AIAA Newsletter
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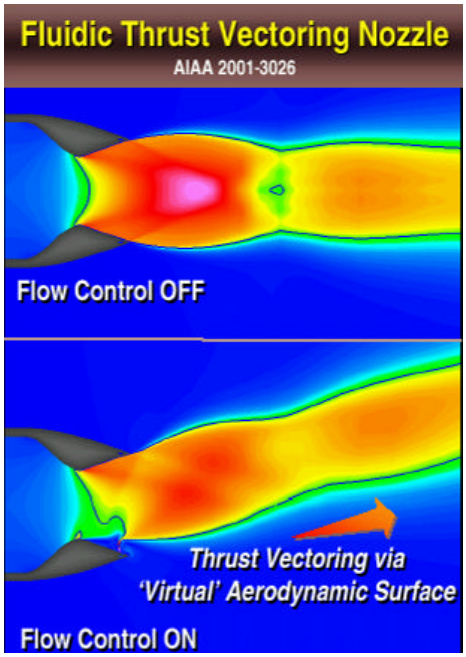
Active Flow Control Technology: Enabling a New Generation of Intelligent Propulsion and Aerodynamics for Tomorrow's Air Vehicles

Speaker: Daniel Miller, Senior Staff Engineer, Lockheed Martin Aeronautics Co.

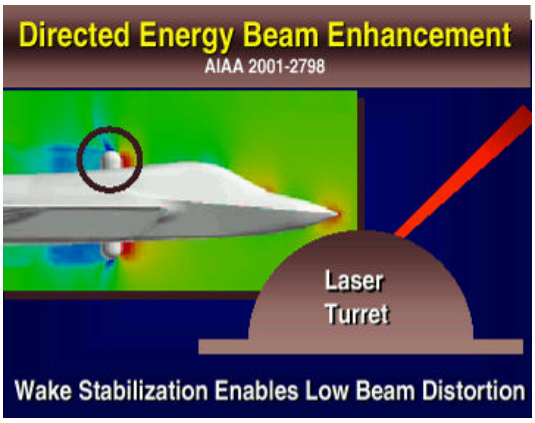


Active Flow Control (AFC) is an emerging field of major significance to future air-vehicle and missile aero-dynamics and propulsion integration. AFC theory has been around for years, but application has been limited to overly simplistic cases. Recent break-throughs have been enabled by advanced computational fluid dynamics (CFD) models that are used to understand the complex physical behavior of turbulent fluid flow near a solid body. Also, affordable micro-scale rapid prototyping techniques enable fabrication of small devices used to carefully manipulate fluid behavior in a tiny region very near body walls and effect a large, global change in fluid dynamic behavior.

One application under development is supersonic nozzles. Here microfluidic actuators can be used to vector a supersonic jet plume without requiring any moving parts in the nozzle, allowing both large weight reduction in the exhaust system and the use of exotic shapes for signature reduction. Another application is directed energy beam enhancement, which uses boundary layer actuators on the beam turret to reduce beam distortion from unsteady shock wave/wake zones. This talk will cover these and other applications of AFC technology.

Daniel Miller has been with the Lockheed Martin Aeronautics Co. for 16 years, interning there and joining the company full-time after earning Master's and Bachelor's degrees in mechanical engineering from the University of Wisconsin. He is currently the Principal Investigator of the Advanced Propulsion Integration IR&D project, leading teams from industry, academia, and the government to develop Active Flow Control technologies for advanced inlet and nozzle systems. He is also the company Technical Focal Point for AFC technology.

Some of his leadership successes include development of fluidic thrust vectoring technology (which results in 30-50% lighter low-observable nozzles for unmanned air vehicles and long-range strike systems) and pulsed ejector pumps for boosting airflow efficiency by 100%. He has pioneered research on fluidic actuation techniques for nozzle flow control and the use of micro devices to control inlet boundary layer separation. He holds four patents for his work.



Mr. Miller has authored approximately 20 professional publications and given seminars on Active Flow Control and CFD-based design. He is an Associate Fellow of the AIAA and is active on that society's Fluid Dynamics Technical Committee.

Joint AIAA/SFTE Lecture - Dinner Meeting

Date: **Tuesday, January 28**, 2003
Place: **Old Spaghetti Factory, 2801 Elliott Avenue**, Seattle
Entrée choices are spaghetti w/ meatballs or spinach and cheese ravioli. Please specify choice when reserving.
Time: 6:00 PM Social, No-Host Bar
6:30 PM Dinner
7:00 PM Program – **Active Flow Control Technology**

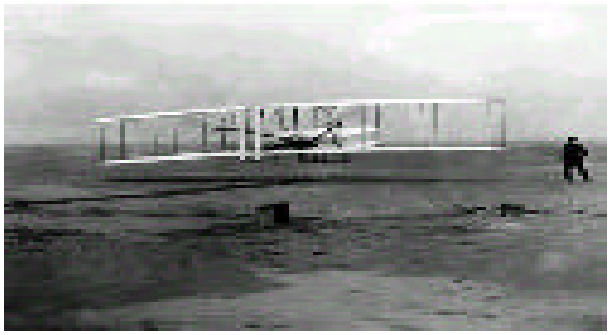
Dinner Reservations: Call anytime (425) 342-0988 or send email to vera.a.martinovich@boeing.com or paul.l.clement@boeing.com
Dinner Price: **$15** AIAA/SFTE Members and Guests
$18 Non-Members
$5 Students (new lower price!)
Program Only: **$5** (Free for persons 17 and under)

Please make reservations by1/24. A reservation is a commitment to pay!

12 hp From 180 Pounds, The Story Of The Wrights Flyer's Engine

By Charles E Taylor

*In commemoration of the approaching 100th anniversary of flight, the following is the **fifth** installment of a **six-part** article written by Charles E Taylor, as told to Robert S Ball when Orville Wright died January 30th, 1948. Charles E Taylor then became the only surviving member of the three who built the first airplane. Charlie Taylor was the only employee and intimate associate of Wilbur and Orville Wright throughout the critical years. Without precedent or fanfare, Taylor built the engines for the Wright's first planes to their designs. The article below was written in 1948 while Taylor was living in retirement in California, it was first published in Collier's, December 25th, 1948 and was reprinted in the Airline Pilot, December 1978. Charles E Taylor died January 30th, 1956.*



We were all very busy out at Simms Station that summer testing the new airplane we built to replace the Kitty Hawk machine. We scarcely had time to keep the bicycle business going, and by the following summer, the boys gave it up entirely.

I must have built half-a-dozen engines for the boys before the airplane company was formed in 1909 and they took on additional help. The brothers also had me doing repair work on the airframe, and as they began to travel around to demonstrate the machines, it was up to me to help with the crating, uncrating, and assembling.

After the company was started in 1909, the place was expanded, more men were hired, and I was put in charge of the engine shop with men working under me. Some of the personal feeling of the old days, when there were just the three of us, was gone. It was beginning to be big business. We had lots of orders, and the first plane sold for private use was to Robert J. Collier. He was a close friend of Wilbur and Orville and owned stock in the company.

Then Calbraith Perry Rodgers came down to Dayton in 1911 to see about the machine he had ordered for his proposed transcontinental flight and offered me $10 a day plus expenses to be his mechanic on the trip. At the time my wages were $25 a week. I told him I'd go; then I told Orv about it. He asked me not to quit. I told him I had already given my word to Rodgers and couldn't very well back out. He told me to make it a sort of leave of absence, and to be sure and come back.

Rodgers left the race track at Sheepshead Bay, Long Island, on September 17 and reached Long Beach, Calif., 47 days later. It was my job to care for the plane every night and make repairs after every mishap. I traveled on a special train that accompanied the flight. Rodgers failed to win the $50,000 prize posted by William Randolph Hearst because he took longer than 30 days to make the crossing. But it was the first coast-to-coast flight.

Because my wife took ill in California, I didn't get back to the East again until fall of 1912. I found it wasn't like old times. Wilbur had died from typhoid fever on May 30, and there were a lot of new faces around the Wright plant. The pioneering days seemed about over for me.

Maybe that's why that Christmas of 1912 stands out in my memory. It wasn't going to be a very happy one, for either the Wrights or the Taylors. Christmas Eve there came a knock on the door, and there was Orville with a big basket filled with everything for a big Christmas dinner. He just handed me the basket, wished us a "Merry Christmas," and went away. It was the first time he had ever come to our house.

I stayed on with Orville after he sold the company and retired to his laboratory in 1915. I helped out with some of his inventions and experiments and kept his car in good running order. But there was less and less work to do, and finally I got restless and took a job downtown with the Dayton-Wright Company in 1919.

In 1916, we took the Flyer out of storage and fixed it up for its first exhibition at the Massachusetts Institute of Technology in Cambridge. If it hadn't been for Roy Knabenshue, there might not have been the historic relic to exhibit there or in Washington now. Roy tells how he approached Wilbur early in 1912 and asked him what he was going to do with the Flyer, and Wilbur told him, "Oh, I guess we'll burn it; it's worthless." Roy argued it was historic and finally talked him out of destroying the plane.

PNW Aerospace Timeline

Dinner Meeting and Lecture

Fourth Tuesday every month	
Topic:	Active Flow Control Technology
Date/Time:	28th, January 2003, Social at 6:00 p.m
Location:	Old Spaghetti Factory, 2801 Elliott Avenue, Seattle

January's Past	
1930	Grumman Corporation established
1939	First flight Lockheed P-38 Lightning = fist service plane to exceed 400 mph
1959	McDonnell receive contract to build Mercury spacecraft for NASA
1974	First flight of YF-16 designed by General Dynamics
1976	Concorde starts regularly scheduled service
1986	Shuttle Challenger explodes 73 seconds after liftoff

Retired Members Brunch

Third Saturday every other month	
Speaker:	Peter Milnes speaking on the Predator UAV
Date/Time:	January 18th, 9:00AM
Location	Museum of Flight, Seattle
Contact	Tom Holgate 253-838-0333

Future	
21 February	Dinner Meeting: Daniel Miller of Lockheed Martin on Active Flow Control Technology
7-8 April	AIAA Congressional Visit Days
7-10 April	Joint Aerospace Structures Conference – Norfolk, VA
20-23 July	39th Joint Propulsion Conference - Huntsville, AL

Editorial: Managing Knowledge in Aerospace

As engineers and scientists in the aerospace field we are paid to create, manage, or teach knowledge. Often the information is related to manufacture of a physical product, perhaps some portion of an air or space vehicle. Sometimes it constitutes intellectual property. Many of us deal with intellectual property (IP) on a daily basis. IP consists not only of patents, copyrights and trademarks, but also many other less formalized types of knowledge. Unfortunately many organizations do not understand the value of this knowledge or the potential impact that a failure to manage it can have .

Most manufacturing companies have a significant amount of intellectual property, but have no idea how to capitalize on it. Historically, patents have been used to protect important inventions and manufacturing processes. But protection is not revenue generation and many kinds of critical knowledge can not be patented.

Manufactured products themselves can be considered as containers for intellectual know how. A handmade wooden sailboat reflects the skill and knowledge of the artisan. On the other end of the spectrum, a computer chip bears no less witness to the skill and knowledge of the individuals that designed the automated machines, processes and facilities used to create it. Nearly all manufacturing efforts lie somewhere between these extremes of individual skill and automation whether the products are car parts, shampoo or satellites. Production processes for manufactured goods are a blend of personal skill and machine automation. The oil paints used on the artist's canvas are blended by machine for the sake of consistency. The most automated manufacturing processes still require a knowledgeable individual to monitor the process. In all cases, the key ingredient is know-how or intellectual property.

Manufacturing companies make their money creating physical goods. Thus the idea of selling or licensing knowledge that may form the basis of their competitive advantage is considered highly questionable. In fact, even internally identifying the information that might bring competitive advantage is often avoided, for fear of bringing attention to the very advantages that must be kept secret. The drawback to this strategy is the potential loss of legal rights to these unidentified trade secrets.

Another issue for the manufacturer is that their intellectual property comes in decidedly different forms. Some portion of it is inherent in the skilled workforce and its internal organization and relationships. Another portion rests in the equipment, control and automation systems. Finally, often overlooked, a portion lies in the design of the facility itself.

If the organization is also involved in design, there are additional considerations. In the commercial aircraft industry, due to government regulations enforced by bodies such as the FAA and JAA, ownership of the component design becomes the critical issue in determining liability, control and ultimately who will profit on a given piece of hardware.

Computers have made it possible to flexibly control production floor machines. Perhaps even more important, computers can be used to automate business processes in a similar fashion to industrial processes. In this sense, business process automation is an extension of the industrial revolution. It is allows machines to do work that currently requires increasingly precious human attention. However, the software and configurations that make these systems work are yet additional types of information that must be managed and safeguarded.

Karl D'Ambrosio

Section website: http://www.geocities.com/aiaa_2000/index.html
National website: http://www.aiaa.org

Please submit newsletter materials to Karl D'Ambrosio by the 20th of January for the February Newsletter.

Outstanding Section Awards
1972-1973
1977-1978
1978-1979
1991-1992
1993-1994
1994-1995

Section Special Event Awards
1976-1977
1977-1987
1978-1979
1982-1983
1987-1988

Membership Award
1997-1998

Young Member Activity Awards
1990-1991
1991-1992
1994-1995
1995-1996

Career Enhancement Award
1997-1998

Newsletter Awards
1994-1995
1995-1996
1996-1997

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Appointed				
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Museum of Flight Liaison	Open			
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