

Richard E. Billo, Ph. D.

Associate Vice President for Research
Professor of Computer Science and Engineering
University of Notre Dame
Curriculum Vitae

Contact

University of Notre Dame
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Employment

Academic

2013 – Present University of Notre Dame

Associate Vice President for Research and Professor of Computer Science and Engineering

2005 – 2013 University of Texas at Arlington

*Interim Associate Vice President for Research (2 years)
Associate Dean for Research, College of Engineering (6 years)
Professor, Industrial and Manufacturing Systems Engineering
Concurrent Professor, Computer Science & Engineering
Co-Director, Center for Renewable Energy Science & Technology
Interim Director, Automation and Robotics Research Institute
Director, Advanced Manufacturing Laboratory*

2000 – 2005 Oregon State University

*Department Head & Professor, Industrial and Manufacturing Engineering
Concurrent Interim Department Head, Chemical, Biological, and Environmental Engineering
Founding Director, Microproducts Breakthrough Institute*

1991 – 2000 University of Pittsburgh

*Assistant and Associate Professor, Industrial Engineering
Concurrent Associate Professor, Department of Informatics and Networked Systems
Co-Director, Manufacturing Assistance Center*

1989 – 1991 Pacific Northwest National Laboratories

Technical Group Leader, Production Systems Analysis Group (Post-Doctorate)

1984 – 1989 Arizona State University Ira A. Fulton Schools of Engineering

*Faculty Associate, Computer Integrated Manufacturing Systems Research Center
Graduate Research Assistant, Computer Integrated Manufacturing Systems Research Center*

Industry

2009 – 2013	Lone Star Advanced Technologies, LLC	<i>President</i>	Dallas, TX
1995 – 2000	B ² Consulting, LLP	<i>Principal</i>	Pittsburgh, PA
1980 – 1984	Intel (Components Production Division)	<i>Training Specialist</i>	Chandler, AZ

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Education

Post-Doctorate	Pacific Northwest National Laboratories	Richland, WA	1989-1991
Ph. D.	Industrial Engineering (concentration: Information Systems Engineering)	Arizona State University	1989
M. S.	Industrial Engineering (concentration: Advanced Manufacturing)	Arizona State University	1985
M. A.	Psychology	University of the Pacific	1981
B. A.	Psychology	West Virginia University	1978

Diversity and Inclusion Initiatives

Throughout his career, Dr. Billo has had a commitment for effective programs to promote diversity and inclusion, and anti-racist practices. Following is a list of a number of initiatives he has established.

1. *NSF REU in Advanced Wireless Networks (AWaRE)* – Working with Co-PI Bertrand Hochwald, the AWaRE program recruits engineering students of color, women, and first-generation college students for summer internships at Notre Dame. The objective is to increase the interest of these students in attending graduate school in Engineering.
2. *Computer Science and Engineering Task Force on Graduate Student Climate*. This concerned group of faculty from CSE came together to develop proactive measures to promote greater inclusiveness and mentoring of underrepresented CSE graduate students.
3. *Students Recruiting Students* -- While serving as department chair at Oregon State University, this recruitment program resulted in the increase of Freshman women engineering students from 13 to 50 (half the freshman enrollment) in the Industrial and Manufacturing Engineering Department. Initiating this program at the University of Texas at Arlington brought the Engineering African American student enrollment to be the second largest in the State second only to the State's HBCU.
4. *Target of Opportunity Program* – Dr. Billo also made use of Target of Opportunity funding to recruit faculty of color eventually resulting in 70% of his faculty comprised of women and persons of color.
5. *Investing Now* – Dr. Billo first became engaged in D&I activities while serving as Associate Professor at the University of Pittsburgh working with Dr. Leslie Horne in the *Investing Now* program designed to recruit inner-city disadvantaged students to college.

Honors and Awards

1. Current Finalist, *1st Source Bank Commercialization Award*, 2021 (University of Notre Dame)
2. *Ambassador*, America Makes Manufacturing USA Innovation Institute, 2018 (Univ. of Notre Dame)
3. *S.T.A.R.S Award*, University of Texas System Board of Regents, 2005 (Univ. of Texas at Arlington)
4. *AIDC 100 Fellow*, Automatic Identification and Data Capture 100 Society, 2006 (UT Arlington)
5. *IIE Transactions Best Paper Award*, Institute of Industrial Engineers, 2003 (Oregon State Univ.)
6. *Intel Faculty Fellow*, 2002 and 2004 (Oregon State University)
7. *W. K. Whiteford Faculty Fellow*, 1995-2000 (University of Pittsburgh)
8. *Outstanding Faculty Award*, Engineering Board of Visitors, 1993 (University of Pittsburgh)
9. *Outstanding Graduate Student Award*, Institute of Industrial Engineers, 1988, (Arizona State Univ.)
10. *Phi Beta Kappa and Phi Kappa Phi*, 1978 (West Virginia University)

Patents

1. *Methods and Systems for Improved Biodiesel Production*, U.S. Patent 8,404,005, Issued 03/26/2013.
2. *Wireless Power Transmission*, U.S. Patent 9,030,161 B2, Issued 03/12/ 2015.
3. *Processes for Liquefying Carbonaceous Feedstocks and Related Compositions*, U.S. Patent 9,580,659, filed September 14, 2015, Issued 02/28/2017.

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4. *Processes for Liquefying Carbonaceous Feedstocks and Related Compositions*, International Patent (pending) WO 2014/149156 A1, International Filing Date, 01/12/2014, Publication Date, 09/25/2014.
5. *Automated Approach for Predicting Low Cycle Fatigue of Printed Metals*, Application No: 63038484, filed June 12, 2020.

Technology Licenses

1. *Patent and Technology License for Predicting Low-Cycle Fatigue of Printed Metals*, in negotiation, 08/2020
2. *Technology License for Thermal Stress, Thermal Distortion, and Design Optimization for the DMLS Process*, 5/2018. This license led to Notre Dame's first sale of a startup to a major corporation.
3. *Patent and Technology License for Improved Biodiesel Production*, 9/16/2006.
4. *Patent and Technology License for Gas to Liquids*, 6/2011
5. *Patent and Technology License for Coal to Liquids Synthetic Crude Oil*, 11/2013

Fundraising

Dr. Billo has a long history in private, corporate, and foundation Development, being closely trained and mentored by development officers.

1. Tom and Carmen West Scholarship Fund (Oregon State University)
2. Jeld-Wen Scholarship Fund (Oregon State University)
3. Intel Philanthropy gift for Wireless Network education (Oregon State University)
4. Hewlett Foundation gift for Wireless Platforms for Learning, \$1 million (Oregon State University)
5. HP Philanthropy gift to develop a Wireless Communications curriculum (Oregon State University)
6. Keck Foundation gift for Microfluidic Device Development, \$670,000, (Oregon State University)
7. Texas Instruments Distinguished Chair in Nanoelectronics, \$5 million (Univ. of Texas at Arlington)
8. N.Y. Chen gift for a Chemical Engineering program, \$1 million (Univ. of Texas at Arlington)
9. Lilly Endowment gift for *Industry Futures*, \$42.4 million (University of Notre Dame)
10. Randy and Sharon Conrads gift for an Endowed Chair in Ethics, \$3 million (Oregon State University)

Professional Service Leadership

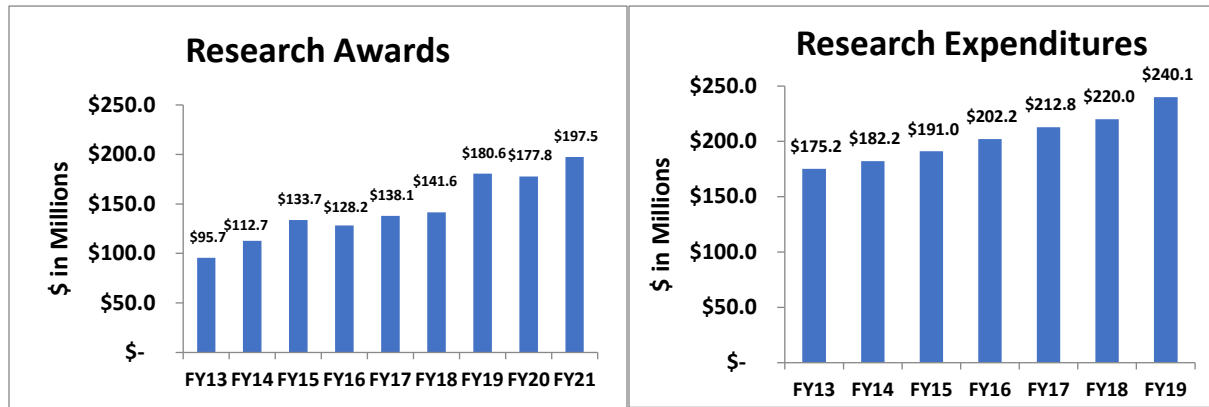
1. Head of the Editorial Board, *J. of Manufacturing Systems* and *J. of Manufacturing Processes*
2. Executive Board, *America Makes Manufacturing USA Innovation Institute*
3. Board of Directors, *Center for Innovation*, Arlington Chamber of Commerce
4. Governance Board, *Texas Medical Electronic Devices Consortium*
5. Member, *Oregon Capitalization & Business Formation Committee*
6. Technology Advisory Board, *Indiana Innovation Institute*
7. Executive Board, *Virtual Validation Institute*
8. Panelist for the National Science Foundation and the U.S. Department of Energy

Noted Leadership Accomplishments

University of Notre Dame (2013 – Present)

As *Associate Vice President for Research*, Dr. Billo manages the *Notre Dame Research Development Office*. In this role, he is responsible for advancing the Notre Dame research mission. This role entails 1) management of the Research Development team; 2) management of the Proposal Development Team; 3) liaison to the Notre Dame Federal Relations office; 4) liaison to Notre Dame Corporate and Foundation Relations; 5) liaison to Notre Dame International; 6) management of the limited submission competitions, 7) management of six of Notre Dame's internal research grant programs; 7) establishment and growth of university research centers.

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University of Notre Dame Research Trends

- From 2013 through 2021, Research Awards grew from \$95 million to over \$195 million, and Research Expenditures grew from \$175 million to \$240 million, with Notre Dame having the fastest rate of growth of research in the U.S. for each of the last five years (NSF HERD Report). In the last two years, three universities visited Notre Dame to benchmark the strategy and processes that led to this consistent growth in research.
- In the last two years, Dr. Billo’s team has led efforts resulting in awarding of many notable federal grants, private foundation gifts, and corporate funding totaling over \$300 million.
 1. Working closely with a team of state-wide leaders including NSWC Crane, Notre Dame, Purdue, and Indiana Governor Holcomb, successfully obtained legislation for \$100 million to be included in the 2020 DOD Appropriations budget for the formal establishment of a University Hypersonics Consortium and a Joint Hypersonics Transition Office.
 2. USAID award for the *U.S. Mission to Haiti* (\$16M)
 3. USAID award for *HELIX: Higher Education for Leadership, Innovation, and Exchange* (\$40M)
 4. Lilly Endowment gift for the *Industry Futures Advanced Manufacturing Labs* (\$42.4M).
 5. OSD award for development of a *Mach 10 Quiet Tunnel* (\$10M)
 6. AFRL award for research in *Hypersonics* (\$6.0M – Joint with Purdue University)
 7. ARL award for a BSL-3 facility and research in Tick-Borne Diseases (\$10M).
 8. AFOSR, DARPA, and Boeing awards for development of a *Mach 6 Quiet Tunnel* (\$5.4M)
 9. NSF Engineering Research Center award for *Transformational Hydrocarbons* (\$19.7M – Joint with Purdue)
 10. UNITAID Foundation award for research in *Chemical Barriers to Malaria* (\$33.7.0M)
 11. SRC/DARPA JUMP award for research in *Energy-Efficient Nanotechnologies* (\$44M)
 12. NNSA Stewardship Science Academic Alliance award for research in *Actinides* (\$12.5M)
 13. IARPA MOSAIC award for research in *Human Performance Monitoring* (\$10.5M)
 14. NIH P01 award for *Drug Resistance in Malaria* (\$12.3M)
 15. DOD awards (AFOSR and ONR) for research in Directed Energy (*Electro-Optics*: \$12.2M)
 16. Notre Dame ranks #1 in the number of NEH grants awarded to faculty in the Humanities
 17. \$48M in active grants with DARPA
 18. \$8M annually in new grants awarded to the Notre Dame Turbomachinery Laboratory
- Established an international collaborative research partnership between Notre Dame and multiple UK and Israeli universities to take advantage of recent NSF/EPSCRC joint sponsored research solicitations. Currently expanding international research to an established network of over 100 countries.
- In support of Notre Dame’s Assistant Professors, Dr. Billo leads an internal training and mentoring program that has resulted in the awarding of 56 NSF CAREER awards and 18 DOD and DOE Young Investigator awards since 2014. Two PECASE awards were made to young faculty in 2019. In support of students, 71 NSF Graduate Research Fellowships (GRFP) were awarded in 2017 and 2018.

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- *Congressional, State and private foundation Initiatives.* Dr. Billo works regularly with the Congressional Delegation, the State of Indiana, the City of South Bend, private foundations, and regional corporations to make use of federal and State appropriations processes to promote economic development in the area. Billo worked with these agencies on various opportunities that have brought over \$270 million in new revenue into Indiana in the past three years. Such awards have resulted in new industries being started in the South Bend area. Three examples follow:
 1. Establishment of the *Notre Dame Turbomachinery Laboratory*. With funds totaling over \$28 million from the Indiana Economic Development Corporation, City of South Bend, Notre Dame, and General Electric, this facility was located on the site of the old Studebaker Manufacturing Corridor in the City of South Bend, resulting in the creation of 45 family-wage jobs. This laboratory now generates over \$8 million in research revenue on an annual basis.
 2. *Industry Futures* award from the Lilly Endowment. This \$42M gift was awarded to promote advanced manufacturing by Northern Indiana companies to usher in the 4th Industrial Revolution.
 3. Establishment of the *Hypersonics Systems Initiative*. Drs. Billo and Corke worked closely with representatives from NSWC Crane, the Notre Dame Federal Relations Office, the federal relations offices of Purdue and Indiana Universities, and the Indiana Congressional delegation to establish a 25-university consortium to conduct research in Hypersonic flight. This initiative has already led to the awarding of over \$23 million to Notre Dame and Purdue in new federal funding for Hypersonics research. Dr. Billo's current role in this initiative is to conduct research in the manufacture of new materials able to withstand the rigors of hypersonic vehicle flight.
- Other notable accomplishments while serving at Notre Dame:
 1. 10 Manufacturing USA Awards (\$11.5M from 2015 - 2020)
 2. DOE Energy Frontiers Research Center (EFRC) award for research in Actinides (\$12.5M in 2014)
 3. Led Notre Dame to serve on the Core Teams for awarding of two Manufacturing USA Institutes including the Lightweight Metals and Materials Innovation Institute (LIFT) with Dr. S. Schmid, and the Advanced Regenerative Manufacturing Institute (ARMI BioFab USA) with Dr. G. Niebur
 4. Chair of the Notre Dame *Classified Research* Working Group (received FSC on 11/30/2018).
 5. Chair of the Notre Dame *Research Development* Working Group. This team was successful in the awarding of \$108 million of Notre Dame's \$180 million in FY19 research awards, and maintains a portfolio of almost \$600 million in active research proposals.
 6. Strong relationships with many federal science and mission directed funding agencies
 7. Hosted the joint Army Research Office/Army Research Laboratory Materials Workshop (2019)
 8. Hosted 35 Office of Naval Research-Global Program Managers (2019)
 9. Hosted Secretary of the Navy Richard Spencer (2019)
 10. Executive Committee, *Notre Dame Wireless Institute*

University of Texas Arlington (2005 – 2013)

As *Interim Associate Vice President for Research (2011 – 2013)*, Dr. Billo's major responsibilities were to enhance the research portfolio of the university's Research Centers, to manage the Office of Technology Management, and to promote research through the State and Congressional Delegations.

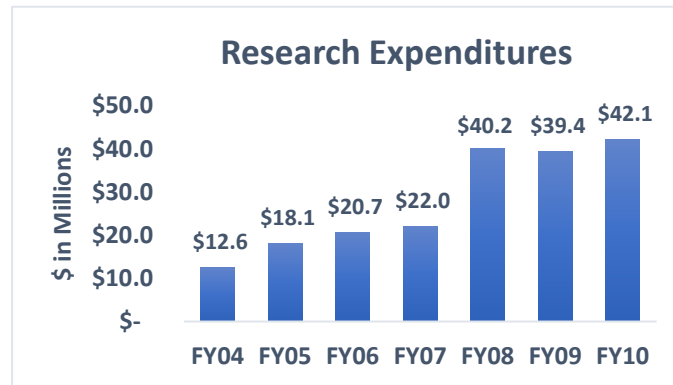
- *Congressional and State Delegation Initiatives.* Dr. Billo led initiatives that resulted in the awarding of over \$25 million in federal research appropriations for the university. These grants were for research in nanotechnology, assistive living technologies, advanced manufacturing, coal-to-liquids technology, microgrid technology, and systems engineering. Similar efforts working with State representatives resulted in the awarding of State funds for a new Engineering Research Building (\$120 million), a Structural Engineering Research Center (\$25 million), funding for biofuels research, and funding for nanotechnology research. Dr. Billo also worked with the Texas Higher Education Coordinating Board for a proposed new degree program in Chemical Engineering
- *University Research Centers of Excellence.* Dr. Billo provided oversight to 7 University-level Research Centers of Excellence. In this role, he established three new Centers (Center for Renewable

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Energy Science and Technology, Solid Waste Institute for Sustainability, and Security Awareness via Advanced Nanotechnology). Research awards from each of these centers ranged from \$1 million to \$3 million, annually. During this same time, Dr. Billo also served as Interim Director of the Automation and Robotics Institute being awarded over \$2.7 million in new grants.

- *Office of Technology Management.* In managing the Office of Technology Management, Dr. Billo established a “Business Friendly” culture to invigorate licensing activity.

As *Associate Dean for Research (2005 – 2011)*, Dr. Billo’s major responsibility was to increase the research awards for the College of Engineering. The strategy he employed was to establish several highly collaborative research centers, for which he then helped center directors cultivate external grants.



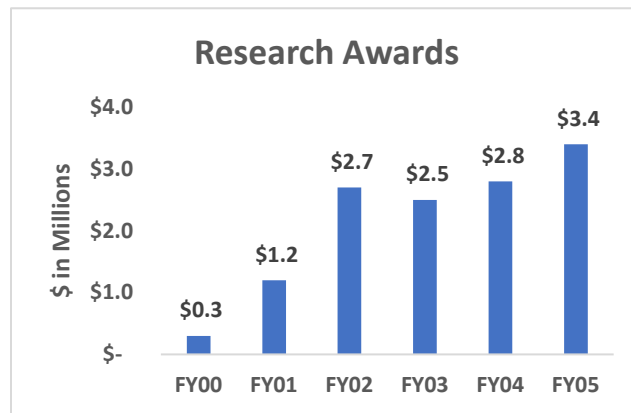
UTA College of Engineering Research Expenditure Trend

Following are several key accomplishments in this role as Associate Dean of Research:

- Annual College research expenditures increased from \$12M to over \$42M over a 6-year period (160 Engineering faculty).
- Research Centers established:
 1. *CREST*: Center for Renewable Energy Science and Technology
 - Collaborations: College of Engineering with College of Science and West Virginia Univ.
 - Total funding levels over first three years: \$5.7M
 2. *TexMED*: Texas Medical Electronic Device Center
 - Collaborations: UTA College of Engineering with UT Southwestern Medical Center
 - Total funding levels over two years: \$3M
 3. *SmartCare*: a Center established to develop medical assistive living device technology
 - Collaborations: College of Nursing with College of Engineering
 - Total funding levels in year 1: \$350K
 4. *Smart MicroGrid Testbed*: Total funding level in first year of operation: \$500K
 5. *Accelerated Pavement Test Facility*. Total funding level in first year: \$1,776,000.
 6. *Sustainable Resource Management Center*. Total funding level in first year: \$1,000,000
- Hosted U.S. Congressional Hearings on Energy (2008)
- Established the College of Engineering *Research Equipment Fund*.

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Oregon State University (2000 -2005)



OSU Industrial & Manufacturing Engineering Research Award Trend

As *Department Head of Industrial and Manufacturing Engineering*, Dr. Billo's major accomplishments were as follows:

- Increased annual departmental research awards from \$300,000 to over \$3,400,000 (12 faculty).
- Founding Director of the OSU Microproducts Breakthrough Institute, a joint institute with Pacific Northwest National Laboratories dedicated to research in advanced manufacturing.
- Obtained \$2M in Corporate and Foundation gifts from such foundations as the Hewlett Foundation, Intel Foundation, and Hewlett-Packard Foundation.
- While absorbing annual 5% budget cuts for four consecutive years, moved the department financial situation from deficit to an annual \$400K surplus.
- Through cash and gifts of hardware provided by Intel, HP Philanthropy, and the Hewlett Foundation, incorporated Wireless Platforms for Learning into 15 Engineering, Math & Science courses
- Instituted an undergraduate Bioengineering degree program
- Instituted undergraduate minors in Business and Information Systems Engineering
- Instituted a graduate concentration in Advanced Manufacturing
- Working closely with the Industrial Advisory Board, modernized the undergraduate Manufacturing Engineering curriculum and obtained ABET accreditation for it
- ABET Program Evaluator
- 2X increase in Freshman Industrial and Manufacturing Engineering department enrollments
- At the request of the Chemical and Bioengineering department faculty, served concurrently as Interim Head of the Chemical and Bioengineering department
- Host, *Institute of Industrial Engineer's 2003 Annual Conference*

Selected Research

Conducting research in Advanced Manufacturing, Information Systems, and Biomedical Device Development, Dr. Billo has been awarded approximately \$20 million as PI or Co-PI. In addition, Dr. Billo has personally led efforts for awards totaling an additional \$100 million in support of department and college, and university-level research initiatives. Following is a selection of these awards.

Current Proposals

Title	Continuous Seam Welding Optimization by Machine Learning
Source	GKN Aerospace
PI's	R. E. Billo, T. Luo

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\$ Amt \$250,000

Title VICEROY: Virtual Institutes for Cyber and Electromagnetic Spectrum Research and Employ

Source Air Force Research Laboratory

PI's P. Brenner, R. E. Billo, T. Pratt

\$ Amt \$1,500,000

Dates 2 years

Title MADMAN: Modeling Additive Manufacturing

Source ITAMCO, AFWERX Phase I

PI's R. E. Billo, T. Luo

\$ Amt \$35,000

Dates: 6-month research project for Phase I

Title Mesh Assisted Devices for Real-time Asset Tracking (MADRAT)

Source Constellation Cargo, Inc., AFWERX Phase I

PI's R. E. Billo, B. Hochwald

\$ Amt \$35,000

Dates: 6-month research project for Phase I

Title Refractory Metal - Ceramic Matrix Composite with Gradient Microstructures
for Hypersonic Edges produced with Wire Additive Manufacturing

Source ONR Science and Technology Advanced Manufacturing Program

PI's R. E. Billo, T. Corke, P. Sanders (Michigan Tech), K. Bradley (ANL), with Lockheed Martin

\$ Amt \$3,000,000

Dates: May 2021 – April 2024

Awarded Grants

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Title Assured Artificial Intelligence

Source NSWC Crane

PI's R. E. Billo, C. Sweet

\$ Amt \$5,000,000

Dates: July, 2021 – June 2024

Title DED Part Certification using Machine Learning

Source LIFT Fast Forge Program: The Lightweight Metals Manufacturing Innovation Institute

PI's R. Billo, T. Luo

\$ Amt \$100,000

Dates January – June, 2021

Title AI-Lifted Airman's Voice & Quality of Life Resilience (A2VQ)

Source Vennli, Inc., AFWERX Phase I

PI's R. E. Billo, C. Sweet

\$ Amt \$35,000

Dates: January 2021 – June 2021

Title A Bioreactor for Large-Scale Culture of Anchorage-Dependent Cells with Hollow
Microcarriers

Source ARMI/BioFab USA

PI's R. E. Billo, G. Niebur, P. Zorlutuna, D. Can Vural, K. Park, B. Dennis

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\$ Amt \$1,589,199
Dates: March 2019 – September 2021
Title Predicting Mechanical Strength Properties of Titanium from the Powder Bed Fusion Process
Source Rolls Royce North America
PI's T. Luo, R. E. Billo
\$ Amt \$285,607
Dates: May 2019 – April 2020
Title NDWI REU: Advanced Wireless Research Experiences (AWaRE)
Source National Science Foundation
PI's B. Hochwald, R. E. Billo
\$ Amt \$369,789
Dates: January 2018 – December 2020
Title ASCENT -- SRC Joint University Microelectronics Program
Source 21st Century Fund (Indiana Economic Development Corporation – Cost Share)
PI's R. E. Billo, S. Datta
\$ Amt \$1,575,000
Dates: May 2018 – June 2023
Title IEDC Turbomachinery Grant
Source Indiana Economic Development Corporation
PI's R. E. Billo
\$ Amt \$200,000
Dates: January 2017 – May 2019
Title Workshop: The U.S. and Germany Collaborative Research in Advanced Manufacturing
Source National Science Foundation
PI's R. E. Billo, Steven Schmid
\$ Amt \$46,466
Dates: August 2015 – July 2016
Title Parametric Design of Functional Support Structures for Metal Alloy Feedstocks (Orthopedic Device Development)
Source America Makes (Air Force Research Laboratory)
PI's R. Shankar (U. Pittsburgh), D. Hoelzle, R. E. Billo, S. Schmid
\$ Amt \$805,966
Dates: August 2015 – October 2017
Title Workshop: Measurement Science Roadmap for Polymer-Based Additive Manufacturing
Source National Science Foundation
PI's R. E. Billo, Steven Schmid
\$ Amt \$46,255
Dates: June 2016 – May 2017
Title Economic Production of Next Generation Orthopedic Materials through Powder Reuse in Additive Manufacturing
Source America Makes (Air Force Research Laboratory)
PI's S. Schmid, R. E. Billo, D. Hoelzle
\$ Amt \$688,767
Dates: August 2015 – February 2017
Title Workshop: Additive Manufacturing for Health

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Source National Science Foundation
PI's R. E. Billo, Steven Schmid
\$ Amt \$49,760
Dates: September 2015 – August 2016

Title The Notre Dame Turbomachinery Facility
Source City of South Bend Tax Incremental Financing (TIF) Fund
PI's R. Billo, T. Sexton, J. Cameron, S. Morris
\$ Amt \$4,430,000
Dates: June 2014 – May 2016

Title IEDC Turbomachinery Grant
Source Indiana Economic Development Corporation
PI's R. E. Billo
\$ Amt \$400,000
Dates: November 2014 – May 2016

Title Turbomachinery Infrastructure Development Grant
Source Indiana Economic Development Corporation, City of South Bend
PI's R. E. Billo
\$ Amt \$2,000,000
Dates: November 2014 – May 2018

Title The Notre Dame Turbomachinery Facility
Source Notre Dame Strategic Research Initiative Fund
PI's R. Billo, J. Cameron, J. Collier, S. Morris, L. Rulli, T. Sexton
\$ Amt \$7,500,000
Dates: April 2014 – March 2019

Title The Notre Dame Turbomachinery Facility
Source General Electric Corporation
PI's Negotiated by R. E. Billo; PIs: J. Cameron, S. Morris
\$ Amt \$13,500,000
Dates: April 2014 – December 2018

Title Consolidation of Tribology Expertise for Engineering Applications
Source Collaborative Engineering Research Initiative PUC-ND Seed Fund Program
PI's J. Ramos, M. Walczak, S. Schmid, R. E. Billo
\$ Amt \$23,600
Dates: January 2014 – December 2014

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Title Center for Renewable Energy Science and Technology
Source Texas Research Investment Program (TRIP)
PI's R. E. Billo, F. MacDonnell, J. W. Priest, B. H. Dennis
\$ Amt \$260,000
Dates: August 2013

Title Coal to Liquids Production
Source TRT Holdings
PI's R. E. Billo, F. MacDonnell, J. W. Priest, B. Dennis
\$ Amt \$255,000
Dates: August 2013 – December 2013

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Title A Novel Glass Microfluidic Neuro-Sensor
Source Texas Medical Research Collaborative
PI's R. E. Billo, S. Prasad, (UT Dallas), H. Beardsley, E. C. Jones, J. W. Priest, S. Bianco
\$ Amt \$100,000
Dates: June 2013 – May 2014

Title A Chemical Engineering Program (Gift)
Source N. Y. Chen (\$1,000,000), Maverick Match (\$500,000)
PI's R. E. Billo
\$ Amt \$1,500,000
Dates: December 2012

Title Automation and Robotics Research Institute (as Interim Director)
Source New Awards (Strasbough Corp, Sellmark, Argonne Nat.Lab, Medtronics, DLA, NSF)
\$ Amt \$2,269,027
Dates 2011 – 2012

Title Design of a Coal-To-Liquids Research Facility
Source TRT Holdings, Inc.
PI's Fred MacDonnell, Richard E. Billo, Brian Dennis, John Priest
\$ Amt \$260,000
Dates 04/1/2012 – 12/31/2012

Title A Gas to Liquids Advanced Manufacturing Process
Source 1st Resource Group, Inc.
PI's R.E. Billo, K. Rajeshwar, B. Dennis, F. MacDonnell, J. Priest
\$ Amt \$300,000
Dates 6/1/2011 – 8/31/2012

Title CREST: Center for Renewable Energy Science and Technology
Source U. S. Department of Energy
PI's R.E. Billo, K. Rajeshwar, B. Dennis, F. MacDonnell, J. Priest
\$ Amt \$964,000
Dates 1/1/2011– 1/15/2013

Title Conversion of PRB Coal to Synoil by Direct Liquefaction
Source TRT Holdings
PI's B. Dennis, F. MacDonnell, J. Priest, R. E. Billo
\$ Amt \$83,000
Dates January 2012 – May, 2012

Title Nanoporous Membrane Oxygenator
Source Texas Health Resources
PI's B. Dennis, Z. Celik-Butler, R. E. Billo
\$ Amt \$100,000
Dates January 2010 – December 2010

Title Systems Engineering Research Center
Source U. S. Department of Education
PI's S. Ferreira, D. Liles, R. Billo
\$ Amt \$142, 000
Dates Sept 2009 – August 2010

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Title A Carbon Extraction Process for Converting Texas Lignite to JP-8
Source Defense Advanced Research Projects Agency (DARPA)
PI's R.E. Billo, B. H. Dennis, J. W. Priest, M. Sattler, A. Stiller (WVU), E. Kennel (WVU)
\$ Amt \$747,837
Dates July 2009 – December 2010

Title SmartCare: Assistive Medical Technologies
Source Health and Human Services
PI's R. E. Billo, C. Cason, G. Zaruba, M. Huber
\$ Amt \$375,000
Dates 1/1/2010 – 12/31/2010

Title CREST: Center for Renewable Energy Science and Technology
Source U. S. Department of Energy
PI's R. E. Billo, K. Rajeshwar, B. Dennis, F. MacDonnell, J. Priest
\$ Amt \$1,403,000
Dates 1/1/2010 – 12/31/2010

Title Natural Gas to Liquid Fuels
Source DFW Genesis Energy Group, Texas Ignition Fund
PI's R.E. Billo, B. H. Dennis, J.W. Priest. F. MacDonnell
\$ Amt \$225,000
Dates May 2009 – August 2010

Title Vacuum Hot Press
Source UT System Research Excellence Funds
PI's R.E. Billo, B. H. Dennis, J.W. Priest
\$ Amt \$50,000
Dates May 2009

Title A MEMS Microreactor Device for Synthetic Fuel Refining
Source Metroplex Research Consortium for Electronic Materials and Devices
PI's R.E. Billo, G. Verbeck (U. of North Texas), B. H. Dennis
\$ Amt \$51,833
Dates January 2009 – December 2009

Title Converting Texas Lignite to Crude Oil
Source Texas Ignition Fund
PI's R. E. Billo, B. H. Dennis, J. W. Priest
\$ Amt \$25,000
Dates August 2008 – July 2009

Title Co-Production of Crude and Hydrogen from Texas Lignite
Source U.S. Department of Energy
PI's R. E. Billo
\$ Amt \$450,000
Dates September 2008 – August 2009

Title Texas Instruments Distinguished Chair in Nanoelectronics
Source Texas Emerging Technology Fund, Texas Instruments, Science & Technology Acquisition and Retention Program
PI's Negotiated by R. E. Billo; awarded to R. Magnussen
\$ Amt \$5,000,000
Dates January 2008

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Title	Nanoporous Membrane Blood Oxygenator
Source	ORtech Bioengineering, Inc., Aurora Healthcare, Texas Ignition Fund, Metroplex Research Consortium in Electronic Devices and Materials
PI's	R. E. Billo, C. Chuong, Z. Celik-Butler, R. Eberhart, R. Timmons
\$ Amt	\$280,000
Dates	January 2007 – January 2010
Title	CREST: Center for Renewable Energy Science & Technology
Source	U.S. Department of Energy
PI's	R. E. Billo and K. Rajeshwar
\$ Amt	\$984,000
Dates	September 2008 – August 2009
Title	Microreactor Biodiesel Production:
Source	BioTech Ventures, LLC
PI's	B. Dennis, R. E. Billo, J. Priest, R. Fernandez
\$ Amt	\$350,000
Dates	September 2007 – December 2008
Title	Texas Microfactory
Source	Office of Naval Research
PI's	Negotiated by R. E. Billo, PI: H. Stephanou
\$ Amt	\$6,800,000
Dates	November 2008 – August 2012
Title	Center for Structural Engineering Research
Source	UT System Permanent University Fund
PI's	R. Billo, S. Self, A. Abolmaali, N. Yazdani, R. Elsenbaumer
\$ Amt	\$25,000,000
Dates	September, 2007
Title	Science and Technology Acquisition and Retention Program (STARS)
Source	UT System Board of Regents
PI's	B. Carroll, R. Billo
\$ Amt	\$1,250,000
Dates	July, 2007
Title	Advanced Technology Development for Logistics & Distribution
Source	Texas Workforce Commission
PI's	R. E. Billo, J. Priest
\$ Amt	\$227,000
Dates	Sept 2007 – August, 2008
Title	Rapid Production of Biodiesel via Microchannel Transesterification of Cottonseed Oil
Source	Texas Dept of Agriculture
PI's	B. H. Dennis, R. E. Billo, R. Timmons
\$ Amt	\$89,667
Dates	Sept 2006 – August 2009
Title	Field Study of a Prototype System for Pharmaceutical Shipping Containers
Source	SAVR Communications
PI's	J. W. Priest, D. W. Engels, R. E. Billo
\$ Amt	\$20,000
Dates	Jan. 2006 – August 2006

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Title	Devices and Materials for a Biodiesel Microreactor
Source	Metroplex Research Consortium for Electronic Devices and Materials
PI's	Z. Celik-Butler, R. E. Billo, E. Kolesar, B. Dennis
\$ Amt	\$60,000
Dates	Sept 2006 – August 2007
Title	<i>The Automatic Data Capture Laboratory</i>
PI	R. E. Billo
Source	Symbol Technologies, Hand Held Products, Intermec, Texas Instruments, Loftware, epcSolutions, Zebra
Dates	January, 2006
\$ Amt	\$182,500

Oregon State University

While serving as Department Head and Professor at Oregon State University, Dr. Billo was awarded 42 research grants valued at over \$14,000,000. Following is a select list of grants:

Title	Impact of Microchannel Geometry on the Hemocompatibility of Hemodialysis Dialyzers
Source	Murdock Foundation, Erkkila Foundation
PI's	R. E. Billo and G. Jovanovic
\$ Amt	\$63,152
Dates	January – June 2005
Title	A Transestrification Microreactor for Production of Biofuels
Source	U.S. Army (Ft. Belvoir)
PI's	R. Billo, G. Jovanovic, B. Paul
\$ Amt	\$90,000
Dates	January 2005 – June 2005
Title	Industrial Economic Development in Western Oregon through the National Center for Multiscale Materials and Devices
Source	U.S. Economic Development Administration
PI's	R. E. Billo
\$ Amt	\$100,000
Dates	September 2004 – July 2005
Title	Microchannel-Based Dialysis Unit
Source	Home Dialysis Plus, State of Oregon
\$ Amt	\$45,000
Dates	April 2004 – March 2005
Title	CM Rapid Temp Model 1512 GSH ₂ FL Inert Gas Furnace
Source	OSU Research Equipment Reserve Fund
\$ Amt	\$44,250
Dates	January 2004
Title	Microchemical 'Fractories' for the High-Yield Synthesis of Dendritic Nanoarchitectures
Source	Keck Foundation
\$ Amt	\$650,000
Dates	January 2004 – December 2006
Title	3-D CAD and Simulation Laboratory
PI	R. E. Billo, B. Layton
Source	Oregon State University TRF

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\$ Amt	\$69,000
Dates	January 2004 – December 2004
Title	ESI Laser MicroMachining Center
Source	ESI, OSU Research Equipment Reserve Fund
\$ Amt	\$450,000 (\$350K ESI, \$100K OSU)
Dates	July 2002
Title	A Feasibility Study of Bio-Fuel Production and Distribution in Oregon
Source	Oregon Tall Fescue Commission
PIs	R. E. Billo, J. Woldstad t
Dates	6/15/02 – 12/15/02
Level	\$20,000
Title	Economic Feasibility of Producing Bio-Diesel Fuel in Oregon
Source	Oregon Agricultural Research Foundation
PIs	R. E. Billo, J. Woldstad t
Dates	6/15/02 – 8/30/03
Level	\$10,000
Title	Advanced HAZMAT Rapid Identification & Sortation System
Source	U. S. Defense Logistics Agency
PI(s)	J. D. Porter, R. E. Billo
Dates	2/11/01-10/30/04
Level	\$160,000
Title	Discrete Event Simulation of a Flexible Maintenance Design Facility
Source	Canadian Department of National Defence
PI(s)	D. Kim, D. Jensen, R.E. Billo, M. Hacker, B. Paul
Dates	4/ 20/ 01 – 10/ 30/ 2001
Level	\$196,000
Title	Technology Study of Identifying Methodologies for Flat Mail
Source	U. S. Postal Service
PI(s)	Dr. J.D. Porter, Dr. Marla Hacker, Dr. R.E. Billo
Dates	11/ 15/ 2000 - 6/ 30/ 2001
Level	\$189,309

University of Pittsburgh

While serving as Assistant and Associate Professor at the University of Pittsburgh, Dr. Billo was awarded 48 research grants valued at over \$3,200,000. Following are a select list of grants:

Title	Advanced HAZMAT Rapid Identification & Sortation System
Source	DARPA
PI(s)	Dr. Richard E. Billo and Dr. Marlin Mickle
Dates	9/ 1/ 99 - 9/ 30/ 2000
Level	\$325,000
Title	The Wireless Network Wire
Source	Pittsburgh Digital Greenhouse
PI(s)	Dr. Marlin Mickle, Dr. Richard E. Billo
Dates	1/ 1/ 2000 - 12/ 30/ 2000
Level	\$154,000
Title	Evaluation of Two-Dimensional Symbolologies for Identification Cards
Source	Immigration & Naturalization Service
PI(s)	Dr. Richard E. Billo
Dates	6/ 1/ 99 - 9/ 30/ 1999
Level	\$93,000
Title	Kauffman Internship Program

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Source Kauffman Foundation
PI(s) Dr. Richard E. Billo
Dates 6/1/ 99 - 5/30/ 2001
Level \$100,000

Title FedEx Industrial Fellows Program
Source FedEx Ground
PI(s) Dr. Richard E. Billo
Dates 9/1/ 98 - 6/30/ 2000
Level \$100,000

Title Development of an Intelligent Metallurgical Engineering System for Hot Roll Milling
Source Ben Franklin Technology Center, Pittsburgh Flat Roll
PI(s) Dr. Brian Norman, Dr. Richard E. Billo
Dates 1/1/ 97 - 6/30/ 98
Level \$206,000

Title The FoxNet Marking and Coding Network
Source Fox IV Technologies
PI(s) Dr. Richard E. Billo
Dates 7/ 1/ 97 - 6/ 30/ 98
Level \$90,000

Title A Computer Aided Diagnostic System for Blow Molding
Source Ben Franklin Technology Center
PI(s) Dr. Richard E. Billo (PI), Dr. Bopaya Bidanda (Co-PI)
Dates 4/ 1/ 95 - 6/ 30/ 97
Level \$245,809

Title Development of the MOST TALK System
Source Ben Franklin Technology Center of Western Pennsylvania, H. B. Maynard & Company
PI(s) Dr. Bopaya Bidanda (PI), Dr. Richard E. Billo (Co-PI)
Dates 9/ 94 - 8/ 97
Level \$223,431

Title Automatic Data Collection Laboratory
Source AIM USA
PI(s) Dr. Richard E. Billo (PI)
Dates 7/ 94 - 6/ 95
Level \$132,225

Title Automatic Data Collection & Identification Laboratory
Source National Science Foundation
PI(s) Dr. Richard E. Billo, Dr. Bopaya Bidanda
Dates 4/ 92 - 9/ 95
Level \$94,538

Title Modernizing Manufacturing Engineering at the University of Pittsburgh
Source Society of Manufacturing Engineers
PI(s) Dr. Richard E. Billo (PI)
Dates 7/ 95 - 6/ 96
Level \$10,175

Title Manufacturing Assistance Center
Source Commonwealth of Pennsylvania: Dept. of Commerce
PI(s) Dr. David I. Cleland (Co-PI), Dr. Bopaya Bidanda (Co-PI), Dr. Richard E. Billo (Co-PI)
Dates 4/ 95 -4/ 96
Level \$200,000

Title Manufacturing Assistance Center Continuation Project
Source Appalachian Regional Commission
PI(s) Dr. David I. Cleland (Co-PI), Dr. Bopaya Bidanda (Co-PI), Dr. Richard E. Billo (Co-PI)
Dates 10/ 95 - 9/ 96
Level \$139,426

Title Manufacturing Extension Technology Reinvestment Program: Yr. 2
Source National Institute of Standards and Technology (NIST)
PI(s) Dr. Dave Cleland (Co-PI), Dr. Bopaya Bidanda (Co-PI), Dr. Richard E. Billo (Co-PI)
Dates 9/ 95 - 8/ 96

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Level	\$110,000
Title	Manufacturing Assistance Center Steady State Operation Initiative
Source	Ben Franklin Technology Center
PI(s)	Dr. Bopaya Bidanda (Co-PI), Dr. Dave Cleland (Co-PI), Dr. Richard E. Billo (Co-PI)
Dates	9/ 95 - 8/ 96
Level	\$100,000
Title	Manufacturing Assistance Center Technical Projects
Source	Ben Franklin Technology Center
PI(s)	Dr. Richard E. Billo (Co-PI), Dr. Bopaya Bidanda (Co-PI), Dr. Dave Cleland (Co-PI)
Dates	7/ 94 - 6/ 95
Level	\$55,463
Title	MAC - Technology Transfer Initiatives
Source	National Institute of Standards and Technology (NIST)
PI(s)	Dr. Dave Cleland (Co-PI), Dr. Bopaya Bidanda (Co-PI), Dr. Richard E. Billo (Co-PI), ,
Dates	11/ 93 - 10/ 94
Level	\$110,000

Publications

Journals

1. Moon, S., Ma, R., Attardo, R., Tomonto, C., Layman, M., Billo, R., Luo T., “The Impact of Surface and Pore Characteristics on Low Cycle Fatigue of Direct Metal Laser Sintering (DMLS)-Printed Ti-6Al-4V Alloy”, submitted to *Additive Manufacturing*, October, 2020.
2. Ghasri-Khouzani, M. Peng, H., Attardo, R. Ostiguy, P., Neidig, J., Billo, R., Hoelzle, D., Shankar, M.R., “Comparing microstructure and hardness of direct metal laser sintered AlSi10Mg alloy between different planes”, *Journal of Manufacturing Processes*, 37, pp. 274-280, January, 2019, <https://doi.org/10.1016/j.jmapro.2018.12.005>.
3. Peng, H., Ghasri-Khouzani, M., Gong, S., Attardo, R. Ostiguy, P., Gatrell, B.A., Budzinski, J., Tomonto, C., Neidig, J., Shankar, M.R., Billo, R., Go, D., Hoelzle, D., Fast prediction of thermal distortion in metal powder bed fusion additive manufacturing: Part 1, a thermal circuit network model, *Additive Manufacturing*, 22, pp 852-868, August, 2018, <https://doi.org/10.1016/j.addma.2018.05.023>
4. Peng, H., Ghasri-Khouzani, M., Gong, S., Attardo, R. Ostiguy, P., Gatrell, B.A., Budzinski, J., Tomonto, C., Neidig, J., Shankar, M.R., Billo, R., Go, D., Hoelzle, D., Fast prediction of thermal distortion in metal powder bed fusion additive manufacturing: Part 2, a quasi-static thermo-mechanical model, *Additive Manufacturing*, 22, pp 869-882, August, 2018, <https://doi.org/10.1016/j.addma.2018.05.001>
5. Ghasri-Khouzani, M. Peng, H., Gong, S., Attardo, R. Ostiguy, P., Neidig, J., Shankar, M.R., Billo, R., Hoelzle, D., “Direct metal laser sintered stainless steel: Comparison of microstructure and hardness between different planes”, *International of Journal of Advanced Manufacturing Technology*, pp. 1 – 7, January 3, 2018, <https://doi.org/10.1007/s00170-017-1528-y>
6. Ghasri-Khouzani, M. Peng, H., Rogge, R., Attardo, R. Ostiguy, P., Neidig, J., Billo, R., Hoelzle, D., Shankar, M.R., “Experimental measurement of residual stress and distortion in additively manufactured stainless steel components with various dimensions”, *Materials Science and Engineering*, vol. 707, pp. 689 – 700, November 7, 2017.
7. Tinnakornsriruphap, T. and Billo, R. E., “An interoperable system for automated diagnosis of cardiac abnormalities from electrocardiogram data”, *IEEE Journal of Biomedical and Health Informatics*, 19(2), March, 2015, pp. 493 – 500, DOI: [10.1109/JBHI.2014.2321515](https://doi.org/10.1109/JBHI.2014.2321515).
8. Billo, R., Oliver, C., R., Charoenwat, R., Dennis, B., Wilson, P., Priest, J., Beardsley, H., “A cellular manufacturing process for a full-scale biodiesel microreactor”, *Journal of Manufacturing Systems*, 37(1), October, 2015, pp. 409 – 416, DOI: [10.1016/j.jmsy.2014.07.004](https://doi.org/10.1016/j.jmsy.2014.07.004).
9. Billo, R. E., Wilson, P. A., Priest, J. W. Romero-Ortega, M., Brunskill, S. R., Keens, D., “Slump molding of microchannel arrays in soda-lime glass for bioanalytical device development”, *ASME*

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 11. Gangupomu, R. H., Kositkanawuth, K., Sattler, M. L., Ramirez, D., Dennis, B. H., MacDonnell, F. M., Billo, R., Priest, J., “Analysis and Comparison of Inertinite-Derived Activated Carbon with Conventional Activated Carbon Adsorbents”, *Journal of the Air and Waste Management Association*, 62(5), 489-499, 2012.
 12. Bhargav P. Nabara, Zeynep Çelik-Butler, Brian H. Dennis and Richard E. Billo, “A nanoporous silicon nitride membrane using a two-step lift-off pattern transfer with thermal nanoimprint lithography”, *J. of Micromechanics and Microengineering*, 22, 2012.
 13. Billo, R. E. and Rajeshwar, K., “Value-Added Hydrogen Generation with CO₂ Conversion”, *2011 Annual DOE Hydrogen and Fuel Cells Annual Report*, 2011.
 14. Billo, R., “Book Review: Design of Industrial Information Systems”, 2008, *IIE Transactions*, 40, 1-3.
 15. Porter, J. D., Billo, R. E., Mickle, M. H., 2006 “Effect of Active Interference on the Performance of Radio Frequency Identification Systems”, *Int. Journal of Radio Frequency Identification Technology and Applications*, 1(1), 4 – 26.
 16. Puthongsiriporn, T., Porter, J.D., Wang, M.E., Bidanda, B., Billo, R.E., 2006 “Attribute-Level Neighbor Hierarchy Construction Using evolved Pattern-based Knowledge Induction,” *IEEE Transactions on Knowledge and Data Engineering*, 18(7), 917 – 929.
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 18. Porter, J.D., Billo, R.E., Mickle, M.H., 2004 “A Standard Test Protocol For Evaluation of Radio Frequency Identification Systems for Supply Chain Applications”, *Journal of Manufacturing Systems*, 23(1), 46-55.
 19. Porter, J.D., Billo, R.E., Mazumdar, M., Brown, S.J., 2003, “The Impact of Bar Code Print Quality on the Performance of High-Speed Sortation Systems”, *Journal of Manufacturing Systems*, 22(4), 317 - 326.
 20. Adickes, M. D, R. E. Billo, B. A. Norman, S. Banerjee, B. O. Nnaji, and J. Rajgopal, "Optimization Of Indoor Wireless Communication Network Layouts", *IIE Transactions*, Vol. 34, 823-836, 2002.
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 24. Kadidal M., Bidanda, B. and Billo, R. E. "On the development of an intelligent castability and cost estimation system", *International Journal of Production Research*, 36(2), 547-568, 1998.
 25. Adickes, M. and Billo, R.E., Performance Standards for Comparing Two-Dimensional Bar Code Hand-held Reader Technologies, *Journal of Manufacturing Systems*, 17(5), 361-370, 1998.
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 28. Billo, R. E., Needy, K. L., Barbe, T. "The application of automatic identification and checkweigh for

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- automated inspection in cellular assembly", *Quality Engineering*, **10**(3), 427-435, 1998.
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 34. Chung, C. and Billo, R. E., "Shared Manufacturing: 10 ways to prevent a MAC attack", *Industrial Management*, Jan/Feb, 29 - 32, 1996.
 35. Billo, R.E. and Bidanda, B., "Representing Group Technology Classification and Coding Techniques with Object Oriented Modeling Principles, *IIE Transactions*, **27**, 542-554, 1995.
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 39. Billo, R.E. and Bidanda, B., "A student advising system for undergraduate education curricular scheduling," *Computers & Education*, **22**(3), 205-213, 1994.
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 41. Shaffer, T. and Billo, R.E., A Demand-Based Method for Manufacturing Cell Design, *International Journal of Manufacturing Systems Design*. **1**(2), 163-175, 1994 .
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 43. Hostick, C. J., Billo, R. E., Rucker, R. H. "Making the Most of Structured Analysis in Manufacturing Information System Design: Application of Icons and Cycle-Time," *Computers in Industry*, 267-278, July, 1991.
 44. Billo, R. E., Henderson, M., Rucker, R., "Applying Conceptual Graph Inferencing to Feature-Based Engineering Analysis," *Computers in Industry*, **13**(3), 195-214, 1990.
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 46. Billo, R.E., Rucker, R., Shunk, D.L., "Enhancing Group Technology Modeling with Database Abstractions", *Journal of Manufacturing Systems*, **7**(2), 95-106, 1988.
 47. Billo, R.E., Rucker, R., Shunk, D. L., "Integration of a Group Technology Classification and Coding System with an Engineering Database", *Journal of Manufacturing Systems*, **6**(1), 37-45, 1987.

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2. Billo, R.E., Porter, J.D., and Puerzer, R. "An Architecture for the Design of Industrial Information Systems," *Handbook of Industrial and Systems Engineering*, A. B. Badiru (ed.), Taylor & Francis: Boca Raton, 2006.
3. Bidanda, B. and Billo, R. E., Line Balancing, *Maynard's Industrial Engineering Handbook*,

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- (5th edition), McGraw-Hill Publishers, May 2001.
4. Billo, R. E., Bidanda, B., and Adickes, M. Automated Data Collection, *Maynard's Industrial Engineering Handbook*, (5th edition), McGraw-Hill Publishers, May 2001.
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6. Billo, R., Wilson, P., Priest, J., Romero-Ortega, M., Brunskill, S., Keens, D., "Slump molding inexpensive soda-lime glass to produce micro-channel arrays", *24th International Conference on Flexible Automation and Intelligent Manufacturing (FAIM)*, San Antonio, Texas May 20 -23, 2014.
7. Wilson, P., Billo, R., Durrett, J., Priest, J., "Eutectic reaction diffusion brazing process for joining aluminum laminae microreactors", *24th Int. Conf. on Flexible Automation and Intelligent Mfg (FAIM)*, San Antonio, TX May 20 -23, 2014.
8. Gangupomu, R, Kositkanawuth, K., Sattler, M. L., Ramirez, D., Dennis, B. H., MacDonnell, F., Billo, R., Priest, J., "Analysis and Comparison of Inertinite-Derived Adsorbent with Conventional Adsorbents", *104th Annual Conference of the Air and Waste Management Association*, Orlando FL, June 2011.
9. Billo, R., Rajeshwar, K., MacDonnell, F. "Value-Added Hydrogen Generation with CO₂ Conversion", *2011 DOE Hydrogen Program Annual Merit Review and Peer Evaluation Meeting*, Arlington, VA, May 2011.
10. K. Kositkanawuth, R. H. Gangupomu, M. L. Sattler, B. Dennis, F. MacDonnell, R. Billo, J. Priest. "Life Cycle Analysis of Emissions from Three Alternatives for Producing Crude," *104th Annual*

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Teaching and Curriculum Development Activities

1. Developed and taught courses in Database Concepts, Java Programming, Automatic Data Collection, Senior Design, Computer Aided Design, Introduction to Manufacturing, and Manufacturing Information Systems. Dr. Billo has capability to teach a variety of courses in Manufacturing such as Computer Aided Manufacturing, Discrete Event Simulation, Manufacturing Systems Design, and others.
2. Implemented an ABET accredited undergraduate degree in Manufacturing Engineering, an undergraduate degree in Bioengineering, new graduate concentrations in Advanced Manufacturing and Information Systems Engineering, and two undergraduate minors in Business Engineering and Information Systems Engineering
3. Obtained a gift from Dr. N.Y. Chen for a new undergraduate degree program in Chemical Engineering, and designed a new undergraduate degree program in Chemical Engineering.