FO OUTLOOK
NASA AMES RESEARCH CENTER
Information for the NASA Ames Aeronautical Test & Simulation Community June 28, 2000

WIND TUNNEL TESTING IN A COMPETITIVE ENVIRONMENT

By Pete Zell

Imagine the benefits if the United States Air Force, NAVY, and Marines all flew essentially the same aircraft to fulfill many of their national defense missions. It's sort of like all of us owning the same make of car. The volumes of spare parts are greatly reduced; the same windshield, CD player, pistons, etc. works for everyone. The amount of training and service manuals for mechanics are less and the number of cars for this special make is very large, contributing to higher reliability, lower per-car cost, and a greater familiarity between drivers. Sounds great…but!

X-35 Lockheed Demonstrator

Just as people have varied needs for their cars, the armed service has varied needs for their aircraft. The NAVY needs aircraft with sturdy landing gear and under carriage for rough landings on carrier decks. It also needs bigger wings for low speed maneuvering. All this adds up to a heavier aircraft. The Marines want an airplane that can take off and land vertically to replace the AV-8 Harrier, requiring a special engine system to deflect thrust vertically. The Air Force needs stealth and extended range capability, requiring an airplane with special, radar-evading shape and big fuel tanks. Meeting all of these varied needs while taking advantage of commonality cost savings is what the Joint Strike Fighter (JSF) Program is all about; an affordable next generation multi-service strike fighter.

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WHAT'S NEXT FOR THE 9 X 7 FT.?

By Dan Bufton

The 9x7 Ft. SWT Control Room

As both the Unitary Modernization Project (UMP) and Code FO Unitary calibration/validation tests are completed, the vast majority of the N227 noise you hear comes from the 11 Ft. Transonic Wind Tunnel (TWT). The 11 Ft. TWT is the most heavily used circuit of all of the Unitary Plan Wind Tunnels, and the highest FO Unitary priority for being restored to commercial operation. The 11 Ft. activation and operations crews have had to successfully identify and conquer a few persistent technical gremlins during the recommissioning this critical national wind tunnel facility.

With the help of the UMP staff, the 11 Ft. and Auxiliaries operations crews, the 11 Ft. Operational Readiness Review (ORR), was successfully accomplished and signed by Dr. Harry McDonald, the Ames Center Director, on March 28, 2000.

Now that the Unitary 11 Ft. is ready to resume commercial operations, what is the status of the other two Unitary Supersonic Wind Tunnels? The 9 x 7 Ft. and 8 x 7 Ft. Supersonic Wind Tunnels compliment

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WIND TUNNEL SCHEDULING *By John Allmen*

Successful managers often find it difficult to juggle all the facts and details for getting the job done so they rely on realistic schedules to help manage effectively. In the past, it always seemed like Code FO had enough resource alternatives in staffing and funding to manage scheduling issues without detailed schedules. The alternatives were fairly easy to manage when there was a large staff that was "essentially paid for", a comfortable budget that "had to be spent by the end of the year" and a large number of tests and facility projects to be done "this year or the next". Life was different.

"Everyone has to manage closer to limitations."

Now, the paradigm shift in resources has hit us like a two by four to the head. We are still capable of doing excellent work but it is not in the same environment. We no longer have a large staff to pull from to handle unforeseen problems without causing major problems from where we pulled them. The projects we have to complete are very few and somewhat critical to get done if we want to continue to run our facilities. The large numbers of tests has dwindled from a one-to-two-year backlog in each of our facilities to tentative test from the Ames rotorcraft group that will fill "one shift" of the NFAC for a year, and "potential tests" for the Unitary and 12' that we can competitively bid on. What a change! "Those tests we can competitively bid on."

We have a new problem to master. Managers now have to manage closer to the limitations of a fixed and limited budget with fewer people, and with different types of constraints for time and equipment. On top of this is the "non-committed" demand from outside customers who want to know exactly when they can come into the facility but do not want to make a firm commitment. In the past, we could be more flexible and almost glib about serving customers who wanted to use the facilities. Now we do not know if we can effectively step-up-to the variable demands potential customers put on us. Can a realistic schedule be of some use to us? We think so…

It has been and is still very easy for our management staff to estimate individual jobs. We know our staff and their capabilities, our resources, time and equipment limitations. What we don't know is when we have over-committed resources beyond their capacity. This is what the realistic schedule can help us understand. By laying out our commitments and assigning detailed resources to them, the schedule resource leveling tells us when we have individuals working 18 hour days when they can only work 8. It tells us when we have critical equipment assigned to more than one test at the same time. When a customer asks if they can come into a facility, we plan more effectively to meet those requests with solid, comfortable answers.

Is this all free? No it is not… it does take time to sit down and put the data into the program and keep it updated. Staff members currently using the program however are pleasantly amazed at their ability to plan more effectively and assign responsibilities with more assurance that the work will get done as planned. There are fewer start and stop directives and people seem to work more efficiently.

We have decided to use Microsoft Project as our scheduling tool. The key directive that comes with this is, "the schedule is a tool for the planner to help get the job done more effectively." What does this mean? It means the schedule is a slave to the manager and not the opposite. It also means to work the level of detail needed to effectively do your job, and rely on the schedule to integrate the jobs for you. It works. Will a detailed schedule be the panacea or prima donna to managing our resource challenges? Neither… It will serve as a credible tool to help us make smarter and timelier decisions.

NFAC- FAN BLADE REPLACEMENT PROJECT *By Joe Hurlbut*

The scope of the Fan Blade Replacement 'Project is to design, manufacture, test and install carbon fiber/epoxy fan blades to replace the existing wood composite fan blades. The fan blades having been repaired are nearing the end of their useful life. Over the past year, criteria and a specification have been developed, potential suppliers have been screened and down selected. In addition, three finalists received contracts to do preliminary design and prepare firm fixed-price proposals. Advanced Technologies, Incorporated, of Newport News, Virginia was awarded a contract to complete their design, and to manufacture, test and deliver the replacement blades.

Gary Frency (NASA) admires full-scale mock-up of replacement fan blade.

Advanced Technologies Incorporated (ATI) has worked to recommend minor adjustments to the performance criteria to allow for a more robust blade design. ATI has also performed thorough investigations into materials and inspection strategies to ensure the performance of the metallic Blade Adapters used to attach the carbon/epoxy blades to the fan disk assemblies. NASA has reviewed the carbon/epoxy material specification and has revisited operating temperature design criteria to assure the blades will be suitable for their intended and foreseeable use in the NFAC.

Currently, ATI has made excellent progress in material characterization studies. ATI has also designed and ordered castings needed to form the blades and to build blade assembly tools. In addition, the N/C programming needed for machining the upper and lower skin mold tools (from the castings) has been completed. NASA is planning a meeting with ATI late in May to resolve potential issues around the design and manufacture of the Blade Adapter Fittings.

Pictured below are (left) a carbon laminate test specimen used to calibrate ultrasonic inspection equipment, and (right) a full-scale mock-up of the new blade design. Manufacturing and testing of the blades will continue through 2000 and 2001, with deliveries scheduled for late 2002.

WIND TUNNEL TESTING IN A COMPETITIVE ENVIRONMENT... *(Continued from page 1)*

Two teams have signed up to design and build the JSF. One team is lead by Lockheed Martin, and Boeing leads the other. Both teams have completed a concept development phase and will be flying demonstrators of their designs later this year (designated X-35 and X-32 respectively). The current plan is for the government to evaluate these two designs and make a choice. The winner will then move on to an engineering and manufacturing development (E&MD) phase. During this phase, the design will be validated and then move into production.

"...taking advantage of commonality cost savings is what the JSF Program is all about."

The validation of the design is NASA's contribution. Lots of wind tunnel testing will be required to make final adjustments to the shape of the aircraft and then validate the final shape for all desired performance requirements. The types of wind tunnel tests required for this version of aircraft development is quite varied. Tests are necessary to evaluate how the airplane performs all the way from hovering to twice the speed of sound. Studies also include the effects of ice, the effects of hot exhaust being sucked into the engines, the way weapons leave from under the wing, and how much aerodynamic load is on an access panel on the belly. Separate tests are necessary to validate the Air Force Conventional Take-off & Landing (CTOL) version, the NAVY Carrier Version (CV), and the Marines and U.K. Short Take-of and Vertical Landing (STOVL) version. NASA owns wind tunnels at the Ames, Langley, and Glenn Research Centers that can conduct nearly all of this required testing. Sounds great, NASA can do it all…but!

Again, it's not so simple. The JSF Program Office run by the Department of Defense has decided that Lockheed and Boeing will no longer be provided with free use of U.S. Government owned wind tunnels. Lockheed and Boeing will subcontract to the agencies that run wind tunnels and obtain the best services available at the lowest cost. This situation makes it necessary for us to market our services to Lockheed and Boeing. We must compete with other U.S. Government facilities (other NASA centers the Air Force) and with facilities sponsored by foreign governments. We must also show that our services are uniquely suited to perform certain types of testing. This must be done to avoid the illegal practice of competing directly with private enterprise wind tunnels; including Boeing and Lockheed martim owned facilities

The good news is that we have a very capable set of recently upgraded facilities in the 12-Foot Pressure Wind Tunnel, the Unitary Plan Wind Tunnel, and the National Full-scale Aerodynamics Complex. All three have a particular niche in the scope of JSF E&MD testing. Over the past year, a team has been working to provide information to the JSF contractors about all of NASA's wind tunnel testing capabilities and costs. We are currently providing responses to proposals for specific wind tunnel tests during the JSF E&MD phase which could last out into 2005 and contain over 25,000 hours of wind tunnel testing (multiply that number by say, $5000/hr!). Our response to these proposals must be accurate and professional. We must also balance the benefits of offering the combined services of all NASA's capabilities with the natural competition between NASA centers for customer dollars. Most of this center to center competition does not arise because we have the same facilities. It results from the fact that testing can be performed in different ways: Big model or small model? High Reynold's Number or low Reynolds Number? Half the model or the whole model? Hot jet simulations or cold jet simulations?…etc…etc. "There are lots of ways to skin a 21st century fighter."

Our future as a vital and healthy wind tunnel organization will be greatly enhanced by winning a good portion of the JSF E&MD testing however; we must also perform. It will be very demanding work with a "laser focus" on maintaining high productivity and the lowest possible cost per data point. We will be expected to constantly improve our capabilities and processes. It is a challenge that our predecessors at Ames have stepped up to over the years. Now it is our turn to set priorities and get the job done.

For more information, visit the JSF Program website at http//:jast.mil.

THE F-18/F VALIDATION TEST CONDUCTED IN THE 11 FT. TWT

By George Rupp

The F-18 E/F Validation test was the second of two validation tests that have been conducted following the calibration tests of the 11-Ft. TWT. The test number designation for this tunnel entry is T11-0054. The test was conducted over a four-week time frame at two shifts per day beginning on March 20, 2000. Prior to the tunnel entry date the model was in the 12-Ft. PWT, Model Prep Room for four weeks.

Data obtained from this test will be compared with test 207-1-11, that was a baseline pre-Unitary modernization test conducted with the same F-18 E/F model in January and February of 1994.

The F-18 E/F is a complex model which consist of multiple leading and trailing edge flop settings and aileron settings along with multiple external store configurations. The F-18 E/F test article is an 8% high-speed aerodynamic force and moment model. The model is constructed of steel, aluminum, and brass and incorporates flow through inlet ducts. The aft end of the fuselage is distorted to permit the entry of a support sting. The wing is configured with pockets to accommodate standard pylons on the inboard and mid-board wing stations, and low-drag pylons on all three-pylon stations. Fillers are available to return the lower wing surface to a smooth surface when the pylons are

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FO ENGINEER SUPPORTS COMMUNITY OUTREACH

By Cheryl Der

Who is Max Amaya and what does he have to do with supporting the community? Max is an FOW test engineer who is just one of many volunteers for NASA's Speaker's Bureau; Created thirty-nine years ago, when John F. Kennedy challenged NASA to create an organization for community involvement. He wanted to build interest and leadership awareness for space sciences within our country. Over the years, the Bureau has had many Ames volunteers, ranging from administrative personnel to engineers and scientists who have participated in countless educational seminars, not only with school aged children, but with people of all ages throughout the community.

San Miguel kindergarden class participates in the presentation

Max Amaya

Max Amaya is an aerospace engineer who has worked at Ames for 15 years and a Speaker's volunteer since 1989 focusing on school aged children. To inspire his audience, Max supplies himself with teaching aids provided by the Speaker's Bureau that includes a mock up space suit, a space shuttle tile with torch, model aircrafts, astronaut food, stickers, pencils and glider kits for the presentation. Detailed information for classroom presentations are researched and developed by the volunteer speaker through various NASA publications, web information, interviews and libraries.

Volunteers like Max benefit the community and NASA in a number of ways. They opened the minds of children to have a broader understanding of NASA's space technology. They show teachers and parents that the government is geared towards sharing first hand education .

Many of the children and teachers write "Thank You" letters to Max in appreciation of his time. Not only is this fun and educational for children, its fun and rewarding for the volunteer. When asking Max of how he feels about supporting the community, he replies " I enjoy giving back to the community through involvement in the Speakers Bureau. Kids love to hear about the space shuttle, space exploration and NASA in general. I try to keep my presentations very interactive and use the props to keeep the kids interested. They really enjoy the space suit and the shuttle tile and torch demo." Max goes on to say that "Speaking to kids of all ages has been enlightening, challenging and very rewarding. I feel great satisfaction in knowing what I tell them about NASA might possibly make a difference in their future. After all, they are potentially the future engineers, astronauts or scientists of NASA.

Max is a volunteer for the Speaker's Bureau, which started in 1961 from a proposal made by John F Kennedy. The volunteers are administrative personnel, engineers and scientists. Volunteers like Max, not only help educate and inspire the community about NASA, but they bring enjoyment to their audience. As a volunteer, Max feels happy and satisfied to see young children interested in what NASA is all about.

Individuals interested in participating in the Speaker Bureau can contact Sheila Johnson at ext. 4-5054.

SUCCESSFUL MEETING OF THE SUPERSONIC -TUNNEL ASSOCIATION INTERNATIONAL

"It was the best STA meeting that I have ever attended" said one long-time member of the organization when speaking of the 93rd meeting recently hosted by NASA Ames. The event began on Sunday, April 30 with a golf tournament at Santa Clara and a tour of the Hiller Aviation Museum in San Mateo followed by an evening reception at the Sunnyvale Hilton. The technical program was kicked off on Monday morning with a keynote speech by Nancy Bingham, the Associate Director for Systems Management and Planning at NASA Ames. The technical program consisted of 35 papers covering a range of topics from Pressure Sensitive Paint to Hypersonic facility upgrades. NASA Ames personnel presented four papers including papers by: Mike Ospring, Abraham Seyoum, Frank Kmak and Max Amaya. The Monday evening banquet was hosted by Ames' STAI representative Mike George and included a speech by Roy Presley, retired AO Division Chief, who provided a humorous biography of his career with NASA. The meeting concluded on Tuesday with an impressive tour of the NASA Ames wind tunnel facilities by Frank Kmak, Rusty Hunt and Joe Sacco and a reception at the Ames Visitors Center catered by Horacio Chavez. Concurrent with the technical meetings, Pat Whittaker hosted a spouses tour to San Francisco on Monday and to Filoli Gardens on Tuesday. Many thanks to all who contributed to making this STAI meeting a great success for NASA Ames. Special thanks also go to Steve Ord, Mike Walke, Shilo Satran, Dan Petroff, Jeanette Clark and Pat Crooks for their roles in organizing the meeting.

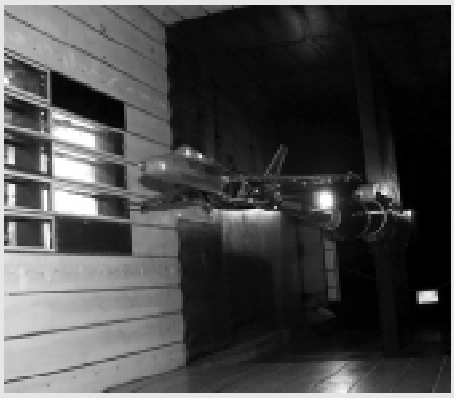
By Phil Stich

THE F-18/F VALIDATION TEST CONDUCTED IN THE 11 FT. TWT... *(Continued from page 3)*

not installed. The inlets can be configured in both the boundary layer bleed configuration and the clean, non-bleed configuration. Interchangeable inlet choke plates are available for inlet spillage effects testing. The control surface test variables are inboard and outboard leading edge flaps, trailing edge flaps, ailerons, horizontal tails, rudders, LEX spoilers, and LEX vents.

The F-18 E/F test assembly for this experiment consisted of a Boeing supplied MDA-893 Modern Machine balance and three DTC model mounted pressure modules. The primary angle-of-attack source was a base mounted QA2000 accelerometer. The secondary angle-of-attack source was the knuckle/sleeve and the third a model mounted QA2000. A redundant QA2000 was installed on the base for primary angle source health monitoring. Model angle-of-sides slip was measured using the knuckle-sleeve. A model-fouling strip was installed on the sting such that it extends two inches beyond the aft end of the model sting cavity.

Installation set-up of the F-18 E/F was conducted such that the model balance center was positioned at tunnel station 145.0. This was achieved by using the 40-inch extension, the Unitary 5° adapter, and the Boeing 80-inch support sting. The model was subsequently assembled on an MDA-893 Modern Machine six-component, single piece balance.



F-18E/F Validation Test Program in the 11-Ft. TWT

The primary test objective of the F-18 E/F 11-Ft. TWT Validation Test was to develop a high level of data quality in conjunction with operational capabilities in the 11-Ft. TWT and to demonstrate production testing capabilities of the refurbished 11-Ft. TWT. Additionally, this test brought to fruition a joint NASA Ames and Boeing/Navair cooperative effort to develop and optimize the test process's necessary for execution of attack/fighter performance tests in the 11-Ft. TWT.

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WHAT'S NEXT FOR THE 9 X 7 FT.? *(Continued from page 3)*

the 11 Ft. TWT with testing envelops of Mach 1.5 to Mach 2.5 and of Mach 2.5 to Mach 3.5, respectively. While we are all fascinated by aircraft like the SR-71 that can travel faster than the muzzle velocity of a 30-06 rifle bullet; there is currently very little testing demand for such an aircraft in these speed ranges. Therefore, completion of the 8 x 7 Ft. modernization and reactivation of the 8 x 7 Ft. Supersonic Wind Tunnel (SWT) remains on hiatus and totally dependent upon the reemergence of customer demand. In addition to the identification of a specific customer demand, reactivation of the 8 x 7 Ft. SWT will require the investment of a substantial amount of time, expertise and funding prior to being placed into operation.

"... the 9x7 ft. SWT is to be restored to full operational capability during the next year."

The construction activities required to modernize the 9 x 7 Ft. Supersonic Wind Tunnel were successfully completed by the Unitary Modernization Project. The 9 x 7 Ft. SWT has a new integrated Facility Control System, a new Control Room, a repaired Tunnel Shell, a new common leg Aftercooler, and a rebuilt Model Support System. In addition, the 9 x 7 Ft. SWT now shares a substantially enhanced Auxiliaries facility with the 11 Ft. TWT. Perhaps more importantly, the 9 x 7 Ft. SWT testing regime also shares the same speed envelope as the next generation of strike aircraft.

During the completion of the 9 x 7 Ft. SWT pre-IST activities there was one test that created more than the anticipated amount of excitement when an operational check of the nozzle block pressurization system resulted in an over pressurization of the nozzle blockhouse. The over pressurization failed a perimeter seam of structural plate. Fortunately no one was hurt and this discrepancy in the pre-operational test program identified a critical single point failure that is currently being designed out of the facility. The damage from this unscheduled and extremely noisy excursion has recently been repaired and the facility is physically once again ready to resume activation and IST activities.

Since it was first commissioned, the 9 x 7 Ft. SWT has proven to be a critical wind tunnel testing facility for the development of supersonic military aircraft. The 9x 7 Ft. SWT also played key roles in the development of both the Space Shuttle and high-speed advanced aircraft concepts. However in the current climate of rapidly shrinking budgets and the pending imposition of full cost accounting, the real key to the 9 x 7 Ft.'s operational future is the JSF fighter program. Code FO and Sverdrup personnel are currently creating a proposal for an extensive series of unique JSF tests that include substantial test time in the NFAC, the 12 Ft. PWT, and the Unitary 11 Ft. TWT and 9 x 7 Ft. SWT. The near-term schedule for reactivating the 9x 7 Ft. SWT is directly tied to the success we have in obtaining a portion of the JSF testing program.

The 11 Ft. TWT has been successfully reactivated and is now ready for commercial customers. The 9 x 7 is now available to resume the prerequisites for a successful IST and although we will not know the official answer for a period of months, the "betting line" currently has the 9 x 7 Ft. SWT being restored to full operational capability during the next year.

NEW DEPUTY BRANCH CHIEF FOR FOI

By Cheryl Der

On April 14, 2000 Herb Finger announced Mike Liu as the new Deputy Branch Chief of the Wind Tunnel Systems Branch, Code FOI. As deputy branch chief, Mike is to train staff, improve processes and procedures, and back up the branch chief when he (Herb Finger) is not available. Currently Mike is also working as the development group leader until a permanent - leader can start.

Born in Salt Lake City Utah, Mike was inspired to work for NASA when he was five years old. This urge to work for NASA began when he learned of men going into space with rockets (AKA Mercury and Gemini programs). Mike moved into the Bay Area where he attended high school and went on to the University of California, Berkley where he studied astronomy. As a graduate of Berkeley with a degree in astronomy, Mike's dream of working at NASA was realized as he began working in the ARC Jet facilities in 1981 for Informatics. He was then transferred over to the 40 x 80 wind tunnels in 1984 where he was an essential part of the development of the new NFAC data systems. Mike became a civil servant in 1990, while continuing with the upgrades to the NFAC data systems until his recent promotion to deputy branch chief.

Mike Liu, who is half Navajo, English, Irish and German, serves as the NASA Ames Chairman of the Native American Advisory Committee where he deals with a variety of unique issues. One such issue is the Navajo Nation's dispute over NASA's "desecration of the moon" when NASA sent the ashes of scientist Gene Shoemaker on the Lunar Prospector probe to the moon. The dispute was successfully resolved when Navajo elders performed a cleansing and blessing of the moon and NASA established a policy not to launch human remains into space.

Some of Mike's other activities include his position as the president of this year's Ames bowling league. You can catch him on Tuesday nights at Palo Alto bowl. He loves star gazing, leisure traveling (especially to the southwest), photography and model trains. With such a variety of hobbies, Mike and his wife, Linda Sue, are never at a loss of activities and are very happy. Mike and his wife enjoy and look forward to every coming day.

THE F-18/F VALIDATION TEST CONDUCTED IN THE 11 FT. TWT...

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The F-18 E/F test was tested at number of the speed and angle of attack to obtain comparison data and validate the facility. The F-18 E/F Validation test was conducted at a Mach number range of 0.20 to 1.30. For tunnel performance validation, the tunnel was operated at Mach number 1.4, with a model angle-of-attack at 4.5°. Data repeatability runs were conducted throughout the full Mach number range. In-test data repeatability was excellent. The angle-of-attack range for this test was from -2.0° to 12.0° at 0° of side-slip. Several runs were conducted at ±10° of side-slip with the model angle-of-attack at 0°. Side- slip runs were conducted from Mach number 0.60 to 1.2. The Reynolds number operating range for the test was from 3.0 million per foot to 8.6 million per foot. The majority of the test was conducted at 4.5 million per foot. With the exception of the AIM-9 missiles (Defined as part of Configuration 1), all stores testing was conducted at a Reynolds number of 3.0 million per foot. Strut vertical traversing studies was conducted between ± 40 inches and discreet strut settings of ± 10 inches, +20 inches and +30 inches. Tail power studies were also conducted from Mach number 0.60 to 1.2. Flow angularity studies were conducted throughout the Mach number range and Reynolds number range documented above. For flow angularity studies the model was rolled between the 40-inch extension and the 5° adapter.

Performance improvements have been made on the strut, polar, continuous sweep and conditional sampling. During this test performance improvements to the strut were made to increase the angle-of-attack pitch rate and decrease the overall time required to complete a pitch polar. Continuous sweep angle-of-attack polars were investigated as part of an evolving effort to increase tunnel productivity. Continuous sweep angle-of-attack polars compare favorably with pitch pause angle-of-attack data. However, it must be understood that this is a new operating procedure that is now only entering its development stage. Conditional sampling data acquisition was used throughout this test. Conditional sampling provided the test with a much tighter Mach number tolerance level especially at the transonic Mach number range. The tighter Mach number tolerance provided a higher level of data fidelity at these critical Mach numbers.

Initial data analysis indicates a high level of data accuracy and data repeatability with the baseline F18 E/F test conducted in 1994. Follow on in depth data analysis is currently underway to further qualify the fidelity of the data quality and detailed comparison with the baseline test.

FO OUTLOOK

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Employee of the Month Awards

DAN ANDREWS

Dan Andrews has been nominated for Employee of the Month for February. He has performed at an exceptional level of technical capability during the design, implementation and activation of the Unitary automation system. Dan has earned this award by investigating and solving what started as a "Sticky Mouse" problem in the Auxiliaries control system. Though not required by the strict scope of the Unitary Modernization Project, or his work with the Model Support System, Dan continued to investigate this problem. He discovered that the Auxiliaries DCS drop (204) was saturated with software. By continuing investigations, he concluded that there was a retrofit CPU available for this specific drop in the Auxiliaries control system. He pursued the investigation of the retrofit CPU and accomplished the engineering required to install the faster CPU into the Unitary system. This experimental CPU upgrade worked so successfully, Ed Newman and Dan Andrews are now working to employ a similar upgrade to all of the Unitary drops. The anticipated increase in productivity will create a payback in a few months.

BOB SURRATT

Bob Surratt, OS system safety and quality assurance engineer, was instrumental in obtaining a quality product from the vendor in the A-1 Motor Generator set repair ensuring its safe and successful completion. Bob worked closely with a contractor to over see the contractor, ensuring that he developed and submitted appropriate plans for the disassembly, manufacturing, and reassembly. In addition, Bob checked out the A-1 Motor Generator Set, and he over saw the manufacturer's operations. Without this oversight, the quality of the final product would have been questionable and late. Mr. Surratt's knowledge and dedication was instrumental in the success of the project. Bob Surratt won Employee of the Month Contractor for April.

GARY SORLIEN

Gary Sorlien's extensive and far-reaching efforts to bring DARWIN online at the 11 ft. Wind Tunnel have earned him an Employee of the Month Award for March. Gary has been called upon to perform an enormous variety of tasks which included installing the DARWIN hardware in the 11Foot Control Room, writing software enhancements to match file and training both the test engineers and the customers on the capabilities and operation of DARWIN. In addition he set up the database for the B777 configuration, wrote a technical paper, assisted on the newly formed Pressure Sensitive Paint team, and provided an audit function on some of the NPRIME code. Gary's capacity of work and his expertise in a broad range of systems and activities are deserving of this recognition.

Employee of the Month Awards

TOM BRIDGE

Tom is being recognized for his rapid, mid-test response to install Conditional Sampling into the Boeing 777 Validation test. Without being given time of preparation, Tom was asked to implement this sampling technique during the early stages of the test. With only verbal requirements, Tom brought this capability into a reality in only a matter of days, which truly "exceeded customer expectations." Tom's expert knowledge of the system, his ability to gain a clear understanding of the customer's desires, his intelligence, creativity and hard work to bring quick solution to the need are worthy of his recognition.

XINXIN NEE

Xinxin Nee, FEF civil/structural engineer was responsible for analyzing the 40 x 80 Wind Tunnel, A1 MG Stator foundation response to measure start up loads and for producing the design documents to reinforce (stiffen) the foundations. She fit the project in an already heavy workload to complete the design documents on schedule. This allowed us to proceed and order long lead equipment to meet the overall schedule. Ms. Nee's design met all our requirements the first time and has been successfully implemented. Start up data collected on the A1 foundation beam and the stator hold down bolts, indicates that her design eliminated all the deleterious deflections. For her hard work and dedication, Xinxin Nee has received a Civil Servant Employee of the Month Award for April.

GARY BOUB

Gary Boub, an FMD model-maker, was responsible for the installation of the A1 MG Stator foundation modifications. Gary implemented the engineering design developing unique tools and processes to meet requirements. The design called for load checking the anchors after placement in the concrete. The anchor was below the flange of the foundation frame so he suggested that pancake hydraulic cylinders be purchased and he fabricated a load bar for the cylinders to react against, while applying the tensile load to the anchor. This is only one example of his creativeness that has allowed for successful accomplishment of a task. Without his contributions the schedule may have not been met. For his outstanding work and dedication Gary is awarded the Civil Servant Employee of the Month Award for April.