

# Montana Society of Engineers

*A state society of the National Society of Professional Engineers*



*Founded 1887*

## *President's Message:*

### ***What have We Done for Each Other Lately? Help Us Help YOU!***

*Sandra Anderson, PE, President*

Another year of NSPE and MSE has started. Dan Munson helped us kickoff the season with a balanced budget and passed the gavel with a BIG smile! Jeff, Tom, Ken, and I are ready to help you get the most out of your membership. We get a huge amount of help from Doug Brekke, who is once again organizing the Joint Engineer's Conference, and from Dan, both as past president and the man behind MATHCOUNTS. And nothing would ever get done without Connie Dempster, our Executive Secretary, who pays the bills, provides insight, and generally keeps us on the straight and narrow.

**BUT IT'S GOING TO TAKE MORE THAN THE SEVEN OF US TO KEEP THIS ORGANIZATION GOING!** We desperately need more volunteers to help us with...

- **MSE website - WANTED: A CHAMPION -** Young website seeks knight in shining armor! [www.mtengineers.org](http://www.mtengineers.org) is up and running. Now we need a volunteer to champion the cause and help make it THE engineering web site for Montana. Day-to-day maintenance and content updates are contracted to JLH Enterprises (Jennifer Harrison). We're looking for someone to help us with new ideas for education, outreach, links, advertising, and any other way to make the site useful, fun, and informative.
- **Joint Engineer's Conference and MATHCOUNTS** – Doug and Dan would like to ensure the continued vision and responsibility of these programs. New blood means fresh ideas to keep these important programs going.
- **Newly-registered PE contact** – Develop ways to welcome new PE's and help them network, including a swearing-in ceremony, local mentors, other ideas?
- **School outreach/public recognition** – Help get the word out to elementary and secondary schools about careers in engineering, participate in Engineer's Week activities, spread the word in your community about the important jobs we do. Does your local college

or university have a student branch of NSPE? If so, how can you help these future engineers, and encourage them to become licensed? If not, can you help organize one?

And what do you get out of NSPE/ MSE involvement? Besides our undying gratitude? You get FIVE memberships for the price of one. NSPE's Five Communities of Service give you the chance to participate at one or several levels.

*National (The Big Picture):* Through our ongoing national programs, conferences, and meetings, you have the opportunity to further your education, meet and share with colleagues, and contribute to your profession. If you're just starting out, national events offer a classroom unlike any you sat in at school. If you're established in your career, national events give you the opportunity to network with colleagues and mentor new engineers as they make their way in the field.

*State (This is your Montana Society of Engineers!):* Engineers who participate in NSPE on the state level find opportunities for leadership and professional recognition through awards programs. Engineers new to the field enjoy the chance to meet area colleagues and mentors and learn from them. Whether you are a veteran or a recent graduate, you can both take and develop courses and seminars to enhance knowledge and further your career.

*Local (How's the health of your local chapter?):* Our chapters offer engineers in your area a chance to network, gain professional referrals, and participate in making the engineering profession better through continuing education. Local chapters also offer the opportunity to give back to the community through volunteer service. Find a mentor, meet other engineers, and take advantage of opportunities to lead and collaborate.

*Practice Divisions (Birds of a feather flock together):* NSPE's practice divisions offer you specialized communities where you can meet and talk with engineers working in the

*Continued to Page 2—*

*September, 2006*

***MSE website - WANTED: A CHAMPION - Young website seeks knight in shining armor! [www.mtengineers.org](http://www.mtengineers.org) is up and running. Now we need a volunteer to champion the cause and help make it THE engineering web site for Montana.***

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# NSPE Summer Meeting

By Jeff Ruffner, President-Elect

I attended the Boston meeting this year as Montana's delegate to the House of Delegates (HOD). This marks the first time I have attended an annual meeting since the early 90's. Even then it was as a practice division representative and I was not exposed to all of the issues. From my perspective this hiatus was beneficial. I must say that the issues discussed during the meeting were very relevant not only to the society but also to our business and personal lives. Maybe I have changed, the society has changed, or hopefully we have both got a little older and wiser, but I was pleasantly surprised to see the new direction.

The first day was spent on leadership training for the new HOD members. The meeting started with the new President-Elect, Bob Miller, jumping up on the table and performing a strip tease dance in front of the group. We were all a little fearful of what was going on because that early in the morning there are certain things that you just don't want to see. Of course he had on gym clothes on underneath (thank god).

Think of the last engineering meeting that you attended that started like that. I suspect you have not attended a meeting that started like that. As a group we are not typically known for wild and raucous meetings or dramatic paradigm shifts. However, his point was well made, it is time for a major paradigm shift for all of us.

While these items have been in the works for a while, it was my first exposure to what they have been working on and their thought process for these changes. First I was glad to see the realization that the society cannot be all things to all people and that they have decided to focus on licensed Engineers as well as Engineers in Training only, and bringing that group increased services. Sitting back and looking at the National Society from a distance for numerous years, it appeared that NSPE was struggling trying to find their place in the world. While all of the technical societies have a clearly defined market niche, NSPE had a much broader, over-arching, market niche that many don't appreciate until they became a little more senior in their profession. I personally feel this new focus is good.

Second is the "state-centric" focus. It was clear that in both their own survey as well as listening to many of the discussions that the states have not been at all happy with the services provided. I applaud NSPE for having the guts to take a hard look in the mirror, accept the weaknesses and flaws, and work on trying to correct them.

The strategic plan lays out how they intend to meet the needs of their constituents and can be found on their website. It would be worth

your time to take a look at it. In summary the three major goals are:

- State-National partnerships
- Value to members
- Membership growth

As I have found in both my personal and business life, change is continuous, if you are not growing you are dying, or in engineering terms "there are no flat curves". Changes like this happen incrementally over a long period of time. It is my sincere hope that NSPE has the discipline to maintain the course and implement these changes. I also hope that everyone will look to the future rather than the past so that this organization can grow to meet the vision of being the recognized voice and advocate for licensed Professional Engineers.

I must say that I approached attendance at the meeting as my duty as a state representative. However, what I found was actually a pretty interesting meeting and a lot of really dedicated people. I would encourage anyone else who has the opportunity to attend if possible.

In closing we were all tasked with recruiting two new members this year.

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## *President's Message* —Continued from page 1

same field. We all know that our profession is becoming more specialized every day. Our practice divisions offer you a way to keep up with your specialty and network with engineers working in that same area.

*Internet (Meet, greet, lobby, and get PDH's from your office or home):* Through our forums and online classes, you can find a professional community at your fingertips. Our national web site, [www.nspe.org](http://www.nspe.org), also offers you the chance to join your voice with the voice of your colleagues from around the country to advocate on behalf of the engineering profession.

Please contact any board member or MSE Office today to help us grow!

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*The meeting started with the new President-Elect, Bob Miller, jumping up on the table and performing a strip tease dance in front of the group.*

# News from the Capitol City: Energy, Government & Professionals

By Ken Phillips, PE, Secretary/Treasurer

If there is any one positive thing about the high cost of energy, it's the fact that with high prices the relative costs of implementing energy savings measures in projects is now more affordable. A few things are happening at the State & Federal level that affect us as professional designers.

**Washington:** The Federal Government is now offering some very good tax incentives to commercial building owners if they are proactive in reducing energy consumption. Commercial building owners can get up to \$1.80/sf in tax deductions if they reduce their building energy consumption by 50% and down to \$0.60/sf if they reduce consumption by 16&2/3%. This savings is only for HVAC and lighting, it does not include plug loads and IT loads.

Where you as the consulting engineer come into play is that a professional must certify these savings. To me the value is that it offers an incentive to the owner to avoid the dreaded "value engineering" out of the incremental cost of energy efficiency and should be something that you the designer incorporates into a life cycle cost analysis to help them help themselves.

Our friends at Northwestern Energy are currently training their Customer Reps on the Federal and State tax incentives so if you have any questions, contact your local Northwestern Service Center. You can go online to [www.energytaxincentives.org](http://www.energytaxincentives.org) if you live out of Northwestern's territory.

**Montana:** A couple of major studies are underway to help reduce the energy consumption in State Buildings and Public Schools. First of all the Special Session on Education Funding came up with funds to do a Facility Condition Inventory on all of our public schools. Included in that study is the gathering of utility data and building size to help determine an Energy Use Index for the building and that index will help determine which facilities need energy upgrades the most. This should give State Government and local school boards insight into what buildings require attention to help reduce operating costs. For more information on the Statewide School Facility Condition Inventory contact Mr. Joe Triem, P.E. at the Architecture & Engineering Division 444-3327.

The second project underway to help curb the State's Energy appetite is the Department of Environmental Quality is using some State/Fed matching funds to do a quick benchmarking of all State Buildings over 10,000 SF. They are using AVISTA to gather utility information and compare usage with the Energy Star Benchmarking of like buildings in the same climatic region. AVISTA who has been maintaining a database to track energy consumption on a couple of campuses, (Capitol Complex & UM Missoula), specializes in this type of work. The information gleaned will help prioritize which State Buildings need the most urgent work. Of note the State has a bonded program that can do energy retrofits to buildings and pay back the bond based on savings. This is one of those no increases in taxes yet doing good things for both the environment and the economy programs. The building users don't see the savings out of their budget but they do get new building equipment and in most cases a better office environment. It also buffers them

against energy cost escalation. So it's a good thing. If you need more information, please contact Ms Georgia Brensdaal P.E. at (406) 841-5240.

**HELENA's LOCAL CHAPTER OF MSE?:** Living in Helena, I never knew that we had a local chapter of MSE until recently. The Chapter is no longer active as membership either moved, got busy or lost interest. I would like to see if anyone in the Helena area would be interested in getting together every other month and having a luncheon. For a couple of years I was a member of the Architectural Society of Helena as an orphaned engineer. During those meetings I did realize there was value in hearing other professional's issues, successes and flops, and hearing presentations from vendors. In Helena we have a unique cross section of many private and government Engineers, it would be a good forum for us to discuss issues we have in common and problems that may arise between us. I know that the Billings and Butte Societies are very active in supporting and recognizing engineering students at MSU and Tech, we could discuss supporting the new Engineering Program at Carroll College as well. So if you have an interest to get together every other month and eating some food your spouse wont let you eat, (like pizza), hearing from vendors, discussing current issues and problems, please feel free to contact me at home 442-8139 or my email [kphillips@mt.gov](mailto:kphillips@mt.gov).

*A couple of major studies are underway to help reduce the energy consumption in State Buildings and Public Schools.*

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## **MATHCOUNTS Update**

By Dan Munson, State MathCounts Coordinator

Welcome back to the new MATHCOUNTS season! We are in the process of sending out registration packets to 423 Montana middle schools. Last year we had 451 Mathletes<sup>a</sup> from 70 middle schools participate, and we are looking for more participation this year. That's where you come in.

Do you have a child in middle school that may be interested in healthy math fun? How about a niece, nephew, or friend in middle school? Sad to say, some middle schools have not shown interest in this exciting and worthwhile program. I bet if you ask your local middle school if they have an active MATHCOUNTS program, you may be surprised by the answer. If they don't have an active program, press on further and ask them why. Some schools are willing, but really need help from parents or friends to help coach a team. How's your coaching ability these days? These middle school kids will give you a run for your money when it comes to solving practical math problems.

I've personally helped coach teams for a number of years, and it is truly a rewarding experience to try to turn kids on to math and analytical problem solving. That's what we engineers are all about anyway! Consider volunteering as a MATHCOUNTS coach this year. It's a perfect way to give back to the young academia world, and nurture kids along the way. Some of these kids will be shaping our next generation of engineers, solving the world's latest problems.

If coaching is not your bag, stay tuned. We will be asking for your help with our local chapter competitions in February, where you can experience in person the power of middle school analytical determination and team building skills. Either way, I challenge all of you to make a difference with a young student, share your knowledge and expertise, and help make Montana MATHCOUNTS the best program around! The small time investment is worth the satisfaction of seeing some of our best and brightest young math stars shine!

**About MATHCOUNTS:** MATHCOUNTS is a combination math coaching and competition program. Students are tested on such topics as probability, statistics, linear algebra, and polynomials. The competition consists of written tests and a fast-paced oral match. The purpose of the MATHCOUNTS program is to motivate middle school students in mathematics and interest them in technology related careers. It is designed to create interest and enthusiasm in mathematics by creating an environment similar to athletic programs, including intensive training, competition, teamwork and recognition. Widely recognized as an effective middle school mathematics coaching and competition program, MATHCOUNTS is celebrating its 24<sup>th</sup> Anniversary. Additional information on MATHCOUNTS is available at [www.mathcounts.org](http://www.mathcounts.org).

The National Society of Professional Engineers on a national level organizes the MATHCOUNTS program. Locally, the Montana Society of Engineers organizes MATHCOUNTS, with local volunteer effort being provided by area engineers, students, and professionals.

Every year, a free copy of the annual *MATHCOUNTS School Handbook* is provided to all U.S. middle schools. Containing 300 creative math problems that meet National Council of Teachers of Mathematics standards for 7<sup>th</sup> and 8<sup>th</sup> grades, teachers utilize these problems as part of in-class instruction or as an extracurricular activity. After months of coaching by a teacher or other volunteer, participating schools select 6<sup>th</sup>, 7<sup>th</sup> and/or 8<sup>th</sup> grade students to compete individually or as part of a team in their local MATHCOUNTS chapter competition held in February of each year. There are seven MATHCOUNTS Chapters in Montana. The winners of the local competition advance to the Montana State competition held in Bozeman in March of each year. The four student winners of that competition advance to an all expense paid National competition. ESPN even broadcasts the MATHCOUNTS National Competition!

### **Problem of the week – Gasoline Prices!**

Sam's vehicle gets 12 mpg city/16 mpg highway. Of the 12,000 miles he will drive this year, 40% of those miles will be "highway miles" and the rest will be "city miles." How much more money will he spend this year if the average price he pays for gas is \$3.038 per gallon rather than the \$2.397 per gallon he paid last year? Answer on Page 6.

### **Montana**

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*It's a perfect way to give back to the young academia world, and nurture kids along the way. Some of these kids will be shaping our next generation of engineers, solving the world's latest problems.*

# Stray Thoughts

By Tom Abel, PE, Vice President

Living in the Flathead Valley, we have performed some engineering related to Flathead Lake. We have looked at houses sliding down the hill into the lake. We have written a forensic-type report for an insurance company explaining why a boat and shore station was on the lawn after a big storm. We have looked at numerous retaining walls, usually the neighbor mad at the guy with the retaining wall which caused increased erosion on either side. The constant seems to be that no matter what man engineers, the Lake and forces of Mother Nature eventually win. The best we can hope for is to delay the failure. The most interesting project by far was being involved in a dock replacement project for North Flathead Yacht Club.

I became involved because I had the skills to see this project through and was in a position to make it happen. I was the Commodore of the yacht club at the time and we had to do something with our aging docks that were built on 100-year-old creosote-soaked wood pilings. I monitored the construction as a volunteer. Here are the design considerations:

- Flathead Lake level drops-at times 10' in winter
- Lake freezes over in Somers Bay most years.
- The lake bottom has 9' of rotting sawdust over gravel and big rocks.
- There is a fetch of 30 miles for wave build-up.
- We had 95 slips and wanted to add more.
- Limited budget – as usual.
- Dock materials had to last 50 years or more.
- We wanted steel pilings.
- Flathead County requires 3 feet of clear space between the bottom of a wave wall and the lake bottom.
- Slips have to handle boats up to 40' long.
- Water depth was 9' to 14'.
- Club members volunteered to help rebuild.

A way to control the waves was on top of our list. During storms, mooring lines break (costing \$35), rubber snubbers break (costing \$35), and sometimes boats break loose and pound against the dock resulting in expensive damage to both.

We put together a dock committee of technical minded club members and one financial wizard. We contacted dock companies around the country and explained our needs and our wish list. We thought for a while that a floating dock system would be good. Some of us traveled to Seattle, Anacortes, Friday Harbor looking at floating docks. We also got into our race committee boat and looked at some of the existing docks and wave walls around Flathead Lake.

Three dock companies sent technical sales reps to meet with our committee and eventually sent proposals for both fixed docks and floating docks. All of the bids were over a million dollars - way out of our price range. We abandoned the floating dock idea due to cost and the fact that none of the companies had good answers for the 10-foot water drop and freezing in the winter and stayed with the tried and true method of fixed steel pilings.

We next solicited bids from local docks builders on Flathead Lake and had 3 responses—all were affordable. We chose a builder that had done repair work on our docks in the past and refined his bid, making sure everything was covered and the quality of work we desired was there. Each dock builder submitted his or her own design based on past experience.

As an engineer, I was tempted to reverse engineer the proposed design and see if made sense.

The big concern for us was the 400-foot long 10-foot high wave wall that would break down the waves building for 30 miles. We looked at wave analysis formulas. Analyzing water waves was no simple task and there were some unknowns such as docks to the front, islands, and points of land. It was a task beyond my experience and I was not inclined to learn a whole new field of engineering for a volunteer project. It made sense to use the design of someone who had been driving pilings in Flathead Lake for 40 years. He knew from trial and error what works and what does not. We settled on 40 foot, 8" pilings spaced 15' apart for the docks and 7-1/2' apart for the wave wall. Angle iron cross beams carried 4x10 wood stringers. The wave wall pilings were X braced for additional strength. What we did do was look at all the components and connections and designed them so they would fail at the same loading. We knew there would be a lot of lateral flexing in the pilings due to the 9 feet of sawdust on the lake bottom and the extreme force of the waves. Only 17 to 20 feet of piling was into something solid. We changed the X bracing connections from solid welded connections to a tab and bolt type of connection. This was done to allow some movement without breaking the welds.

When we watched the pilings being driven, the operator hit the piling with a couple of easy blows to get it started (while another worker held it in place holding a chain around the piling with his hands), then the dead weight of the pile driver drove the piling home with no additional blows required. We knew there would be lots of lateral movement.

Another problem was the stringers were 20 feet long and the spacing was 15' between pilings. The dock builder started to simply scarf the ends of the stringers without regard to the location of the joints relative to the pilings and bolted them together with all-thread. We devised a layout where the joints the stringers would overhang the pilings equally on both sides of 2 pilings. The next stringer would then be supported by the short cantilever on each end and by a piling in the middle. Using 50 psf for dock loading, this gave us an acceptable design without having to cut the stringers.

One problem occurred during construction. The builder used the wrong elevation for the top of pilings for the entire wave wall. Water would have been lapping at our feet while walking down the dock with the lake at full pool. He used the bottom of stinger instead of top of stinger for his finished elevation. To fix this he put 2" vertical pipe extensions on top of the angle iron cross beams to raise the stringers to the correct height. The problem with this fix is the top of the wave wall was then attached to a 2" pipe held in place with a 3/4" all-thread rod, instead of being solidly attached to the tops of the 8" pilings. We designed some diagonal braces to transfer the load from the top of the wall to the pilings to correct this.

Some smaller design problems had to do with mounting the 20-foot aluminum square tube light poles onto the side of the docks. We designed a mild steel platform to hold the base of the light pole and an aluminum angle bracket to hold the pole to the side of the dock stringers. The pole base was isolated from the steel platforms under water with rubber pads made from rubberized roofing material to prevent galvanic action between the dissimilar metals. Stainless steel fasteners were used on all the light poles. The light poles contained electrical outlets and water hose bibs.

The project was completed last June. We came in \$100,000 under budget. The docks look great. We increased our slip count by over 30 slips. The wave wall has withstood one summer's worth of wave pounding. During a storm the dock area is as calm as a millpond. No more broken mooring lines. So far so good!!!



Waves pounding old docks.

*We chose a builder that had done repair work on our docks in the past and refined his bid, making sure everything was covered and the quality of work we desired was there.*



Wood boat at new dock.

**2006 JEC  
November 2-4  
Helena, Montana**

Participants will be able to earn at minimum 14.0 CEUs. Vendors are encouraged to sign-up sooner rather than later since space is limited. For registration & more conference information go to:

[www.mtengineering.org](http://www.mtengineering.org)

JEC Chairman Doug Brekke can be reached at DLB@5400.TV or at 406-932-5400. Make your plans to attend TODAY:

**Joint Engineers Conference  
November 2-4, 2006  
Red Lion Colonial Hotel  
Helena, Montana**

**Solution to Math Counts Problem on Page 4:**  
Of Sam's 12,000 miles, 0.40 \* 12,000 = 4800 of the miles are "highway miles" and 12,000 - 4800 = 7200 are "city miles." Since he gets 16 miles per gallon for 4800 of his miles, he will need 4800 / 16 = 300 gallons of gas for those miles. He will need 7200 / 12 = 600 gallons of gas for his city miles. This is a total of 900 gallons of gas for the year. With the higher price per gallon he will pay 900 \* \$3.038 = \$2734.20 for gas. With the lower price per gallon he will pay 900 \* \$2.397 = \$2157.30 for gas. This is a difference of \$2734.20 - \$2157.30 = \$576.90 for the year.

**Participants will be able to  
earn at minimum 14.0  
CEUs!**

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**2006-2007 MSE Board**

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