



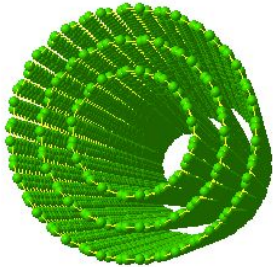
# Newsletter

Volume 37, Number 3, November 2006

## Next Generation Material Opportunities for Future Aircraft from Nanotechnology

*Russell G. Maguire*

**Boeing Technical Fellow – 787 Technology Integration  
The Boeing Company**



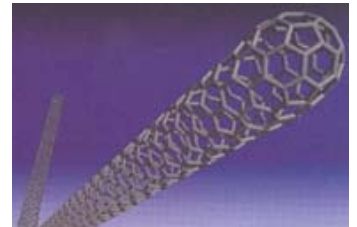
Multi-Walled Nano-Tube (MWNT).

This presentation is a discussion on the use of nanotechnology in the application of enhancing polymer based materials to form the next generation of composite materials. It is given from the perspective of how nanotechnology will help enhance these next generation composite materials that will in turn be used to help advance the next generation of commercial aircraft. Some basic principles of nanotechnology will be discussed to demonstrate the rational for why these materials can add value when used in conjunction with more conventional polymer based materials. The presentation will establish how these materials may have value to the aerospace industry in the future and where that industry is looking to use these materials and the associated process technologies to help make the most advanced, the most efficient, and the safest commercial aircraft in the world.

Russ Maguire is a Boeing Technical Fellow specializing in composite materials and structures and is currently in the Boeing Commercial Airplane Group, responsible for global technology assessment for the Boeing 787 program. He is also the nanotechnology focal for the Phantom Works M& PT organization and manages a nanotechnology portfolio for the 787-9. He joined

Boeing in 1978 and has been working in the field of composite materials and structures since then. He has supported major composite programs such as the V-22, A-6, Advanced Composite

Development Program, 767, the New Large Airplane Composite Wing, ARPA Composite Wing Development, the Asian Composite Joint Venture Program, 777 composite empennage and all the major commercial composite programs at Boeing, most recently as part of the team that selected composites for the 787 wing and fuselage. He is a member of the American Society of Composites, the European Society of Composites, the Chinese Society of Composites and the Society of Advanced Materials & Process Engineering, and is an advisor to several academic and industrial nanotechnology initiatives.



Single-Walled Nano-Tube (SWNT).



Russ Maguire (l) and Mike Richey of LTD at the White House for a nanotechnology meeting.

### AIAA Lecture - Dinner Meeting

**Date:** Tuesday, November 21, 2006

**Place:** Old Spaghetti Factory  
2801 Elliott Ave  
Seattle, WA

**Time:** 6:00 PM Doors Open  
6:30 PM Dinner Begins  
7:15 PM Lecture Begins

**Dinner Price:**

**\$15** AIAA Members and Guests

**\$18** Non-Members

**\$5** Students

**\$5** Educator Associates

*A reservation is a commitment to pay.*

#### RSVP Via the Section Website

AIAA members can sign up online at [www.pnwaiaa.org](http://www.pnwaiaa.org) or send an e-mail to [reservations@pnwaiaa.org](mailto:reservations@pnwaiaa.org). A confirmation e-mail will follow.



## From the Left Seat

Paul Kostek: 2006-2007 Chair

Some highlights from a busy October. I had the opportunity to meet with some members from Oregon while attending the Digital Avionics Systems Conference last month. With most of the activity focused here in the Puget Sound area it's easy to forget that our Section covers all of Washington, Oregon, Alaska, Idaho and Western Montana. The members in the Portland area work for/run small businesses, teach at colleges/universities and are teacher affiliates. There is also a very active NASA presence in education at the K-12 level through a NASA rep and the Oregon Space Grant Consortium ([spacegrant.oregonstate.edu](http://spacegrant.oregonstate.edu)). A very different group from here in Puget Sound where most of our members work for large employers, i.e. Boeing and the UW. This does offer some interesting opportunities for any member interested in starting a business. Members in Oregon might be able to provide information on how to get started, networking, applying for SBIRs, etc. Going forward I'll working with the Oregon members to hold quarterly meetings and help with identifying volunteers/resources for the educator affiliates. If you're a member from outside the Puget Sound area and would like to explore activities/meetings where you reside feel free to contact me and we can see what we can do.

At the end of the month I met with several staff members of the Aviation High School ([www.aviationhs.org/pub/pub.aspx](http://www.aviationhs.org/pub/pub.aspx)). This unique high school located at Boeing Field, is for students interested in pursuing a career in aviation. The Section is exploring how we can work with the school. Examples of school needs include mentors and assistance with judging on projects. If you're interested in volunteering please let me know.

Besides our technical activities AIAA is also involved in public policy. Each year members head to Washington, DC and meetings with their Senators and Representatives during AIAA Congressional Visits Day (CVD). This year besides the DC area visits, Christian Carpenter and several other local members met with members of the Washington State delegation during the August break. Besides participation in CVD 2007 in DC we're also looking at a possible event here in the Seattle area next summer.

These activities allow us to educate members of Congress on how important the aerospace industry is to Washington State and how many jobs are impacted.

If you would like to participate in the CVD activities in 2007 contact Christian Carpenter ([Christian.carpenter@rocket.com](mailto:Christian.carpenter@rocket.com)).

## AIAA 75 Years

*In honor of our 75<sup>th</sup> anniversary, the following series will cover the Institute's history. The entire series can be read on the AIAA website.*



### The ARS – Early Years (1930-1944)

In sharp contrast to the IAS, the American Rocket Society (ARS) started in a very different way. It began in Nino and Nella's, an Italian restaurant/speakeasy in the West Chelsea section of New York City. There, the Pendrays, Gawain Edward (1901-1987) and his wife, Leatrice (Lee) Gregory, met with their friends to talk enthusiastically about the possibilities of space travel. The Pendrays regularly contributed to Science Wonder Stories, a science fiction magazine owned by Hugo Gernsback, best known for starting the first science fiction publication, Amazing Stories. Ed and Lee often invited David Lasser, the editor of Science Wonder Stories, and other contributors, to story conferences at Nino and Nella's. From there they would adjourn upstairs to the Pendray's apartment to continue their discussions on the prospect of space flight. At some point one evening, David Lasser suggested that they organize, and the American Interplanetary Society was born. On April 4, 1930, eleven men and one woman signed their names to a sheet of typing paper, making them the official founding members, with David Lasser as the first president. They quickly signed up other members, using Gernsback's publications for recruitment. One early member, listed as having joined while "at sea," must have been Midshipman Robert Heinlein; the future science fiction writer was serving at the time on board the USS Lexington. By the end of 1931, the society had 100 members. The society had already begun to publish, starting with a four-page mimeographed newsletter offering a mix of news and information in June 1930.

Pendray replaced Lasser as president in 1932, and the AIS Bulletin changed from a mere mimeographed version to the more formally printed Astronautics. The AIS itself was also changing. Ed and Lee Pendray took a trip to Europe, where they visited with rocket enthusiasts there. They were particularly excited to meet members of the German Rocket Society, which at the time was starting to build and test liquid propellant rockets. Ed Pendray returned to the U.S. determined to do the same, and the AIS began redefining its central

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purpose. From a society that existed to promote the wonders of space travel, it had become a society seriously building and testing small rockets.

AIS #1, as their first rocket was called, was to be launched on November 12, 1931. It had cost the grand sum of \$49.40 - \$30.60 for the rocket and \$18.89 for the test stand, propellant, batteries, and other supplies. Most of their supplies were donated, or improvised – the aluminum can that served as a water jacket for the motor was actually a malted milk shaker, for example. The launch site chosen was an empty farm field near Stockton, New Jersey. Unfortunately, the rocket slipped while being mounted, fell to the ground and was twisted out of alignment, ending its short career.

AIS#2 was built of salvaged parts from #1, along with bailing wire, razor blades, and other cast-offs. It had balsa wood fins and valves scavenged from gas light fixtures. The group received permission to launch the rocket in Great Kills Park, on Staten Island, and on 14 May 1933, they held the first public launch of a rocket, captured by crews from both Acme and Universal Newsreels. The rocket roared 250 feet into the air, where the oxygen tank burst and fell into lower New York Bay.

Due to these continuing experiments, the society decided to rename itself the American Rocket Society (ARS) in 1934. Most of the original science fiction crowd had left, to be replaced by scientists and engineers.

The ARS continued their experiments, off and on, throughout the decade, refining and adding to their designs. Several young engineers, including James Wyld, Franklin Pierce, John Shesta, and Lovell Lawrence, had contributed many refinements to the motors and designs. On December 18, 1941, they formed Reaction Motors, Incorporated, the first American company founded to produce liquid-propellant rockets, based on the work the group had done with the ARS. They had formed the company in order to do business with the U.S. government, which would not contract with individuals.

## August Congressional Blitz—Pacific Northwest Section

*By Reece Lumsden*

While those of us working in the Aerospace sector may think that engineers and their technology provide the direction, there is actually another enabler at play. When Ed Harris delivered his famous line in *The Right Stuff* ‘No bucks, no Buck Rogers’ he neatly encapsulated the premise that faces aerospace; there can be no glitz and glamour, no photo opportunities, maiden flights or



Meeting with Sen. Patty Murray's  
Community Outreach Representative—Ms Sheila Babb  
(L-R Reece Lumsden, Christian Carpenter, Sheila Babb)

impressive landings without funding. And so with this in mind, AIAA seeks to ensure that it pays close attention to those in the political establishment who fund public sector aerospace initiatives. This comes through two major pushes each year—the Congressional Visits day, held in Washington DC during the month of March and the August Congressional blitz, held during August when representatives return to their constituencies before returning to DC in September.

This year, the Pacific North West section of AIAA got its message out there by meeting with Washington State representatives from the offices of Sen. Maria Cantwell, Sen. Patty Murray and Congressman Jay Inslee. Leading the charge for AIAA in Washington were Mr. Christian Carpenter, a Senior Project Engineer with Aerojet in Redmond and Mr. Reece Lumsden, a Project Manager for Boeing on the 787 Dreamliner in Everett.



Meeting with Sen. Maria Cantwell's  
Northwest Washington Director—Ms Sally Hintz  
(L-R Sally Hintz, Christian Carpenter)

Staffers from respective offices were more than happy to sit down and discuss aerospace issues, with some of the more common themes being:

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- Recognition of the need to better engage and enthuse students about Math and science and how they are used in the aerospace industry
- Support for the strong U.S. stance in the dispute currently before the World Trade Organization (WTO) regarding government subsidies to Airbus in support of its development of the A380
- Recognition that Washington state possessed truly innovative companies operating in the aerospace domain
- Acknowledgement that opportunities in aerospace development may come from aligning product development with the present needs of the Department of Homeland Security (DHS) and the current War on Terror.

Representatives were keen to find out more on Aerospace companies that resided in the local region and what capabilities such companies fielded. For example, it is a little known fact that within the Redmond area alone, there exists the entire suite of capabilities required to launch a mission to the moon.



Meeting with representatives from Congressman Jay Inslee's office  
(L-R: Ms Kennie Endelman (District Director), Mr Adam Bartz (Community Liaison), Reece Lumsden (AIAA PNW), Christian Carpenter (AIAA PNW))

meetings and lessons learned will be communicated back to AIAA head office in the hope that this will help other chapters of AIAA as they reach out to their state representatives.

### Autumn 2006 AMTAS Meeting

The Autumn 2006 AMTAS meeting was held October 19, 2006 at the Edmonds Conference Center. The workshop summary and presentations are posted on the

AMTAS website at:  
[http://depts.washington.edu/amtas/events/amtas\\_06fall/index.html](http://depts.washington.edu/amtas/events/amtas_06fall/index.html).

The meeting included presentations devoted to a Center activities report, an update on the FAA-sponsored Centers of Excellence program, and presentations from AMTAS PIs about their research projects



There is also a summary of the Washington Composites Luncheon and Expo that immediately followed the AMTAS meeting. Go to [http://depts.washington.edu/amtas/events/amtas\\_06fall/expo.html](http://depts.washington.edu/amtas/events/amtas_06fall/expo.html) for more information.

### Aviation High School Call for Volunteer Judges

*The following is an open letter to PNW AIAA Members from Aviation High School in Seattle, WA.*

Dear friends, colleagues, heat-shield engineers (past, present, & future), and other heat-related experts:

This fall, ninth-grade students at Aviation High School have been doing rocket science... or part of it anyway.

Students are in the process of designing, creating, and testing three iterations of pint-sized heat shields to protect chocolate bunnies from three minutes of exposure to 850°F air. Students' choices are constrained by limited materials, narrow parameters for dimensions, NASA-like costs, and a tight timeline... In other words, it's as much like real life as possible.

In addition to developing increasingly effective designs to protect the chocolate bunny from the scorching heat, students are also expected to demonstrate their knowledge of the heat shields and to discuss the evolution of their designs. On November 20 and 21, students will orally defend their work in front of teams of outside experts. Each expert will be responsible for assessing approximately four teams of students; after reading through students' design files, experts will allow students to briefly explain design decisions and results, and then will ask students a series of probing questions intended to assess the depth of student knowledge of thermal energy and the design process.

Are you feeling like an expert?

If your schedules are like mine, I know that you are insanely busy. Even so, the investment is small and the returns are large. In last year's project presented to

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outside experts, students' chief complaint was that they wanted more time... to build another, to test another, to perfect the design, etc. For learners to defend their work to experts is powerful; it is compelling; it makes learning stick.

I am recruiting experts for Monday, November 20 and Tuesday, November 21. There are ten slots on Monday morning (9:00 to 10:50), ten slots for Monday afternoon (1:10 to 3:00), eight slots for Tuesday morning (9:00 to 10:50), and eight slots for Tuesday afternoon (1:10 to 3:00).

The time commitment of judges is modest:

- one hour to read through several students' design files prior to the interview
- two hours of interviewing on Monday or Tuesday
- one hour to discuss results with other judges

I would be grateful for your help and so too would the students.

I will contact you in the next several weeks. If you have questions in the meantime, please email or call.

With profound appreciation,  
**Scott McComb**  
 Aviation High School  
 6670 East Marginal Way South  
 Seattle, WA 98108  
 206.716.0006 ext. 219  
 Where the sky is NOT the limit!



(L-R) PNW AIAA Vice Chair Scott Eberhardt presented a laser pointer to John Swihart for his October presentation on "Design Characteristics for Replacement of 737's and A320's."



PNW AIAA members at the Bellevue, WA, Azteca for the October dinner meeting.

### 2006-2007 PNW AIAA Calendar

**Tuesday, November 21**

Speaker: Russ Maguire-Boeing  
 Topic: Nanotechnology in Aerospace  
 Location: Old Spaghetti Factory<sup>2</sup>

**December TBD**

Topic: Young Professional Committee Meeting  
 Contact: Emmanuel Domingo  
 Location: TBD-Seattle, WA

**Saturday, December 16**

Speaker: Portland State Aerospace Society  
 Topic: Portland State Rocket Program  
 Location: Museum of Flight

**Tuesday, January 16**

Speaker: Tom Daniel-University of Washington  
 Topic: Bug Flight  
 Location: Museum of Flight

**Tuesday, January 23**

Event: PSEC Mentor Night: University of Washington  
 Location: University of Washington, McCarty Hall Seattle, WA

**Tuesday, February 20**

Speaker: Roger Launis  
 Topic: Apollo: The Thrill of a Lifetime  
 Location: Old Spaghetti Factory<sup>2</sup>

**Saturday, February 24**

Event: PSEC Engineering Fair  
 Location: TBD

**Tuesday, March 20**

Speaker: TBD

**Tuesday, April 17**

Speaker: TBD

**Tuesday, May 15**

Speaker: Paolo Feraboli-University of Washington  
 Location: Azteca<sup>1</sup>

<sup>1</sup> Azteca 150 112 <sup>th</sup> Ave NE Bellevue, WA	<sup>2</sup> Old Spaghetti Factory 2801 Elliott Ave Seattle, WA
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### 2006-2007 Retired Members Brunches

**Saturday, November**

Speakers: Dick Taylor  
 Topic: B-47

**Saturday, May**

Speaker: Bob Bogash  
 Topic: Caretaker of the Original 737: The Last 30 Years

All Retiree meetings are held at the Museum of Flight, Seattle, WA. Contact Tom Holgate (see list of officers) for more information.

Section website: [www.pnwaiaa.org](http://www.pnwaiaa.org)  
 National website: [www.aiaa.org](http://www.aiaa.org)

Please submit newsletter materials to the editor by the 21<sup>st</sup> of November for the December newsletter.

A PUBLICATION OF THE PACIFIC NORTHWEST SECTION OF AIAA  
**Address Corrections**

Mail to:  
**AIAA**  
**1801 Alexander Bell Dr.**  
**Reston, VA 22091**

On-line at  
**<http://www.aiaa.org>**  
 (Join/Renew/Update). Membership ID needed

## Section Officers and Directors

Position	Name	Address (Mail stop if Boeing*)	Phone	Email address
<b>Council</b>				
Chair	Paul Kostek	6M-EU	-	<a href="mailto:kostek@pnwaiaa.org">kostek@pnwaiaa.org</a>
Vice-Chair	Scott Eberhardt	-	-	<a href="mailto:eberhardt@pnwaiaa.org">eberhardt@pnwaiaa.org</a>
Secretary	Jon Lee	02-XJ	-	<a href="mailto:lee@pnwaiaa.org">lee@pnwaiaa.org</a>
Treasurer	Chris Nelson	6712 183 <sup>rd</sup> St. SW, Lynnwood, WA 98037	-	<a href="mailto:nelson@pnwaiaa.org">nelson@pnwaiaa.org</a>
Advisory Council	Bonnie Dunbar	-	-	-
Advisory Council	Ratan Khatwa	-	-	-
Past Chair	Dave Lednicer	2133 152nd Ave NE, Redmond, WA 98052	425-643-9090	<a href="mailto:lednicer@pnwaiaa.org">lednicer@pnwaiaa.org</a>
<b>Elected, non-voting</b>				
Vice-Chair-Elect	Steve Runo	-	-	-
Secretary-Elect	Mark Viviano	-	-	-
Treasurer-Elect	Jim McClelland	-	-	-
<b>Appointed</b>				
Webmaster	Andrew McComas	2133 152nd Ave NE, Redmond, WA 98052	425-643-9090	<a href="mailto:mccomas@pnwaiaa.org">mccomas@pnwaiaa.org</a>
Honors & Awards	Scott Eberhardt	-	-	<a href="mailto:eberhardt@pnwaiaa.org">eberhardt@pnwaiaa.org</a>
Retired Members	Tom Holgate	2704 SW 314th, Federal Way, WA 98023-7842	253-838-0333	<a href="mailto:holgatz@aol.com">holgatz@aol.com</a>
Newsletter	Emmanuel Domingo	03-JP	206-227-7819	<a href="mailto:domingo@pnwaiaa.org">domingo@pnwaiaa.org</a>
Nominations	Vera Martinovich	02-XJ	425-266-8664	<a href="mailto:martinovich@pnwaiaa.org">martinovich@pnwaiaa.org</a>
Museum of Flight Liaison	Bonnie Dunbar	-	-	-
Pre-College Outreach	Scott Eberhardt	-	-	<a href="mailto:eberhardt@pnwaiaa.org">eberhardt@pnwaiaa.org</a>
Public Policy	Karl D'Ambrosio	5026 18 <sup>th</sup> Avenue NE, Seattle, WA 98105	253-395-3710	<a href="mailto:dambrosio@pnwaiaa.org">dambrosio@pnwaiaa.org</a>
Young Professionals	Emmanuel Domingo	03-JP	206-227-7819	<a href="mailto:domingo@pnwaiaa.org">domingo@pnwaiaa.org</a>

\* All Boeing people have the address of P.O. Box 3707, Mail Code xx-xx, Seattle, WA 98124-2207



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