

SAE ARIZONA • NEVADA SECTION

March 2007

MEETING: MAR 15

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

HIGHLIGHTS...

- US Airways
- Coffee Talk

- Message from the Chair
- Recap of February Meeting

- SOLS 2007
- GM Plug-In Hybrid

Dinner Presentation...

*US Airways
by Hal Heule*

US AIRWAYS GROUP is based Tempe, Arizona. With the 2005 merger between America West Airlines and US AIRWAYS, the airline is among the top six large US based international airlines.

The airline has its roots from the early days of com-



US Airways aircraft in flight.

mercial aviation. It is made up of many airlines that merged over the last forty years. Today's airline consists of America West, USAir, PSA, Piedmont, Mohawk, Allegheny and Lake Central.

Today's US AIRWAYS operates 360 mainline aircraft with 35,000 employees serving 235 cities around the globe. Two subsidiary airlines and several contract airlines provide regional and hub feed support. MESA Airlines, based in Arizona, is among the largest of the contract airlines.

Airline operations are particularly complicated with many safety and security regulatory authorities, municipalities that own the airports, and large labor groups to deal with it. Engineers within the operational organizations play a significant role in guiding the safe and efficient operation of the aircraft. Yet, most people outside of the industry know little



Front view of US Airways aircraft.

about the role of engineers in airline operations.

Please join us as Hal Heule from US AIRWAYS will be here to discuss airline

operations and the role of the engineer in those operations.

HAL HEULE

From 1994 until 2001, Hal Heule served as Executive Vice President at a prominent aviation consulting firm. In 2000, Hal led a technical team that provided the plan and management to improve operations at America West Airlines. For his accomplishments in 2000/2001, Hal was recognized by Aviation Week and presented with their 2002 International Safety Award in Hamburg, Germany. In 2006, Hal received the prestigious Nuts and Bolts Award - a top industry award that recognizes the highest technical achievements in the airline industry. Mr. Heule is currently the Vice President of Technical Operations and Safety at US Airways.

Coffee Talk - SAE@NAU

SAE@NAU is designing one vehicle to compete in two competitions, both are new to NAU: the Shell Eco-Marathon in April and SAE Super Mileage in June. NAU is designing/fabricating one three-wheeled highly aerodynamic vehicle with two separate power plant configurations (one per competition) to achieve the highest fuel economy possible. NAU is on the way to completing our overall design and has almost completed fabricating the fairing. Don't miss this opportunity to hear an inside perspective from students participating in these competitions!

DATE	TIME	LOCATION	COST	With Dinner	Presentation Only
Mar. 15	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 March 12.			Call Donna Miranda: 602.364.7456		

Message from the Chair

We had a fantastic turn out for the February 2007 meeting from Stirling Energy Systems. We had over 45 RSVP's for this event, which leads me to believe that it was an important topic to our membership. I was happy to see some new faces in the audience.



Dave Vasquez,
Section Chair

At our event, I congratulated Max Rumbaugh Jr. and Kevin Willson for being selected as recipients for their respective awards. Little did I know, we had another member in the audience who is being recognized by SAE HQ. Each year, SAE selects 25 individuals from industry and academia to the prestigious status of SAE Fellow. To quote the SAE website "SAE Fellowship status is the highest grade of membership bestowed by SAE International. It recognizes outstanding engineering and scientific accomplishments by an individual that have resulted in meaningful advances in automotive, aerospace, and commercial vehicle technology."

John M Leinonen, PE, is a retired executive engineer from Ford Motor Company living in Arizona. John is being recognized for his lengthy career in Automotive safety, in particular, his role in establishing the execution of Ford's FMVSS compliance, defect prevention and related analysis activities. John has served two terms on the board of SAE directors, was SAE president in 1995 and helped "open the door" for SAE India. Congratulations on your recognition John!

I wanted to recognize one other individual from our section -- Although he hasn't won an award, his work has helped our section for years. You may remember him for his outstanding term as the 2003-2004 Chair, but now, Todd Zuercher helps the section with Newsletter activities. The largest budget item for the past several years has been our Newsletter mailings. As many other sections have transitioned completely to an electronic newsletter, we've tried to keep our mailings a staple of section membership. With that, we've been challenged by our ever changing membership population and work hard to keep our member's mailing information current. When we fall short of that task, Todd helps us straighten the books, updating the section/SAE HQ with the most current information, and saves us hundreds of dollars in lost postage. Thanks Todd, for your hard work, continued dedication and contribution to the SAE Arizona section!

Lastly, I'd like to end with a call for assistance. Each year, the board puts together a nominating committee to look towards the following years activities. As the committee forms over the next few weeks, you may receive a call from one of the members on the nominating committee and I urge you to consider their request. The time commitment per month is not very high and the rewards are so great. Serving on the SAEAZ board is a rewarding and pleasant experience that I know you'll enjoy.

Dave Vasquez, Section Chair

Recap of February Meeting

by Bill Gest

Faced with a worldwide energy shortage, our February speaker Bob Liden from Stirling Energy Systems (SES) presented a possible solution. Stirling Energy Systems is a Phoenix based company has acquired the patents and



Bob Liden (left) and Bill Gest (right).

intellectual property of the previous work done by M c D o n a l d Douglas for the design of a solar concentrator that focuses the sun energy onto a compact Stirling engine. Stirling

Energy Systems has taken this knowledge and built six working demonstration models of the dish and engine system, which have been installed at Sandia National Laboratories in New Mexico. By doing this, they have validated the design and then won large commercial contracts from two major California utilities to produce electricity for them.

What sets the SES design apart from other solar technologies is its increased efficiency. In actual operation, the SES system has achieved operating efficiencies of 30%. This compares with other solar technologies whose best efficiencies are ~15%. This is due primarily to the thermal efficiency of the Stirling Engine. What makes it so efficient compared to the internal combustion engine is the use of regenerators and coolers to capture most of the heat energy from the solar flux and convert it into mechanical energy to drive the generator to feed the power grid. The engine operates at a constant 1800 rpm and uses hydrogen gas as its working fluid. The speed is regulated by changing the hydrogen gas pressure.

One of the engineering challenges with designing a structure that is 37 feet in diameter and weighs 6-7 tons is that it is impractical to build and test a prototype of the design. To validate the new commercial phase design for the dish concentrator required the use of a combination of several computer tools to complete this process. The dish structure is affected by changes in gravity as it tracks the sun and rotates along its axis. In addition, the dish must provide sufficient stiffness to prevent the mirrors from losing their focus at evaluated wind speeds. Another wind condition is when the dish in the stowed (off sun) position, it needs to be able to survive tornado type of winds. Earthquake effects on the structure also needed to be considered. Analysis was used to drive the design process to assure that all of these requirements could be met. A computational Fluid Dynamics (CFD) model of the solar field had to be constructed, and the wind force on the structure determined. Gravitation forces were then imposed upon the structure. These forces were then evaluated for stress and deflection of the unit. The deflection

data was then converted into mirror deflection and imported to another program CIRCE that computed the flux pattern on the engine heater head. Since there are four cylinders to this engine, it is critical that for all operating conditions there is a balance of solar flux energy between the engine quadrants. Stress analysis was also run for earthquake and high speed wind conditions. The net result was a validated structure without ever building a prototype. Bob gave credit to ESG Engineering for their engineering work on this dish.

We want to thank Bob Liden for a very informative presentation on SES's solar technology and for staying around to answer the many questions from the meeting attendees.

SOLS 2007

by Josh Rudin

The SAE Section Officer's Leadership Seminar (SOLS) 2007 was held at the Crowne Plaza Hotel in Orlando, Florida to an enthusiastic audience. Half of the invitees were from North American industries and the other half were students. The group started off as a whole, then broke off into sections as the seminar progressed to focus in on ways to make our respective sections stronger.

Mark Pope of General Motors emceed the event and had a lot of input as SOLS unfolded. He introduced Mark Levin, a motivational speaker who discussed "Leading Your Section & Helping It Grow." One notable thing extrapolated from his presentation is that in spite of the fact there are 1.6 million nonprofit organizations in the US, 56% of those members don't serve or attend beyond basic membership. The biggest reason? 78% aren't asked. We can learn from this scenario and encourage our fellow members to serve beyond a basic capacity.

The next activity was an AWIM presentation. Groups of 3 built a paper car and optimized their designs for maximum thrust. Because of the contingencies from GM, BMW, Cummins, Freightliner and Peterbilt to name a few, success was anything but guaranteed. We had fun and learned the merits of science and teambuilding in the classroom.

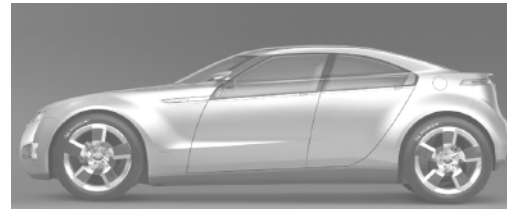
Next, Corinne Smerenka presented an excellent topic--Powerful Presentations. Engineers are not known for communication skills but she took the time to break down what makes a good speaker. Among the many things learned were that as the level of management increases, the amount of technical information delivered should actually decrease. Upper management cares about the big picture in a short amount of time. She contends that a great presentation should have the speaker passionate about the topic, well-prepared and polished, never exceeding a 20 minute timeframe.

These newly-learned skills were put to the test after a panel of ex-SAE presidents & executives S.M. Shahed, Neil Schilke and Jim Cook candidly spoke about the do's and don't's of speaking with a CEO or upper-level management. Subgroups formed and delivered a mock-presentation to

these gentlemen who graded our performance.

On day 2, the most-notable topic was "Best Practices." In this segment, Ken Kallis of SAE Headquarters called on a few invitees to deliver their sections' strengths in hopes that they would be implemented. Mr. Pope of GM presented his section's webpage, saetexas.org. They have a nice site and an excel spreadsheet that describes their schedule. Other members discussed the merits of a student night in January, so that finals are not interrupted, joint meetings with other engineering societies, family nights, and the encouragement of speakers to bring their own guests, aiding the networking process. Finally, the notion of corporate sponsorship, "For \$X you will get Y," delivered to the aforementioned upper-level management adds structure, funds, and gets results for a more successful SAE Section.

The GM Plug-In Hybrid: Chevrolet Volt



The GM Plug-In Hybrid: Chevrolet Volt

At the 2007 North American Auto Show in Detroit, GM displayed its new concept vehicle, the Chevrolet Volt. It is a battery-powered, four-passenger electric vehicle that uses a gas engine to create additional electricity to extend its range.

According to GM, the Chevrolet Volt is a new type of electric vehicle. It addresses the range problem of electric vehicles and has room for passengers and their stuff. The driver can climb a hill or turn on the air conditioning and not worry about it's battery going dead.

The Volt can be fully charged by plugging it into a 110-volt outlet for approximately six hours a day. When the lithium-ion battery is fully charged, the Volt can deliver 40 city miles of pure electric vehicle range. When the battery is depleted, a 1L, three-cylinder turbocharged engine spins at a constant speed, or revolutions per minute (rpm), to create electricity and replenish the battery. According to Lutz, this increases the fuel economy and range.

The Chevrolet Volt is designed to run on E85, a fuel blend of 85 percent ethanol and 15 percent gasoline. Using E85, fuel economy of 150 mpg would translate into more than 525 miles per petroleum gallon.

A technological breakthrough required to make this concept a reality is a large lithium-ion battery. This type of electric car, which the GM calls an "EV range-extender," would require a battery pack that weighs nearly 400 pounds (181 kg). Some experts predict that such a battery - or a similar battery - could be production-ready by 2010 to 2012.

The Volt concept car is built on a modified future architecture, Lauckner said, similar to the one GM uses for current small cars, such as the Chevrolet Cobalt and HHR.

THE UNIVERSITY OF ARIZONA ANNOUNCES:

The 33rd Annual Applied 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; a practical approach to attain the high Reliability goals demanded nowadays; to improve our world-wide competitive posture by creating more Reliable products through testing; solder joint durability and their useful life estimation; the determination of the time-to-failure distributions, failure rates, mean lives, reliabilities, and their confidence limits at desired high confidence levels; small-sample-size, high reliability, short-duration, efficient tests; non-parametric testing; test duration, sample size, and number of failures determination; HALT and HAST; burn-in testing, Qualification and Reliability Demonstration Testing; failure analysis technologies; product assurance techniques for becoming more competitive in today's markets; development cycle time reduction; productivity improvement techniques to achieve U. S. leadership in world markets; all types of goodness-of-fit test; determination of the confidence limits of the actual Reliability, Mean life and Failure Rate of all types of components, products and systems at high confidence levels; solutions to participants' problems; plus much more.

THE 33rd ANNUAL RELIABILITY TESTING INSTITUTE
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Registration Fee: \$1500 Proceedings Cost: \$50

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**ARIZONA-NEVADA SECTION:
Meeting Schedule**

March 15 - US Airways
April 19 - Unmanned Little Bird

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