

SAE ARIZONA • NEVADA SECTION

MEETING: Mar. 18

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

HIGHLIGHTS...



- Phoenix-Mesa Gateway Airport
- Chinese Aviation Repair Market
- Message From the Chair
- Recap of February Meeting
- Meeting Location Map
- Coffee Talk by Ron Will
- ASU Baja Request
- SAE Announcements
- Meeting Schedule

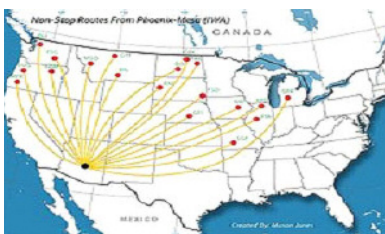
Phoenix-Mesa Gateway Airport

by
Patrick Oakley

Patrick Oakley will provide an overview of developments at Phoenix-Mesa Gateway Airport. Phoenix-Mesa Gateway Airport was built in 1941 and inaugurated in 1942 by the military as Williams Air Base. It served as a flight training field during World War II for military pilots. In 1948, Williams became the first jet training base, and in 1966 it was the first site of the Undergraduate Pilot Training (UPT) program.

The airport narrowly missed permanent dismantling when the 1991 Base Realignment and Closure (BRAC) Commission recommended closing it due to high operating costs. As the base was being shut down in 1993, it was decided that, with the growing traffic at Sky Harbor International Airport in Phoenix, an alternative airport would be needed in the area. The runway was expanded to accommodate jets, and the facility reopened in 1994 as Williams Gateway Airport. In 2004, charter airline Ryan International Airlines began offering MD-82 jet flights from there to Bullhead City International Airport in Bullhead City, Arizona, which is adjacent to Laughlin, Nevada, and many resorts.

In 2007, the low-cost Las Vegas-based carrier Allegiant Air announced plans to open a focus city from Phoenix-Mesa Gateway Airport, connecting the Phoenix metropolitan area to 13 destinations. In 2007, the name was changed to Gateway Airport. The new name is now Phoenix-Mesa Gateway Airport. Reasons behind the name change are "to have the airport reach its highest potential in creating jobs and commercial service development." Services and routes are continuing to expand.



Patrick Oakley

Patrick Oakley currently serves the Phoenix-Mesa Gateway Airport Authority as the Community Relations Coordinator, responsible for community outreach and noise abatement programs. He started his career



as a maintenance contractor for Williams Air Force Base (former name of Gateway) and worked on transitioning the former military base to a commercial airport. Patrick also worked as an Airport Airfield Maintenance Technician and participated in several construction projects to rebuild runways and airfield infrastructure

March Coffee Talk by Ray Berg

Ray Berg is Vice President of Engineering at Perform Air International, Inc. Perform Air is an FAA 145 Aircraft Component Repair Station located in Gilbert, Arizona.

He has 20 years of combined airline and aviation experience, including 8 years at America West Airlines in various management capacities.

Recently, China has become a major emerging market for both transport and general aviation. For the last two years, Ray has worked with Asian air carriers and aircraft repair facilities to help establish Perform Air International's place within this new arena. This evening's discussion will cover the Chinese aviation repair market in general, as well as the challenges faced between Asian and American business cultures.

DATE	TIME	LOCATION	COST	With Dinner	Presentation Only
Mar. 18 2010	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 - \$12	no charge
RSVP by Monday March 15.			info@saearizona.org		

Message From the Chair

As our newsletter being readied to go out, I want to thank Bill Gest for arranging for our March presenter. Our speaker for the March 18th meeting is Mr. Patrick Oakley. He will talk about economic development at Phoenix-Mesa Gateway Airport, covering history, accomplishments, and future planning for the new transportation and jobs center.



Michael Kremer, Section Chair

Prior to the main presentation we are privileged to have Mr. Ray Berg, Vice President of Engineering at Perform Air International, Inc as a coffee talk speaker. Ray will share his experiences working with Asian air carriers and aircraft repair facilities while establishing his company in this emerging market.

I received lots of positive feedback from members after the February presentation. We started with an excellent and well presented overview of car aerodynamic design history by Ron Will, which was followed by an interesting technical and well delivered review of state-of-the art race car aerodynamics by Thomas Ramsay of Honda Motors. Nearly 60 people attended, with many student members and AIAA guests present. This was another of the enjoyable joint meetings between our SAE Section and the AIAA.

More of the good news –Arizona schools cannot help but to keep winning SAE International AWIM Gary Dickinson Awards. This award is given to only one school per year nationally, and Arizona schools have been winners for the last three consecutive years. Our Section Board voted to fund a recognition dinner for the 2007, 2008, and 2009 recipients of the AWIM Gary Dickinson Award. That would include six teachers and two principals. Matt Miller, The Director of the SAE Foundation will be in AZ on March 9th and 10th to present the 2009 Gary Dickinson Award to the Taylor Jr. High teachers.

I have received a message from our strategic team (Ron Weary and Steve Trimble): The final questionnaire was sent in to SAE Int'l on Feb. 16 for distribution. Expect the survey to appear in our emails before too long. Please remember that your participation is very important – it should take only a few minutes to answer all the questions and we should learn a lot on how to further improve our organization.

Last meeting I had an opportunity to learn about recent activities at ASU Student Chapter. Our student members, led by Michael D. Mitschele are putting a lot of effort into marketing and membership numbers. They have been securing sponsorships from local industry, organizing plant tours for students and working hard towards attracting new

members. I think this is remarkable and would like to encourage everyone to assist them as they enter SAE Formula and Baja competitions.

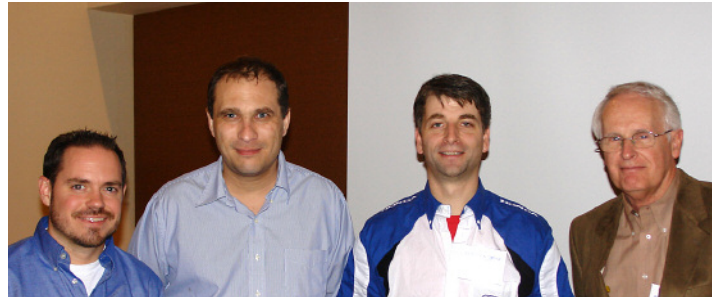
A final note: It will soon be time to nominate Section Officers for the next year. I would be happy to receive your suggestions. I will see you on March 18th.

Michael Kremer, PE

Recap of February Meeting by Steve Atkins

When I was fifteen and just learning to drive, my father taught me that regardless of all the other rules of the road, I should, indeed must always, obey The First law of Driving: “Two objects may not occupy the same space at the same time”. Having personally verified this law on more than one occasion, I was happy to attend last month’s dinner meeting, in the hopes of learning how to avoid any future tests.

On February 18th the SAE AZ/NV Section was privileged to hear a fascinating talk on race car aerodynamics,



L-R: Ryan Carlblom, AIAA Chairman, M. Kremer SAE AZ-Nevada PE, T. Ramsay & R. Will.

presented by Mr. Tom Ramsay, a senior engineer at Honda R&D Americas in the Vehicle Research Division. Mr. Ramsay is the technical leader of computational fluid dynamics (CFD) modeling for most passenger cars and light trucks developed for Honda’s North American market.

In order to limit speeds and even out the playing field, race sanctioning bodies have increasingly established rules governing engine and chassis configuration. This has left racing teams to invest enormous sums (\$500,000,000 annually), in the pursuit of innovations in race car aerodynamics to provide that winning edge. Aerodynamicists like Ramsay use computational modeling, wind tunnel testing (including “rolling road” wind tunnels) and track testing to design and optimize the race car.



Tom Ramsay

As a car goes around a curve (of radius r), it is acted upon by centrifugal forces (MV^2/r), which tend to throw the car to the outside of the curve possibly crashing into the wall

(oops). This force is, or is supposed to be, countered by the centripetal force applied by the frictional force of the tires, typically this force is the weight of the vehicle opposed by the tires (the Normal force, N) multiplied by the coefficient of friction (μ) between the tire and the road (μN). Should the centrifugal force on the car exceed the centripetal force, the car will cease to go around the curve and will (theoretically) proceed in a straight line, eventually leaving the road and testing the first law of driving once again.

Mr. Ramsay applies aerodynamics to three aspects of racing, the race car, the race track and the race craft.

The principles which allow aircraft to fly can be applied to the race car in order to increase the normal force. The Bernoulli Effect means that if a fluid (gas or liquid) flows around an object at different speeds, the slower moving fluid will exert more pressure than the faster moving fluid on the object. The wing of an airplane is shaped so that the air moving over the top of the wing moves faster than the air beneath it. Since the air pressure under the wing is greater than that above the wing, lift is produced.

The shape of the Indy car exhibits the same principle: the air moving under the car moves faster than that above it, creating down force or negative lift on the car.



Formula 1



IRL

Airfoils or wings are also used in the front and rear of the car in an effort to generate more down force. In addition the shape of the underbody (an inverted wing) creates an area of low pressure

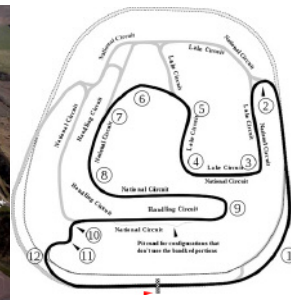
between the bottom of the car and the racing surface, which tends to suck the car to road. This down force adds to the gravitational force to greatly enhance the normal force acting on the tires.

Indeed, a 1500 pound IRL race car can, at speed, generate 3000 pounds of aerodynamic down force, which would allow the race car to drive upside down if it had an inverted track to race on.

Another key aspect of the application of aerodynamics to race cars involves the concept of drag. Drag, sometimes called air resistance, refers to forces that oppose the relative motion of an object through a fluid, such as air, and acts in a direction opposite to the oncoming flow velocity; meaning that drag acts to slow down the race car. The Drag force is characterized by the Drag Equation $F_d = 1/2 \rho A V^2 C_d$ where ρ is the (air) density, V is the speed, A is the frontal area, and C_d is the drag coefficient (dimensionless).

Obviously, racing is about going fast, so it is impera-

tive that race cars reduce drag as much as possible. But this imperative often conflicts with the requirement to increase down force. Much of the art of race car aerodynamics involves optimizing the inherent tradeoffs associated with maximizing down force and minimizing drag.

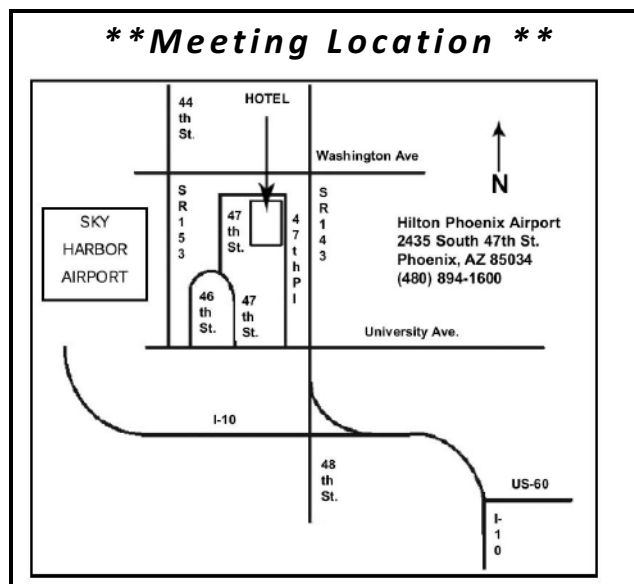


And this leads to Ramsay's second aspect of race car aerodynamics, the race track. In general, the same race car can compete on two different types of race tracks; a road course, with numerous tight right and left corners and reduced straightaway's, and a high speed oval, often with gentle, banked left-hand turns and long straightaways

A road course favors a race car with high down force, which allows high speed cornering and reduced break wear at the expense of increased drag and slower top speeds. While the high speed oval favors a race car with minimum drag. An aerodynamicist like Ramsay, adjusts and balances the size, shape, angle of attack, and yaw angle of the various airfoils (generally a front and rear wing) within racing guidelines to optimize the race car for the specific track.

In addition, Mr. Ramsay uses various computational models (such as Bosch Lap Sim) to predict the most efficient line or path a race car should take through a corner. This particular program is free and available at: <http://www.bosch-motorsport.de/content/language2/html/3589.htm>.

Finally, Mr. Ramsay spoke of aerodynamics in terms of race craft -- that is, the intuitive use and understanding of aerodynamics by the race car driver in a racing environment.



Topics included the concepts, use, and diminishing returns of drafting, side-by-side racing and passing techniques. Also the importance of “clean air”, which is relatively undisturbed air, free of turbulence and eddies, and the great advantage clean air gives to the race leader, often starting from the pole position and first turn.

This was a fascinating presentation with a number of proprietary, top-secret slides. It is my hope that we will see Mr. Ramsay at a future SAE meeting.

ASU Baja Request



L-R: James Rivera & Bill Gest.

Student team leader for ASU’s Baja team requests technical help on their Baja vehicle. It involves a monthly meeting with the team to help resolve technical issues.



Coffee Talk by Ron Will

Ronald (Ron) Will, formerly Manager of Product Planning & Design at Subaru of America and Senior Designer at General Motors, provided an interesting overview of the history and state of the art of automotive aerodynamics. Ron, who is now a local resident, has enjoyed a long career in automotive design. This included a ground-breaking venture of his own, which resulted in one of the most exotic and high-performance three-wheelers ever built - the Turbo Phantom (right).



Ron Will (above) and the Turbo Phantom (below) designed in 1978.



Upcoming SAE Events, Conferences, and Symposia

SAE 2010 World Congress

When: April 13-15, 2010

Where: Detroit, Michigan, USA

Aerospace Manufacturing and Automated Fastening Conference & Exhibition

When: September 28-30

Where: 2010, Wichita, Kansas USA

For event and registration details, please visit the page at: <http://www.sae.org/events/>

ARIZONA-NEVADA SECTION: Meeting Schedule

March 18	- Phoenix-Mesa Gateway Airport
April 22	- Nissan EV
May 20	- Student SAE Competition Vehicles Exhibit & AWIM Student/Teacher Presentation

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