Automatic Daytime Running Light System." U.S. Patent No. 5,438,237, filed December 6, 1993, and issued August 1, 1995.

Benedict; Charles E., Thomas B. Middlebrooks, Robert G. Stampfli, Victor C. Cordiano, Charles W. Belt, and Jay S. Tiedeberg. "Adjustable Showerhead Assemblies." U.S. Patent No. 5,294,054, filed January 27, 1993, and issued March 15, 1994.

Bornstein; Irvin, Thomas B. Middlebrooks, Scott M. Eddy, and Charles E. Benedict. "Cam Phase Change Mechanism." U.S. Patent No. 5,253,622, filed February 17, 1993, and issued October 19, 1993.

Bornstein; Irvin, Thomas B. Middlebrooks, Scott M. Eddy, and Charles E. Benedict. "Spring Assist System for Internal Combustion Engine Valves." U.S. Patent No. 5,245,957, filed February 4, 1993, and issued September 21, 1993.

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Benedict; Charles E. "Tie Rack." U.K. Design Patent No. 1,013,691, filed December 27, 1982, and issued October 6, 1983.

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Benedict; Charles E. "Loom Lay Drive Linkage." U.S. Patent No. 3,964,524, filed January 8, 1975, and issued June 22, 1976.

Benedict; Charles E. "Shuttle Drive Linkage for Looms." U.S. Patent No. 3,964,523, filed December 12, 1974, and issued June 22, 1976.

Benedict; Charles E. and Calvin C. Oliver. "Shuttle Box for Looms." U.S. Patent No. 3,901,288, filed February 11, 1974, and issued August 26, 1975.

Benedict; Charles E. and Calvin C. Oliver. "Picker Stick Drive Mechanism for Fly Shuttle Looms." U.S. Patent No. 3,901,287, filed February 11, 1974, and issued August 26, 1975.

Benedict; Charles E. and Calvin C. Oliver. "Lug Strap for Weaving Loom." U.S. Patent No. 3,900,052, filed January 15, 1974, and issued August 19, 1975.

## **HONORS AND AWARDS**

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- General Lewis Brereton Award for Significant Contributions to United States Aerospace, 1978
- Florida Engineering Society, Award for Outstanding Technical Achievement for 1977 for Florida
- Past Board of Directors, Governor's Task Force on Target Industries
- Past Board of Directors, Advisory Resource Panel – Governor's Task Force on Science, Engineering and Technology Service to Industry
- Past Board of Directors, Engineering Advisory Council – University of Florida
- SAE Accident Investigation Practices Standards Committee Florida Engineering Society, Big Bend Chapter, Award for Outstanding Technical Achievement for 2007
- Mechanical and Aerospace Engineering Department, University of Florida, Outstanding Alumnus Award, 2010

## **REPRESENTATIVE PROJECTS**

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C.E. Benedict has been involved in machine design, product development, and analysis of over 5,000 accidents during his career, which has spanned more than 39 years. These accidents have involved vehicles of all kinds, equipment, machine systems, and products.

His analyses have included accident causation, safety defects, and violations of design and safety standards and codes in many areas, including machine guarding and automotive parts failures, as well as electrocutions, construction accidents, ladders, saws, loaders, conveyors, process equipment, material-handling equipment, agricultural equipment, lumber and industrial equipment, and virtually any electro-mechanical or purely mechanical equipment failures.

Since 1971, C.E. Benedict has directed the design, development, fabrication and operator-training programs for high-rate, programmable, intelligent material-handling systems, machine systems that assemble piece-parts into end-items and commercial and consumer products, as well as material-handling, textile equipment, and production, aircraft and weapons parts and sub-systems. A partial list of these products and machine systems includes:

- Streamline Flow, Mechanically Actuated High Pressure Gas Regulator – Florida Gas Transmission Company
- Nickel Cadmium Rechargeable Battery Assembly Machine – General Electric Company
- Calibrator and Sorter Spirit Glass Thermometer – Hartley Gove Sons Thermometer Company
- Sorting, Orienting, Packaging and Loading of 20mm Ammunition – General Electric Company
- Sorting, Orienting and Packaging 30mm Ammunition – Honeywell Corporation, Olin Corporation – Aerojet Corporation and Bermite Corporation

- Folding and Packaging Disposable Surgical Sheets – Proctor and Gamble Company
- High Speed Minimum Space Yarn Insertion for Weft in 12 Foot Wide Carpet Weaving Machine – Fieldcrest Mills, Inc.
- Dwell Linkage System for Needle Bar Drive on Carpet Tufting Machine – Card Company
- Heavy Kraft Bag Orienter and Feeder for End Sewing – St. Regis Paper Company
- Armor Piercing Incendiary Projectile Assembly Machine – Aerojet Ordnance Company
- Quick Disconnect/Reconnect Linkage for Aircraft Surface Control System – Fairchild Republic Company
- Disposable Surgical Scalpel Assembly Machine – Seamless Corporation
- Vehicle Towable 30mm GAU-8/A Ammunition Loading System for the A-10 Aircraft – U.S. Air Force
- Former for Semi Pneumatic Rubber Strips into Circular Tires – Amerace Corporation
- Fly Shuttle Loom Mechanical Dwell Linkage for Shuttle Propulsion – Rockwell International (fka Draper Corporation)
- Linkage Actuated Shuttle Box for Fly Shuttle Looms – Rockwell International (fka Draper Corporation)
- I.V. Bag Assembly Machine – Seamless Corporation
- Disposable Pen Light Assembly Machine – Concept, Inc.
- Rechargeable NICAD Battery Assembly Machine – SAFT America
- Test Evaluation, Simulation, Analysis and Correction of Crank Shaft Failure Problems – Florida Gas Transmission Company & Natural Gas Pipeline Company of America
- Two-Man Portable (second generation) Automatic Mechanically Operated 30mm GAU-8 Ammunition Loader to Replace Original Vehicle Towable 30mm ALS – U.S. Air Force
- Sealed Lead Acid Battery Assembly Machine – General Electric Company
- Automatic Stagger Feed System for Optimizing the Utilization of Precious Metals in Stamping and Forming Processes – Englehart Industries
- Pen Top and Indent Assembly Machine – A.T. Cross Company
- Credit Card Actuated, Automated Fuel Accounting System (Self Service Fuel Stations) With On Line Computers to Central Base Accounting – U.S. Air Force
- Conceptual Design and Half Scale Prototype of Orange Tree Canopy Shaker for Fruit Harvesting – Florida Citrus Commission
- Carpet Loom Needle Drive for Quasi Dwell and Stroke Reduction – Field Crest Mills
- Tufting Machine Dwell System for Backing and Needle Drive – Card Company
- AGV Material Handling System for the CVX Next Generation Aircraft Carrier – U. S. Navy
- Cargo Securing, Clamping Stanchions for Weapons, and Other Supplies for Naval and Other Supply Ships – U. S. Navy
- Selective Retrieval and Discharge System for Container Ships – Military Sealift Command

Product lines C.E. Benedict has developed and taken to the consumer market include:

- The Automatic Precipitator Light Control Device, UL Approved, which automatically turns on vehicle headlights when wipers are turned on and turns off lights when ignition is turned off
- The Air-Bearing Turntable with straight line tracking and a magnetically balanced turn arm for the high-end user, audiophile market
- Extendable Closet Organizers for ties, belts, scarves, skirts, slacks, shoes, folded garments, and tools. This line included a mailbox caddy and coffee filter device.
- The Door Jammer, a security device for inward swinging doors
- The Whirl Massage Showerhead
- The Rain Light Switch for Automobiles, which utilized solid state logic to pulse-actuate a mechanical latching relay switch
- A flow control device for maintaining constant output pressure over predetermined range of input responses for liquid and gas systems
- Automatic light switches for vehicles, including a super daytime running light switch, and three logic-controlled mechanical relays for vehicle lights
- A temperature-responsive fluid valve and controller for showerheads
- A pool-skimmer screen
- An exerciser for back muscles
- Three non-inertial-release buckles for vehicle restraint systems
- A cam system for varying the compression volume of internal combustion engines
- A prototype (full scale) of the Multi-Directional Overhead Conveyor System
- A permeable groyne system for reclaiming beach sand using passive methods