



The Connecting Rod

**Newsletter for the
Master of Engineering
in Engine Systems
Program**

Spring 2005



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MEES welcomes new program assistant Theresa Jennemen and thanks Pat Butler for her contribution to the program.

Send us your news!





From Frog Alley Road by Kevin Hoag, Director

It was about five years ago. A few engineering leaders from around the engine industry were sitting around a lunch table and began talking about the degree that we would have loved to have had available when our careers were just beginning. That was the first discussion. I wish we had recorded that conversation, but I still remember a few important points:

- The need of engine development leaders for sound technical background in both the thermal and mechanical sciences
- The need to be able to integrate these technical capabilities with a familiarity with customer needs and application engineering, manufacturing, electronic control and other areas in leading a diverse engineering team
- The difficulty every engine company faces in finding individuals who have gained the desired technical breadth as their careers progress

We are now enrolling our third class in the degree program that resulted from that discussion. But before adding my perspectives on the resulting degree, a few important moments in our brief development history should be noted. First, very early on it was recognized that the Internet would allow us to think about a degree program targeted to a specific industry – while the worldwide engine industry is very large it is also geographically dispersed. The University of Wisconsin-Madison was uniquely positioned to develop this degree. The renowned Engine Research Center provided a core group of faculty to develop and teach courses in the new program, and the previously developed Master of Engineering in Professional Practice (MEPP) degree provided an award-winning model for a Web-based program.

A few more key elements needed to come into place to initiate the MEES program, and this reflection provides me the opportunity to acknowledge those people and events that made MEES possible. John Klus, emeritus professor in UW's Department of Engineering Professional Development, saw the merit of this degree and secured a grant that funded Continuing and

Vocational Education graduate student Michael Mariasingam to put together our business plan. Thank you John and Michael!

One of the fundamental messages for those developing Web-based education programs is that to do it well is expensive—this is not a quick money-making scheme for universities. A sizable investment was needed to initiate the development of MEES, and for that investment we thank Dean Howard Martin and his staff at the UW Division of Continuing Studies.

Finally, I must acknowledge the faculty and staff of the Department of Engineering Professional Development. When the funding was received, the program was staffed virtually overnight, and many people have been working hard ever since – often above and beyond already busy schedules. A hearty thank you goes out from this program director to all of you.

That brings us to today. Eleven people in the Class of 2007 are nearing completion of their second year. The Class of 2008 is made up of 15 people now completing their first year. And the Class of 2009 is now being selected. Fundamental to the educational objectives of the MEES program is that each of these classes form a learning community where the diverse background and experience of each member greatly enhances the learning experienced by everyone. No matter how much those involved with the MEPP program insisted that this really happens, I was not prepared for how well it works! On any given topic the experience of the learning cohort allows all of us to see how it applies to engines from lawn mowers to motorcycles to automobiles to outboards to heavy trucks to railroad locomotives to huge ship engines.

Can learning really be this much fun? And if we're having this much fun can we really be learning? A resounding YES! I've been working with engines since I was a dashing young high school student, and I find I'm learning new things about this fascinating device everyday in the MEES program.

continues

Having been reminded of my youth, it is fitting to conclude with an explanation of the title I've chosen for this column. (I'm sure you've all been wondering!) For me the world of engines began on Frog Alley Road. Yes, there really is such a place, although with a name like that it was hard to find because the street sign was forever being pulled down, and probably hangs in many dorm rooms and apartments. Frog Alley Road, near Mukwonago, Wisconsin, is the home of Vollmer Brothers Garage.

When I was in high school Bud and Merle Vollmer hired me to start from the very beginning. My first day was spent cleaning and organizing the tools (I had to clean wrenches before I could start turning wrenches). The Vollmer brothers were artists with engines, and I cannot think of a better place from which to begin one's path of lifelong engine learning. For me, MEES has its roots on Frog Alley Road.



Supplier Software Enhances Courses

The MEES learning experience is greatly enhanced by software support provided by major suppliers to the internal combustion engine industry. This allows us to better bridge the gap between the worlds of academia and industry, using the same tools widely used in the industry.



Ricardo has provided their WAVE engine cycle simulation suite to the students in Professor Rolf Reitz's Engine Fluid Dynamics class and it has become an integral part of the course.



Patrick Niven of Ricardo taught a two-day training class during the MEES summer residency in 2004 to familiarize the students with the software. At the beginning of the semester the students began by using WAVE to simulate fundamental engine fluid dynamics in engine subsystems. They continued to build increasingly detailed models of the entire engine as the course progressed.

Ricardo will once again be donating the use of WAVE for the MEES program in the 2005-2006 school year.

ReliaSoft

Reliasoft has provided their Weibull++ and ALTA software to the students in Engine Design I. The software is used initially for reliability characterization, and then supports lessons covering engine failure mechanisms, accelerated testing, and rig and engine test development.

The University of Wisconsin-Madison and the MEES faculty team extends their thanks to these companies for their important support of advanced engineering education and the MEES degree program.



Faculty Profiles

In each issue of The Connecting Rod we will introduce a couple of the MEES faculty. One of the keys to the success of any degree program is the experience and commitment of its faculty. MEES is proud to have an especially strong faculty team bringing a diverse array of academic and industrial experience, and a sincere commitment to education and the success of the program. This issue introduces Rolf Reitz and Bruce Dennert.



Rolf Reitz

The MEES program is fortunate to have Wisconsin Distinguished Professor of Mechanical Engineering Rolf Reitz teaching Engine Fluid Dynamics with Engine Research Center Director and professor Chris Rutland. Originally from South Africa, Professor Reitz completed his bachelor of science and master of science degrees at the University of Cape Town. He then completed a master of science degree in mechanics at the State University of New York, Stony

Brook and then attended Princeton University where he completed his PhD in mechanical and aerospace engineering.

Rolf's background includes both academic and industrial experience. Before joining the faculty of the University of Wisconsin-Madison in 1989, he was employed by General Motors for six years. He is a co-founder and the U.S. editor of the *International Journal of Engine Research*, and has authored or co-authored more than 200 technical articles pertaining to engine research and development.

Rolf and his wife Syte have two sons, Chris and Tom, both now in college. Rolf's outside interests include playing classical guitar, singing in a choir and boating with his sons.

When asked about his experience with his first MEES class, Rolf offered the following comments:

"The MEES students bring invaluable industrial experience and immediately interpret the fundamental principles in terms of their application to the product. The class discussion forums were quite lively with interesting postings, from which we all learned."

"Being able to use the Ricardo WAVE engine simulation throughout the course and incorporating it in the final project added greatly to the practical application of the course material."

"We will make a few changes for the next class, but I believe MEES is off to a great start, and I look forward to working with the next student cohorts."



Bruce Dennert

Bruce Dennert team teaches the series of engine design courses with MEES Director Kevin Hoag. A graduate of UW’s Master of Engineering in Professional Practice (MEPP) program, Bruce is able to help the MEES faculty understand the student perspective on Web-based education. He also holds bachelor's degrees in math and physics from Carroll College and a master's degree in engineering from the University of Wisconsin-Milwaukee.

Bruce is one of the MEES faculty hailing from industry, where he is the principal engineer-concepts for powertrain engineering at Harley-Davidson Motor Company. He has more than 37 years of experience in product engineering and analysis, 31 of which were with Harley-Davidson. Prior to joining Harley, he worked as an analytical engineer at Waukesha Engine. Bruce is also the owner and principal engineer of CamCom, Inc., a consulting company specializing in engine cam profile design, valve train system analysis, and custom software.

Bruce and his wife Jan are the proud parents of six grown sons, and now have 10 (almost 11) grandchildren. Bruce has the good fortune of experiencing the engines of a 2000 Corvette, a 2005 Harley-Davidson Electra Glide, and a Coachman motor home. His further outside interests include model railroading, photography, travel, and woodworking.

When asked for his comments on the MEES program Bruce had the following to say:

“I love working with engines. MEES fills an education niche that’s just not available anywhere else. It is a powerful way to move your career forward.”

“The content of each course can be immediately applied at work. Each of us is able to share examples from our experience. I continue to learn as much as any of the students.”



Companies Represented in MEES

Throughout this newsletter and the MEES literature the importance of the breadth of student perspectives is emphasized. Breadth can be identified in many ways, including educational background, past and current job responsibilities, and many more. One interesting measure is the variety of companies and products with which the MEES students are involved. The following is the current list of companies employing MEES students and their graduating classes. Those admitted to the Class of 2009 as of this writing are included.

- Borg Warner (2007, 2008)
- Briggs & Stratton (2007)
- Caterpillar (2008)
- Cummins (2008)
- DaimlerChrysler (2008)
- Eaton (2008, 2009)
- Fairbanks Morse (2008)
- Ford (2009)
- General Electric (2008)
- Harley-Davidson (2007, 2009)
- Honeywell Turbochargers (2008)
- International Truck and Engine (2008)
- Mercury Marine (2007, 2009)
- Mototron (2007)
- Ricardo (2007)
- S&S Cycle (2009)
- WE Energy (2008)



With each issue of The Connecting Rod we will include a few perspectives from current MEES students. A regular feature needs a name, and for that we thank H el ene Cornils, whose perspective appears below. She titled her article “MEES and Me,” and we liked it so much that we asked whether we could adopt it as the feature name. Thank you H el ene!



H el ene Cornils
Test Engineering Manager
Eaton Corporation
Marshall, Michigan
Class of 2008

I wasn't sure I'd made the right choice. After all, I had a good life and an easy job. Why would I want to go back to college and challenge my comfort zone?

The answer was fairly easy. Although I was working in the automotive industry, much of my background had little to do with my current job's duties. Further, the engineering skills level required in the automotive field made me realize that my lack of engine systems expertise would catch up to me and limit my growth.

So I signed up for the Masters of Engineering in Engine Systems (MEES) degree program at the University of Wisconsin-Madison. MEES appeared to be the best choice for me. Wisconsin has an acclaimed College of Engineering, it has one of the few engine systems programs, and it was only a click away.

Our first class was Engine Performance and Combustion (EPC). I quickly hit the proverbial wall... I mean, uh, ... quickly met the pace. The first three weeks were tough—20 to 35 hours of work per week. What was I thinking? Halfway through the class, we tackled emissions. The class itself became my work and then work became my homework. Which one was which?

Based on the latest technologies described in our course, I shared course material with my work team who helped develop ideas to improve our existing product. At least one disclosure was submitted, thanks to the wealth of information shared on particulate filters.

Shortly before completing this class, I decided to pursue greater opportunities within Eaton Corporation. I had developed, validated, and successfully implemented a new engine component and I was ready to move on.

I applied for a position in the Test Engineering Group. The job required significant engine and engine-tester design knowledge, as well as accelerated testers development background.

The timing was perfect; the position would start in January 2005 and so would Engine Design I. When asked about my background on testing, I mentioned that I was currently pursuing MEES and described in length the spring class and its content.

I'm happy to say that I was offered the new position and I now lead the Test Engineering Group. Each Engine Design I class has been a valuable source of background information.

The classes have been excellent preparation for my new job. They've allowed me to quickly get acquainted with the many steps needed to understand, develop, validate, and analyze testers of all kind. Go Badgers!



Braman Wing
Engineer
BorgWarner Morse TEC
Ithaca, New York
Class of 2007

I was first drawn to the MEES program by its unique nature. Most of the distance learning degree programs I had looked into were business or management oriented, and I was looking for a more technical program. The MEES curriculum was a great fit with my interest in engines. I think the program achieves a good balance between depth and breadth on the whole. It can be frustrating at times since any one of the classes could take up an entire graduate program in its own right, but I believe it is actually one of the strengths of the program in that it exposes me to aspects of engine design that I would never normally consider.

I was concerned at first about the distance learning format, and I didn't really know what to expect. It did take some getting used to, especially in terms of planning my time and keeping up with deadlines. The summer residencies were very valuable in helping to put faces to names and to get classes rolling. I find that the instructors are very understanding of the issues facing a student who is employed full-time and has work, family, and other concerns. In addition, they are very willing to accept feedback and change things in the class that are not working.

As I approach the halfway point in the MEES curriculum, the value of the program is very apparent to me. The general knowledge of base engine design, emissions, and combustion has been useful in my work. In addition, the exposure to engineers and ideas from other industries has been helpful in learning about different design philosophies and technologies.



Mike Mihelich
Manager, Design Analysis Group
Mercury Marine
Fond du Lac, Wisconsin
Class of 2007

I have been very impressed with the approach and material used in the MEES classes. They provide a very good balance of fundamentals and details, tempered with industry experience.

The faculty team has been covering topics with meat — that is, issues and solutions I have to contend with every day. An example is a recent discussion on cylinder heads and valve-bridge fatigue. At work we had an intensive analysis task to determine why we cracked a head in testing one of our new engines. The discussion we had in MEES took me back to that big challenge. The deep-dive we did in class gave insight to the significance of characterizing the thermal loads and the need for more component tests here at Mercury. I shared the ideas discussed in our class with colleagues at work, and to say the least, it created a lot of excitement.

Furthermore, while listening to the wear mechanisms CD narration, I found myself taking a ton of notes in the margins of the printed material. I thought to myself, “Wow! There is a load of science (knowledge) on this topic, and that if I wanted to know more you've cited and included additional sources. It also sounds like a topic your faculty has a great deal of industry experience with – a perfect blend!”

The MEES courses hit right on the mark. Now I just need to find some time to generate some discussion as well as read the supplemental materials.

Given this, I've challenged myself to drive this new knowledge into the Mercury organization through my own work and by sharing it with my colleagues. Already, I can see the integrity of my decisions has improved as a result of what I have learned in MEES!

Thank You! It will be a Great Adventure!



News and Announcements

Thank you, Pat and Welcome Theresa !

Although MEES is a very new program we have already celebrated our first retirement. Pat Butler was the MEES program assistant for our first year of operation. On February 25th she retired after a long career with the university and the Department of Engineering Professional Development. Thank you Pat, and best wishes in your retirement!

We are pleased to welcome Theresa Jenneman as our new MEES program assistant. Theresa has been with the State of Wisconsin for seven years. For the last five years she has worked closely with Engineering Professional Development from a role with the University of Wisconsin-Extension. Theresa and her fiancée operate a 400-acre dairy farm near Montello, Wisconsin. Every spring we can expect her to take a portion of her vacation during turkey hunting season.

Send Us Your News!!

We'd like to include in future issues of *The Connecting Rod* news of job changes, promotions, awards, babies, and more for all members of the MEES Community. We also welcome any feature articles, ideas or suggestions for improving *The Connecting Rod*.

Please send your news and articles to Nancy Rebholz, newsletter editor, rebholz@engr.wisc.edu.

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