

# MoMEntum

Department of  
Mechanical Engineering  
Summer 2015



## Mayhew Shares Teaching Techniques During India Sabbatical

Professor Jim Mayhew's recent sabbatical to India merged an exchange of best teaching practices with a family adventure, a learning experience in its own right.

"The key to India is patience," Mayhew said.

The Rose-Hulman professor of mechanical engineering traveled to India on sabbatical from July to November of 2014, serving as an educational consultant to universities there seeking an exchange of best practices with American teachers. Based at Indian Institute of Technology Madras, Mayhew, his wife, and three of their children, lived on the campus located in the city of Chennai, which was previously known as Madras, the state capital of Tamilnadu, in the south.



Students test the viscosity of motor oil in a laboratory at IIT Madras.

Mayhew's host at IIT Madras was Professor V. Babu, an enthusiastic fan of Rose-Hulman who met Rose professors Don Richards and Allen White while he was a PhD student at The Ohio State University.

In addition to working with Indian professors and their students, Mayhew said his wife, Mary, and their children, ranging in age from 8 to 18 years old, took the opportunity to immerse themselves in the culture of one of Earth's most diverse regions.

"We were interested in an adventure, as a family," he said.

From an educational perspective, Mayhew explained that India maintains a number of national universities as a component of its overall system of higher education, not unlike the way American states sponsor their own schools. IIT Madras is a top tier research university in that regard, with approximately 8,000 students between graduates and undergraduates, all operating within the city of Chennai and its 4 million residents.

The Indian universities funded by the central government use English as the common language for classes, although very few of the students speak that as their native tongue. "I thought of Indian states like our own 50 states, but that is a poor comparison," he said, adding that it's more accurate to think of them as different countries, like the European Union. The differences between Indian states can be as great as those found in Germany and France, from language to culture.

Some of the best practices from Rose-Hulman that he shared with his counterparts focused on using active learning techniques, stating learning objectives for their courses, and seeking written feedback from students. At IIT Madras, the norm is 50-minute lectures to classes of 60 to 90 students, with student feedback consisting only of numerical ratings of professors.

Mayhew did not teach while in India, but rather attended over 80 hours of classroom lectures in an effort to learn their curriculum well enough to advise future study-abroad students. He was especially encouraged that five professors took him up on his offer to attend their lectures and provide feedback on how they might improve the quality of their teaching. He also participated in the weekly meetings of their Teaching and Learning Center, a comparatively new effort on the IIT Madras campus, and one with a link to Rose-Hulman: Professor Jeff Froyd, formerly a Rose faculty member and now at Texas A&M University, helped them establish the center a few years ago, and conducts their annual teaching workshop for new instructors.

Rose-Hulman ties with Indian educational institutions are growing. In August, Professor Anjan Ray from IIT Delhi will arrive at Rose as the first Mechanical Engineering Teaching Fellow, and will teach in the department for the fall and winter quarters. Ray's association with Rose-Hulman began in January 2014, when he met Rose Professor Mike Moorhead at the 2014 Human Powered Vehicle – India competition that IIT Delhi hosted. Also, Professor Mark Yoder and family are currently on sabbatical at IIT Mandi, a new IIT campus in the Himalayas. Mayhew heard about the campus while in India, and suggested it as a possibility for Yoder. IIT Mandi leadership wants to emphasize good teaching and welcomed Professor Yoder to help with this.

While there, Mayhew was able to reconnect with the family of one of his own former Rose students, Avinash Ramesh (MSME 2010), and he noted that his experience with Indian students at Rose-Hulman was a factor in his decision to pursue the sabbatical there.



Among many things, Mayhew noted the difference in attire required for work in the the un-air conditioned laboratories at IIT. "They had to wear these heavy outfits. Sometimes we (students and faculty) grumble about not being able to wear shorts and flip flops in our air-conditioned labs!"

### **Patsy Brackin Wins ASME Distinguished Service Award**

Decades of service were rewarded with recognition in March as Rose-Hulman professor of mechanical engineering Patsy Brackin won the Distinguished Service Award of the American Society of Mechanical Engineers (ASME).

A member of the professional organization since 1981, Dr. Brackin credited the group for her ability to travel and work in such countries as China, Mexico, Kuwait and Qatar. "I have a lot of very good friends from ASME," Brackin noted.

Brackin received her award at the International Mechanical Engineering Education Leadership Summit hosted in Newport Beach, Calif. March 12-14. As part of her 34 years of service with the organization, Brackin has advised undergraduate groups, evaluated programming and chaired graduate fellowship committees.



Patsy Brackin

"That's actually a fun thing to do," she said, pointing out it's nice to be able to distribute financial aid to deserving students.

### **Transitions**

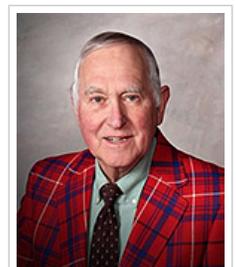
#### **End of an Era: Gibson Retires After 44 Years at Rose-Hulman**

Dr. James Darrell Gibson looked back on half a century spent teaching college students and said it was all worthwhile.

"I had fun here for all those years," Gibson said late in the afternoon as he filled boxes full of papers accumulated while teaching mechanical engineering at Rose-Hulman Institute of Technology. Gibson retired at the end of the spring semester after 44 years at the school.

But he'd been teaching several years prior to his arrival in Terre Haute for the fall of 1971, and had in fact been tenured at the University of Wyoming before deciding on the change.

Gibson, a South Bend native, began his educational career as an undergraduate at Indiana State University in 1952, set to earn a degree in science education. By 1954 though he'd transferred to Purdue University and switched to aeronautical engineering, earning his bachelor of science there in 1957 and his masters in 1959. While at Purdue, Gibson spent his summers working at Douglas Aircraft Company as an associate engineer and draftsman. After graduation, he worked for General



Darrell Gibson

Dynamics as a senior engineer in structural research and analysis focusing on upper stage space vehicle and communication satellite structures.

In 1963 he returned to school, seeking his doctorate in applied mechanics at the University of New Mexico, which is where he first began teaching undergraduates. Upon receiving his doctorate in 1968, his first teaching position was the University of Wyoming, where he developed an affinity for skiing, eventually becoming an instructor.

In 1971 he accepted a position teaching mechanical engineering at Rose-Hulman and decided to stay for the duration of his career. During the course of his 44 years at Rose-Hulman, he has served as an advisor to more than 60 graduate students.

"I always liked working with seniors and graduate students," he said.

Not sure what his future holds exactly, he said he's seen a lot of changes in industry and on campus over the years, but the rewarding experience of working with students remained a constant. Gibson retires now to his small farm in Cory, where he's accumulated seven John Deere tractors to renovate and operate.

**Make a gift to continue Dr. Gibson's legacy.**

**Donations may be made via web or by phone at 812-877-8453 (Specify Fund 990902 Dr. Darrell Gibson Scholarship Endowment Fund -Designated)**

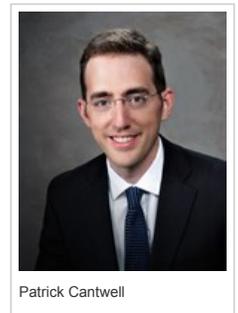
### Patrick Cantwell

Rose-Hulman students had a new mind with which to work this year as assistant professor of mechanical engineering Patrick Cantwell wrapped up his spring classes. A specialist in materials engineering and analysis, Cantwell earned a BA and BS from Dartmouth College in 2004 and 2006 respectively, as well as an MS there in 2006. His PhD was earned at Purdue University in 2011.

Cantwell said he particularly enjoys introducing students to materials engineering. While engaging in post-doctoral work at Lehigh University he worked in the field of electron microscopy. Still, teaching is a calling over industry, he said.

"I find it very satisfying. I really enjoy talking to people and explaining how things work," he said. School has always been an enjoyable experience for him, and he hopes to bring that spirit to the students at Rose-Hulman. "Professors have played a pivotal role in my life, I hope to do the same for others."

Cantwell and his wife, Cara, have a 3-year-old daughter, Eleanor, and hope to become active in the Rose-Hulman community. In his spare time, he said he enjoys photography, a hobby he said has many similarities to the work he does in microscopy.



Patrick Cantwell

### Ryder Winck

Professor Winck had a bicycle in his office and robots on his mind as he welcomed students to discussions after class this spring.

Assistant professor of mechanical engineering Ryder Winck has completed his first year as a member of the Rose-Hulman faculty and said the experience has been quite enjoyable. Earning both a BA and BS at Rice University in 2007, Winck completed his MS at Georgia Institute of Technology in 2009 and his PhD there in 2012.

Winck's areas of interest include control systems and robotics, as well as haptic technology, which provides tactile feedback, recreating the sense of touch by applying forces or vibrations. Applications are found in mechanisms ranging from robotics to video game controllers, he said. His own experience includes work with surgical robots and robotic systems designed to repair satellites in space.

Winck worked at Stanford University for a little more than a year as part of a post-doctoral program, and said he really enjoys teaching.

"I like the learning process. I like working with students," he said, describing the challenge in determining where a student's awareness or understanding might have fallen off track.

Winck and his wife, Emily, brought a new daughter home this past November, and in his spare time, he said he enjoys cross-country bicycling, travelling up to 100 miles in a day.



Ryder Winck

### Competition Team Wrap-Up

#### Rose-Hulman Human Powered Vehicle (HPV) Team

Dedication and ingenuity has produced yet another big season for Rose-Hulman's Human Powered Vehicle (HPV) team this spring.

Head coach Mike Moorhead, associate professor of mechanical engineering, happily reported the team won 1<sup>st</sup> place overall at the West Coast competition in San Jose, Calif. April 24-28. The team also placed well at this year's East Coast contest.

Sponsored by the American Society of Mechanical Engineers, the Human Powered Vehicle Challenge has become a Rose-Hulman tradition over the last 10 years, with more than a dozen national first place finishes and even more at the regional levels.

Moorhead, now in his eighth year as the faculty sponsor, co-coaches the team with John McSweeney, assistant professor of mathematics. Moorhead himself has advanced within the organization to serve as chairman of the Human Powered Vehicle Challenge and noted the competition has grown to the international level with events in both Latin America and India. Remaining as dominant as Rose-Hulman has become is always a challenge, he said.

The team creates a new vehicle for each season, and while similar in nature, seems to bring something new to the track every time.

The Rose-Hulman Human Powered Vehicle Team maintains a Facebook page with pictures and updates to share with family, friends and alumni. Moorhead said past participants in the tight-knit bunch are always glad to see their tradition of success carried forward.



Rose-Hulman's HPV team has earned more than a dozen national first place finishes.

#### Rose Grand Prix Engineering (Rose GPE)

Rose-Hulman students earned another year of solid experience on the tracks while competing as part of the Rose Grand Prix Engineering (Rose GPE) team this spring.

The Rose-Hulman team competed at Michigan International Speedway May 13-16 as part of the Society of Automotive Engineers' (SAE) annual Formula SAE Michigan event, taking 24<sup>th</sup> in Cost, 56<sup>th</sup> in Presentation, 45<sup>th</sup> in Acceleration, 9<sup>th</sup> in Skid Pad, 61<sup>st</sup> in Autocross and 55<sup>th</sup> Overall.

Daniel Kawano, assistant professor of mechanical engineering, said about 120 teams registered for the annual competition, including perennial contenders such as Oregon State University, TU Graz (Austria) and Missouri S&T.

As part of the competition, students build an open-wheel, open-cockpit Formula-style race car for judging in both static and dynamic events, Kawano said. Static events include a review of the design, cost and both business and marketing plans associated with the end product. Dynamic events include acceleration and skid pad performance, as well as handling and durability tests in the autocross and endurance competitions. The endurance event takes the student drivers out on a 22 km run around a course set up on the track of Michigan International Speedway.

"That's where you really see the problems," he added.

The Rose GPE team has done very well as a relative newcomer to the competition. Kawano said Rose-Hulman sponsored a team about 20 years ago, but 2011 was the first year for the new incarnation. That inaugural year the team took 55<sup>th</sup> overall, advancing to 15<sup>th</sup> in 2012 and 33<sup>rd</sup> in 2014. Rose GPE maintains a Facebook page for family, friends and alumni.



RoseGPE students build an open-wheel, open-cockpit Formula-style race car for judging in both static and dynamic events during the Formula SAE competition.

#### Rose-Hulman Efficient Vehicle (RHEV) Team

The Rose-Hulman Efficient Vehicle (RHEV) Team persevered through what faculty advisor Sean Moseley described as an “eventful” trip to Detroit for a great experience at the Shell Eco-Marathon Americas Challenge this April.

In his first year coaching the team, the associate professor of mechanical engineering recounted the five days with nine Rose-Hulman students which tested their resourcefulness by way of a blown tire on the team’s F-350 en route to the competition. Undeterred, the team finished mid-pack overall and posted a fuel efficiency of 586.6 mpg using ethanol in the Prototype Alternative Fuel category, earning them a 6<sup>th</sup> place out of 9 in that event.

Moseley said more than 100 teams competed this year, the sixth for Rose-Hulman to participate. This year’s students also had the chance to meet up with Rose-Hulman alumni in attendance, including Ally Nelson 2013, who drove for the team while a student.

The challenge of driving a vehicle further than their competition on limited fuel appeals to Moseley, who joked that some of the off-road struggles proved as much a learning experience as the event. The Rose-Hulman Efficient Vehicle Team maintains a Facebook page for family, friends and alumni.



Shell Ecomarathon participants from the RHEV team recorded fuel efficiency of 586.6 mpg using ethanol in the Prototype Alternative Fuel category.

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### Team Rose Motorsports

Team Rose Motorsports is gearing up for its 2015/2016 season, readying vehicles for tracks of all kinds.

Michael Mueller, professor and head of the chemistry department, said the students are working this summer on their cars—a BMW sedan, a Mustang and a Porsche.

“Right now, they’re rebuilding the Porsche,” he said, noting the team is installing a new engine.

Team Rose Motorsports had no competitions this past year, but Mueller said the group of about 16 members hope to get into more autocross and racing events this coming season.

Team members take their engineering skills to the track with hands-on automotive repair, design and fabrication, as well as maintenance and race prep, he said. In addition to building vehicles, the team also gets a chance to practice high-performance driving through a variety of courses.

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### Design/Build/Fly

For the first time in the team’s 9-year history, the Design-Build-Fly project was led by 4 juniors (Michael Cirocco, Nicholas Diskerud, Kane Weinberg, and Nicholas Wilkowski) who were returning members from last year’s team. The junior team squeezed time out of their normal course schedule to design and construct a plane capable of carrying and dropping as many 12-inch plastic balls as possible by using a minimum number of servos determined by the team. But, time management and delays in motor arrivals kept the team from finishing up a working prototype before the competition date. Dr. Lui and the team plan to compete again in Wichita next year!

