

Rajeev Pandit

rajeev@rootcausepro.com

Ph: +91-9019691199

PROFESSIONAL PROFILE

Problem-Solving Expert & Trainer in mechanical, aerospace & other applns., with advanced degrees and 30+ yrs exp. 100% success thus far, in resolving tough, long-standing technical problems / repeated failures.

Expert at troubleshooting and root cause analysis / investigations. Well rounded engineer with good insight & grasp of engineering, extensive hands-on experience & advanced degrees in Mech & Aeronautical Engineering. Sub-disciplines of experience include integrated hydraulic control systems and components, structures, fluid dynamics, stability and control, and some electrical systems, with systems being the most recent field of activity. Well rounded with a good mix of analytical and practical knowledge.

Developed new and improved products in a variety of fields, including medical devices, farm equipment and electric vehicles. Customers are immensely pleased with the products, improvements and services provided.

Contributed to the development of innovative products, with work recognized in professional publications (Sport Aviation and Jane's All the World's Aircraft 1987-88). Products range from ground based devices to unconventional aircraft and from components to integrated systems. Handled projects from concept to finished product and field service; aware of the pitfalls to expect/avoid. Good at planning, scheduling and sequencing the various sub-tasks in order to give the project the best chance for expedient completion. While implementing projects, worked closely with engineers and technicians on the shop floor. Enjoys using a variety of computer software and mechanical tools. Strives to make products and processes more efficient and user-friendly. Excellent at troubleshooting and problem-solving.

SALIENT POINTS

Analytical experience covering: Aircraft Hydraulic Control Systems, Structures, Aerodynamics and Stability.

Adept at development, analysis, (rig-, ground.- and flight-) testing and troubleshooting of integrated systems.

Development includes architecture, trade studies, all requirements, safety aspects, maintenance, etc.

Analysis includes classical and computer techniques, sizing, performance, modeling, FMEA.

Testing includes developing the complete test-plan for system integration, validation, risk-mitigation, and performance, along with devising the instrumentation plan, operational details and debugging. Integration includes mechanical, electrical, avionics and control logic s/w.

Expert at troubleshooting and root cause analysis/investigations.

Experienced in project implementation, coordination (internal and external, with customers and suppliers, through IPTs, P/CDRs, technical support), costing, scheduling and tracking.

Experienced in developing technical specifications, operational procedures and documentation (test & certification).

Training:

University of Kansas short course on Federal Aviation Regulations.

SAE 4-day workshop on Applied Reliability Engineering and Product Assurance.

Fault tree analysis using CAFTA.

Six Sigma Methodology.

Conversant with MS Excel, Word, PowerPoint, Project, Access, Visio, MathCAD, etc.

3D modeling s/w used: AutoCAD Inventor (includes solids, surfaces, kinematics, etc.);
CADAM-3D for FE Modeling/stress analysis w/ NASTRAN; CATIA.

EDUCATION

ME, Mechanical Engineering and Mechanics, Old Dominion University, Norfolk VA	1985-'87
MS, Aeronautical Engineering, Indian Institute of Technology, Bombay	1981-'83
BS, Aeronautical Engineering, Indian Institute of Technology, Bombay	1976-'81

PROFESSIONAL EXPERIENCE

Independent Consultant, Lafayette IN & Lexington Park MD Expert Problem-Solver, Sep 2002 – present
Providing services in the **development / improvement of mechanical and hydraulic systems and components**:

- **Failure analysis / root cause** investigation and resolution of challenging technical problems.
- **Identifying and implementing solutions** to resolve failures during product development. e.g. failures in performance, seals, ball-bearings, etc., tolerance stack-up analyses, dynamic/oscillatory phenomena, etc.
- Development of **new products and improvements**: medical devices, farm equipment, eVehicles, etc.
- Mentoring. Charitable help to friends in identifying the root cause of their ailments.

Tech. & Mgmt. Int'l, LLC, Toms River NJ as Navy Contractor / Subject Matter Expert, Jun 2007 – Aug 2009
Provided engineering services in support of the acquisition and testing of naval aircraft:

- **Failure investigations, root cause analysis** and resolution of technical problems in military aircraft, such as the **V-22 Osprey** tilt-rotor aircraft.
- **Engineering review** of design substantiation reports for **Landing Gear** subsystem in E-2D Advanced Hawkeye aircraft (including structural analyses and testing).

Eaton Aerospace, Vickers Fluid Power, Sep 1998 – Aug 2002

Lockheed Martin's F-35 Joint Strike Fighter, as Engineering Specialist at Eaton/Vickers, Feb-Aug, 2002

- Conceptualized the hydraulic system **Diagnostics, Prognostics and Health Monitoring methodology**. Hydraulic System **Test Program Development**:
- Identified the testing requirements and conceptualized the test setup and facility needed to validate system performance.
- Developed **resource estimates** with detailed breakdown of itemized cost and man-hours for various tasks.
- Developed a detailed time-line/schedule for managing the project with several synchronized tasks to be carried out in parallel in order to meet very challenging deadlines and yet accomplish the top level requirements of the test program.

Bell Helicopter AH-1Z, as Engineering Specialist at Eaton/Vickers, May-Jun, 2001
Troubleshooting of pressure spikes and instability in AH-1Z upgrade helicopter hydraulic system:

- Serving on a team with other supplier-companies, helped identify and resolve the cause of pressure spikes and oscillations in the hydraulic power generation and distribution system.

Gulfstream Aerospace Corp., as Engineering Specialist at Eaton/Vickers, Sep '00-Feb 2001
Root cause analysis / Troubleshooting of elusive field-failures of the GV aircraft main hydraulic pump:

- Performed **analysis** of pump performance, internal flows, heat generation and contributions from various causes to the observed failure effects.
- Deduced the likely pattern of failure progression.
- Devised unique tests and successfully replicated the original part of the failure mode, leading to very surprising discoveries of the conditions necessary to cause the problem (including chemical interactions).
- Further, designed and developed a system test setup in the lab to create those conditions of real life operating scenarios of the subject components and system.
- Discovered the **elusive combination of conditions** that was causing the problem being pursued.
- In the process, developed a setup to display the real-time test data in such a **user-friendly** way as to capture the elusive transient conditions.
- Succeeded in being able to **turn the problem on and off** by test demonstration.
- Aircraft testing verified the presence of those conditions/factors, **thus validating** the identified cause.

BOEING Large Airplane Preliminary Design, as Engineering Specialist at Eaton/Vickers, Jan–Nov 1999
Development of Hydraulic System Strategy for a very large airplane considered for development:

- Represented Eaton on a team of Suppliers to develop a synergistic system architecture and identify technology required for the Large Airplane.
- Performed trade studies and compiled information from team-effort on alternative and latest technologies.
- Organized and coordinated regular weekly team-meetings between supplier-companies and Boeing.

Hawker 4000 business-jet development, as Engineering Specialist at Eaton/Vickers, Sep' 98 – Jan 2002

Hydraulic System Design:

- Resolved various design, sizing, and performance issues during system development.
- Completed the System Description report, including functional details of various components.
- Performed **detailed analysis** and testing on **Emergency Rudder System** and optimized its DC motor-driven pump to meet additional limitations imposed on its current-draw.
- Supported Manufacturing Dept. on installation and operational issues.

Testing at Integrated Systems Development Facility:

- Conceptualized and wrote the hydraulic system **test plan**. Identified all test-sensors, special hardware and special installation requirements.
- Verification of calibration, setup of **data acquisition**, verification of readings, data manipulation and recording; **interpretation** of test-data.
- Devised **user-friendly** installations and displays, making it easy to notice and identify abnormal behavior.
- Developed servicing procedures, **orchestrated the tests** and **expediently resolved various problems** that surfaced.
- **Performance Testing** revealed challenging flow-demand conditions, leakage rates, performance details such as travel-rates, temperatures, efficiencies, electrical power demands, pressure spikes, cavitation, etc.
- Coordinated and performed **Verification and Validation** testing and **identified and resolved discrepancies in mechanical, electrical, avionics** (Cockpit Controls and Display) **and automatic control logic** matters related to the hydraulic and flight control systems.
- Also identified discrepancies in CAS warning messages, and **further found their causes** in either the wiring or in the message-generation decision logic.
- Represented Eaton/Vickers in supplier conferences with partnering companies and team-meetings / discussions on **resolving design issues** and modifications.

Aircraft Testing:

- Conceptualized and developed detailed **flight test plans** and instrumentation requirements.
- Flight test data collection and interpretation.
- **Expediently troubleshot elusive, intricate problems and in-flight failures, including malfunctioning in the flight control system.**

Research & Development Services for new products, as Independent Consultant, Mar '95 – Aug 1998
Design, Devmt. & Prototyping of ergonomic & assistive devices for individual inventors of consumer products.

Cessna Aircraft Company, Wichita KS, Apr '1989 – Feb 1995

Cessna Citation X, as Senior Engineer –Project Design, at Cessna, Apr '92 – Feb 1995

DESIGN, ANALYSIS and PROJECT COORDINATION of Citation X hydraulic system:

- **Analysis** of various flight control and utility sub-system activity in different flight scenarios; resulting flow demands, pressure drops and temperatures.
- **Component Sizing:** of reservoirs, engine-driven pump, electric motor-driven pump, accumulators, etc. and **analysis** to resolve problems discovered during development.
- Trade studies and evolution of **system architecture**.
- **Coordination** with suppliers of various components, to ensure compliance with specifications, on-time delivery of test hardware, and in-time resolution of problems during component development.

Development-test project management:

- Conceptualization, test plan and design of full-scale test setup ("iron bird").
- Technical direction to technicians on installation and test-operation.
- Identification of all **instrumentation**, special hardware and special installation; verification of calibration, setup of data acquisition, verification of readings; data manipulation and recording.
- **Test result interpretation, problem resolution** and re-testing, including tests of engine-driven pumps, motor-driven pump, **landing gear sub-system, flight control actuators**, power transfer unit, etc.
- Developed **servicing techniques** and advised technicians accordingly.
- Provided technical support for installation of hydraulic system in prototype airplane. Developed and guided **functional testing** on prototype.

Flight test support:

- Identification of key parameters, type, range, sensitivity and location of sensors.
- Data collection and interpretation of results.
- **On-call support to test-pilots and ground crew** to interpret observations and **resolve problems.**

Cessna Aircraft Co., Structural Integrity Group, as Senior Engineer –Structures, Apr '89 – Mar 1992

Stress analysis and testing of aircraft structures:

- Developed Finite Element models using **CADAM 3D**; determined various **loads** to be applied on them, analyzed them using **NASTRAN** and summarized the results for generating substantiation reports.
- Items analyzed include:
 - various parts of the Citation VI business-jet,
 - the M208 nose-LG strut bracket,
 - the wing of the M210 single-engine light plane,
 - the M421 engine support truss, etc.

Independent Consultant, by sub-contracts from Aero Science Software, Wichita KS, May 1988– Feb 1989

Hillsboro Trailers, as Indep. Consultant, for Aero Science Software, Oct '88 - Feb 1989

Performed **stress analysis of a stock-trailer** for Hillsboro Industries, Wichita KS,
in order to optimize the strength / material-sizing in different areas.

- Vehicle **dynamics modeling and determination of loads**.
- Calculations of material strength properties of various members in the trailer structure.
- FE modeling of the structure and payload.
- **FE stress analysis** (using SAP86/mTAB FE package), post-processing/display of the stress distribution, and explanation of the results.
- As an added benefit, the results **revealed the cause of field-failures** that were occurring in the trailer structure, **thus also validating the analysis**.

Learjet M31 Fuselage Modifications, as Indep. Consultant, for Aero Science Software, May – Sep 1988

Design support for modification of the fuselage structure to accommodate a camera and door in its belly.

- Design of door-mechanism and control system re-routing.
- **Kinematic analysis** of improved rudder control system.

Light Aero, Inc, Caldwell ID, as Senior Engineer –Aerodynamics & Structures, Sep '87 – Apr 1988

Design and Development of Explorer, a custom-built amphibious airplane large enough to carry the 2-seat Avid Flyer airplane within it (with its wings folded) and fly to remote areas of the earth.

- Performed all **aerodynamic analysis**, LG loads, **stability** calculations, etc.
- Performed all detailed **classical structural analysis** of the airplane fuselage, wings, etc.
- Work **recognized in Sport Aviation, Aug. 1991**, pp 40-47.
- Working closely with the chief designer, Dean Wilson, provided similar analytical support for 3 other land and amphibious airplanes, including a single-seat **motor-glider**.
- Results **explained existing real life problems** in the Avid Flyer –**thus verifying accuracy of analysis**

Daedalus Research, Inc., Petersburg VA, as Senior Engineer –Aircraft Design & Development, Apr – Sep 1987

Unique (slaved tandem-) Free-wing Aircraft design and development:

- Made **original formulations** that brought about the understanding and analysis of the **Stability & Control** behavior of this novel airplane (with wing freely pivoting about its spanwise axis and tail pivoting in a slaved manner) that provided a gust-alleviated ride and was also capable of short takeoff and landing.
- Findings from the stability analysis were **verified by scaled-model flight tests**.
- Performed **aerodynamic analysis** and **structural design and analysis** of the airframe made of **composite** material, and provided technical direction for **prototype development**.
- Work **recognized in Jane's All The World's Aircraft 1987-88**, pp 410-411.
- Project was funded by R&D contracts from US-DOT.

Old Dominion University, Norfolk VA, as **Adjunct Asst. Professor**, Jan '86 – Apr 1987

- Taught undergraduate courses on Thermodynamics and Engineering Graphics.

Indian Institute of Technology, Kharagpur, India as Jr. Scientific Officer, Jun '83 – Jan 1985

- Served as a key contributor in a team to **design, build and test-fly mini-Remotely Piloted Aircraft** on an R&D contract.
- Also performed structural **design, analysis and testing** of a mini-RPV's **composite airframe structure** as part of graduate project work from 1981 to '83.