

Section Web Site: www.saearizona.org - Sign up for your newsletter on our website.

HIGHLIGHTS...

- Off-Highway Vehicles
- Coffee Talk - AWIM

- Message from the Chair
- Recap of March Meeting Presentation & Coffee Talk

- Mine Tour
- Map to Mine Tour

Off-Highway Vehicles and Empire Southwest LLC by Lloyd Shull

With over 1850 employees and headquartered in Mesa, Arizona, Empire Southwest, LLC is one of the top-ten Caterpillar dealers in the U.S. Their products/services range from \$3.5 million mining trucks to scale models of CAT's famous bulldozers. Our speaker, Lloyd Shull, has over 37 years of experience with Empire Southwest. He will provide us with a history of this 58 year-old company, an overview of



its products/services, and an insight into some of CAT's new technologies such as engine development, hydraulics, electronic control, and GPS-based mine management. Mr. Shull has been in Empire's training department for the last 18 years, so he thrives on audience participation. Come with your questions to April's meeting and learn about the exciting world of off-highway vehicles.

Valley, AZ. This mine is one of the safest open-pit hard-rock



The benches of Phelps Dodge's Morenci Mine

mines in the U.S. Our tour will bring us up close to their gigantic mining vehicles and we will also learn about their copper, molybdenum and rhenium processing.

Meeting Times and Locations:

6:15am at **Best Buy parking lot**, Chandler Fashion Mall (for those who want to carpool/caravan) or **8:30am** at **Casa de Esperanza**, 780 S. Park Centre Av, Green Valley, AZ.

The Sierrita Mine will have a bus pick us up there. Cost is \$5 per member/non-member. Students are FREE! Please RSVP through the dinner reservation line by 12p.m. on Tue 15 April.

Coffee Talk - A World in Motion

We will have two student AWIM presentations at our April meeting. AWIM (A World In Motion), is an SAE sponsored program that brings math and science principals to life through highly interactive learning experiences in an effort to get elementary and middle school students interested in considering a career in the science or engineering fields. We have just completed AWIM programs at three schools in the Phoenix area. The 7th grade students from Sierra Vista Elementary School in Phoenix will give a PowerPoint presen-

Mine Tour - April 19, 2008

SAE AZ-NV Section is having a tour of the Phelps-Dodge Sierrita Mine and Processing Facilities near Green

DATE	TIME	LOCATION	COST	With Dinner	Presentation Only
Apr 17	Social	- 6:00 pm	Hilton Phoenix Airport	Members - \$22	\$10
	Dinner	- 6:30 pm	2435 S. 47th St, Phoenix-85034	Guests - \$27	\$10
	Presentation	- 7:30 pm	480.894.1600	Students - \$10	no charge
RSVP by 10:00am Tuesday Apr 15.			Call Sam Bethune: 602.364.7456		

tation about their 'Motorized Toy' and demonstrate the toy's performance. The 8th-grade students from Christ Lutheran School in Phoenix will give a PowerPoint presentation about their 'Glider' and demonstrate its performance. Volunteers (engineers) go into the schools once a week for 7 weeks to work on the 'hands on' projects with the students and the teacher. SAE provides the training, materials, and lesson plans, all at no cost to the school. Most of the volunteers in the Phoenix area are retired General Motors engineers, but we also have a retired pilot, an employee from US Airways, and an Airman from Luke Air Force Base. If you interested in helping as a volunteer, call Don Robins, 248.807.3604 or go to the AWIM website at www.awim.org.

Message from the Chair

Our March meeting was well attended with over 55 members and guests attending our meeting. This meeting also marked another first for our section—holding a joint meeting with American Institute of Aeronautics and Astronautics—AIAA. Having a joint meeting, resulted in a very positive experience for both groups and a chance to meet additional professionals in the area. I really appreciate Mark Loganback—chair of the AIAA for having his group join us for this event.



Because of the excellent turnout, we had several additions to our dinner reservations. Our Hilton hotel team quickly responded to add another table and arrange for additional dinners for us. A special thanks to our facility co-coordinator Cathleen Gary for not only smoothly handling this but also skipping her own dinner to assure all our guests were taken care of. In addition, I really appreciate the several board members who waited patiently for the new table to be added and give up the existing tables for our many new attendees. I was especially please to see the number of new members attending this meeting.

Our main speaker – Bob Smith from Honeywell was extremely informative and gave us and insight of both the challenges and the future development direction for Honeywell and the aerospace industry. What was amazing was that Bob had left San Paulo Brazil earlier in that same day. He certainly qualifies for the greatest distance traveled award for a speaker.

For our coffee talk speaker, we were pleased to have Steve Atkins –research engineer at NAU to present on developing methanol from CO2 and Hydrogen. As he described this, it turns hydrogen into a liquid fuel that works with our current refueling infrastructural.

As announced at the meeting. We have a nominating committee consisting of David Vasquez, Doug Curry, and Allen Watts. They are speaking with our membership-seeking candidates for the secretary position. The preferred method, which are section operates, is for a person to start as the secretary, then in the following year they move up to the Vice

Chair position and then in the third year they become the Chair and then move onto the Board. This way, our officers gain valuable experience in the our section's operation and we also retain the experience and knowledge gain from our past officers as they move on to the board. Please contact David Vasquez at David.Vasquez@Honeywell.com if you would like to learn more.

For our April 17, 2008 meeting we will be going off road. Steve Trimble has arranged for Empire machinery, the largest Caterpillar dealer in the Southwest. Empire will be sharing with us not only their activities (they have their own engineering team) but also the trends in heavy construction off road machinery. In addition, we will have an opportunity to visit a Philips Dodge operating copper mine south of Tucson on Saturday April 19. Please see the article in this newsletter.

For May 15 we will have the deans from ASU, NAU, and U of A for a panel discussion on the future of engineering. This is a must attend meeting to understand what our Universities are doing to meet the upcoming shortage of engineers.

--Bill Gest, Section Chair

Recap of March Meeting: Honeywell Presentation

by Bill Gest



Left to Right: Mark Longanbach (Chair of AIAA), Bob Smith (VP of Advanced Technology Engineering) , and Bill Gest

Our main speaker for the March 20th meeting was Bob Smith Vice President of Advanced Technology Engineering & Technology. He provided a vision

of the future course of product development for Honeywell—a leading supplier of aerospace systems.

Technology has always driven the aerospace industry. Many people look at Orville and Wilbur Wright as only tinkers who built bicycles. The reality was that they used extensive engineering skills to develop the technologies that made flying possible. Among their accomplishments were the developments of the wing airfoil including building the wind tunnel. Their propeller had a 70% efficiency which after all of these years propellers are only 85% efficient. They also designed and built their unique 12 horsepower engine, an engine that did not even have a spark plug.

Aerospace development has always been hard. There have many failures during the testing and development of aircraft. The Spruce Goose is one example. Interesting even today, the problems encountered with the electrical problems associated with the A380 - a million pound airplane illustrate

that we still have great challenges in developing new aircraft.

The aerospace industry faces many challenges. The good news is that the hours of air travel continue to climb following the world economic growth. Unfortunately, most domestic airlines are struggling financially due to the change to an unregulated competitive market place. Another major challenge is the congestion at our airports. It is estimated that the cost of delays is \$170 billion. This does not count the loss of good will from delayed passengers. Fuel costs continue to rise and now represent approximately 35% of airlines operating costs. Even though airlines represent a minor amount of the total air pollution problem (2%) their emissions are visible and there are calls for improvement.

Aerospace as an industry is faced with a problem also found in other industries –the shortage of engineers. Engineering enrollment in colleges is too small to match the large numbers of seasoned engineers that are retiring. In addition, these older engineers had the advantage of doing many design iterations during the aerospace growth decades of the sixties and seventies. Due to less changes, newer engineers have not had a chance to gain this experience.

Some of the solutions to these challenges will be the change to electrical versus hydraulic/pneumatic systems for activating the aircraft systems. The use of improved engineering simulation analysis software to increase engineering capabilities. Improved avionics- such as the new real time terrain mapping integrated with the normal head-ups display to prevent ground crashes.

Honeywell in Arizona is working on new solutions to allow more aircraft to use the same flight pattern by using GPS instead of radar which has delays. Work is being done on high-temperature engine cycles. This is made possible by developing nano material to coat engine components. The use of optical fiber for communication is also a promising area with 10 terabyte/second capabilities. Lastly, electrical power generation and distribution is another area of significant development. Honeywell is also active in the area of developing alternative fuels including algae. Algae produces 450 million BTU's per acre versus 30 million BTU per acre for ethanol from corn.

Recap of AZ Synthetic Fuels

by Bill Gest

The Arizona Synthetic Fuel Project will capture and recycle carbon dioxide from the atmosphere or as a by product from commercial processes such as beer fermentation and harness the power of renewable electricity in order to produce a carbon-neutral liquid fuel that is fully compatible with our existing gasoline infrastructure.

There is a direct connection between the amount of energy consumed and the quality of life. For comparison, electricity consumed by an individual in the US is about 12,000 kw compared to the 100kw of electrical energy con-

sumed in Kenya, a third world country. As the rest of the world develops there will be more demand for energy. Most of the energy consumed in the US is used for transportation (67%). Compounding the situation is that oil production is peaking in the 2007-2015 timeframe.

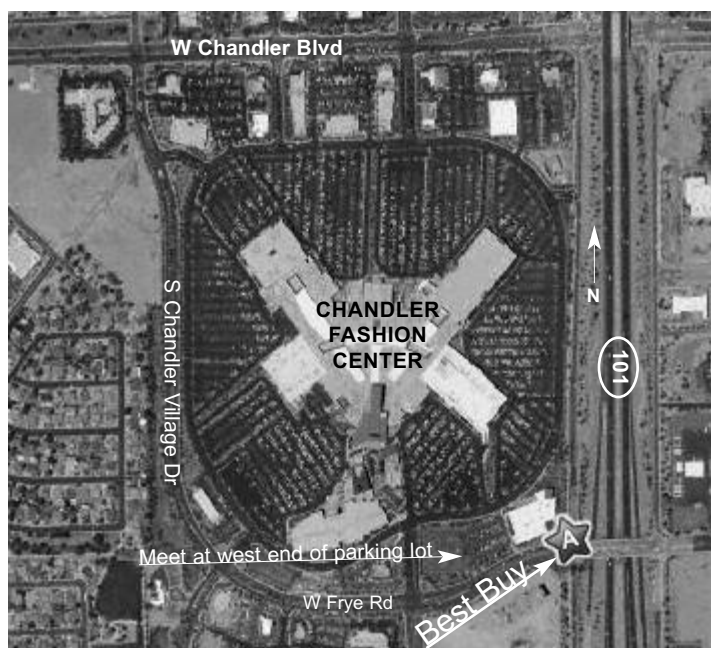
Our transportation system in the US relies on liquid petroleum, and therefore, in the short term, a substitute for gasoline is needed. Ethanol provides a marginal contribution but results in conversion of our food resources to energy.

Methanol CH₄O is similar to ethanol C₂H₆O but can be manufactured using CO₂ and hydrogen. This means that instead of using limited agricultural resources, liquid fuel can be made using alternative means. For this project, CO₂ from Mongolian brewing company in Flagstaff will be combined with hydrogen produced from wind power to make Methanol using a catalyst. The reason for converting the hydrogen into liquid methanol rather than using the hydrogen directly is this allows the use of the current refueling infra-



Left to Right: Mark Loganbach, Steve Atkins (March Coffee Talk speaker), Bill Gest structure in this country. A 1000 gpm capacity methanol facility is being constructed. Please contact Steve Atkins at Steve.atkins@nau.edu for more information.

***** Meeting Location for Tour *****



THE UNIVERSITY OF ARIZONA ANNOUNCES:

The 34th Annual Reliability Testing Institute provides coverage of how to implement and manage the Design-for-Reliability process through testing, to implement an integrated Reliability & Maintainability Engineering management strategy, learn a practical approach to attain the high Reliability goals demanded nowadays, to improve our worldwide competitive posture by creating more Reliable products through thorough testing, to determine the useful life of our products, and more. Dr. Dimitri B. Kececioğlu and 10 speakers from 10 sponsoring industries will take part in expertly covering the subject matter of this Institute. For more information, please see the contact information below.

The 46th Reliability Engineering and Management Institute provides all engineers, particularly Reliability Managers and Engineers, Product Assurance Managers and Engineers in government and Industry, with a working knowledge of Reliability Engineering Theory and Practice, Mechanical Reliability Prediction, Reliability Testing and Demonstration, and more. Dr. Dimitri B. Kececioğlu and 10 speakers from 15 sponsoring industries will take part in expertly covering the subject matter of this Institute. For more information, please see the contact information below.

THE 34th ANNUAL APPLIED RELIABILITY TESTING INSTITUTE
May 5-8, 2008

THE 46th ANNUAL RELIABILITY ENGINEERING
AND MANAGEMENT INSTITUTE
use contact information below to receive date information

Clarion Hotel, Tucson Airport
6801 S. Tucson Blvd.
Tucson, Arizona 85706
520-746-3932 or 800-526-0550

Registration Fee: \$1500 Proceedings Cost: \$50

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Please see his website at: <http://www.u.arizona.edu/~dimitri>



ESG Engineering (WWW.ESGENG.COM) is a full service mechanical engineering consulting company located in Tempe, Arizona. We provide Industrial Design, CAD Design and

Engineering Analysis including linear and non-linear Stress, Dynamics, Fluids, Thermal and Tolerance. We also sell the Z Corp rapid prototyping machines and scanners; SensAble design software and the full line of Altair HyperWorks analysis software. How can we help you? Contact Bill Gest at 602-618-1304.

ESG Engineering is growing, contact Mike Kremer at MKremer@esgeng.com for career opportunities.

ARIZONA-NEVADA SECTION: Meeting Schedule

Apr 17	- Empire-Caterpillar
May 15	- Future of Engineering: Deans from ASU, NAU, and U of A
Jun, Jul & Aug	- A Summer Hiatus: Board plans next year's program

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