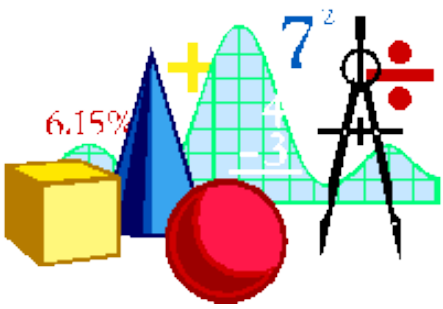


# McKinney Associates

- **Systems Analysis & Optimization**
- **Aerospace & Defense**
- **Environmental & Public Works**
- **Environmental & Regulatory Affairs**
- **Public Policy**

***1756 Stifel Lane Drive, St. Louis, MO 63017 / (314) 514-1352 / leonmck@mckinneyassociates.com***

**McKinney Associates** has been providing innovative **modeling, simulation & analysis (MS&A)** solutions for complex systems since 1993, specializing in developing high-fidelity mathematical models of highly complex nonlinear systems, allowing customers to obtain constrained optimal answers to system scenarios and to conduct system trade studies.

**McKinney Associates,** a nationally recognized leader in the aerospace and defense community, is known for combining technical expertise with state-of-the-art MS&A tools to develop high-quality, cost-effective MS&A solutions.

**McKinney Associates'** stable of MS&A tools includes:

**OTIS ● POST ● GVSIM/GVTRAJ ● Model Center ● NPSS ● APAS ● DATCOM ● PANAIR ● SHABP ● RJPA ● SAS-JMP ● @RISK ● Evolver**

**McKinney Associates'** experience in analysis of aircraft, missiles, space launch vehicles, space platforms, re-entry systems, and various tactical and strategic systems is unique in the aerospace and defense industry. **McKinney Associates** combines that unique experience with an equally unique data archive of systems analyses.

Through regular interaction with U.S. government executive branch agencies including the **OSTP, the Department of Defense and NASA**, as well as **U.S Congress Members, staff and committees, McKinney Associates** provides timely technology, programmatic and policy assessments to clients.

In addition to its aerospace and defense experience, **McKinney Associates** also has extensive experience in environmental & regulatory affairs and public works engineering, partnering with **Lee McKinney** (COL-US Army Corps of Engineers, Retired) and various engineering firms and consultants.

**McKinney Associates** MS&A projects involving storm water and flood control systems resulted in savings of millions of dollars for local governments – one MS&A project saved over $35 million, 90% of the original estimated cost.

**McKinney Associates MS&A solutions** will improve system performance while reducing costs and risks through optimized resource allocation and processes.

**Leon McKinney, founder and president of McKinney Associates**, has more than 34 years of experience in system concept synthesis, design, performance assessment, optimization, and mission analyses, extending back to his graduate coursework at Purdue University, beginning in 1982 at McDonnell Douglas Astronautics Company in California, and continuing since 1993 as the founder and president of McKinney Associates, Inc.

Mr. McKinney has participated in an unusually wide range of programs for the Department of Defense (the National Reconnaissance Organization, the Ballistic Missile Organization, the Strategic Defense Initiative Office, the Defense Advanced Research Projects Agency, and the U.S. Army, Navy and Air Force) and NASA.

Operational programs include Delta, Space Station, Shuttle, Shuttle Launch Dispenser, Peacekeeper, SICBM, Trident, DSP and many classified programs. Mr. McKinney has participated on many advanced vehicle development programs including AMaRV, AMLS, TAV, Copper Canyon, NASP, STAS, ALS, NLS, DSV, Smart MaRV, MSTART, HEDI, ABLV, SLI, RMLS, X-43, NGLT, CAV/CPGS, X-51, FALCON, HiFIRE, HLS, ALASA, RBS, IRCPGs, and TBG.

Mr. McKinney has also been involved in a number of other national security programs besides those listed above, including support of National Intelligence Estimate and Foreign Technology Assessment activities.

Mr. McKinney currently provides MS&A support to many government agencies and contractors on various aerospace and defense programs and also provides technical and policy support to Congress.

Mr. McKinney is an AIAA Fellow and serves on AIAA's Technical Activities, Public Policy, Space Transportation, and Hypersonic Technologies & Systems Programs Committees. Mr. McKinney holds a 1981 BS and 1982 MS degree, both in Aerospace Engineering from Purdue University.

Mr. McKinney resides in Town & Country, Missouri, in suburban St. Louis. He is married with one daughter.

## McKINNEY ASSOCIATES WORK HISTORY (AEROSPACE & DEFENSE)

- **Jan 2016 – Present** Concept development for proprietary program
- **Apr 2015 – Jun 2015** OTIS training & support to KTSi-Arlington
- **Jan 2015 – May 2015** System analysis support to Boeing on DARPA Tactical Boost-Glide (TBG) Phase 1a
- **Sep 2014 – Jan 2015** OTIS training & support to Masten Space Systems
- **Feb 2014 – Present** System analysis support to Northrop-Grumman on DARPA XS-1 program
- **July 2013 – Dec 2013** System analysis support to Boeing on DARPA Tactical Boost-Glide (TBG) Phase 0
- **Jun 2013 – Dec 2013** System analysis support on proprietary program
- **Jul 2012 – Present** Partner with private entities to develop trans-atmospheric vehicle (TAV) concepts
- **Jan 2012 – Present** McKinney Assoc proprietary analysis of trans-atmospheric vehicle (TAV) concepts
- **Jan 2012 – Present** Mckinney Assoc proprietary development of optimal multi-vehicle engagement simulations: BMD, Strategic anti-TBM, and Anti-Access/Area Denial scenarios
- **Oct 2011 – Jan 2012** OTIS training & support to Purdue University & IN Space LLC
- **Oct 2011 – Dec 2011** OTIS training & support to Raytheon Space Development & Technology Lab
- **Feb 2011 – April 2011** System analysis for DARPA / Booz Allen Hamilton in support of HTV-2 (Hypersonic Test Vehicle-2) boost-glide reentry vehicle project
- **Nov 2010 – Nov 2011** System analysis for JHU/APL on high-speed weapons concepts
- **Oct 2010 – Oct 2011** System analysis for NASA / National Institute of Aerospace on Horizontal Launch Study of space launch concepts
- **Sep 2010 – Present** System analysis support to Astrox on various high-speed vehicle concepts
- **Apr 2010 – Dec 2011** System analysis for DARPA / Booz Allen Hamilton on space launch concepts
- **Oct 2009 – Present** System analysis support to Universal Technology Corp for AFRL programs
- **Oct 2009 – Present** Strategic partnership with Purdue University and IN Space LLC
- **Jul 2009 – Oct 2009** System analysis support and training for Raytheon Space Development & Tech Lab
- **Jan 2009 – Present** System analysis for Boeing Phantom Works on various high-speed vehicle concepts
- **Jan 2009 – Dec 2011** Charter member and Executive Director of US Hypersonics Industry Team to advocate to Executive Branch agencies and Congress
- **Jan 2009 – Dec 2011** System analysis for Boeing Advanced Weapons & Missiles Systems (AWMS) on various high-speed weapon concepts
- **Nov 2008 – May 2010** System analysis for IN Space LLC / Purdue University on SBIR program
- **Jul 2008 – Aug 2009** System analysis for Pratt & Whitney-Rocketdyne on advanced vehicle concepts
- **Jun 2008 – Nov 2008** System analysis for Boeing AWMS Triple Target Terminator (T3) program
- **Jun 2008 – Nov 2008** System analysis for Boeing AWMS Medium Range Time Critical Strike program
- **Mar 2008 – May 2008** System analysis for JHU Applied Physics Lab NASA ALHAT program
- **Feb 2008 – Dec 2008** Hypersonic Test Vehicle concept performance analyses for Boeing Phantom Works
- **Sep 2007 – Dec 2007** System analysis of Aerojet proprietary hypersonic engine concept
- **Aug 2007 – Dec 2007** System analysis for JHU Applied Physics Lab for missile / reentry vehicle concepts
- **Nov 2006 – Feb 2007** Lead system performance director for American Spacecraft Corp, San Rafael, CA
- **Aug 2006 – Feb 2007** System analysis of AFRL Flexible Aerospace Transportation system, AirLaunch QuickReach Launch Vehicle and Lockheed Martin HTV-2 reentry vehicle family
- **Jan 2006 – Dec 2006** System analysis for Boeing Phantom Works global range studies
- **Apr 2005 – Dec 2005** System analysis for SAIC / Boeing NASA X-43C hypersonic demonstrator program
- **Feb 2004 – Aug 2004** System analyses of CAV and Hypersonic Cruise Vehicle (HCV) concepts for Boeing Phantom Works/DARPA FALCON program
- **Jan 2004 – Sep 2005** Lead for system modeling & system performance for SAIC on NASA Exploration Systems Mission Directorate support
- **May 2003 – Jun 2003** System analysis for SAIC on NASA-DoD Space Partnership Council support
- **Apr 2003 – Dec 2005** System analysis for Boeing Phantom Works on CAV studies
- **Sep 2002 – Dec 2004** System analysis for SAIC on NASA Integrated Space Transportation Plan (ISTP) and NGLT (Next Generation Launch Technology) programs
- **Jul 2001 – Sep 2002** System analyses of Space Operations Vehicle concepts for US Air Force Research Lab, Propulsion Directorate
- **Jul 2001** OTIS training class for US Air Force Research Lab personnel
- **Feb 2001 – Jul 2002** System analyses of military launch systems for US Air Force Research Lab
- **Feb 2001 – Sep 2002** Lead for system modeling & system performance for SAIC on NASA Integrated Technology Assessment Center (ITAC) contract
- **Oct 2000 – Mar 2003** System analyses of laser propulsion launch systems for US Air Force Research Lab

- **Oct 2000 – Oct 2003** Lead for system modeling & performance for ANSER / Princeton team on National Science Foundation grants to investigate MHD for hypersonic applications
- **Sep 2000 – Dec 2005** System analyses for Boeing Phantom Works on NASA and DoD vehicle studies related to X-43 hypersonic demonstrator program
- **Sep 2000 – Jul 2002** System analyses of CAV concepts for Boeing Phantom Works on Advanced Technology Vehicle System Demonstration study
- **Jun 2000** OTIS training class for US Air Force Research Lab personnel
- **Feb 2000 – May 2000** System analyses for Space Access LLC
- **Feb 2000 – Mar 2000** Developed tactical mission simulations of advanced air-to-air tactical missiles for USAF Phillips Lab, Propulsion Directorate
- **Jan 2000 – Sep 2000** System analyses of CAV concepts for Boeing Phantom Works on Advanced Reentry Vehicle Design Concepts study
- **Apr 1999 – Sep 1999** System analyses of CAV concepts for Boeing Phantom Works
- **Sep 1999 – Nov 1999** Conducted upper stage orbit mission and aeromanuever analyses for Space Access LLC on Space Transportation Architecture Study
- **Apr 1999 – Jan 2001** System analyses of ABLV (Airbreathing Launch Vehicle) concepts for NASA Marshall Space Flight Center Advanced Space Transportation Program
- **Mar 1999 – Aug 2000** Developed 6-DOF trajectory simulation in support of Great Lakes Rocket Society application to FAA for approval of launch system
- **Jan 1999 – Nov 1999** System analysis for ANSER / Princeton team on National Science Foundation grant to investigate MHD for hypersonic applications
- **Dec 1998 – Nov 1999** Developed proprietary systems performance software for Lockheed Skunk Works
- **Oct 1998 – Jan 1999** System analyses on NASA STAS study for Space Access LLC
- **Jun 1998 – Jul 1998** Supported Lockheed Skunk Works assessment of proprietary launch system concept
- **Jun 1998 – Mar 1999** Testified to and assisted U.S. House Committees investigating possible illegal transfer of aerospace technology to China
- **Apr 1998 – Aug 1998** Supported Boeing Phantom Works on CAV Phase 1 study
- **Jan 1998 – Jul 1998** Independent assessment of Space Access LLC launch system for ANSER/USAF
- **Oct 1997 – Jan 1998** System analyses of Military Space Plane concepts for Lockheed ADP
- **Feb 1997 – Apr 1997** System analyses of hypersonic missile concepts for Lockheed ADP
- **Jan 1996 – Dec 1997** System performance for ANSER/Lockheed team NASA's HRST study
- **May 1995 – Oct 1995** Developed simulations of advanced tactical missiles for USAF Phillips Lab
- **Apr 1994 – Jun 1994** Developed simulations of advanced tactical anti-missile interceptors for Ballistic Missile Defense Organization

## McKINNEY ASSOCIATES WORK HISTORY (NON-AEROSPACE)

- **Jan 2008 – Present** Developing various SoS MS&A (System-of-Systems Modeling, Simulation & Analysis) tools for use in multiple industries, in partnership with assorted companies and corporations. Due to the competition-sensitive nature of these activities, none of which involved government contracts, no further disclosure is allowed
- **Mar 2006 – Mar 2007** Developed model of Howard Bend Levee District flood and storm water system using Microsoft Excel that allows optimization of any system parameter(s) - model produced immediate savings of over $300K (15-to-1 return on contract cost) due to better modeling of levee culverts and also validated engineering decisions on culverts design and placement
- **May 2000** Developed system model of commercial air traffic as part of studies analyzing St. Louis Lambert Airport runway expansion. Model demonstrated superior ease-of-use compared to other available software packages, while also providing capability to accurately assess the viability of the proposed runway expansion
- **Oct 1998 – Jan 1999** Performed system optimization study for Chesterfield, Missouri flood plain water control system design, resulting in planned land acquisition cost savings of nearly 90% (over $35 M), several orders of magnitude above McKinney Associates cost
- **Jun 1993 –** Supported various clients in government and private sectors on public policy, political and environmental & regulatory issues

## EDUCATION

- Aerospace Systems Engineering, BS 1981 / MS 1982 Purdue University

## HIGHLIGHTS

- Eleven years with McDonnell Douglas Aerospace as senior technical analyst prior to founding McKinney Associates consultancy. Performed system concept synthesis, design, optimization, performance assessment and mission analyses on space and strategic systems. Significant work on sensitive/classified projects
- Involved on every major US space transportation system and hypersonics development program since 1982
- Nationally-published commentator on politics, economics, public policy, science and technology - Publications appeared in include the *Orange County Register*, *Los Angeles Times*, *Detroit News*, *Houston Post, St. Louis Post-Dispatch, National Review*, C*alifornia Political Review.*

## PROFESSIONAL MEMBERSHIPS

- Public Policy Coordinator for American Institute of Aeronautics & Astronautics (AIAA) Technical Activities Committee (TAC), Dec 2011 – Dec 2013
- Executive Director and Founding Member, US Hypersonics Industry Team, Jan 2009 – Dec 2011
- Member, AIAA Corporate Member Committee, 2006-
- Member, AIAA Public Policy Committee, 2004-
- Member, AIAA HyTASP Committee, 1996-
- Member, AIAA Space Transportation Technical Committee, 1996-
- Member, AIAA Society and Aerospace Technology Technical Committee, 1993-1996
- Founding member, AIAA Space Transportation Technical Committee, 1986-1993
- Associate Fellow, AIAA
- Life Member, Tau Beta Pi

## OTHER

- Received NASA Aerospace Technology Enterprise' "Turning Goals Into Reality" Award in July 2004 jointly with SAIC for the NASA Next Generation Launch Technology (NGLT) System Analysis Project
- Received McDonnell Douglas Golden Eagle Award in May 1993 for outstanding effort in supporting the Neutral Particle Beam Space Experiment, McDonnell Douglas' highest performance award for individuals and/or groups

## MCDONNELL DOUGLAS EXPERIENCE

- **Nov 1991 - May 1993** Developed simulations of air-launched space access concepts in support of NASA advanced launch systems studies
- **Jun 1990 - May 1993** McDonnell Douglas lead for mission operations planning and system performance on the Strategic Defense Initiative Organization/ Grumman/McDonnell Douglas Neutral Particle Beam Space Experiment (NPBSE) program and associated NPBSE-derivative systems; helped synthesize concept for joint US-Russian lunar resource mapping mission using neutral particle beams
- **Feb 1990 - Jun 1990** Lead performance analyst for McDonnell Douglas on the Strategic Defense Initiative's Single-Stage-To-Orbit Phase I proposal; helped develop McDonnell Douglas' unique Vertical Takeoff/Vertical Landing configuration, based on earlier McDonnell Douglas' concepts (e.g. Tossback Booster); MDC won down-select for Phase II, to build the Delta Clipper-X prototype
- **Jan 1989 - Mar 1990** Developed process optimization software for McDonnell Douglas on the USAF/NASA Advanced Launch System Program's Mission Analysis Simplification (MAS) Task; MAS task utilized process optimization and critical path management (CPM) to characterize, model, and optimize space launch mission analysis for the Delta, Titan, and Shuttle systems
- **Oct 1988 - Apr 1990** One of two McDonnell Douglas Lead engineers for mission analysis, systems performance, flight mechanics, and guidance on the NASA/McDonnell Douglas Aeroassist Flight Experiment (AFE) program, a proof-of-concept flight experiment of using atmospheric re-entry drag-braking to establish Earth and/or Mars orbit
- **Apr 1988 - Dec 1990** Lead engineer for mission analysis, systems performance and flight mechanics on USAF/McDonnell Douglas Smart Maneuvering Re-Entry Vehicle (Smart MaRV) and Missile System to Attack Relocatable Targets (MSTART) studies, designed to defeat deployed and postulated Soviet ballistic missile defense (BMD) strategic launch systems
- **Apr 1987 - Dec 1987** Provided system engineering support on USAF/NASA Advanced Launch System (ALS) Phase I proposal and study; McDonnell Douglas had highest-ranked proposal
- **Aug 1984 - Apr 1989** Developed vehicle simulation and sizing software, conducted systems performance and mission analysis studies on the USAF/Advanced Research Project Agency's National Aerospace Plane (NASP) program and on NASP-Derived Vehicles (NDVs) studies. Work was critical in developing McDonnell Douglas' winning NASP configuration baselined by subsequent National Team
- **Sep 1984 - Apr 1987** Provided system analysis support to Martin Marietta/McDonnell Douglas team for USAF/NASA/SDIO Space Transportation Architecture Study (STAS), precursor to ALS program
- **Jun 1984 - Aug 1987** Led systems design studies of McDonnell Douglas proprietary launch vehicle concepts such as Tossback Booster as an Industry Research & Development (IRAD) project Principal Investigator (PI)
- **Jun 1984 - Dec 1985** Developed low-thrust orbit transfer and intercept/rendezvous software as an IRAD PI; the software package was extensively used by McDonnell Douglas for system design in early Strategic Defense Initiative studies
- **Aug 1983 - Aug 1984** Provided mission analysis and system performance to McDonnell Aircraft Company on the USAF Transatmospheric Vehicle (TAV) and Copper Canyon programs, precursors to the NASP program
- **Jan 1983 - Oct 1988** Provided overall system analysis and system performance for various Strategic Defense Initiative missile-defense system concepts
- **Oct 1982 - Aug 1984** Developed tether-control algorithms and system performance assessment software for tether-assisted orbit transfer vehicles under NASA-MSFC contract
- **Oct 1982 - Sep 1984** Performed vehicle dynamics & mission analyses for classified space shuttle payloads
- **Jun 1982 - Oct 1983** Developed branched-trajectory optimization software as an IRAD project PI.