Affidavit

Affidavit of Mr. Brett Mukherjee Hoffstadt

I, Brett Mukherjee Hoffstadt, hereby affirm and state the following:

1. I am an aerodynamicist with a Bachelors of Science (Purdue University, 1993) and a Masters of Science (Penn State University, 1997) in Aerospace Engineering.

2. My current employment is with a company that uses state-of-the-art computer tools, computational methods, and analyses to resolve engineering design and performance issues. Its primary clients are in the automotive, aerospace, and power industries.

3. As a Technical Specialist, my primary responsibility is to act as a technical consultant and provider to these clients who seek these engineering services.

4. My previous employment was with The Boeing Company, lasting from December 1997 to July 2002. I was a Technical Specialist in the Aerodynamics group for the V-22 Osprey tiltrotor. My primary responsibility was to calculate the lift, drag, and flight performance of the V-22 Osprey.

5. Due to my education and experience above, I am intimately familiar with the various methods, assumptions, and types of tools (including their limitations) that are available to professionals to make aerodynamic and performance calculations for all types of aerospace vehicles, including commercial aircraft.

3. A standard tool for aerodynamicists is a computational fluid dynamics (CFD) computer program. This tool models the three-dimensional geometry of arbitrary aircraft configurations and calculates the airflow, pressures, forces, and moments of such shapes in arbitrary flight conditions.

4. CFD computer programs are the most complex, thorough, and computer-intensive class of tools available for calculating or simulating aircraft performance.

5. One CFD program widely used in the aerospace field, and at Boeing in particular, is VSAERO. This product is made by Analytical Methods, Incorporated (AMI), of Redmond, Washington, U.S.A.

6. AMI provides VSAERO to the general public for a price of $27,500 (computers not included).

7. AMI provides the geometry of a Boeing 747-200 and a 747-300 aircraft for use with VSAERO to the general public for a price of $5,000 each.

8. Any competent aerodynamicist can learn to use VSAERO. With the 747 geometry available from AMI, he or she can calculate the aerodynamic pressures and forces on the aircraft. These forces can then be used to accurately predict or simulate the

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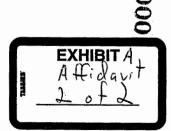performance and motion of the aircraft. In fact, tools such as VSAERO are used precisely for these applications.

9.   VSAERO and other comparable CFD tools can calculate the effect on performance due to either small or large changes in an aircraft configuration. Small changes could be different airfoil shapes or different wing tip shapes. Large changes could be major portions of the aircraft that are added, modified, or removed (such as the front third of the aircraft).

10.   Differences between the 747-100 and 747-200 or -300 aircraft, based on publicly available information, are another example of modifications that a user can make to the aircraft geometry used in VSAERO.

11.   Results and analyses using tools such as VSAERO and existing aircraft geometries are routinely published in professional journals and conference proceedings, which are then available to the public.

12.   The aerospace community benefits from such publications in many respects. First, it provides a form of formal documentation and acknowledgement for the assumptions, tools, and rationale behind the analyses. Second, it subjects unique, notable, or possibly controversial analyses to peer review. Third, it allows other independent researchers to duplicate and possibly expand on the methodology, calculations, and results.

13.   Based on the facts that the CFD tool VSAERO and the Boeing 747 geometry are publicly available and the fact that TWA800 represents a unique, notable, and controversial event; any CFD analysis of TWA800 flight performance is eminently appropriate for public disclosure and peer review.

I declare under penalty of perjury that the foregoing is true.

DATE: October 20, 2002.

Brett Mukherjee Hoffstadt

Brett Mukherjee Hoffstadt
Aerodynamicist

Curriculum Vitae
January 2002

SPECIAL INTERESTS
- Aerodynamic design, analysis and computational modeling of manned and unmanned aircraft.
- Wind tunnel and flight testing of aircraft for aerodynamic, performance, and related data.
- Conceptual design, integration, and evaluation of aerospace vehicles.

FORMAL EDUCATION
M.S., Aerospace Engineering, Penn State University, State College, PA, May 1997. Thesis: *Analysis and Design of Winglets for Standard Class Sailplanes.*
B.S., Aerospace Engineering, Purdue University, West Lafayette, IN, May 1993.

DESIGN & ANALYSIS EXPERIENCE
V-22 Aerodynamics, Engineer/Scientist 2. The Boeing Company. Responsible for calculating and evaluating the drag, aerodynamic, and performance impact of design changes on the V-22 tiltrotor. Interacted with other design groups to find aerodynamically acceptable solutions to design requirements. Responsible for calculating and communicating V-22 flight performance to internal and external customers. Developed improved tools and processes for the above tasks. (Dec 1998 - Present.)

SAIC Fluid Dynamics Division, Staff Scientist. Responsible for analysis, design, and wind tunnel test support of HOPE-X (a Japanese reusable orbital vehicle) in the hypersonic flight regimes. (May 1997 - Nov 1998.)

The Pennsylvania State University, Graduate School. Conducted research and analysis into the behavior and computational requirements for successful winglet designs on 15-meter sailplanes. Designed a new winglet with up to 6% improvement in Lift/Drag vs. the same sailplane without a winglet (1% improvement is considered an outstanding achievement). M.S. Degree (with thesis) awarded. (Aug 1994 - Aug 1996)

McDonnell Douglas, Low Observable Technologies (now Boeing). Conducted a trade study for a classified cruise missile, optimizing performance for various sizing, weight, and internal hardware requirements. (Jan - May 1991.)

Aerodynamics & Performance, Purdue University Senior Design Course AAE451. Aero/Performance lead for 650-passenger commercial airliner design team. Incorporated airfoil Euler codes, vortex lattice computer models, and other original tools to calculate lift, drag, and optimum wing geometries for a joined-wing aircraft configuration. (Jan - May 1993.)

Designed, fabricated, and piloted an original radio-controlled (R/C) 6-foot wingspan glider. (1992)

Modified a 3-foot wingspan electric R/C airplane by adding winglets. Violent, asymmetric stall characteristics were eliminated and the stall speed was reduced by approximately 15%. (1991)

WIND TUNNEL EXPERIENCE
V-22 Fuel Dump Test, Boeing V/STOL Wind Tunnel. Planned, coordinated, and conducted a fuel dump test for Boeing Aerodynamics using water and a 15% scale drag model. Evaluated seven dump locations and mapped dump characteristics for a range of tube geometries at optimum locations. (BVWT 425, June 2001.)

Fuel Dump Developmental Test, NAVAIR Patuxent River Research Tunnel. Planned and conducted a wind tunnel test in a 2' x 2' tunnel using water and tubing to explore scaling and similarity issues for a future V-22 fuel

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dump test. Optimum dump tube geometries and trends were also found, saving time and material for the future V-22 test. (February 2001.)

HOPE-X Hypersonic Test, Arnold Engineering Development Center (AEDC) Mach 10 Tunnel, Tullahoma, TN. Coordinated, monitored, and reduced aerodynamic data for a Japanese re-entry vehicle while employed as a Staff Scientist with Science Applications International Corporation (SAIC). (October 1997.)

Vortex Lift Developmental Test, McDonnell Douglas Advanced Design Wind Tunnel (ADWT), St. Louis, MO. Conducted an internal research test as the Aerodynamics Test Conductor to evaluate lift trends of wing planforms with various leading edge root extensions, sweep angles, and aspect ratios. Data was used to provide an empirical basis for a fighter aircraft preliminary design tool. (June-July 1992.)

FLIGHT TEST EXPERIENCE
McDonnell Douglas Flight Testing, Structural Dynamics (now Boeing). Senior Flight Test Engineer. Coordinated structural dynamics data requirements for an F/A-18 flight test program at Patuxent River N.A.S. Ensured accurate data collection within the ground station and accurate data reduction from onboard data hardware. (June 1993 - July 1994.)

FLIGHT SIMULATION EXPERIENCE
McDonnell Douglas Simulation Systems, St. Louis, MO (now Boeing). Integrated a 6-degree of freedom helicopter simulation into a multi-aircraft simulation environment. Retaining realistic real-time flight characteristics was accomplished despite limited computer processing power by judiciously simplifying the laws of motion and incorporating innovative computational algorithms. (Sept-Dec 1991.)

MANUFACTURING/FABRICATION EXPERIENCE
Penn State University, Sailplane Design Course. As Teaching Assistant, supervised and participated with undergraduates in the design and fabrication of a full-scale composite sailplane. (Jan 1995 - May 1996.)

McDonnell Douglas, F-15 Structural Design, St. Louis MO (now Boeing). Incorporated aerospace standards, sheet metal and other manufacturing requirements in the design and layouts of fuselage structural parts of the F-15 Eagle aircraft. Worked extensively with blueprints, mylars, AutoCAD drawings, and parts lists. (Aug - Dec 1989.)

OTHER AEROSPACE-RELATED EXPERIENCE
McDonnell Douglas, AV-8B Propulsion & Thermodynamics (now Boeing). Validated and interrogated an engine deck program for a Rolls-Royce powerplant for the AV-8B Harrier. (May - August 1990.)

PROFESSIONAL/CIVIC SOCIETIES
- American Helicopter Society
- American Institute of Aeronautics and Astronautics
- National Academy of Recording Arts & Sciences
- Philadelphia Songwriters Alliance
- Toastmasters International

1. This affidavit supplements the one I signed on October 20, 2002. I am no longer employed by The Boeing Company. I currently work in an engineering firm as a computational fluids engineer. I have reviewed Dennis Crider's May 18, 2004 declaration and Richard S. Breuhaus' May 19, 2004 declaration.

2. Breuhaus cites as proprietary data the lift coefficient, pitching moment, and drag coefficient of the 747-100 aircraft in two configurations: the aircraft's baseline configuration and a hypothetical configuration in which the aircraft's forward fuselage has been removed. All of these data and more can be obtained from the publicly available CFD models of the 747-200 and 747-300, which can be modified to represent a 747-100 if desired. However, this information is also contained in Figures 1, 2, and 3, respectively, in the NTSB's MAIN WRECKAGE FLIGHT PATH STUDY, Exhibit 22C, Docket Number SA-516, by Dennis Crider.

3. Breuhaus cites as Boeing proprietary data the aircraft gross weight, center of gravity, and pitch and roll inertias of the 747-100 in two configurations: the aircraft's baseline configuration and a hypothetical configuration in which the aircraft's forward fuselage has been removed. However, this data is listed plainly on Page 2 of Exhibit 22C mentioned above.

4. With the CFD tool and 747 models mentioned previously, very detailed and specific aerodynamic information can be produced directly or derived by a competent person. In fact, CFD tools are the most complex class of computational tools that exist to obtain aerodynamic data and performance. Boeing surely recognizes this and wouldn't have permitted public release of this geometry if it believed any sensitive or proprietary data were still at risk.

5. Dennis Crider, in his declaration, refers to the "aerodynamics, propulsion, geometry, controls mass properties and so on of the aircraft" as Boeing proprietary data. With the same evidence stated above, the aerodynamics, geometry, and mass properties of the aircraft have been made available to the public with Boeing's knowledge and consent. I am not in a position to state an opinion regarding the propulsion and controls of the aircraft.

6. The claim of proprietary data related to a 747 without a nose section is so obviously bizarre and incredible that I find it hard to believe that anyone would make it.

7. I have reviewed the FOIA requests numbered 3 through 69, which ask for the records of the formula and data upon which the graphs appearing in Mr. Crider's Main Wreckage Flight Path Study and its two Addendums are based. In my opinion, it is highly unlikely that Mr. Crider has no record of any data, and no record of any formula, that he used to write any of these 64 graphs.

8. Mr. Crider wrote his simulation program in C++. It is highly likely that he could release this program's code in a non-executable version, after removing any Boeing-supplied information, without printing the code. Review of the simulation's computer code program, without Boeing-supplied data, would permit review of much of the simulation program's inputs. Care and diligence must be taken, however, to avoid removing other unrelated but essential coding which would make review of this program possible.

I declare under penalty of perjury that the foregoing is true.

DATE: June 16, 2004.

Brett M. Hoffstadt

EXHIBIT

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