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## HIGHLIGHTS...

- Boeing 787 Dreamliner
- Message from the Chair
- Recap of March Meeting
- International Science Fair
- Global Warming on Mars
- Tucson Meeting
- Mini Baja
- Electronic Newsletter

Dinner Presentation...

## Boeing 787 Dreamliner

By Allan G. Miller and Kathy Collins



Boeing 787 Dreamliner makes extensive use of composites

The 787 Program is defining the future of commercial transport aviation through its recent selection of advanced composite materials for the airframe structure. Although all composite airframe designs have been demonstrated on regional jets, many technical challenges are now being solved for the application of these materials more broadly to commercial transport class aircraft. The composite experience gained on the 777 empennage and previous airplane models has positioned Boeing to deliberately pursue composites more extensively on the 787 Program. Composite use on 787 primary structures includes the fuselage monocoque, outboard and center wing box, trailing edge structures and the empennage. The improved fatigue properties and corrosion resistance of composite materials enables Boeing to deliver an airplane with enhanced passenger experience such as a 6000ft cabin altitude and larger windows.

The 787 Program has set extremely aggressive cost and weight targets that dictate the need for innovation design and manufacturing solutions. Boeing is pursuing joint airframe and technology development activities with international partners capturing the experience and capabilities of a

global supplier base. This presentation will discuss the design and manufacturing technologies that will enable Boeing to develop the 787 family of aircraft providing a new standard for airplane operational efficiency and market effectiveness.



Allan G. Miller

Alan G. Miller is Director of 787 Technology Integration. He oversees the efforts to develop and transition to practice key technologies. These are efforts being performed within the global alliances which comprise the 787 program covering north America, Europe, Asia and Australia. Prior to this assignment, Al was Senior Manager-Manufacturing & Quality Technology and Product Development for BCA Manufacturing Research. This included leadership, planning, research, development and implementation to production for all Manufacturing Technology in BCA.

Additional position held: Chairman, Corporate Standards Committee; Boeing Health and Safety Institute; AIA TARC-211 Cabin Fire Safety Institute; SAE Technical Standards Board; SAE Aerospace Council; Affiliate Faculty, Chemical Engineering and Materials Science and Engineering, University of Washington.

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Kathy Collins

Kathy Collins is the Materials, Processes & Standards Department Manager at Boeing's Rotorcraft Division in Mesa, Arizona.

DATE	TIME	LOCATION	COST	With Dinner	Presentation Only
April 21	Social	- 6:00 pm	Crowne Plaza Hotel (Holiday Inn)	Members - \$20	\$10
	Dinner	- 7:00 pm	44th St. & Washington	Guests - \$25	\$10
	Presentation	- 8:00 pm	602-273-7778	Students - \$10	no charge

**RSVP by 2:00 pm Monday April 18. Call Bob Riley: 623-872-3475**

## Message from the Chair

As our Newsletter goes to print, we have come up with a presenter for the latest from Boeing, the 787. The Boeing 787 is defining the future of commercial transport aviation through the use of composite materials for the airframe structure. Our presentation for April will focus on the design and manufacturing technologies developed for the 787 to meet aggressive weight and cost goals.



Kevin Willson in Dodge Viper.

Kathy Collins, Materials, Processes & Standards Dept. Mgr. for Boeing Mesa Rotorcraft will be presenting to the section manufacturing and design technologies used in the 787. Al Miller, Department Manager of Materials, Processes and Standards Group for Boeing in Seattle, WA, will be on teleconference during the meeting to answer questions and provide insight from Boeing in Seattle regarding what is happening with the 787. This is something new for our section that we hope to use in the future if needed to continue to bring quality subjects to the Arizona-Nevada section.

In March, the section was privileged to hear from Gary Rogers, President and CEO of FEV Engine Technology Inc. His insight into the state of the art in Diesel Technology was combined with the economics of alternative fuels and the influence the price of foreign oil has on developing alternative energy source technologies. The combination of these two subjects demonstrated the true need for developing more efficient uses of existing energy sources while continuing to research new technologies in power generation. I would like to again thank Gary Rogers for coming out and presenting to our section. Thanks also go to Max Rumbaugh for inviting Gary to present and for making the arrangements for Gary to be here.

In March we were also presented with the University of Arizona's Formula SAE vehicle this year. Headed by Ryan Kanto, the U of A Formula SAE team has built on the success of last year's program to develop a new car for this year and to put together a successful SAE program at the University. With a majority of the team in attendance from Tucson, the students answered questions from just about everyone during the social hour and after their Coffee-Talk presentation. The excitement and dedication of this team shows in the development of their program. We wish them great success in the competition this year.

Please remember to thank a member of the Board for all of their hard work in bringing these presentations to the section this year. For next year, plans are already under way but we will still need a few more topics to fill in the calendar. If there is a subject you are interested in and may know of a someone willing to present, please give a board member a call and let them know.

Kevin Willson  
Section Chair

## Recap of March Meeting by Max Rumbaugh, Jr.

Diesel powered automobiles are capable of achieving between 30% and 40% reduction in fuel consumption as compared to gasoline engine powered new cars. However, this month's speaker noted that the current image of diesel cars in the United States is that they are "noisy, smoky, smelly, under powered and unreliable."



Section Vice Chair, Allan Watts, thanks Gary Rogers on behalf of our entire Section for an outstanding presentation.

As the principle investigator on projects with the EPA, DOE, DoD, Ford, Eaton, and International Truck and Engine Company, Gary Rogers reported that these studies show current and future diesel engines are not deserving of their current reputation. Some of his points were:

The diesel engine has greater torque than a gasoline engine and provides very peppy acceleration and it is very reliable when properly designed. Further, the diesel engine is inherently more efficient than the gasoline engine.

The current diesel powered cars, which enjoy a 50% market share in Europe, each have some 110 microprocessors. As Gary Rogers noted, today's fuel injector is not your grandfather's fuel injector. It can have some four microprocessors to assure that exact multiple injections of differing quantities of fuel occur in precise amounts during each cylinder cycle

Noting that the gasoline engine benefits from the simple but effective catalytic converter for reducing emissions, the catalytic converter does not reduce gaseous and particulate pollution from the diesel engine. Fuel injectors that are far more sophisticated than those used in the gasoline engine have been developed to provide improved fuel economy and reduced emissions for the diesel.

More recent developmental projects have been focused on reducing particulates in the exhaust. Two technologies are being explored: the injection of ammonia into the cylinder and the use of particulate traps.

Ammonia works well but is a liquid that must be replenished periodically in the vehicle. Future environmental regulations would not permit reliance on the vehicle owner to replenish the supply of ammonia as it is used. Thus, the distribution of ammonia and the means of automatically refilling a storage container would add complications to the diesel powered vehicle.

In development projects on which Gary is involved, the focus has been on the use of particulate traps. These too add complications. Material selection for the trap must take into account the high heat needed to automatically clean the trap. However, a most recent study having EPA financial sup-

port demonstrated that sophisticated traps could achieve the most stringent EPA regulations for particulates.

These technologies that are required to make the diesel environmentally acceptable are now available, but very expensive. Gary noted however that any alternative for greatly improving fuel economy and meeting future stringent emission regulations will be much more expensive than is the current gasoline engine. Gasoline costs will have to reach approximately \$5.00 a gallon to make new technologies economically viable for those buying and those manufacturing the vehicle.

However, the diesel is an alternative that can achieve greatly improved fuel efficiency and meet future, more stringent emission regulations.

Members in attendance enjoyed a very insightful and educational program from one of our nation's experts on diesel engines.



University of Arizona Formula Team with their Formula car on display at the March meeting.

Students from the University of Arizona in Tucson were on hand to give personal tours of their new Formula car. Led by Ryan Kanto, they provided an insight into the engineering that goes into one of these vehicles. Your Arizona-Nevada Section directly supports student programs like this at several universities in the Arizona-Nevada region.

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### *International Science Fair: Phoenix, May 8 -12*



The International Science Fair is being held in Phoenix in May. This is the Super Bowl of science fairs where 40 different countries are represented, made up of over 500 regional and national science fair winners, and \$3,000,000 in scholarships.

The Science Fair still has openings for judges. For more information, visit [www.intelisef2005.org](http://www.intelisef2005.org). If you sign up, please contact Jeff Brown at 602-319-4161

### *Use Global Warming To Make Mars Habitable Says American Geophysical Union*

"Injecting synthetic "super" greenhouse gases into the Martian atmosphere could raise the planet's temperature enough to melt its polar ice caps and create conditions suitable for sustaining biological life. In fact, a team of researchers suggests that introducing global warming on the Red Planet may be the best approach for warming the planet's frozen landscape and turning it into a habitable world in the future.

Margarita Marinova, then at the NASA Ames Research Center, and colleagues propose that the same types of atmospheric interactions that have led to recent surface temperature warming trends on Earth could be harnessed on Mars to create another biologically hospitable environment in the solar system. In the February issue of *Journal of Geophysical Research-Planets*, published by the American Geophysical Union, the researchers report on the thermal energy absorption and the potential surface temperature effects from introducing man-made greenhouse gases strong enough to melt the carbon dioxide and ice on Mars.

"Bringing life to Mars and studying its growth would contribute to our understanding of evolution, and the ability of life to adapt and proliferate on other worlds," Marinova said. "Since warming Mars effectively reverts it to its past, more habitable state, this would give any possibly dormant life on Mars the chance to be revived and develop further." The authors note that artificially created gases -- which would be nearly 10,000 times more effective than carbon dioxide -- could be manufactured to have minimal detrimental effects on living organisms and the ozone layer while retaining an exceptionally long lifespan in the environment. They then created a computer model of the Martian atmosphere and analyzed four such gases, individually and in combination, that are considered the best candidates for the job.

Such a process could take centuries or even millennia to complete but the raw materials for the fluorine gases already exist on Mars. The authors conclude that introducing powerful greenhouse gases is the most feasible technique for raising the temperature and increasing the atmospheric pressure on Mars, particularly when compared to other alternatives like sprinkling sunlight-absorbing dust on the poles or placing large mirrors in the planet's orbit.

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### *SAEAZ Tucson Dinner Meeting: Spring 2006?*

The governing board is looking into having a Spring 2006 dinner meeting in Tucson. If you have suggestions for a dinner topic or meeting location, we'd like to hear from you! Please contact us at [info@saearizona.com](mailto:info@saearizona.com) or let us know by contacting a board member.

*Mini Baja West  
Opportunities for Participation*



The Mini-Baja 100 is only two months away! The SAE will not have another event like this until the 22nd Century. Our Section has the honor of hosting it, and we need your help to make it the best Mini-Baja ever! Whether you have experience or not, you can be a part of this once-in-a-hundred-years opportunity to celebrate SAE's 100 years as an organization. Sign up to volunteer for any or all days via the Mini-Baja 100 website at: <http://www.sae.org/exdomains/minibaja100/volunteer.htm>.

For more information, contact Derek Logan at [derek.logan@email.sae.org](mailto:derek.logan@email.sae.org).

Positions available include:

Technical Inspector - Examine entries for compliance with the rules.

Design Judge - Judge the teams' designs and evaluate design reports.

Presentation Judge - Judge the teams' presentation skills.

Continued next column....

*Meeting Schedule*

April 21	- The Boeing 787
May 19	- Automotive Tire Technology & Testing

Continued from prior column....

Dynamic Events Crew - Operate and Marshall the dynamic events.

Endurance Event Crew - Operate and Marshall the 100 mile endurance event.

Scorekeeper - Assemble event records, determine scores and declare the winners.

General Event Crew - Fill in to help keep the event running smoothly.

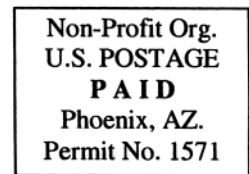
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