

CELEBRATING THE VITALITY OF MANUFACTURING & OPERATIONAL EXCELLENCE

DCMME CENTER

KRANNERT SCHOOL OF MANAGEMENT · PURDUE UNIVERSITY

For nearly thirty years the DCMME Center (Dauch Center for the Management of Manufacturing Enterprises) has been the focal point within the Krannert School of Management for promoting education, research and industrial engagement with those interested in operations management and manufacturing management.

Dear center collaborators,

This year's Annual Report will highlight collaborations as we focus on our goal of being a bridge for collaborations involving industry, students and faculty. For this academic year, we selected "Managing Smart Manufacturing" as our theme. You will read about the work done by our students, the conferences hosted on campus, global internships by our students, projects with industry partners and blogs. In summary, the 2015-16 center efforts have built a foundation for us to grow our activities as we seek to build an ever stronger footprint in the manufacturing management arena. Our Fall Conference provided an opportunity to learn about the use of big data in the motorsports world, image data analysis and use in manufacturing facilities at Wovenmetal, 3D printing at Caterpillar, Manufacturing Ecosystems at Cummins, Brilliant Factories at GE, human resource management at Wabash National, Smart Robots at HDS and Smart Challenges for Innovation. All the presentations and associated interview will remain available for continued use at (http://www.krannert.purdue.edu/centers/dcmme_gscmi/events/archive/2015-archive/2015-

http://www.krannert.purdue.edu/centers/dcmme_gscmi/students/home.php). Our center student collaborators are the heartbeat of the center and their stories are available at (http://www.krannert.purdue.edu/centers/dcmme_gscmi/students/home.php). You will see their reporting on successful implementation and emerging challenges in smart manufacturing and on the opportunities and challenges with TPP (the TransPacific Partnership) in the blogs they developed (<https://dcmme.wordpress.com/>). Our goal with these blogs is to be a resource – we will use these blogs as a foundation to develop industry newsletters this year.

Center projects with industry and funded by the Indiana Manufacturing Center (INMaC) were launched with the first project with our long term partner American Axle Manufacturing's (AAM) location in Rochester, Indiana. Our student collaborators and center staff and faculty had a great opportunity to work with senior managers at AAM to learn about and develop a toolkit to address business opportunities and challenges in advanced manufacturing. We look forward to expanding our industrial engagement footprint this year as we expand our project collaborators. You will

also read about our continued collaboration with TVS and the global manufacturing internship in India. Our student projects on site in Bangalore continue the over 10 year tradition of onsite learning, with over 125 students having benefited from the amazing dedication of top management at TVS, their generosity in covering costs for our students on site for three weeks and for creating learning opportunities through projects for our students on site. This year will see us focused on building on our foundation, expanding our collaboration with industry and creating new opportunities for our students. We are excited about our newly acquired Smart Lean Ecosystem Engagement Center and hope you will help us build it to its fullest potential. We have many exciting partnerships being explored and new industry collaborators working with us. We look forward to an exciting year exploring the opportunities in manufacturing management, please contact us at dcmme@purdue.edu for a conversation.



Ananth V. Iyer, Center Director



ANANTH IYER
director



STEVE DUNLOP
mng director



HEIDI ALLWES
coordinator

DCMME

meet the center

Professor Iyer is the Susan Bulkeley Butler Chair in Operations Management at the Krannert School of Management. He is also the Director of Purdue NExT (a University wide modular online interactive courses for global distribution) and Director of the DCMME & GSCMI Centers. He was the Associate Dean for Graduate Programs (2011-2013) and Director of DCMME (Dauch Center for the Management of Manufacturing Enterprises) and the founding Director of GSCMI (the Global Supply Chain Management Initiative) (2006-2011) at the Krannert School of Management. Previously, he was Purdue University Faculty Scholar from 1999-2004. His teaching and research interests are operations and supply chain management.

With multiple years of private sector experience, Steven Dunlop incorporates a unique approach to education. As Managing Director, he is currently responsible for the operations and deliverables for Purdue NExT, a non-credit distance education program/classes for Purdue University. Prior to Purdue NExT, he managed multiple projects for Purdue University. These grants and projects have covered content areas in battery research, development of coursework (online and face-to-face), pharmacy, chemistry, video conferencing, and information visualization, as well as STEM based projects in the K12 environment. In addition, Steven Dunlop is an Assistant Professor (courtesy appointment) of Organizational Leadership and Supervision within the College of Technology. He has developed and co-taught a course on Hybrid-Electric Vehicles, project management and major event planning (relating to events at the Indianapolis 500). He is currently the lead instructor for OLS Training Methods on Purdue's West Lafayette campus. He also provides outside consulting in the areas of leadership in training and training methods.

Heidi Allwes started with the Center in June 2012. In her role as Center Coordinator, Heidi coordinates the Center's annual conferences and student competitions. She also coordinates the annual TVS Motor Company India Internship, one of the central Krannert School of Management study abroad programs offered to Krannert Masters students. This year marks the 10th anniversary for this unique international study abroad opportunity. In addition to event coordination, Heidi oversees the marketing communication & designs the Center marketing materials.



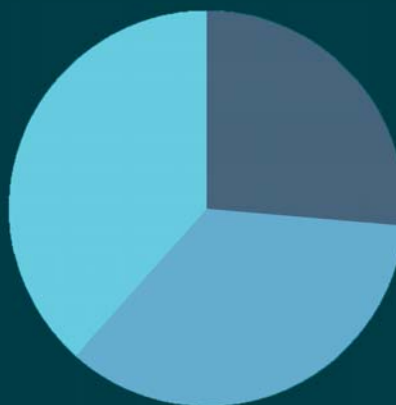
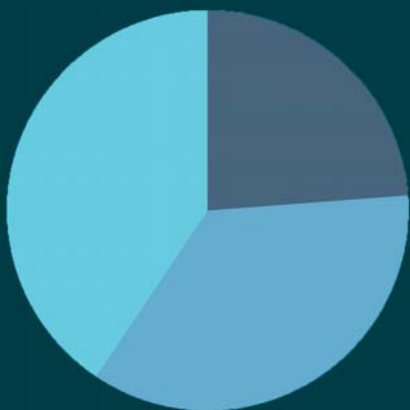
Dedicated industry partnerships are at the heart of success for the DCMME and GSCMI Centers. We thank our many distinguished industry partners for their significant and ongoing involvement and support. Our mission and the many important objectives set for the Center could not be accomplished without you.

Thank you.

CENTER FINANCIALS

EXPENSE SUMMARY

- Outreach & Marketing
- Events & Student Enrichment
- Center Projects



INCOME SUMMARY

- Individual Donors, Projects, Scholarships
- Partnership
- University Support

DCMME
30 YEARS
1988
JOIN THE CELEBRATIONS

02.16.2018

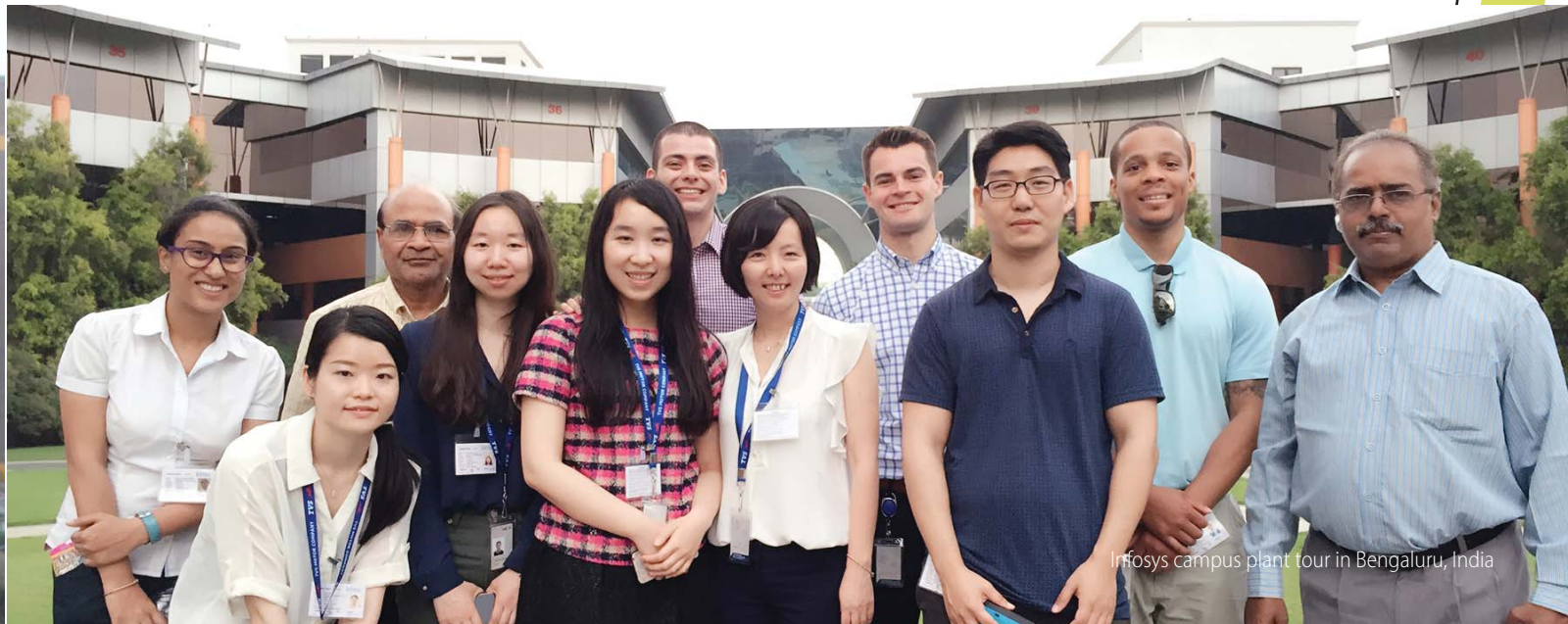
GSCMI Spring Conference &
Intercollege Case Competition

09.28.2018

DCMME Fall Conference

reaching globally.





Infosys campus plant tour in Bengaluru, India

TVS INDIA INTERNSHIP

“ **AT TVS, CLASS-LEARNED OPERATIONS CONCEPTS COME TO LIFE.** ”

Dennis Hernandez, MBA



The 2016 student team enjoyed cultural experiences including a trip to the Taj Mahal and other historic sites.

The TVS India Internship organized by the Center in conjunction with the TVS Motor Company was developed in 2006. Providing a unique study abroad internship opportunity in Bangalore, India, this trip assists students in developing a global business perspective while enhancing their resume profiles. Participants have a distinctive occasion to take concepts learned in the classroom and apply them to real life business situations. “My experience at TVS was the highlight of my Krannert Life. I learned strategic planning as well as operational execution. It was an amazing opportunity to apply my knowledge from Krannert and solve real world challenges,” says Hyejin Kim, MBA 2017. This innovative and challenging global program is celebrating 10 years with a total of 135 students having

participated, represented by MBAs, MSHRMs, and engineering students. Work on this three credit course begins in mid-February when students begin communication with their mentors. Discussions with their mentors regarding project objectives and completion of research pre-departure for India help to ensure a productive and successful internship for everyone involved. The course culminates in May with a three week visit to Bangalore, India where students continue work on their projects with TVS mentors and present their final work to TVS Company representatives. This year 9 students headed for the airport on May 10th to begin their flight to Bangalore, India, the location of their TVS internship. Students were accompanied by professors of management, Professor Suresh Chand and Professor Tom Brush. The internship lasted three weeks ending after final presentations on May 30th. Students received intimate



WHO IS TVS?

TVS is a Deming Prize winning two-wheeler manufacturing company producing motorcycles, scooters, and mopeds. TVS has been credited with many innovations in the Indian automobile industry, notable among them being the introduction of India's first two-seater moped. Krannert alumnus Venu Srinivasan (MSM '77) is the chairman and managing director of TVS Motor Company.



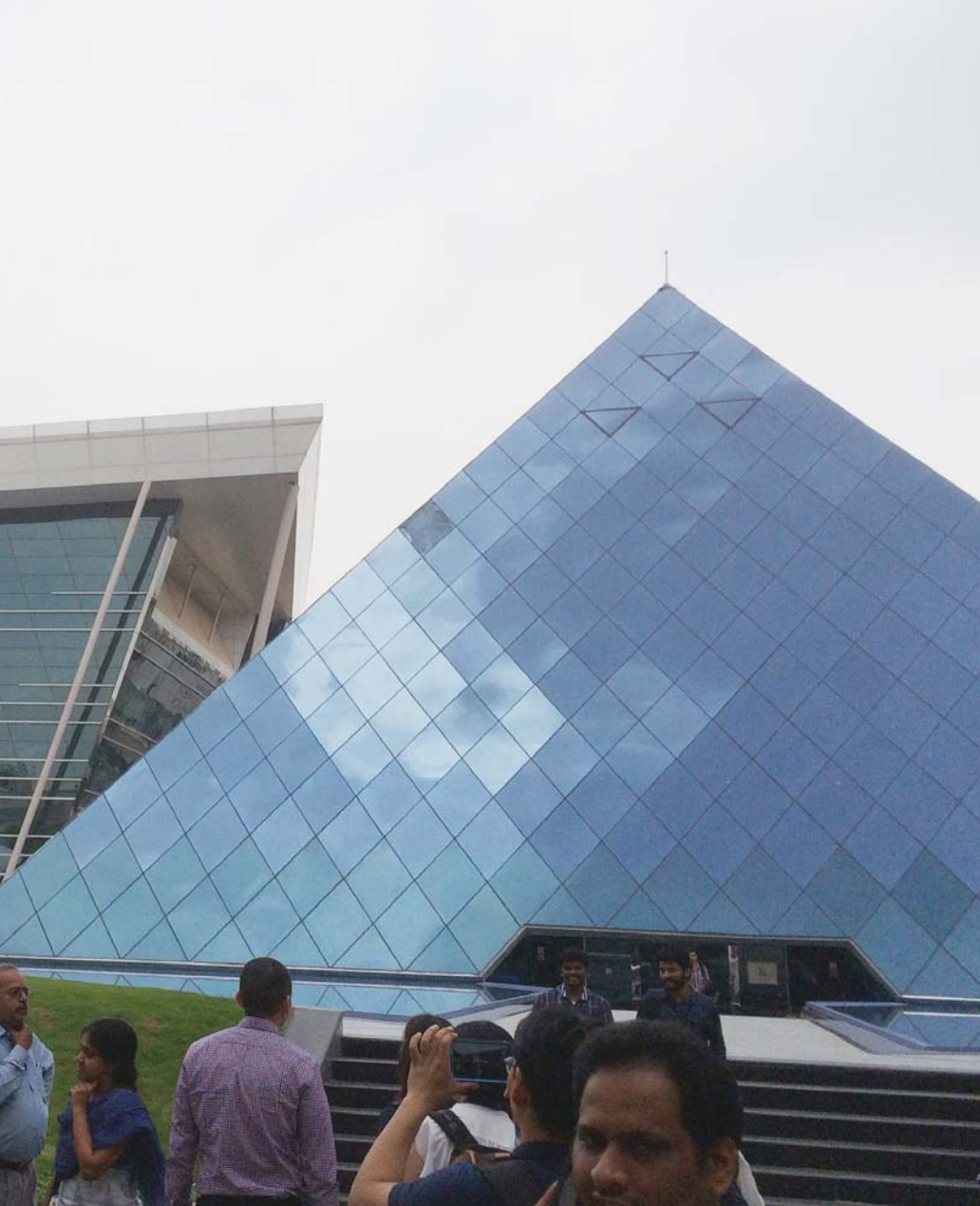
Yoko Okubo (MBA 2017), Xiaoqiu Li (MSHRM 2016), Jiaxin Huang (MSHRM 2016), Deron Leslie (MBA 2017), Hyun Kim (MBA 2017), and Zach Schmid (UG 2018) outside of the entrance to the Taj Mahal



The beautiful architecture of the Infosys Campus located in Bengaluru, India

exposure to TVS Motors and its strong culture through presentations and discussions from company leadership, a plant tour, and a visit to one of their corporate social responsibility villages. TVS also ensures that students get a taste of Indian culture outside of the office by coordinating dinner for the students to meet with various Indian families in their homes as well as provide an evening of classical Indian music and dance. "Bangalore is a vibrant city," Dennis Hernandez, MBA 2017. A weekend trip to the Taj Mahal is yet another highlight to the trip. TVS arranged a visit to the beautiful Bangalore Infosys campus where students learned about how

the company develops its human talent. Mason Preusser, MBA 2017 reflects on the company exposure during the trip, "My internship at TVS granted me irreproducible insight into how companies work overseas. Both the exposure to consumer sentiment and business culture in India are invaluable assets." TVS selects their projects primarily based on meaningful work product. Part of the success of the program rests on the fact that students are aware that the consulting projects carry great importance to the firm, and if done well, they will likely become part of an adoption and implementation strategy. The projects that the firm



The team visited a village nearby TVS. The village is a part of Srinivasan Service Trust which helps villagers and farmers in rural India eradicate poverty and experience an improved quality of life. Pictured are students attending summer school learning about flowers and fruits in English.

ultimately offers tend to have a unique balance of the following qualities: analytical complexity, urgency for resolution, lack of available resources to assign internally, and a desire to test a current business situation against international best practices. Projects cover many different management areas including Operations and Supply Chain Management, Human Resources Management, Sales, and Management Information Systems, naming just a few. Deron Leslie, MBA 2017, sums up the trip- "The TVS Motors Internship in India gave me a new, refreshing perspective on friendship, culture, global industry and life in general."

“ I NEVER KNEW I WOULD FALL IN LOVE WITH THIS PLACE UNTIL I SPENT TIME WITH THE PEOPLE HERE. ”

--Jiixin, MSHRM 2017



MANUFACTURING

SMART MANUFACTURING



conference SPEAKERS

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Russ Hillenburg

Russell Hillenburg is the President of Woven Metal Products (WMP). As a third-generation family business owner, Mr. Hillenburg has seen the growth of WMP over the years and the evolution that has occurred from a fabrication facility making custom metal parts, into the solutions provider of today, working with all major licensors in the oil and gas processing industry. Mr. Hillenburg began as an Operator/Worker at WMP and worked through the ranks of Field Superintendent, Administrative VP, and on to President of the company. The field time gave him invaluable experience that he still calls upon today when dealing with clients or helping to anticipate problems in the field. Mr. Hillenburg has a degree in Entrepreneurial Business from Baylor University. He sits on the board of directors or has a majority interest in seven other companies. Mr. Hillenburg's expertise includes finance and evaluation, business development, management, sales and acquisitions. He sits on the Executive Board for the Lighthouse Charity Team in Friendswood, Texas; is a Board Member of the Friendswood ISD Education Foundation; and is a Board Member of the Alvin Community College Foundation.

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Daniel Louks

Daniel Louks joined INDYCAR as Engine Support Engineer in November 2011, responsible for data collection, analysis, and inspections of Honda and Chevy Engines for Rules compliance. Louks, from Lebanon, Indiana, received his Bachelor of Science in Aeronautical and Astronautical Engineering from Purdue University in 1998. Following graduation, Daniel started his career working with drag-racing chassis manufacturer McKinney Corp. as an extension of research work he performed during his studies at Purdue. He continued the work with a variety of research & development projects including on-board data acquisition, CFD analysis, aerodynamic design, and custom software designs. He has held data engineering positions in IndyCar Racing since 2001, and during his tenure with racing teams has worked with current Verizon IndyCar Series drivers Ryan Hunter-Reay, Takuma Sato, and Graham Rahal, among others.

P17



Will Phillips

INDYCAR named Will Phillips as Vice President of Technology in March 2011, responsible for overseeing the direction and implementation of the technical rules package for the next generation of Verizon IndyCar Series car and their enforcement starting with the 2012 season. Additionally, Phillips chairs the IEC and IAC (INDYCAR Engine Committee and INDYCAR Aero Committee). Phillips, of the United Kingdom, served as engineering director for Patron Highcroft Racing in the American Le Mans Series, which won the LMP championship in 2010. He also has held senior engineering positions in North American racing with de Ferran Motorsports, PacWest Racing, Herdez Competition and Rocketsports. Phillips was responsible for the design, development and delivery of the Reynard 02S sports car. Additionally, he contributed to chassis design and development for March's 1989 & 90 Porsche Indy, the 1991 Fondmetal Formula One car and 1992 Venturi Larrousse Formula One car. Phillips as a race engineer has worked with current Verizon IndyCar Series drivers Ryan Hunter-Reay, Simon Pagenaud and previously Alex Tagliani, Danny Sullivan, Scott Sharp, Nigel Mansell and Teo Fabi among others.

conference SPEAKERS

P21 PURDUE UNIVERSITY
Discovery Park



Tomás Díaz de la Rubia

Tomás Díaz de la Rubia is Purdue University's chief scientist and executive director of Discovery Park. Before coming to Purdue, Díaz de la Rubia served as innovation leader and a director in Deloitte's energy and resources industry practice in Washington, D.C., working with Fortune 500 energy and manufacturing companies to identify and capitalize on business opportunities arising from potentially disruptive, innovative new technologies. Prior to joining Deloitte, Tomás was the chief research officer and deputy director for science and technology at the Lawrence Livermore National Laboratory (LLNL) in California where he was responsible for the long-term health of the science and technology foundations of the laboratory's \$1.6 billion research program. Díaz de la Rubia has published more than 150 peer-reviewed articles and has co-edited several books and conference proceedings. He is a fellow of the American Physical Society and of the American Association for the Advancement of Science. He holds a bachelor's degree (summa cum laude) and a doctorate in physics from The State University of New York, Albany.

P23 



Eric Matteson

Eric was born in Buffalo, New York. He attended the Rochester Institute of Technology and graduated with a B.S. degree in Electrical Engineering in 1994. He started his career with GE in 1992 with GE Power Systems in Schenectady, NY, and later joined GE Fanuc in 1994 as an application engineer in Albany, NY. In 1996, Eric moved to GE Fanuc HQ in Charlottesville, VA, where he held various roles including 3 years in a dedicated Six Sigma Black Belt role leading business critical projects. In 2005, Eric accepted the role as Program Leader at GE Aviation in Durham, NC. He led several jet engine assembly programs through periods of significant growth and expansion. Currently, Eric is leading the new GE Aviation Lafayette site start-up project, positioning this new facility to begin production operations in January of 2016.

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Stacey DelVecchio

As a manager for Caterpillar Inc., Stacey DelVecchio leads an engineering pipeline transformation project to ensure the best engineering talent is available to meet enterprise needs. She is also responsible for the engagement strategy with professional external organizations, as well as the science, technology, engineering, and math education (STEM) strategy. In her more than 23 years with Caterpillar, DelVecchio has worked in process and product development for nonmetallic components, production support for paint and process fluids, and the build and start-up for a green-field facility in China. A certified Six Sigma Black Belt, she earned that classification by working on projects that included lean manufacturing, failure analysis, and employee engagement. A SWE life member of the Central Illinois Section, DelVecchio holds a B.S. in chemical engineering from the University of Cincinnati. Her previous SWE experience includes the Corporate Partnership Council, strategic planning committee, conference programming board, awards committee, and Society treasurer. She served as the SWE president from July 2012 to June 2013.

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Roy Vasher

Roy Vasher began his career at Ford Motor Company in Dearborn, MI. He served as Information Systems Manager in Ford Division and Finance Staff. During his 19+ years at Toyota, Roy developed deep insight and experience on how to integrate Information Technology to support lean processes by serving as General Manager, Information Systems. Roy led a cross-functional team to streamline and integrate Toyota's vehicle supply chain to reduce Order-to-Delivery lead-time and optimize vehicle inventory – leading the industry in these innovations. Roy is currently Assistant Professor of Management at Purdue University. Roy is also a Lean Consultant and President of RPV Consulting, LLC. He co-authored Toyota's Supply Chain Management: A Strategic Approach to Toyota's Renowned System.

P29 Cummins



Alexander Nazarov

Alexander Nazarov is a Product Chief Engineer at Cummins Distribution Business Unit. After the acquisition of North America Distribution Network, he became a part of the leadership team and has played a major role in the development of a central ecosystem. The ecosystem will link together systems, processes, between various functions within a single distributor, and complete North America distribution network. Alexander has more than 10 years of business-building experience. He has lived and worked in United States, Russia, and Singapore. Alexander's leadership experience has grown because of the diverse opportunities in Russia and Singapore, the technical general management role, and a strong upper management team. Alexander holds a Master Degree in Electrical Engineering from Purdue University. He also graduated from the Leadership Skills Program and Management Accounting Program at Singapore Institute of Management.

P31 WABASH NATIONAL



Robert L. Nida

Mr. Robert L. Nida, also known as Bob, has been Vice President of Organizational Development at Wabash National Corp. since February 27, 2014. Mr. Nida has been Vice President of Business Development at Wabash National, Inc since February 2008. He served as vice president and general manager, retail at Wabash National since 2008. He is employed at Wabash National Trailer Centers. He served as corporate senior vice president at Accuride Corporation in Evansville, Ind. He was Senior Vice President of Accuride Wheels, Gunitite & Brillion Iron Works at Accuride Corp. since August 10, 2005. He served as Senior Vice President Gunitite & Brillion Iron Works at Accuride Corp. from December 2006 to December 2007. He served as Vice President- Technology at Accuride Corp. since July 2002. Bob has a Black Belt in Six Sigma and holds certifications as a Quality Systems Auditor for QS9000 and TS16949. He is in the final dissertation stage of his Ph.D. in Organizational Leadership at Regent University's School of Global Leadership & Entrepreneurship. Mr. Nida holds a B.A. in Sociology from Bridgewater College and a Masters in Total Quality Management from Friends University.

evolution -

keys
to

SM

Exploring Woven Metal Products President Russell Hillenburg's vision for smart manufacturing.

A visit to the Woven Metal Products facility yields a vast array of workstations, laser and water-jet cutters, perforation machinery, press breaks, welding essentials, and much more. Woven Metal Products, Inc., got its beginning in 1968 as a manufacturer of wire mesh internals, including chlorine filter leaf pockets for Dow Chemical worldwide. As the business grew, so did WMP, expanding their main areas of expertise into that of center pipes with wire mesh, cover plates, catalyst support grids and expander rings. WMP was called upon to do more and began supplying other

specialty internals including sieve trays, chimney trays, mixing trays, distributing trays and pipe spargers, among other things. Again, as customers' designs changed, WMP adapted and perforated plate began to replace wire mesh in many processes. To accommodate changing needs and enhance production, WMP added a Perforated Products Division utilizing CNC equipment. Today, this added technology allows WMP to furnish hundreds of customers with custom perforated products.

vision – people

Russell Hillenburg presented Woven Metal's insight into Smart Business and how being smart about managing domestic capacity to respond to urgent orders and routine orders helps them stay competitive, the technology investments that have been required, and the need to maintain skill sets to be competitive. According to Russell, there are three important keys to a smart business, namely, the people, its evolution and its vision. **People:** The people aspect of a smart business encompasses the following points. First, the team. The team that works for you matters a lot. In this regard, you need the right people at the right place. By creating the right environment, you get the best people, and they stay for a long time if they are fulfilled. Secondly, the **Customers:** Woven Metal Products prides itself on its customer focus. WM provides unique solutions and a

very high service level for each of its customers. According to Russ, speed and service is the key for growing a huge customer base, and that is the WM philosophy. Thirdly, the vendors. Given the high service and speed requirements for WMP customers, it is necessary to have a close relation with vendors to provide the same service level. **Evolution:** Constantly evolving in today's world is the key, and Russ states that following areas are key for evolution. **1. Personal:** Long term development of people is important to ensure that people are motivated and that they are ready for any new challenges coming up. **2. Technology:** In the ever changing environment, one has to be abreast of latest technology and adapt it to improve on their product, process or service. **3. Machine:** To make sure that WMP can service all customer urgencies, they keep a lot of spare capacity with their machines and

often upgrade or buy new machines to ensure the same. **Vision:** As per Russ, a business must have a long term vision for what it wants to be and how it will achieve it. A vision consists of the following parts: **1. Goals:** An organization must have clear defined goals on what it needs to achieve. **2. Financial:** The organization should have strong financial knowledge and all decisions should be made keeping the financial aspects in mind. **3. Training/ Implementation:** For development of its resources and achieving its vision, there should be a strong training and development program for the people and implementation of new technology.

-Akshit Bajpai, DCMME Center GA



The team that works for you matters a lot. In this regard, you need the right people at the right place. By creating the right environment, you get the best people, and they stay for a long time if they are fulfilled. --Russ Hillenburg

SMART DATA FROM start to FI



A discussion on smart manufacturing with Will Phillips, Vice President of Technology and Daniel Louks, Engine Support Engineer of Verizon IndyCar



With major corporations like Whirlpool, IBM, and the NFL adopting big data technology, bigger has never been better. In our world of infinite information at our fingertips, the idea of big data is being implemented in every facet of business, education, and society. Verizon's Indy Car Series is a perfect example of how real time data is being used in a new medium. The presentation highlighted the

close interaction between the data acquisition and its use to fine tune a competitive racecar. Optimizing this data to improve performance is a key capability in this industry. Participants received a glimpse of the future of manufacturing – as the cost of sensors and data acquisition devices drop, more and more devices, from passenger cars to refrigerators and washing machine to machine tools, will generate lots of continuous data that will be routinely used to optimize



INDYCAR



their performance. Seeing how all of this comes together in the heat of the race provides a fascinating look at this industry as a harbinger for smart manufacturing in Indiana.

Long gone are the days of a pit crew changing tires after a set number of laps, and the driver getting a squirt of water. Today, car and driver are equipped with over 200 sensors that feed real time data to engineers and data scientists, allowing them to make

informed decisions about the race when it is needed. So where does all this data come from? The first place to look is no further than the drivers own earpiece. Housed in this tiny communication device is a collection site for enormous amounts of data. The sensor system uses accelerometers to measure changes in linear force. It sends out voltages and measures the amplitude to collect valuable data. This information is used primarily to study crashes and make the driver and car safer. McLaren Electronics

has developed the TAG-320 as a device to log analytics gathered from several sensors on the car. This processing unit monitors the powertrain of the car, as well as high-speed telemetry control, and provides real time data associated with the throttle, clutch, and engine. Indy car teams also use technology that allows them to predict different outcomes based on track conditions and driver behaviors. MATLAB (Simulink), provides a history of tendencies and results that assists teams in preparing



**235
MPH**

IndyCar Series cars reach speeds up to 235 mph at the Indy Motor Speedway.

for races. As you can see, these small devices and new technologies have already made huge changes to the way that Indy car teams prepare and race, and will continue to reshape the racing landscape. Just like the fast-paced business world, big data has found its way to the world of fast-paced racing.

Matthew Jung (DCMME Center GA)

**150
engineers**

At any point during a race there are upwards of 150 engineers directly involved in the running of a race.



WHAT IS INDYCAR?

Featuring racing at a combination of superspeedways, short ovals, road courses and temporary street circuits, the IndyCar Series offers its international lineup of drivers the most diverse challenges in motorsports. The top point scorer is crowned the series champion and receives a \$1 million bonus. Founded in 1994, INDYCAR serves as the sanctioning body for the IndyCar Series.

11 TEAMS

There are currently 11 teams
in the INDYCAR Series



Students from the Purdue 3D Printing Club printed an IndyCar model for the DCMME conference.



FORECASTING THE FUTURE

9.6B
2050

With a growing population expected to reach 9.6 billion people by 2050, the planet faces difficult challenges.

PURDUE UNIVERSITY
Discovery Park

PURDUE UNIVERSITY DISCOVERY PARK

Purdue's hub for interdisciplinary and translational research, conceived as a place where scholars from all disciplines could work together to define whole new areas of research and solve grand challenges. Now in its 15th year, Discovery Park represents a billion dollars of enterprise—research expenditures, buildings, research equipment, and endowments. Discovery Park spans the boundaries of all Purdue academic disciplines and involves faculty, staff, and students in funded projects and activities. Discovery Park is driven by large, funded projects: To date, 13 funded projects of over \$5 million and 8 projects are \$10M or higher. Discovery Park represents approximately 25% of the total Purdue annual research portfolio. In total, Discovery Park provides over 250,000 assignable square feet of laboratory and office space.



With a growing population expected to reach 9.6 billion people by 2050, 60% of which is expected to live a middle class lifestyle by the year 2030, the planet faces difficult challenges. This translates into large populations migrating towards large cities and the growth of said 'Mega Cities'. These global megatrends drive projected increases in demand for energy, food, water and other resources, which in turn add new stresses to the environment. At the same time, we now live in a world in an era of exponential advances in science and technology. In particular, the emergence of new digital technologies—the so-called Digital 4.0 revolution—promises to transform the way in which society benefits from these advances. Indeed, the future discoveries and innovations that will help solve society's 21st century grand challenges will emerge not just from advances in the physical and life sciences, but from the convergence of these disciplines with exponentially advancing digital technologies. Tomás explored some examples of how this convergence is leading to new innovation business models, and how it is being exploited by companies worldwide to offer new products and remain competitive. Interconnected

devices will be a major part of business, society, and life as we know it in this unprecedented growth of the future. Smart devices will help to connect millions of users and aid everyone from entrepreneurs to educators. Big data analytics will help to predict trends and manage a massive population. Drones and smart devices will help to grow the sufficient amount of food to feed the world. New alloys and metals will help to make buildings, cars, and devices lighter, smaller, and more compact. Dr. Tomás went on to discuss how technology has grown exponentially over the past few decades. He noted that super computers 30 years ago were housed in large warehouses, whereas today they fit in our pockets. This exponential growth in technology is what is necessary to keep pace with our ever-growing population. With the birthrate of millennials much lower than that of the baby boomers this technology will be needed not only to manage the growing population, but also to care for and assist the aging population.

-Matt Jung, Center GA



GE DIVISIONS**\$18B**
HEALTHCAREOIL & GAS
\$15B**50,000+**
TECHNOLOGISTS**\$25B**
POWER
AND
WATER**ENERGY
MGMT**
\$7B**HOME &
BUSINESS
SOLUTIONS**
\$8B**THE 21ST CENTURY
BRILLIANT FACTORY**

By highlighting GE's business branches, Mr. Eric offered insightful information about GE. With more than 50K technologists, the company is able to manage its seven branches including Aviation, Power and Water, Transportation and Healthcare. The focus of Eric's presentation

was to describe the way manufacturing is evolving within GE's walls. The enterprise is aware of the new trends in the market such as 3D printing, desktop design and virtual manufacturing. The physical and digital worlds are currently converging when the advanced manufacturing meets industrial internet. The more collaborative and efficient these become, the greater is the chance for GE to increase its productivity. To reflect an estimated number, 1% of productivity savings represents more than

\$500MM for GE. Returning to virtual manufacturing, GE is currently focused on developing a network that will be fully connected, automated, and predictable. It will be like a factory that never stops. There will be feedback loops within units that will help to improve design and production. All of these will translate into a better experience for the end consumer. Mr. Eric also introduced GE's App Store that he expects will deliver an unprecedented efficiency and speed in manufacturing. Predix™ will serve as the platform for supply



[CONTINUED]

chains to collaborate in the cloud. This will enable better communication among the different branches that shape the business. Predix Cloud will drive the next phase of growth for the Industrial Internet and enable developers to rapidly create, deploy and manage applications and services for industry. With \$4B in software revenues in 2014 and projected software revenues of \$6B in 2015, GE continues to grow its investment in software. The Industrial Internet is generating data twice as quickly as any other sector. With investment in infrastructure expected to top \$60 trillion over the next 15 years, the number of devices connected to the Internet will continue to swell, generating an unprecedented collection of data and analytics. Built for Predix, the cloud platform for the Industrial Internet, Predix Cloud is designed to provide a highly secure infrastructure for this next phase of growth, which will generate a new level of insight, asset performance management (APM) capabilities and innovation in the developer community.

-Pablo Martinez, DCMME
Center GA

**CUSTOMERS
ARE DEMANDING
INTEGRATED
SOLUTIONS AT A
FASTER PACE.**

SEEING 3D

Stacey DelVecchio discussed the experience that Caterpillar Inc. has had implementing Smart 3D Printing in the manufacturing environment. As Additive Manufacturing Product Manager at Caterpillar Inc., Stacey has led interesting engineering pipeline transformation projects as well as coordinated the engagement strategy with external organizations.

As certified Six Sigma Black Belt, she has worked in projects that include lean manufacturing and data analysis. During her presentation Stacey explained the challenges related to building engagement and knowledge while implementing strategic projects such as Smart 3D printing. To expose employees to the new technology, the management team offered nomadic printers at their facilities in order to allow workers

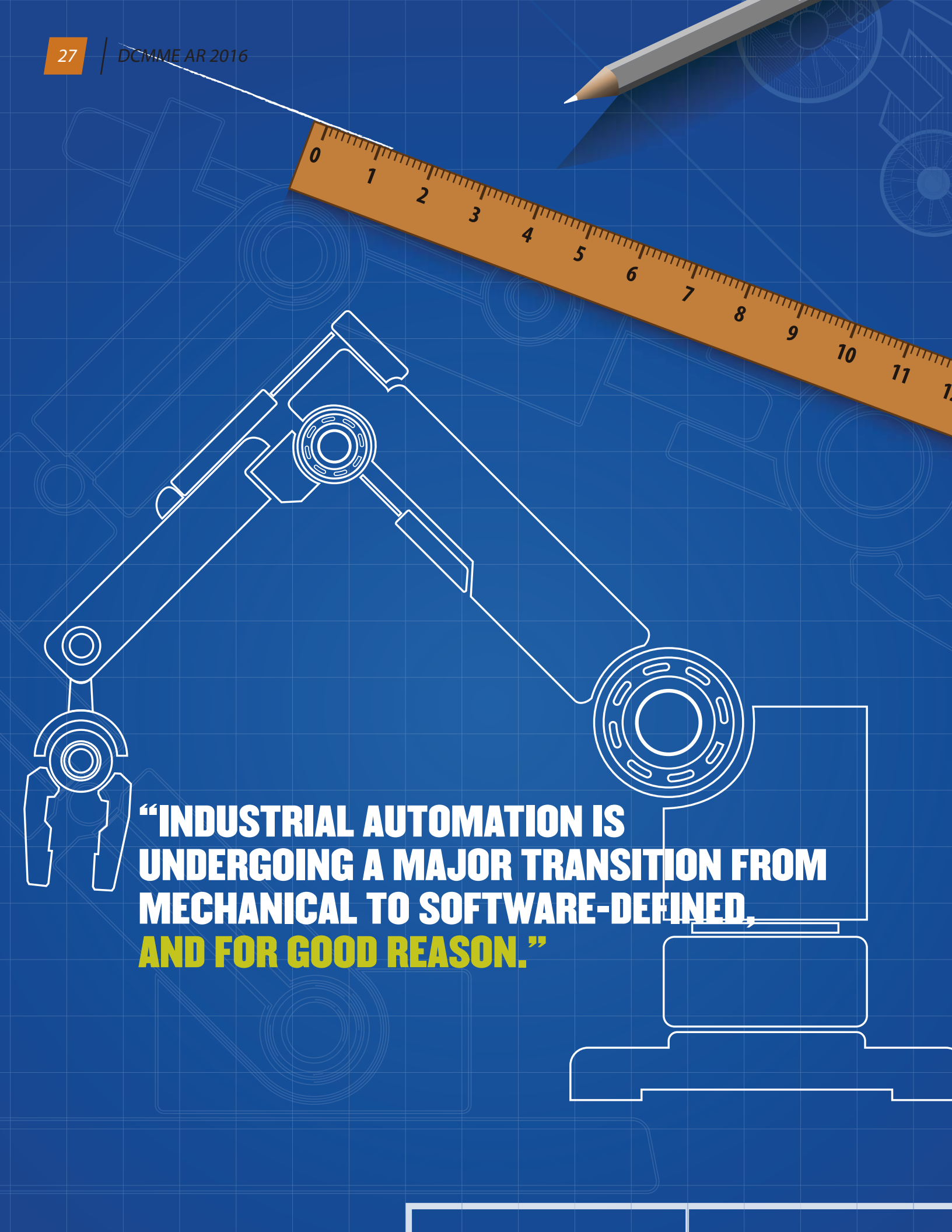
to experiment with the processes, suppliers, materials and software. This phase of the project took place in 6 locations of the organization during 6 months. Through this pilot, the company learned the importance of starting small and moving up in the technology ladder. The process was improved after gathering feedback in an internal website built to share questions and failures that the employees faced after experimenting

**RIGHTFULLY SO
— AND WE'RE
UP FOR THE
CHALLENGE.”**

CATERPILLAR INC.

with 3D printing. This project pushed the organization to evaluate the cost of 3D printing versus the realization of benefits that this technology provides. Stacey DelVecchio showed unique use cases that Caterpillar experimented while implementing 3D Printing in their manufacturing activities. Some of these processes include design verification, gauging, manufacturing aids, casting aids, and production. The scale of the

designs that Caterpillar uses in the manufacturing procedures represented a challenge and an intense learning process for the employees exposed to the 3D Printing technology. -Gisela Condado, DCMME Center GA



“INDUSTRIAL AUTOMATION IS UNDERGOING A MAJOR TRANSITION FROM MECHANICAL TO SOFTWARE-DEFINED, AND FOR GOOD REASON.”

HDS *RoboFS*

ACCORDING TO OUR FULFILLMENT SCENARIOS, COMPANIES WHO INTEGRATE ROBOFS SHOULD EXPECT TO SEE A REDUCTION IN COSTS OF AS MUCH AS

50%.”

HDS 2015

SMART ROBOTICS

INCORPORATING
ROBOTS
EFFECTIVELY &
ECONOMICALLY

At the recent DCMME Fall Operations Conference, Roy Vasher, Assistant Professor Management at Purdue University, gave a very interesting presentation on one of his latest endeavors, the HDS (Home Delivery Service) RoboFS program. This program is revolutionary in the supply chain industry, utilizing intelligent vision and mobile/articulated robots to reduce labor and total fulfillment costs, while simultaneously enhancing the supply chain capabilities. This patented program is an end-to-end solution from receiving to load through a fully automated system. How exactly does the RoboFS work? There are five main parts of the RoboFS process. The first is receiving, in which containers are sorted into trays and compartments. After reception comes transportation. Small mobile robots move the stacks of trays to the storage location quickly and efficiently. These robots

are not only safe but also people aware, resulting in a hazard free environment. At the storage location, autonomous robots manage the received trays and store them in low cost, non-precision, dense shelving. When one of the stored items is needed, it is packed and kitted at the vision-guided robotic pick station, where it is later loaded via conveyer, mobile robot, or pallet. How is this different than any other supply chain system? RoboFS is the first end-to-end solution with integrated automation and software, utilizing a modular, software-defined, articulated and highly accurate automated system. What are some of the benefits? One of the most appealing aspects of the RoboFS program is the unlimited SKU count possibility resulting from the tray-based system. These trays also allow flexible outbound orders or any size, in which mixed-SKUs and cases can be integrated. Complementing the unlimited SKU count possibility is the flexible

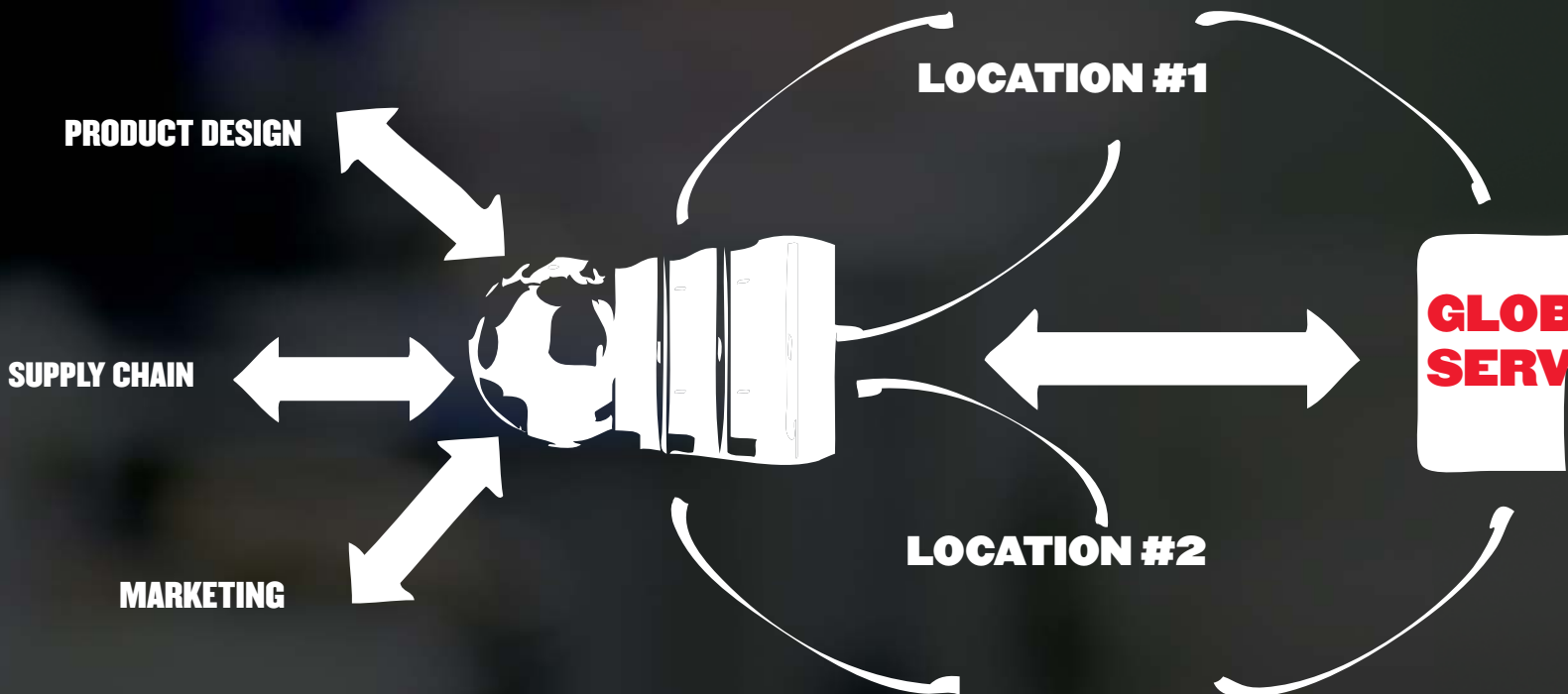
flows of the RoboFS. The mobile robots used for the transportation of goods are easily programmed and are without bottlenecks or single points of failure. As well as being easily programmable, these robots are also articulated, with product size and shape being handled via software. Being software based, the robots are predictable and reliable, and the software can be continuously improved for accuracy and speed. Even with all of the software and robotics, theft is an outlier event because of the inexpensive cameras as well as RoboFS RFID and weight scales. With all of these benefits what isn't there to like? RoboFS seems to be the supply chain of the future.

-Taylor Haws, MBA 2017

CUSTOMER EXPECTATIONS

How a Corporate Ecosystem Could Help

Cummins products are becoming more complex every year and customer expectations are evolving. Why is an ecosystem the answer? Alexander Nazarov, Chief Engineer at Cummins Inc. discussed this issue.



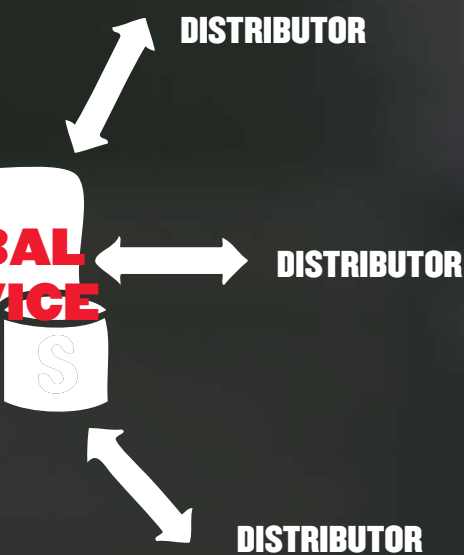


Mr. Nazarov spoke about how customer expectations are evolving and how a corporate ecosystem can help deal with this issue. His presentation started by describing how products are more and more complex every year which is increasing customer expectations of products. Customers currently require technical services, complete solution integration, design support from beginning to end, and field support of their product. He stressed the fact that access to information is key so that companies can provide their customer with all of the services that they require.

From there Alexander spoke about how a synchronized product design flow can help meet customer expectations. He stressed that input to a global system, including product specifications and installation/service requirements, can help to meet customer expectations. Having easy access to all of this information, whether it is at a distribution center or a location at a different global location, is vitally important so that they can meet their customer's expectations. This information also needs to flow from engineering, to supply chain, and to marketing throughout all points of product design to ensure that they actually

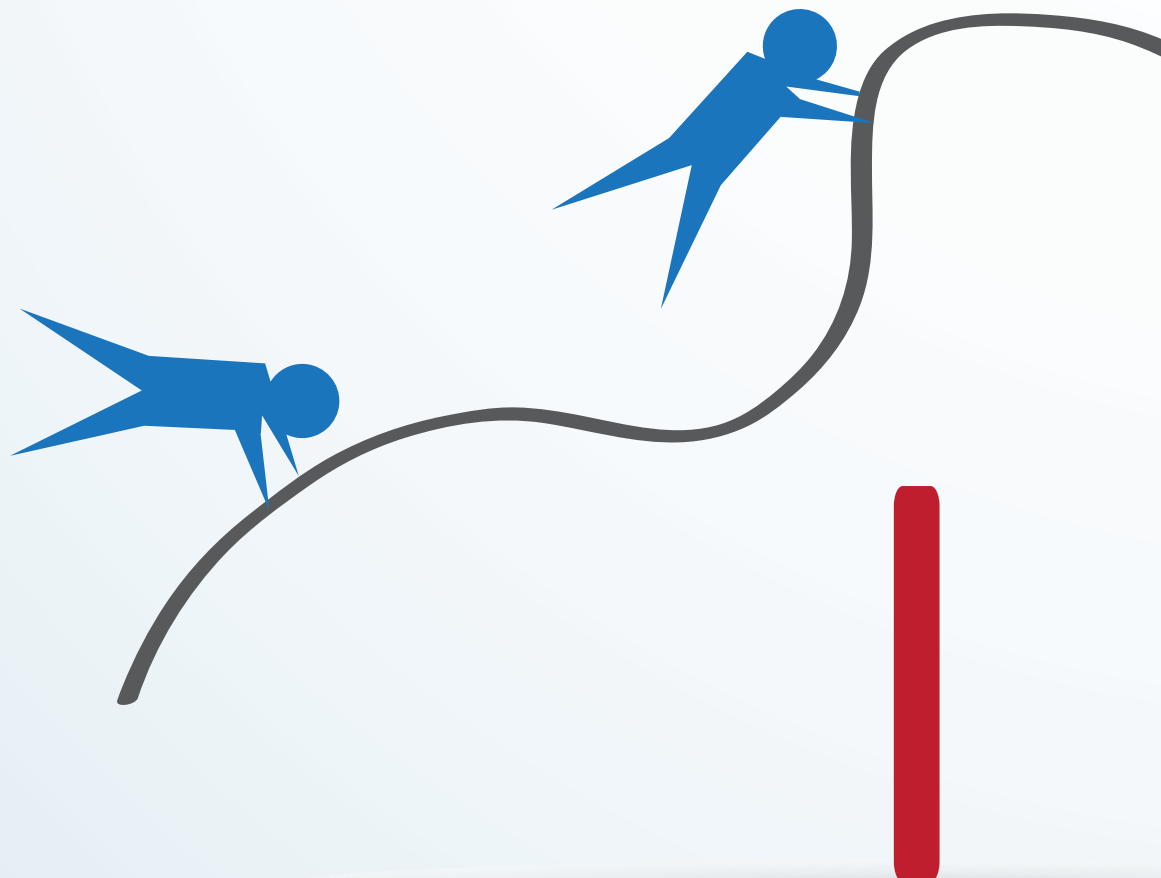
meet their customer's needs. Finally he spoke about how governmental regulations can affect customer expectations. He provided specific examples, including emission compliance and arms traffic regulations that showed how their customer's expectations and requirements changed due to government regulations. These governmental regulations are becoming more stringent, and corporate ecosystems have the ability to protect companies from potential lawsuits and penalties.

-Joey Meisberger, DCMME Center GA



SMART PEOPLE, SMART MANUFACTURING

Every company throughout the world is faced with several of the same questions and problems year in and year out. Two questions in particular are very pertinent to the development and success of each employee, and in turn, the company.



How is value created in manufacturing organizations? Who creates the value? by Taylor Haws, MBA 2017

At the recent DCMME Fall Operations Conference, Bob Nida, Vice President of Organizational Development at Wabash National, shared some key factors that help answer these very questions. "Value-creating growth" is a learned skill that entails an aggressive approach to creating long-term value for shareholders through leadership commitment and development. What does this mean for you as the employee? It means that as you consistently strive to be committed to the company, its goals, and its leadership, you will add value to yourself as an employee (i.e. promotions), to your team, and to the company as a whole. What does it mean for your manager? The manager's role is two-fold; they must not only emulate the same dedication to the job and company, but must look for these key traits in their employees to continuously build the success of the team and company. "Workforce" is the diverse group of individuals who, in a perfect world, all have

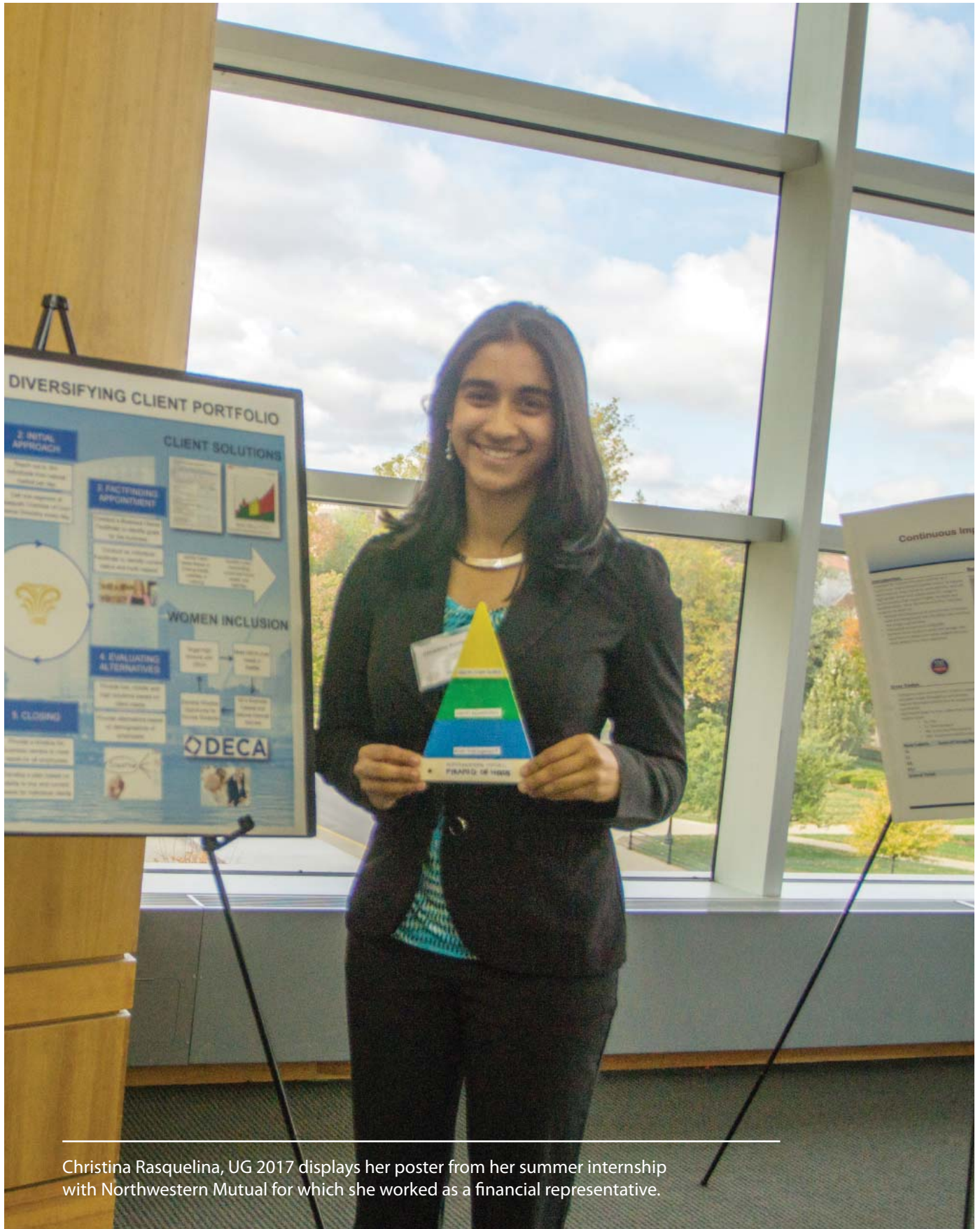
"value creating growth". The complexities of management come from the diversity of the workforce (especially in today's global economy), and managing each individual with their respective "value level". The key, as explained by Bob, is finding the "smart employees" in the company. These are the employees that not only have value-creating growth, but help build a successful workforce in whichever position they find themselves.

How does a company find these "smart people"? While IQ is important, it is not the determining factor.

Trust levels and willingness of the individual worker to emulate value-creating growth are two key components. With several "smart people" working together, a successful workforce is built and goals are achieved. Is it possible for employees to develop into smart people? Bob provided very conclusive evidence that yes, each employee has the ability to develop into a

"smart employee". Bob argued that leadership development can play a key role in this process, and should not be limited to the top of the organization. The last point that I really enjoyed from Bob's presentation was his statement that "take charge" individuals exist at all levels of the company, both hourly and salary. As an organization these individuals need to be found, given opportunities to grow, and then strategically placed to not only use their skills effectively, but to inspire those around them to undergo the same transformation process. Imagine what would happen if this was practiced at all levels in a company. The increase in success would be almost instantaneous. As students, future employees, and even current employees, Bob's discussion applies to all of us.

If we can learn to have "value creating growth" and become "smart employees", the future is bright for all of us.



Christina Rasquelina, UG 2017 displays her poster from her summer internship with Northwestern Mutual for which she worked as a financial representative.

Poster competition



THIS COMPETITION WAS CREATED TO BENEFIT BOTH INDUSTRY VISITORS AS WELL AS STUDENTS

by accomplishing three primary objectives:

1) Demonstrate to industry visitors the caliber of summer projects that Krannert students can complete during an internship and provide an alternative resource for locating

student candidates interested in operations and supply chain careers. 2) Provide an opportunity for graduate students to promote their talents and refine their presentation skills by marketing themselves to industry visitors. 3) Expose undergraduate and incoming 1st-year MBA students to the variety of companies and employment opportunities which they might encounter when searching for internship employment themselves. Participating

as judges for the competition, our industry conference guests have the opportunity to meet the competitors individually. Judges listen carefully and ask probing questions as the students articulate their internship work experience and accomplishments. We value all of our participants' preparation and willingness to share their experiences with us at the conference.



CONGRATULATIONS TO OUR WINNERS:

GRADUATE

1st: Amy Wong
2nd: Gaurav Kumar
3rd: Akshit Bajpai

UNDERGRADUATE

1st: Kaila Flanagan
2nd: Kelsey Starks
3rd: Christine Rasquinha



IT'S ALL IN THE DETAILS

**CENTER GRADUATE
ASSISTANTS PROVIDE
CONSULTING SERVICES TO
PREMIER AUTO DETAILING
& WASH**

by Joey Meisberger (MBA 2016)

FINANCIAL ANALYSIS AND PROCESS IMPROVEMENT, PREMIER AUTO DETAILING

Student Team: Joey Meisberger, Taylor Haws, Matt Jung, Gisela Condado, Pablo Martinez, Akshit Bajpai

Advisor: Steven Dunlop

Premier Auto Detailing was established in 2003, and is a local car wash and detailing facility located in Lafayette, Indiana. Premier Auto Detailing services both local businesses and the greater Lafayette community. Premier Auto Detailing partnered with the Center to obtain an improved understanding of their current financial situation and to obtain innovative ways to improve their current operational

processes. The financial analysis intended to guide management from Premier Auto Detailing to identify potential problems in their accounting and managerial systems, and the process improvement analysis was intended to find areas of improvement within their operational processes as well as to address any issues that their management team brought up. Multiple cost saving and process improvements were recommended to Premier Auto Detailing, including reducing their number of

magazine subscriptions, imposing caps on some of their monthly expenses, implementing a vehicle classification system, and including a web based self-check in on their website. If Premier Auto Detailing implements some of these recommendations, we believe that they will see direct benefits from these cost saving and process improvement measures. This will be an ongoing collaboration between Premier Auto Detailing and the Center.

meet **DONTE**

[creating happiness through professional detailing]

Premier Auto Detailing and Wash was founded on humble origins by Donte Wilburn in 2008. Donte had worked in the detailing industry and felt there was a better way to build a positive, happy business atmosphere for both the employees and the customers. Donte graduated from Purdue University in 2005 and started his career at Premier (a car wash line at

that time) in 2005. In 2011 Premier opened its doors to a new building with Donte leading thirteen employees. In 2012 Premier expanded services to include a mobile washing business that specializes in vehicles, fleet trucks, semis, and concrete pressure washing. That year as gross sales doubled, Premier hired twenty more employees.



“At Premier, we believe our mission is to create happiness through professional detailing and our purpose is to exhibit a philosophy of servanthood!”

INVENTORY MANAGEMENT, FINANCIAL ANALYSIS AND FACILITY DETAILING, AMERICAN AXLE & MANUFACTURING

Summer Student Team: Matt Bobrowski, Koji Yamada, Sayan Sinha

Spring Summer Team: Joey Meisberger, Taylor Haws, Matt Jung, Gisela Condado, Pablo Martinez, Akshit Bajpai

Advisor: Steven Dunlop

In 2014, American Axle & Manufacturing, Inc., purchased what is now AAM's Rochester Manufacturing Facility (ROMF), which is a 71,000 square foot facility with various machine tools in Rochester, Indiana. This is the first IN-MaC project grant for the center which emphasizes Indiana economic improvement. The project objective is to model, analyze and evaluate various proposals to maximize the Gross Profits, Contribution Margin and

Internal Rate of Return (IRR) to support the utilization planning for the open floor space currently available. Through the adoption of these modeling and analysis capabilities, this project will result in the following outcomes:

1. Written proposal and recommendation of various alternatives utilizing a variety of academic methods/tools.
2. Final Project Summary to support the cost justification

and project return on investment, implementation plan, etc. Detailed inventory storage management models and multiple plant layouts were recommended. Also included were financial analysis, material flow and SWOT analysis for different plant configuration and optimization of storage space including holding cost analysis.



about AAM

For over 20 years, vehicle manufacturers around the world have entrusted AAM to design, engineer and manufacture driveline systems for their vehicles. Over that time, we've delivered innovative technologies and solutions that are smarter, lighter, smaller, electric and even more powerful. We're in the business of Delivering POWER that keeps the world moving at the speed of efficiency. To learn more, visit aam.com.





GIVE US YOUR job jar.

Every firm has that list of important projects that just never seem to reach peak priority for the limited resources available. **These are exactly the projects that the DCMME and GSCMI Centers are interested in assisting you with.**

MARKETING

SUPPLY CHAIN

OPERATIONS

If your company is interested in supplying a project to our team,
please contact us at gscmi@purdue.edu

UNDERGRAD OPERATIONS AND SUPPLY CHAIN ORGANIZATION

OSCO's mission is to provide the means for members to gain exposure in the field of operations and supply chain management while effectively networking with companies to cultivate career opportunities for the future. The Operations & Supply Chain Organization offers its members plant visits, guest speakers, and information sessions throughout the year in order to learn about the operations of various companies in the surrounding area. **OSCO@PURDUE.EDU**



GRADUATE KRANNERT OPERATIONS CLUB

The KOC mission is to expose students to real-world opportunities through different channels; KOC hopes to broaden the understanding of Operations beyond the traditional classroom setting. During the course of the year, they organize various events bringing in operational leaders from industry to provide students with insight and future outlook. **KOC@PURDUE.EDU**

... View further student information at **gscmi.org**



PARTNERING WITH STUDENT CLUBS

EXPOSING STUDENTS TO REAL-WORLD OPPORTUNITIES

DCMME CENTER VOLUNTEER OPPORTUNITIES

The Center partners with OSCO & KOC to offer many occasions for both undergraduate and graduate students to experience action-based activities which give real-world experience and provide vital leadership preparation. Our events utilize and enhance their skills and provide excellent networking opportunities with potential employers.

To our many student volunteers,

Thank you, You help make our events a success.

Academic Programs

Krannert MBA Option in Operations Management

Operations Management is a multi-disciplinary field that focuses on managing all aspects of an organization's operations to provide products and services. Operations managers apply ideas and technologies to increase productivity and reduce costs, improve flexibility to meet rapidly changing customer needs, enhance product quality, and improve customer service. The concerns of Operation Management range from strategic to tactical and operational levels, which involve designing, planning and managing the system. The Operations Management Concentration is designed to prepare students for leadership in their operations management careers. With the trend in globalization and decentralization, successful management of supply chain requires system thinking and cross-functional skills. The rigorous coursework and curriculum offered by Operations Management faculty at Krannert aim at providing state-of-the-art training to ensure the competitiveness of our students.

Undergraduate-- Supply Chain, Information, and Analytics Major

The Supply Chain, Information, and Analytics major is a boundary-spanning field of study that integrates supply chain- the sequence of organizations and activities in acquiring, producing, and delivering goods and services all over the world- and analytics- the broad set of analytical and numerical methodologies that enable business problem solving and decision making. The program unites the

strengths of three elite programs in Krannert: Operations Management, Management Information Systems and Quantitative Analysis. The curriculum is designed to meet the rapidly growing business need for multi-disciplinary talents with strong analytical and leadership skills. Students complete a set of courses in all three sub-areas and select a career track of one sub-area for in-depth study. While the career tracks allow students to be well-prepared for a career in supply chain, information systems, or business analytics, the major prepares students with a cross-functional career that is required of major global companies.

Master of Science in Global Supply Chain Management Program

- Full-Time, One Year Program (Spring, Summer and Fall).
- Curriculum designed to meet the rapidly growing business need for specialized talents with thorough understanding of the intricacies involved in global supply chain management as well as strong analytical and leadership skills.
- A wide selection of courses developed by Krannert faculty who teach in our elite Operations programs (ranked #3 and #7 for undergraduate and MBA in 2014 US News and World Report).
- International partnership across a global supply chain with Tianjin University (China), Institute of Management Udaipur (India), and Universidad Popular Autónoma del Estado de Puebla - UPAEP (Mexico) bring unique global perspective and experience to the students.
- Faculty directed summer internship and experiential learning projects give students unique learning experience by working in international teams to apply classroom knowledge to the real


world under close faculty guidance. The Global Supply Chain Initiative (GSCMI) Center works with partner institutes and company sponsors to offer the students project opportunities in China, India, Mexico, and the United States.

MTM and GSCM Option Certificates

The DCMME & GSCMI Centers offer two certificates to our Master's Students: GSCM and MTM Option Certificates. By taking specific required courses to obtain these two options, students will be better prepared for many of the challenges that must be faced in order to succeed in today's highly competitive world of manufacturing.

The Global Supply chain Management (GSCM) option allows students to learn how the network of suppliers, manufacturing facilities, distribution centers and customers located around the world work together to ensure that the right product arrives at the right place at the right time for the right price. The Center granted 66 GSCM Certificates in 2016.

Managing a manufacturing enterprise has never been more challenging or exciting than today. With the focus of corporate leaders increasingly shifting towards innovation and entrepreneurship and high-value, high-margin products in new and evolving industries, students must be well-prepared to succeed in today's highly competitive world of manufacturing. The Manufacturing & Technology Management (MTM) option focus allows students to prepare for these challenges. The Center granted 34 MTM Certificates in 2016.



2016 [OPERATIONS MBA #7]
[#3 UG OPERATIONS]

US NEWS AND WORLD REPORT
TOP RANKED
KRANNERT OPERATIONS MANAGEMENT

KRANNERT FACULTY

We are grateful to the many faculty at Krannert who participate in Center sponsored events, projects and research. Thanks to each one for their efforts to progress the scholarly works in Operations and Global Supply Chain Management.



Faculty Bios

Gemma Berenguar

Professor Berenguar is an Assistant Professor of Management. Gemma received her Ph.D. in Operations Research from the University of California, Berkeley in 2012. Her research interests include supply chain design and operations research resolution methods, sustainable and socially responsible operations, analysis of nonprofit supply chains, and benchmarking studies in global health supply chains. She was a recipient of the 2012 Doug and Maria DeVos Faculty Summer Support Award in global supply chain management

Tom Brush

Thomas H. Brush is a Professor of Management in the Strategic Management Area at the Krannert School of Management, Purdue University. He is Senior Associate Dean, and Head of the Management Department. He received his Ph.D in Economics and Business Administration at the University of Michigan where his doctoral dissertation received the 1991 Free Press Award for Outstanding Dissertation Research in Business Policy and Strategy. Before coming to Purdue University, Dr. Brush spent two years on the faculty at the University of Minnesota's Carlson School of Management and a sabbatical year in 2001 as a Visiting Research Scholar at the Watson Research Center of the IBM Corporation. His research focuses on

corporate strategy and manufacturing strategy topics such as acquisitions, diversification, manufacturing capability exploitation within companies, and supplier relationships and alliances. Connections between these streams include the disintermediation of existing business models with IT initiatives and the rise of new outsourcing opportunities in both primary activities and business processes. Some specific applications include HR outsourcing, knowledge management in outsourcing, e-commerce marketplaces, and the effect of customer capabilities on performance in online banking. His current research focuses on technology diffusion and the competitive choices of standards selection by incumbents and potential disruptors as well as corporate

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governance in acquisitions. He has published in *Management Science*, *Strategic Management Journal*, *Academy of Management Journal*, *Organization Science*, *Production and Operations Management*, *Journal of Operations Management*, *Journal of Economic Behavior and Organization*, *Managerial and Decision Economics*, and *Explorations in Economic History*. He is an active member of the Academy of Management and the Strategic Management Society. Tom has done consulting and teaching for such firms as IBM, Dow Corning, Pioneer Hi-Bred, Navistar International, the American Animal Hospital Association, and American Axle and Manufacturing and is on the Board of Directors of Mackey Bancorp.

Suresh Chand

Professor Chand is the Professor and Louis A. Weil Jr. Chair of Management and the Associate Dean of Graduate Studies. He teaches Operations Management. His current research interests include the application of Operations Management principles in improving health-care delivery processes, supply chain models to match supply with demand with multiple orders, and investigating characteristics of batch sizes in the presence of learning and forgetting. Professor Chand has been with Krannert since 1979. He has taught a variety of OM courses at Krannert ranging from core courses for the MBA (both regular and executive) and undergraduate students to electives for undergraduate and MBA students on topics such as Factory Physics,

Technology Management, Supply Chain Management, and Service Operations Management. He also teaches doctoral seminars. He is currently senior editor for *Production and Operations Management*. He served as Associate Editor for *Management Science* (1986-2008). He was area editor for *Production and Operations Management* (1988-2003). He was also senior editor for *Manufacturing and Service Operations Management* (1999-2003). He was the general chair for POM 2005, the annual international conference of the Production and Operations Management Society.

Amy David

Amy David joined the Krannert School of Management as a Clinical Assistant Professor in August 2014 after completing her Ph.D. in Industrial Engineering and Operations Research at the University of Illinois at Chicago. She teaches the faculty-directed student project course, as well as undergraduate and graduate courses in production planning and control and supply chain management. Previously, Professor David worked as Logistics Planning and Process Development Manager at USG and a Logistics Analyst at Medline Industries. She holds an MBA from Lake Forest Graduate School of Management and the APICS CPIM designation.

Annabelle (Qi) Feng

Q. Annabelle Feng is John and Donna Krenicki Chair in Operations Management, Professor of Operations Management, and joined the Krannert

School of Management as an associate professor in June 2012. She was a faculty member at McCombs School of Business, The University of Texas at Austin since 2006. Her main research interest lies in studying firms' sourcing decisions in the broad context of supply chain management. Her work focuses on individual firm's procurement planning in uncertain environment and multiple firms' interactions in sourcing relationships. She received the first prize in the INFORMS Junior Faculty Paper Competition in 2009 and the Wickham Skinner Early-Career Research Accompaniment Award in 2012. Her work with Hewlett-Packard on product proliferation management won the 2009 Edelman Award.

Greg Hundley

Professor Hundley's interests include human resource management, compensation and reward, international human resource management, and entrepreneurship. His current areas of research include strategic human resource management, self employment, and international compensation. Professor Hundley is also interested in the effects of national culture on human resource outcomes. Professor Hundley has been on the faculties of the University of Oregon, University of Western Australia and Xavier University. He is on the editorial board of the Asia-Pacific Journal of Human Resources. He is a member of the Academy of Management and the Industrial Relations Research Association. In 2001, he received the John and Mary Willis Young Faculty Scholar Award.

Ananth Iyer

Professor Iyer is the Susan Bulkeley Butler Chair in Operations Management at the Krannert School of Management. He is also the Director of Purdue NExT - a University wide modular online interactive courses for global distribution. He was the Associate Dean for Graduate Programs (2011-2013) and Director of DCMME (Dauch Center for the Management of Manufacturing Enterprises) and the founding Director of GSCMI (the Global Supply Chain Management Initiative) (2006-2011) at the Krannert School of Management. Previously, he was Purdue University Faculty Scholar from 1999-2004. His teaching and research interests are operations and supply chain management. Professor Iyer's research currently focuses on the analysis of supply chains including the impact of promotions on logistics systems in the grocery industry, and analysis of the impact of competitors on operational management models and the role of supply contracts. His other topics of study include inventory management in the fashion industry, effect of supplier contracts, and use of empirical data sets in operations management model building. He has four books ranging from a textbook on Managing Supply chains to trade books on Toyota Supply Chains, Supply Chains on the Silk Road and Orchestrating Supply Chain Opportunities. He has published in MandSOM, Operations Research, Management Science, Naval Research Logistics, Networks, and Manufacturing and Service Operations Management. He was the FMC Scholar in 1990-91. He has served as a Department Editor

of Management Science, Associate Editor of Operations Research, is on the editorial boards of Operations Research Letters, IIE Transactions, the ECR Journal and Manufacturing and Service Operations Management editorial board, and member of INFORMS. He was president-elect of the MSOM Society of INFORMS in 2001-02 and served as president for the year 2002-03. Prior to joining the Krannert faculty in 1996, Professor Iyer taught at the University of Chicago. He has been affiliated with the Production and Distribution Research Center at Georgia Tech, and a consultant to Daymon Associates, Sara Lee, Turner Broadcasting and others. He served his Chicago community as a pro bono consultant to the Chicago School System and the Chicago Streets and Sanitation Department.

Justin Jia

Professor Jia joined the Operations Management group in the Krannert School of Management in fall 2011 after completing his Ph.D. in Supply Chain and Information Systems at the Pennsylvania State University Smeal College of Business. He conducts research on pharmaceutical supply chain, closed-loop supply chain, and procurement auctions. Professor Jia teaches the core undergraduate Operations Management course and an elective undergraduate course, Supply Chain Analytics.

Karthik Kannan

Karthik Kannan is an Associate Professor at Purdue's Krannert School of Management. He has pioneered the

concept of "Design for Instincts" as a way to organize businesses in the current age. To learn more about the concept, visit <http://www.designforinstincts.com>. His research also can be themed along the same dimension "design for instincts." His research work tries to understand and sometimes even manipulate human's instinctive behavior in specific contexts through the use of information technology. He works on two primary research streams markets and pricing of information goods and services through auctions, and economics of information security. His papers have been accepted in several leading conferences and journals in the information systems area, including Management Science, Information Systems Research, Workshop on Information Technology and Systems, Workshop on Information Systems Economics, International Conference on Information Systems, and Conference on Information System and Technology. His papers have won the Best Paper Awards in the 10th and the 15th Annual Workshop on Information Technology and Systems. He currently serves/ has served as an Associate Editor for Management Science, Information Systems Research, and MIS Quarterly. He is a member of AIS and INFORMS. He is also a CERIAS Fellow and Krannert's Faculty Fellow. At Purdue, he teaches the IT course in the MBA programs (in the regular, weekend, and Exec Ed MBA). He has also been a visiting faculty member at GISMA and ISB. Previously he taught undergraduate required courses as well as a database course. Prior to joining Purdue, Karthik obtained his PhD in information systems, his MS in Electrical and Computer Engineering, and MPhil

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in Public Policy and Management all from Carnegie Mellon University. His undergraduate degree is in Electrical and Electronics Engineering from NIT Trichy (formerly, REC Trichy). Before joining the graduate school, Karthik worked with Infosys Technologies.

Ellen Kossek

Ellen Ernst Kossek is the Basil S. Turner Professor at Purdue University's Krannert School of Management and Research Director of the Susan Bulkeley Butler Center for Leadership Excellence. She holds educational degrees from Yale University (Ph.D in organizational behavior), the University of Michigan (MBA in human resources); and Mount Holyoke College (with honors in psychology.) Her research has won awards including the 2015 Rosabeth Moss Kanter award for research excellence, the Families and Work Institutes' Work-Life Legacy award for helping to build or advance the work-life movement and the Academy of Management's Gender and Diversity Division's Sage Scholarly achievement award for advancing understanding of gender and diversity in organizations. She was the first elected president of the Work-Family Researchers Network, a founding member of the Work Family Health Network and elected a Fellow in the American Psychological Association and the Society for Industrial and Organizational Psychology. She was elected to serve on the Academy of Management's board of governors, and Chair, of the Gender & Diversity in Organizations Division. She has won distinguished faculty teaching awards for multiple years at Purdue. She has been invited to give keynote speeches

to managers, scholars, students and policymakers in over a dozen countries. Prior to becoming a chaired professor at Purdue, she was awarded the rank of University Distinguished Professor at Michigan State University. She has been a visiting scholar at Kings' College London, Harvard Business School, the University of Adelaide, Australia, and the University of Michigan's Institute of Social Research, and Center for Education of Women (awarded a Jean Campbell Fellowship). Prior to becoming a professor, she worked in Human Resources in Asia, Europe and the U.S. for Hitachi, IBM & GTE. She works globally to advance knowledge on gender and diversity and positive employment practices.

Yanjun Li

Professor Li's teaching interests include management science, statistics, production, optimization models, and algorithms. His current research includes discrete optimization and application, approximation algorithms, network and graph, location and distribution, vehicle routing, lot sizing and scheduling, inventory and supply chain management, and financial optimization. He received the Jay N. Ross Young Faculty Scholar Award (2005), John and Mary Willis Young Faculty Award (2008), and Krannert Faculty Fellow (2008) at the Krannert School of Management, Purdue University. He is a member of the Institute for Operations Research and the Management Sciences (INFORMS), Mathematical Optimization Society (MOS), and Society for Industrial and Applied Mathematics (SIAM).

Yaroslav Rosokha

Dr. Rosokha received his Ph.D. in Economics from the University of Texas at Austin in 2013. His research interests concern individual and social learning under uncertainty. Also among his interests are Behavioral Operations Management, Experimental Economics, and Game Theory. He has taught courses in Operations Management and Economics.

George Shanthikumar

Professor Shanthikumar is the Richard E. Dauch Distinguished Professor in Manufacturing and Operations Management and the Director of the Dauch Center for the Management of Manufacturing Enterprises and Global Supply Chain Management Initiative. He joined the Krannert faculty in 2009. Prior to coming to Purdue, he was a Chancellor's Professor of Industrial Engineering and Operations Research at the University of California, Berkeley. His research interests are in integrated interdisciplinary decision making, model uncertainty and learning, production systems modeling and analysis, queueing theory, reliability, scheduling, semiconductor yield management, simulation stochastic processes, and sustainable supply chain management. He has written or co-written more than 250 papers on these topics. He is a co-author (with John A. Buzacott) of the book *Stochastic Models of Manufacturing Systems* and a co-author (with Moshe Shaked) of the books *Stochastic Orders and Their Applications* and *Stochastic Orders*. He was a co-editor of *Flexible Services & Manufacturing Journal* and is (or was) a member of

the editorial boards of the Asia-Pacific Journal of Operations Research, IEEE Transactions on Automation Sciences and Engineering, IIE Transactions, International Journal of Flexible Management Systems, Journal of Discrete Event Dynamic Systems, Journal of the Production and Operations Management Society, Operations Research, Operations Research Letters, OPSEARCH, Probability in the Engineering and Information Sciences, and Queueing Systems: Theory and Applications. Professor Shanthikumar has extensively consulted for various companies, including Applied Materials (AMAT), Bellcore, IBM, KLA-Tencor, NTT (Japan), Intel, Intermolecular, ReelSolar, Safeway, and Southern Pacific. Through KLA-Tencor, he has worked on joint development projects for Advanced Micro Devices, IBM, Intel, LSI, Motorola, Texas Instruments, Toshiba, Fujitsu, Taiwan Semiconductor Manufacturing Company, and UMC.

Masha Shunko

Professor Shunko joined the faculty at the Krannert School of Management in July 2011. Her primary professional interest is in tax efficient global supply chain management, where she focuses on the effective usage of transfer prices and sourcing policies to take advantage of operating in favorable tax jurisdictions. The second area of interest is healthcare operations where she focuses on the effect of ambulance traffic coordination to improve performance of the emergency departments. Professor Shunko has worked on consulting and research projects with Caterpillar Inc. and

University of Pittsburgh Medical Center, which have shaped her research areas. Prior to the academic career, she worked for Deloitte. in Estonia, where she audited and consulted various manufacturing and banking clients in Estonia, Latvia, Belarus, and Russia. Professor Shunko teaches the core Operations Management course in the MBA program and an elective MBA course in Supply Chain Management. Professor Shunko completed her PhD in Operations Management at the Tepper School of Business, Carnegie Mellon University, during which she received the 1st prize in the POM Supply Chain Management student paper competition in 2009.

Susan Watts

Professor Watts' research focuses on the effect of information and competition in markets as well as issues in corporate social responsibility. She has published papers in the Journal of Accounting Research, Journal of Accounting and Economics, The Accounting Review, The Rand Journal of Economics, Management Science, Contemporary Accounting Research, Review of Accounting Studies, Journal of Management Accounting Research, Journal of Economics and Management Strategy, and other accounting, economics and finance journals. Professor Watts teaches both financial and managerial accounting as well as courses focused on corporate social responsibility. She also teaches in the doctoral program and is the Accounting area doctoral student academic advisor. She has won numerous teaching awards at the university, school and

departmental levels and was included in Purdue University's Book of Great Teachers in 2008. Other awards include the Purdue University Charles B. Murphy Outstanding Teaching Award, Purdue University Teaching for Tomorrow Award, Excellence in Undergraduate Teaching Award, and Best Teacher Award in the School of Management. She is also a Fellow in Purdue University's Teaching Academy and was named a Purdue University Faculty Scholar. Prior to joining Krannert, she taught at Indiana University-Bloomington, where she also won university, school and departmental teaching awards, and at the University of British Columbia. She taught at the University of Northern Iowa while a doctoral student. Before going to graduate school, she was an accountant with Brown Group, Inc. in St. Louis. She has a CPA certificate from the State of Missouri, and is a member of the American Accounting Association, the Canadian Academic Accounting Association, the American Finance Association, Financial Management Association, INFORMS, the National Investor Relations Institute, FEI, Beta Alpha Psi and Beta Gamma Sigma.



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A man with a beard and a striped shirt is smiling and looking towards the left. He is sitting at a table. In the background, another man in a blue sweater is visible, looking at a computer monitor. The setting appears to be an office or a meeting room.

A special **thank you** to all who contribute to scholarship funding for our DCMME students.

As stated by late Richard Dauch, Co-Founder American Axle & Manufacturing (AAM), Purdue alum and generous benefactor of the Center, "We know that competition on a global scale will require the best we have to offer. The same is true for educating our future manufacturing leaders and encouraging innovation in manufacturing and technology research."

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