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DAUCH CENTER FOR THE MANAGEMENT
OF MANUFACTURING ENTERPRISES

2017-2018 ANNUAL REPORT

KRANNERT'S MANUFACTURING CENTER

DAUCH CENTER FOR THE MANAGEMENT OF MANUFACTURING ENTERPRISES



KRANNERT
MS OPERATIONS
MGMT.
PROGRAM
2016 US News &
World Report

#6



KRANNERT
MS SUPPLY
CHAIN
PROGRAM
2016 US News &
World Report

#12



AT THE HEART OF A TOP RANKING BUSINESS SCHOOL

A Message From Center Director

Welcome to the DCMME Annual Report (DCMME refers to the Center for Data-Driven Management & Operations). This report highlighted the benefits from modeling and optimizing our operations, and the importance of data-driven decision-making. We are proud of our achievements and the support of our faculty, staff, and students. We look forward to continuing our work and the foundation of our center.

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Anand V. Iyer, Director, DCMME & SCOM
Susan Bulkeley Butler Chair in
Operations Management
Professor of Management,
Krannert School of Management

BRIDGING INDUSTRY, STUDENTS, & FACULTY.

INDUSTRY



**KRANNERT'S SMART
LEAN ENGAGEMENT
CENTER**



A CENTER WITH COLLABORATION IN MIND

Technology doesn't stop progressing, and it is the responsibility of every individual to stay up with the newest technological breakthroughs. On a campus dedicated to research and learning, it is only applicable that an initiative dedicated to the management and advancement of manufacturing create an opportunity for those who wish to see the newest technologies first-hand. The Engagement Center is a place where students, professors, and even the general public can learn and experience the some of the newest technologies as well as understand their applicability and usage in a manufacturing setting. The Engagement Center contains a number of different technologies. Starting from the right side of the room as you walk in, there is a computer which runs a live stream of the six cameras placed throughout

the room. The cameras record a live stream, and with a simple code, the computer that live streams the camera feed can run a video analytics tool which counts the number of individuals that enter the center. Moving along the right-side wall and wrapping around to the right corner of the room, a visitor can see six 3D printers. Five of the 3D printers are used in conjunction with the industrial design department, and the last printer is the DCMME's own. The 3D printers are used to print out a number of different objects including holders for some of the other technologies in the center, DCMME and GSCMI logos, Purdue logos, and a number of other different objects. With 1000s of different free designs online, almost any object can be 3D printed. For the more artistically inclined, custom designs can be made using the software that accompanies the



**TAKE A VIRTUAL TOUR
OF THE SMART LEAN
ENGAGEMENT CENTER AT
[DCMME.ORG](https://www.dcmme.org)**

During the academic year, the Engagement Center has regular operating hours of 8AM-5PM, M-F located in STEW 162.

3D printers. Next to the 3D printers is the Light Guide System (LGS). LGS is a powerful industrial training tool that incorporates a touch screen, touch pad, and virtual display that can allow users to virtually assemble, repair, or more generally, virtually complete a task. Users can also code their own training programs in the LGS as well as scan using the virtual display to create interactive, realistic training programs. Next to the Light Guide System is the barcode scanning technology. The barcode reader is an electronic device that can read and output printed barcodes to a computer. Scanning technology is familiar to most as a simple and quick way to transfer information with a simple barcode scan. Moving along the wall of technologies, next up is the Google Glass. Google Glass was the first of its kind with regard to an optical head-mounted display designed in the shape of a

pair of eyeglasses. Google Glass was designed to be a hands-free device that has a camera that can take pictures & videos, operate google applications, and operate other free applications built by third-party developers. The next technology shown is the robotic arm which is in the general manufacturing area. The robotic arm can be programmed easily by showing it which movements to make, when to grab an object, and when to place it back down. This programming is a very simple version of machine learning. The far-left wall of the center has two large-screen TVs. The first TV is used to live-stream the Microsoft Hololens. The Hololens is the newest, and arguably the best, mixed augmented reality device. The Hololens can examine a user's environment and create an augmented reality setting that can be manipulated. The Hololens can create augmented reality training sessions

which allow a user to complete a task virtually and then physically. An application that can be used with the Hololens is the Scope AR application where a user can complete a circuit box in augmented reality and then physically. Finally, the other large screen TV is used to demonstrate how drones are used in industry and for personal use. Drones have been gaining traction for uses such as inventory control and even product delivery. The center has three drones – two mini drones and one larger drone that can record drone view.

MATT FOUST MBA 2018



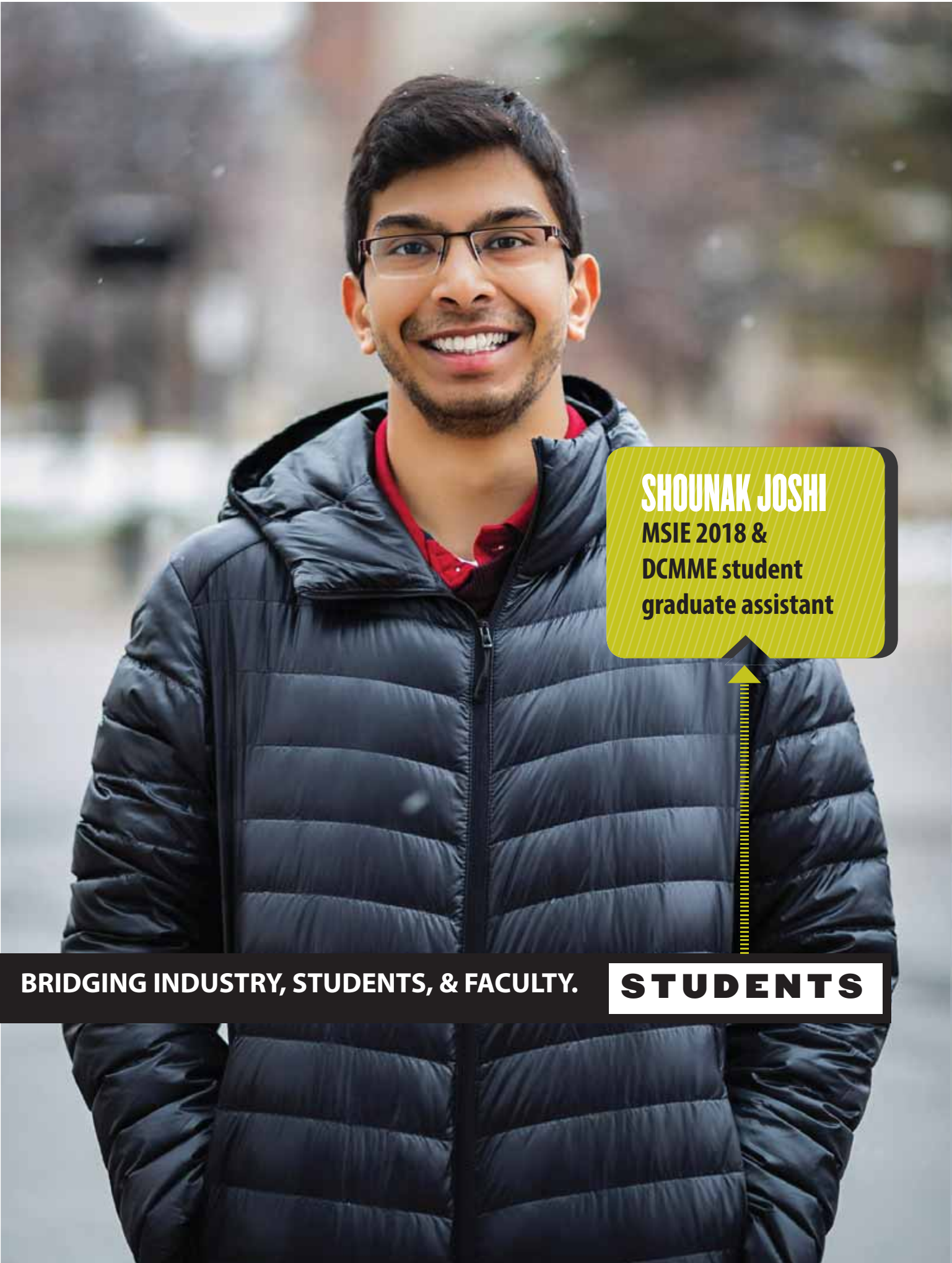
When you work at DCMME, you work in multi-functional, diverse teams much like in a full-time job, and these experiences are invaluable for future professional endeavors.

One aspect of working in DCMME is that it allows students to lead teams and work on real-world issues which is a great way to prepare for successful future leadership roles.

While working at DCMME, students work with professors, industry professionals, and fellow students which allows these students to develop exceptional communication and networking skills.



Matt Foust, MBA 2018 at the Engagement Center.



SHOUNAK JOSHI
MSIE 2018 &
DCMME student
graduate assistant

BRIDGING INDUSTRY, STUDENTS, & FACULTY.

STUDENTS

JOINING FORCES

AN INTERVIEW WITH CENTER GRADUATE STUDENT, **SHOUNAK JOSHI**

Q: From an IE student's perspective, please describe the importance for your career goals in joining up with the management department to work on projects? Why not just work with IE on projects?

SJ: Industrial Engineering at its core deals with optimizing processes to improve utilization of the 3 M's in any industry – Manpower, Material and Money. Positive results can be seen only when solutions are developed, tested and implemented. IE offers me an opportunity to learn the 'Development' part of the process and the Management department plays a key role in teaching the 'Implementation' part. In order to grow and sustain in today's world, I feel one needs both these skillsets, and this is the reason why I joined DCMME in the first place. DCMME is one such unique place where I get to apply whatever I have learned with my IE background in a real time scenario and make an impact in some of the worlds leading companies.

Q: What value have you gained so far working with DCMME on projects?

SJ: I'd like to stress on two things that I have learned from working with DCMME on projects. First – the

difference in working for a course project and working with a company project. Before joining Purdue for my Masters, I had just one internship and did not have much experience of working with a company. I had often heard people telling me that working on a company project is far more different and rather difficult than working on a course project. With DCMME, I got an opportunity to work directly with professionals from the industry that had immense knowledge and experience in dealing with company issues. When you work on a course project, you never think of the problems that one might face while implementing the solution, or you have all the data available before you even start the analysis. But, when working with a company, at every step you need to think about feasibility of implementing the solution. You need to gather data from several different sources and then try to understand it on your own. You need to understand what the company's real objective is and then try to explain the solution in their own terms. You are questioned at each and every step of your analysis by the company's leadership and stakeholders because the company's future is at stake. DCMME gave me an opportunity to experience all this which I don't think can be learned anywhere else. Second – working in a team and people management. At DCMME, everyone

works in teams. We have people from diverse backgrounds like Ops, Supply Chain, IE, Business Analytics, and Finance. We all delegate tasks among ourselves, handle problems together, brainstorm ideas in case of road blocks, and deal with clients together. There are so many new things I get to learn from my team mates- their way of thinking, approaching a problem, handling clients- which no course can teach you. Since we have such a diverse group of students, everyone has their own approach towards solving problems which indirectly makes

DR. PAT BRUNESE, IE, TVS PROGRAM LEADER



“ The IE and Krannert collaboration with TVS Motors has been a very fruitful endeavor for our students, faculty, and TVS. The collaboration between IE and Krannert is important to ensure that TVS managers develop a holistic toolkit in operations research utilized at multiple organizational levels in a sustainable manner, much like their exceptional quality management system. ”



the entire process much more creative, innovative and interesting. I remember while working on a project with Cummins, even though our main goal was to develop quantitative models, we had a hard time understanding the data that was provided to us. Luckily, one of our teammates had some experience in manufacturing. He made sure that we all understood the technical terms in the data, and then using his technical acumen and our analytical skills, we developed the final model which Cummins was very happy with. This is what DCMME has to offer – diverse minds working toward a goal.

Q: What has your favorite project been?

SJ: My favorite so far has been the project with Cummins, which I mentioned earlier. We were a team of five working on the project. Our objective was to develop financial models for the client. The most interesting thing in this project was that it involved analytical thinking combined with manufacturing knowledge. The client was eager on implementing our models, and hence we had to make sure that whatever we were developing was feasible to implement. Often times we used heavy statistical analysis to come up with models. However, it was an enormous task to explain those models to non-technical people in

ways they could relate to. We made sure that the recommendations were easy to grasp at the management level in a business scenario. We submitted the final model in October 2017. We even built a user-friendly dashboard to analyze results from the model. With our models, we were able to improve the expense recovery by 20%.

Q: What is your background and how did you get to where you are?

SJ: I come from India. I was born and raised in the beautiful city of Pune – also referred to as the ‘Oxford of the East’ due to the large number of educational institutes it has. I completed my under graduate in Mechanical Engineering from the University of Pune. After my graduation in 2015, I took a gap of one year to pursue my interest in music after which I came to Purdue for my Masters. I am a percussionist. I learnt Tabla – an Indian percussion instrument for five years in school after which I shifted to playing drums. Back in India, I play for two bands – New Breed (pop rock genre) and Cat Kamikazee (post rock genre). Cat Kamikazee released its debut album – ‘Raining Cats’ in 2015. I joined Purdue in Fall 2016 in the MSIE program

and started working with DCMME in Spring 2017. Even at Purdue, I play for a rock band ‘Vertigo 42’. It’s a good stress buster and keeps my creative instincts alive.

Q: What do you enjoy most about Purdue University?

SJ: Its hard to talk about a single thing. Everything about Purdue is awesome – campus, students, social events that we have here. All of this has been a memorable experience so far. There’s just one thing that sometimes bugs me – ‘The Mid-West Weather’. I remember one time when I experienced all the three seasons on the same day. It was sunny in the morning, raining in the noon and it started snowing late evening. That was fun!

Q: What is your career goal?

SJ: Well, currently I am focused on gaining as much experience as possible in the domains of supply chain and operations. Quiet frankly, I haven’t thought much further about where I would see myself. I am more of a ‘go with the flow’ person and take life as it comes.

STUDENT SCHOLARSHIPS

JOHN DEERE

Marquette Minner
Richard Luan-Jimenez
Darren Young

SUBARU ISUZU

Collin Taylor

MAPLE LEAF FARMS

Cline, Linnea N.
Brumfield, Benjamin D.
Chackochan, Oswin P.

ENSIGN BICKFORD

Alexandra Rocholl-Werner

Through the generous sponsored scholarships provided by our industry partners, students who express sincere interest in supply chain management and manufacturing management can benefit from Krannert's highly regarded undergraduate and MBA programs.

STUDENT SCHOLARSHIP RECIPIENTS Christine Rasquinha, Marquette Minner, Jessica Miller, Richard Luan-Jimenez, Darren Young, Margaret Rochford, Hannah Gates, Alexandra Rocholl-Werner, Blake Mawhorter Shekhar Jha, Deepali Jain

STUDENT GSCM & MTM OPTION CERTIFICATE RECIPIENTS: Christian Bencid, Avanthi Boopalan, Jau Chen, Matthew Foust, Vinay Gundam, Akanksha Gupta, Subhash Katragadda, Mohaneesh Khubchandani, Kody Kleine, Vibhav Mishra, Sarinah Narciso, Amer Nasrawi, Jyothi Pokkunuri, Christine Rasquinha, Matthew Snell, Yanzhou Zheng, Juan Zubillaga, Shashank Chinnolla, Manita Dagar, Adam Davis, Shankar Eleswarapu, Bryan Gissal, William Harbert, Muhammed Karadayi, Nathan Lowe, Saravana Mariappan, Amitesh Mishra, Siva Rai, Jacob Robinson, Murilo Siqueira, Stephanie Takacs, Yi-Hang Yang, David Putt

TVS STUDENT INTERNS: Pranai Abilash Perumareddy, Mauricio Iriondo, Jiani He, Ji Jiang, Nicholas John Molter, Anuj Niraj Mehta, Man Lu, Xiaoli Gao, Kulwinderjit Singh Dhaliwal

STUDENT PROJECT TEAM: Abrar Mohammed, Adarsh Goyal, Amitesh Mishra, Amol Shetty, Anand Deshmukh, Asmita Parashar, Claire Conneely, Deepak gupta, Gopi Manthena, Hardik Shah, Humphrey Kanyoke, Jerry Jana, Jewel James Rodrigues, (Swarup) Jyothi Pokkunuri, Kalyan Mupparaju, Matt Foust, Milay Hemant Haria, Mohammad Rahman, Mohaneesh Khubchandani, Naveed Lalani, Neelesh Prakash, Nick Wright, Nicole Plewniak, Niyati sadhu, Pavni Garg, Pekham Dey, Prasad Gujela, Priyanka Rao, Rishabh Mohan, Rushabh Banthia, Sai Sravan Akasam, Satwik Kulkarni, Saurabh Kurjekar, shashank chinnolla, Shounak Joshi, Shubhda Kulkarni, Siddhanth Rajagopalan, Sushant Bhat, Swathi Veeradhi, Tanya Arora, Vibhav Mishra, Yash Ambegaokar

STUDENT INVOLVEMENT



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

TVS INDIA

INTERNSHIP



The TVS India Internship organized by the DCMME 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.

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.

Participants have a distinctive occasion to take concepts learned in the classroom and apply them to real life business situations.



Summer interns visiting New Delhi, India during weekend excursion.

“ TVS PROVIDED ME THE OPPORTUNITY TO ABSORB TEXTBOOK KNOWLEDGE THROUGH APPLICATION.”

**Man Lu
TVS Intern
MSGSCM**

TVS interns Man Lu and Jiani He standing in front of the Taj Mahal





**AN INCREDIBLE
EXPERIENCE
TO WORK WITH
ONE OF INDIA'S
LEADING
MANUFACTURERS**

NICK MOLTER
TVS Intern
MSBAIM



Nick Molter
visiting the
Taj Mahal.



TVS PROJECTS

STUDENTS: Jiani He (IE), Mauricio Iriondo(IE)

PROJECT OBJECTIVE: Reduce NVA in Plant #1 stores through location study of parts and location

STUDENTS: Man Lu (MSSCM), Anuj Mehta(IE)

PROJECT OBJECTIVE: Simulation to decongest traffic of trucks in Hosur location (includes inbound, out bound logistics of both 2W and 3W)

STUDENTS: Nick Molter (MSBAIM), Ji Jiang(MBA)

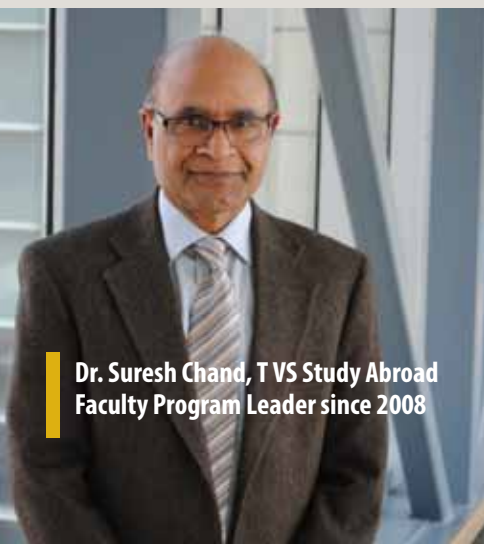
PROJECT OBJECTIVE: Development of implementation road map of AR/VR and MR for entire plant operations , includes detailed study of pilot area and scale up plan

STUDENTS: Xiaoli Gao (MSHRM), K. Dahliwal(MBA)

PROJECT OBJECTIVE: Consumers are the center-stage of great marketing companies. In order to influence consumers we must understand their needs, expectations, and buying behavior. The goal is to see if there are any rules that the company can decode and classify in order to help segment the market for better targeting of their brands.

STUDENTS: P. Perumareddy (IE)

PROJECT OBJECTIVE: Improving utilization of TVSM vehicle handling system



**Dr. Suresh Chand, TVS Study Abroad
Faculty Program Leader since 2008**

"TVS program enriches students' overall academic experience at Purdue by exposing them to various functions on TVS's value chain, including Product Design, Human Resources and Leadership Development, Operations, Logistics and Supply Chain Management, and Customer Relations and Marketing Management, under guidance of highly qualified mentors in a global learning environment. Students, working in small teams, get to apply what they learn in the classroom to practical problems with real-time feedback from clients. It also enriches students' cultural experiences. Students live a vastly different way of life for three weeks – life full of both joys and challenges. Students develop life-long friendships with each other and with hosts in India. Overall, a time- and cost-efficient, high-value, life changing experience in a global environment."

“ Do more than **YOU** can.”

Originally from the closed town of Sarov, Russia, Dr. Olga Senicheva started teaching at Purdue in August 2016. Describing her time here so far, Olga reflects on her most satisfying moments as an instructor, “moments when you can sense that you have a connection with the students- to be able to sense that they get it.” As an instructor it’s important to know that you are reaching your students, engaging with them, and helping them reach their goals.

“You never know what to expect from students.”

She describes watching them learn, sometimes fail, but giving them the opportunity to work through things as one of the most satisfying things about working with students. Part of that learning comes through real-world out of the classroom experiences which are vital in preparing students for full time work. Olga, who currently assists with center projects, sees

the invaluable experience offered to the students through DCMME projects and events. The center offers professional industry interaction, deadlines, and results from teamwork. Collaboration is key, and Olga mentions the unique opportunity that DCMME projects offer through interaction with other faculty members and students on a regular basis. Olga currently assists with the Proctor and Gamble project facilitated by DCMME. Regarding her research interests, Olga focuses on inventory

Olga reflects on her view of pushing yourself in everyday life and the importance of working as a team- “Do more than you can.”

management which was her PhD focus while studying in Hamburg, Germany. Looking forward, Olga perceives she may pursue further research related to agricultural supply chain development as

agriculture is such a vital part of the Midwest. When Professor Senicheva is not teaching or researching, you’ll probably find her in one of three places- with a suitcase or book in hand or on a yoga mat.

A portrait of Olga Senichiva, a woman with long dark hair, smiling warmly. She is wearing a blue textured blazer over a black top and a gold necklace with a pearl pendant. She is holding a white coffee cup. The background is blurred. A yellow vertical bar is on the right side of the image.

OLGA SENICHIVA

Krannert Faculty &
DCMME Project Lead

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FACULTY

THE FUTURE OF MANUFACTURING DCMME 2017 CONFERENCE

Speakers Share Insights on 'Future of Manufacturing' at DCMME conference

"Incentives will never make up for lack of access to talent or a qualified labor force for the project."



Smartphones have been around for only two decades, yet they've become so useful to us that we can hardly imagine our lives before them. Likewise, David Nedohin believes that augmented reality will become an essential part of our everyday lives and, like the first-down line in televised football games, seamlessly improve our

experiences. "This isn't something that's going away," said Nedohin, president of Scope AR, a company that offers augmented reality training solutions. "It's something that every one of us is going to engage in – in one way or another – in both our personal and professional lives." Nedohin and other speakers addressed the theme of "The

Future of Manufacturing" at the conference of the Dauch Center for the Management of Manufacturing Enterprises (DCMME), coinciding with the center's 30th anniversary celebration. Students, faculty, staff and industry representatives gathered in Purdue Memorial Union's North Ballroom to hear insights on the impact of augmented reality,

"Nobody is going to sit on your shop floor for 30 to 40 years without having to learn new technology,"



Internet of things (IoT), 3D printing and other emerging technologies. IoT is having a major impact on manufacturing, said John Annakin, chief revenue officer at Clear Object, an Indianapolis company that offers custom IoT solutions on common platforms. He cited the example of a washing machine that communicates with

the manufacturer, allowing a replacement part to be delivered to the customer before the original part breaks down. Manufacturers that initially put software in their products are now trying to collect data from the software so they can improve their products and serve their customers better, Annakin said. The prevalence of networking,

2017 DCMME SPEAKERS:

BEN WRIGHTSMAN

(COO of the *Battery Innovation Center*)

DOUG MANSFIELD

(CEO, *Kirby Risk*)

MICHAEL FORNASIERO

(Program Manager, Workforce Development and SMM Engagement, *UI LABS*)

BEN LARSON

(Plant Manager, *Evonik Corporation*)

DAVID NEDOHIN

(President, *Scope AR*)

PROFESSOR TONG JIN KIM

(Associate Professor, *Purdue University*)

SCOTT HARTFORD

(ITAMCO)

PAMELA FISHER

(Director of Economic Development & Special Initiatives, *Indiana Department of Transportation*)

JOHN ANNAKIN

(Chief Revenue Officer, *Clear Object*)

cont'd

Speakers Share Insights on the 'Future of Manufacturing' at DCMME conference

combined with reduced costs of cloud computing, has hastened and eased the adoption of IoT, he said. "The industry has blown up in the last couple of years," he said. While the Internet of things is a new concept to many people, everyone uses batteries – usually several types of them. But batteries are an emerging market too, said Ben Wrightsman, chief operations officer and chief engineer at the Battery Innovation Center (BIC) in Newberry, Indiana. **"Yes, batteries have been around for a very long time, but advancements in batteries have really only come along in the last few years,"** he said. BIC helps develop, test and personalize energy storage systems for defense and commercial customers. IoT has allowed the center to provide real-time data to clients and also pinpoint problems faster. Instead of looking across hundreds of cycles of a battery's life, "we can now make changes on the fly," Wrightsman said. Scott Hartford, project manager at ITAMCO in Plymouth, Indiana, described how the business, which makes precision-machined components, connected its equipment to a network and collects useful data. "We can have an operator call for either maintenance or material resupply at a workstation without having to leave that workstation," he said. Additive manufacturing is also

making an impact at ITAMCO, which has invested in both small- and large-scale additive manufacturing. **"Additive manufacturing has great potential," Hartford said. "... There are going to be transformative uses of additive manufacturing going forward."** Doug Mansfield, president of Kirby Risk, a multi-faceted company that provides a wide range of products and services, including electrical supplies and wiring harnesses, noted that many of the current manufacturing practices, such as continuous improvement, Six Sigma and elimination of waste, will remain relevant in the future. "Those are a given to stay in the competitive field we're in," he said. Sensors, vision systems, robotics, IoT and data analytics are all part of the future, he said. He shared some of the challenges of making braided harnesses and how data analytics and IoT have improved the manufacturing process. "We think we're one of the most automated plants in the world for making wire harnesses," he said. "That's allowed us to be competitive and efficient, but at the same time, there's much more to do." The future of manufacturing in Indiana depends largely on retaining existing manufacturers and attracting new firms. Pam Fisher, Director of Economic Development and Special Initiatives, Indiana

Department of Transportation, spoke about the site selection process for manufacturers as they engage with government agencies to find the right location for a new or expanding business opportunity. While the government can offer incentives, "incentives will never make a bad site the right site," she said. Improving a community's quality of life makes it more attractive for a skilled labor force and consequently for employers. **"It has become critical for communities to recognize that if you don't have a community where the millennials want to live, where talented workforce want to live, it is impossible for you to effectively compete for new technology,"** Fisher said. For manufacturing to thrive in the future, it's important to encourage students to design and make products. Tong Jin Kim, associate professor of Industrial Design in Purdue's Department of Art and Design, shared a few success stories of young entrepreneurs, including Elephant Hooks, a product created by eighth graders in Chicago. Kim's research interests include building design platforms and communities that help students develop products and establish companies. Through a platform at Purdue, he has helped introduce young students to 3-D printers, CNC laser cutters, and other tools. "By teaching the kids these technology-based tools at an early age, you can actually improve their

DCMME 30TH ANNIVERSARY CELEBRATION



Pam Fisher, INDOT



Student Poster competition at DCMME conference

creativity," he said. It's vital to show students what they can accomplish at an early age, he said. "We don't encourage our college students to become entrepreneurs by the time they graduate – no, we should encourage them by the time they enter college!" Ben Larson, plant manager at Evonik Corporation, spoke on the principles of leadership for a world full of change and adversity, using the Biblical story of Moses to illustrate the principles. **"The future is laden with change and adversity," he said. "What kind of leader will you be? To be successful in the future, I think we need leaders who champion justice and pursue it justly, leaders who don't stop believing the mission, and leaders who find a team with**

grit." Michael Fornasiero, program manager, Workforce Development and SMM Engagement, UI Labs, shared some of the findings of the Digital Manufacturing and Design Jobs Taxonomy and Success Profiles, released recently by UI Labs and Manpower Group. The report identifies 165 data-centric jobs that will define the future of manufacturing in the United States. To get workers to adopt new technology, it's important to show them the impact of the technology and the opportunities it will provide, he said. Companies should also provide opportunities for continuous learning, so workers prepare themselves gradually for changes in technology.



Former DCMME staff: Tom Brady, Amanda Thompson, Mary Pilotte at banquet.



Dauch family, David Dauch, CEO American Axle & Manufacturing, DCMME generous benefactor, at the DCMME celebration banquet, September 2017.

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Dauch Center for the Management of Manufacturing Enterprises

OUR PROJECTS

The center has a vast variety of manufacturing and supply chain related projects provided by companies for work to be done by our students and faculty.

CENTER'S INTERNATIONAL PRESENCE

South America
North America
Europe
Africa
Asia
Australia

- Company student projects
- International internships
- Graduate student assistants
- Scholarships
- Conferences
- Training courses

Bridging industry, students, and faculty around the globe through projects, conferences, and education.

PREMIER AUTO DETAILING PROJECT

Premier Auto Detailing and Wash serves individuals and business owners throughout the Greater Lafayette Community, providing vehicle cleaning, detailing and repair services for all sizes, makes, and models of vehicles. The company was looking to optimize their operations to provide faster and on-time delivery for its services and to use their capacity more profitably. They also wanted to reduce their carbon footprint and become a green business to contribute to the environmental cause. The team from

DCMME center made site visits to understand the business problem better. The site visits were also used as opportunity to interview process stakeholders working on-site. Post data collection, the team used various analyses used for solving business problems. As per the AS-IS analysis of the business operations, the following areas for improvements to reduce the carbon footprint of the business were discovered: water usage and treatment, solid waste disposal, power utilization, air emissions, and operational

layout. The team listed out the long-term and short-term measures to be taken for each of these areas. The team also summarized the information needed to help Premier get started with Indiana Department of Environmental Management's Environmental Stewardship program, and the team provided curated information to put a robust Environmental Management System in place.

PROCTOR & GAMBLE PROJECT OVERVIEW

The European Union grant offered faculty, students and staff a great opportunity to work with Procter and Gamble on projects that included business continuity planning with suppliers, manufacturing synchronization and container visibility optimization. Each of these projects was driven by detailed data and contracts and focused on generating quantitative estimates of the impact of optimizing the system and maximizing impact to the supply chain.

The Business Continuity project was led by Professor Gemma Berenguer. The simulation models for production were led by Professor Olga Senicheva. The manufacturing synchronization and container visibility projects were led by Professor Ananth Iyer. The goal of the synchronization effort was to produce all required orders on a weekly basis i.e., get to a goal of 100% weekly synchronization.

But there were some key issues to consider, from differences in packaging, to differences in formulation to line production constraints to forecast variability. In addition, there were setup times that had to be kept track of as production shifted across products. With intense collaboration with P&G managers, and data at a highly granular level, the team produced a mathematical model to optimize the system that permitted both 100% weekly synchronization as well as a close to 5% projected reduction in capacity required. The project provided a great learning experience and will appear in various forms, from class exercises to cases to academic papers in future years. The container visibility project involved a visiting faculty member from Turkey, Professor Cagri Haksoz and Ananth Iyer. They applied ideas from their past methodological papers to the estimation of the optimal way to use container visibility to improve the supply

chain. Their results suggest that waiting to gather data so that it helps in the choice of contingent actions may be preferred to acting too early. Similarly, the decision of when to get this information may depend on how significant the cost of delay is to the system and how expensive the cost of taking corrective steps to remain on schedule. The container visibility project's results are expected to be used to understand the economics of different tracking schemes for global container flows.

PROCTOR & GAMBLE BUSINESS CONTINUATION PLANNING

A second student group worked with Dr. Berenguer and Dr. Iyer on the Procter and Gamble's (P&G) laundry pod to accomplish a safety stock and inventory analysis for key components, a JaamSim model to visually and analytically simulate supply chain disruptions for different components, a business continuity and risk planning analysis for each supplier, and an optimization model to determine optimal production plans in a global context. The team began the project by looking at different components and identifying the most critical by

delay impact, supplier risk, demand variability, and other factors. From there, the team created a mathematical model to provide recommendations on optimal inventory levels. The next step was a model created in JammSim, a 3D graphic simulation tool, which visually showed how supply chain disruptions lead to manufacturing delays and the financial impact. This simulation model showed the importance of managing risk which transitioned the project into the third stage. Here the team created business continuity plans

for each component. This involved conducting a risk analysis of the supplier, the substitutivity of the component, the criticality of the material, and other risk areas. A plan was created for each component of the laundry pods and areas that need to be particularly monitored. The final part was an optimization model that pulled in data from other parts of the project which enabled us to create optimal production plans for day-to-day production as well as when disruptions occur.

OUR PROJECTS

WHIN EDUCATION PROJECT

WHIN Education has built a network of company representatives interested in providing research to develop a global epicenter for agriculture and next-generation manufacturing empowered by smart “Internet of Things” platforms. The team is in the early stages of company interviews and has spread

the word through interactive group sessions and a WHIN launch event. In April, WHIN offered a pilot training session, where the team helped to address technology and education issues companies may be facing.

INDOT AV PROJECT

We are on the verge of the next transformational revolution in transportation and the automobile industry with the introduction of Autonomous Vehicles. As an emerging technology, Autonomous Vehicles have the ability to impact economic value creation as well as enable economic development, with its adoption in the consumer as well as business markets. Indiana

Department of Transportation (INDOT) has partnered with DCMME Purdue students to work on developing a business ecosystem around Autonomous Vehicle Infrastructure in Indiana to help support this emerging technology and allow businesses to leverage the benefits that it brings with it. The project team will be evaluating the perception of Autonomous vehicles

with the business community and identifying opportunities and key projects for INDOT to embark on. The focus of the partnership is to empower businesses to adopt and implement Autonomous Vehicles and leverage them to develop a competitive advantage.

INDOT ECONOMIC DEVELOPMENT PROJECT

In the INDOT Economic Development project, the project work is progressing as per the schedule and the team has completed mapping of I-65 and I-70. The mapping includes gas stations, restaurants, rest areas, emergency shelters, truck parking spaces and motels.

Moreover, progress has been made on completing the same for I-64 to I-94. Data comparing Federal vs. State owned roads has been compiled. Data on green space from the state tax department has been acquired which will form the base for filtering out state owned green space. This

project is in its early stages, and much more data will be compiled in the future.



Student graduate assistants and center project leads.

JRDS PROJECT

The focus of the project was to research for new market opportunities, improve operations with the help of new technology, and build a simulation tool for improving bidding accuracy for the contract work services team at JRDS. The proposed solution was designed to help JRDS enhance current operations and establish new business. During the course of the project, the team explored the opportunity for JRDS to pair with French Knot to carry out quality check, packing and billing for

their gloves, headband, caps and other products. The other ideas for business development included bundling, packing of school supplies during start of school season, and fruit basket packing and decoration. Technologies like Light Guided Systems, Bar Coding, Microsoft HoloLens, BrainExchange, Video Analytics, and BlueVision were evaluated. These technologies would enhance the productivity of different types of employees in the facility. We proposed Light Guided System and Bar Code technology for streamlining

the supply chain and quality test system. Light Guided System can be used to quality inspection, training, sorting, part knitting and sequencing. For simulation purposes, the team used SimQuick spreadsheet and JaamSim simulation software to replicate real life operations at JRDS to help improve the bidding accuracy and reduce the risk of variation from planned and actual costs.

(STARTING AT TOP,
LEFT TO RIGHT)

GEMMA BERENGUAR

TOM BRUSH

SURESH CHAND

AMY DAVID

ANNABELLE (QI) FENG

GREG HUNDLEY

ANANTH IYER

JUSTIN JIA

KARTHIK KANNAN

ELLEN KOSSEK

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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.

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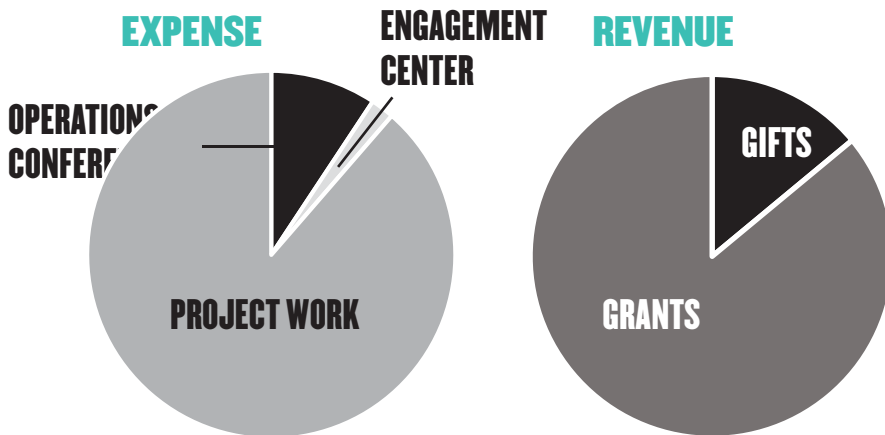
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 ARCELOR MITTAL
 CATERPILLAR
 GENERAL MOTORS
 JOHN DEERE

BRIDGING INDUSTRY, STUDENTS AND FACULTY.

For 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. The Center accomplishes this through various conferences, student competitions, and company projects that create venues for collaboration between firms, students and faculty across the state and around the globe.



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