Ranny A. Meier, P.E.
Structural Analysis & CAE Programming

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Education

MSME	May 1992	Washington University - St. Louis	
BSME	Dec 1981	University of Missouri - Rolla	Cum Laude

Highlights of Qualifications

- Quality work, ownership, customer focus, job knowledge, and technical leadership.
- Complete detail analyses using FEA. Run NASTRAN, Femap, StressCheck, Mechanica, Cosmos, Adams, Patran, MatLab, and MathCad as required. Knowledge and understanding of linear and non-linear solutions, h and p-version modeling, contact, results extraction, theory, limitations, and error estimating needed to use FEA reliably. Simulate non-linear plastic, harmonic and non-linear transient dynamic, fluid flow, & composites.
- Apply the standard procedures used for structural analysis: Load balance, elastic/plastic stress, section analysis, complex bending, lugs, joints, sockets, stability, secondary effects, fatigue, and damage tolerance analysis.
- Experience with Boeing applications; CSW, LifeWorks, DTANAL, GKJoint, INCAP, FEADMS.
- Determine structure response from harmonic, shock, random environments, to spectrum in AFGrow.
- Develop applications using several languages and platforms, conduct testing, and provide customer support.
- Readily construct iterative design optimization and synthesis computer models of mechanical systems. Proficient using CAD/CAE applications, operating systems, & programming languages. Developed several extensive computer programs that proved to provide substantial savings of engineering effort. Much experience with parametric solids, including Catia, NX, SolidWorks, and mechanisms analysis tools.
- Apply quality methods including Quality Function Deployment, Taguchi Robust Design, Position Variation Analysis, and Design for Manufacturing and Assembly.
- Microsoft Certified Partner since 1996 for network, server infrastructure, AD, Win32, C#.NET, SQL, ASP.NET.
- Pilot with 840 hours PIC time in C150, C172, C182-G1000, DA20, DA40-G1000, complex, and Maule tailwhl.

96 to 25	**Response Mechanics Inc.**	*Shock, Vibration, Strength Analysis, & App. Development*
2015-22	**BleuFluid** CFD air loads, structural analysis, optimization of composite assemblies.	
2014-20	**1650 Corp:** Develop multi-company sets accounting data system, on SQL Server, MS Entity-Framework ORM, and WPF clients. App uses background threads to process million row tables.	
2013	**Patriot Machine:** Large quantity beam member welded steel platform response to seismic base load.	
2013	**VanDillon-Flood PC:** App used for image scan, OCR, data flow from RBase into QuickBooks.	
2012-25	**Patriot Machine:** Receptance Coupling Substructure Analysis for machining dynamics prediction. Develop methods to reliably predict machine assembly frequency response by coupling physical measurements with FEA. Build database used to optimize process parameters.	
2010-13	**Boeing:** F-15 Wing Structural analysis for MRB dispositions and design modification development.	
2010	**Spirit AeroSystems:** Boeing 787 leading edge slats FAA certification test report correlation to FEA.	
2008 to 2009	**Spirit AeroSystems:** Boeing 787 Wing leading edge slats certification test plan development. Using Nastran to survey laminate strains to determine critical flight loads and equivalent test loads. Specify pad loads for wiffle tree, enforced displacements to simulate rigging and wing bending, manufacturing defect and impact damage design, and strain gage placement. Test completed before first flight.	
2007	**Spirit AeroSystems:** G250 business jet wing structure. Use MathCad, Cosmos, SolidWorks, Nastran, Femap, and Catia while optimizing the design of the flap drive and aileron actuation system parts.	
2006	**Spirit AeroSystems:** Boeing 787 Wing leading edge slats carbon epoxy skin and joint analysis. Developed Excel macros to automate process for checking joint capacity on thousands of fasteners.	
2005 to 2006	**Spirit AeroSystems:** Boeing 787 Section 41 (Fwd of Sta 585). Global Partner Oversight directing analysis methods on seat tracks, floor stanchions, and systems installations used by teams in India and Russia. I wrote a program to generate thousands of load cases on the passenger floor adaptable zone.	
2005 to 2006	**AeroCad Systems:** Produce fiberglass/epoxy kit plane sandwich structure from hard tooling. RespMech provided structural analysis to AeroCad.	

2005   **Kuchera Defense Systems:** Design and analysis of retractable Main Landing Gear for UAV aircraft with take-off weight of 450 lb. I used a single DOF time step simulation model to optimize the gear kinematics, OLEO shock valve shim stack, and oil volume to limit vehicle response to 3g for 15 ft/s landing sink rate. The valving in the OLEO is critical to limit the peak touch down and bottoming force. I used a NASTRAN beam model to determine peak joint forces. I used NASTRAN shell element models to determine the stress distribution in the welded 4130 gear trunnion and leg assemblies. I worked the retract kinematics to allow both left and right MLG to retract using a single electric actuator. I sized the various clevis joint fittings.

2000 to   **Westar:** Structural analysis for GR/EP composite inlet duct for Army UH-60 helicopter.
2004   I used Femap to input laminate properties and make a NASTRAN model of this inlet duct assembly. This model identified some high strain areas in the corners of some details. These were changed to be integral with the main part thus eliminating that problem. RespMech also worked as needed on structural design of various other filter installation assemblies during this period.

1997 to   **Server & Network Configuration:** Install and maintain computers and networks for several local
2009   businesses; NewPeds.com, Envisioneering, MGI Freight, West County Auto, and RespMech.

2004   **Innoventor (StereoTaxis):** Structural analysis for FDA approval of heavy magnet positioning system. I made a Cosmos model of a large cast aluminum mount for the purpose of locating strain gages used to correlate some field measurements that were made by another company.

2003   **Kirkland & Assoc. (Honda Jet landing gear doors):** Loads, deflection, gap, and stress analysis of gear door assemblies to maintain OML fit during various load conditions.
            There are 3 doors on each wing for the main landing gear (MLG). The 2 outboard doors are rib stiffened machined aluminum plate. The inboard door started as a built-up sheet metal assembly and was changed to rib-stiffened machined with sheet metal torque box cover after my initial NASTRAN shell element model determined that we would not get enough stiffness with the sheet metal design. The customer's goal was to limit deflection (door gapping) due to negative pressures in some areas under the wing. I used Cosmos solid element models and NASTRAN shell element models to determine a warped shape for the inboard door such that when it is preloaded in the stowed position it returns to the defined OML shape, thus limiting the in-flight deflection. The NASTRAN result included non-linear large displacement with surface contact gap elements. We lofted a new surface through an array of FEA deflection output to get a new machining surface definition. This surface replaced the original surface in the parametric CAD model causing the model to update automatically. I had previously done warped doors on the F/A 18.

2002   **Essex Cryogenics Inc.:** Gaseous Oxygen Generator system structural and electrical design. RespMech had 8 engineers on this 6 month project. We designed a chassis to mount the various compressors, valves, filters, heat exchangers and oxygen separator equipment.

2002   **Brunswick Bowling Centers:** Structural engineering and certification for Scorer installations. RespMech was hired to design structure modifications to hang new heavier scoring equipment at several bowling alleys in the St. Louis area.

2001 to   **Evisioneering Product Development Corp.:** Mechanical design and analysis of ultrasonic probe
2002   medical devise. Detailed shape optimization of electromechanical assembly parts.

2000   **Royal Bank of Canada:** Produced software, for 10000 customers, with customer support Web site.

2000   **Engineered Air Systems & Marlo Coil:** Analyzed capacity of several alternative fluid system interface designs in an effort to qualify a Fan Coil Unit for Navy Shock and Fatigue test.
            The first MIL-S-901 high-impact shock test of this fan coil unit caused a crack where fluid fitting inlet interfaces with this unit's structure. RespMech was hired to model this system and to evaluate a new modified design for the fitting interface. We modeled the structure in UG and I created mid-plane surfaces in Femap. I used NASTRAN transient shock runs to compare the new design to the original.

1999   **Bank of America:** Produced custom version of translator software for Nations Bank.

1999   **CODE3:** Developed two applications used by the engineering departments. The first moves BOM/ERP data from legacy system into new ERP system. The next is a client application used to record man-hours on projects.

1997 to 1998	**Kirkland & Assoc. (Visionaire):** Detailed loads analysis and component design of the landing gear and flight control systems on the Vantage VA10 aircraft. We had 17 engineers working at RespMech on this two year project. We integrated the nose and main landing gears into the airframe by designing bearing mounts into the bulkheads. We designed landing gear doors that are actuated by links connected to the gear legs. We designed all of the flight control system and trim tabs consisting of cranks and cable. We designed the control yoke and rudder pedal assemblies. I was responsible for the force balance, loads, and stress analysis for this work which we did using Adams, NASTRAN, and spreadsheet calculation.
1995 to 2005	**MYM2QIFW:** Created a personal finance dataset translation utility and sold 19000 copies to date. This system attaches to a relational database, indexes, joins tables, and queries to extract account and transaction data and then exports this to a neutral format.
1997	**Mark Andy:** Determine response of printing press structures due to shaft unbalance shaking forces. I used Pro/Mechanica to get a frequency response result due to a rotating unbalance in the printing machine. The entire assembly structure was included in the model. I identified a number of areas where load paths could be changed to increase the frequency of the modes.
1997	**Tayman Medical:** Detail design of actuated support stand assembly consisting of 200+ components.
1995 to 1999	**Systems and Electronics Inc.; EGOGM:** Transient shock peak stress response and random vibration fatigue life calculations on a Humvee mounted missile launcher. Most of this work was done in 1997. I analyzed the response to a collection of load cases for the missile launcher. These load cases include various half-sine pulses for crash, rail-hump, and missile firing. There was a parachute drop case defined as a 20g, 54ms square wave. I also analyzed static, handling, wind, and a PSD ground mobile environment. The transient dynamic analyses were done by saving the NASTRAN database of modes and restarting for transient and frequency response cases. The PSD result is from post processing the frequency response result. Internal load were extracted from the assembly model and used for a various detail solid element models to find stress gradients in the joint fittings. I analyzed all of the lugs and sockets for both fatigue and ultimate strength. I only found two areas in the assembly that were inadequate for the environment. One was simply fixed by adding a gusset. The other was the missile canister latches and I went through a number of design iterations to end up with something both simple and with sufficient capacity.
1995 to 1996	**Systems and Electronics Inc.; BFIST:** Response of isolated pallet for a Bradley armored vehicle infrared targeting system to shock and vibration environments. I built NASTRAN models of an infrared targeting camera shock mount structure with wire rope isolators and also the missile launcher structure. The analysis of the camera mount was primarily to verify clearance during the transient response to shock and random vibration input and secondarily to look at the stresses in the mounting structure. This analysis involved a rigid side with linear small displacements and a soft side with non-linear large displacements.
82 to 96	**McDonnell Douglas** *Full time employee on various programs.*
95 to 96	**MDA Phantom Works** *Metal & Composite Strength & Stability Analysis.* F/A-18 E/F Inlet duct composite hat stiffener termination problem; CRAD study. New F15 speedbrake design with high speed machined Aluminum rib-stiffened panel replacing composite skin & honeycomb core design (**NASTRAN Optimization**). Analysis of DC-XA composite intertank structure. Hands-on experience on F/A-18 C/D horizontal stabilator layup production in clean room.
94 to 95	**F/A-18 E/F** *Loads and Strength Analysis.* Strength and Fatigue analysis of Landing Gear/Fuselage test fixture interface using NASTRAN and RASNA. Large displacement model with a fuselage GENEL is used to find test loads to realize desired interface loads.

| 92 to 94 | **F/A-18 E/F** | *Landing Gear & Mechanism synthesis and structure stress analysis.* |

Lead stress engineer on the F/A-18E/F boarding ladder with the help of three other stress engineers. This ladder beam is an outer moldline door, which requires non-linear gap contact analysis (NASTRAN), of the preloaded beam with the sill. Several four-bar mechanism over-center latches, powered by coil springs, pull the required warp out of the door. Synthesis, simulation and optimization of the components, using Mechanical Advantage, MathCad and Amotion software, produce a design that meets our customer's requirements.

| 91 to 92 | **Educational leave of absence** | *Complete MSME at Washington University.* |

Courses in area of specialization: **engineering mechanics;** three FEAs, a heat transfer, 2 advanced math, 2 electrical, 4 advanced dynamics and vibrations, 2 elasticity, a fatigue, a fracture mechanics. **Additional** post graduate course work: four electrical, and three engineering management.

| 90 to 91 | **Tacit Rainbow** defense suppression missile; | *Structural design and FEA.* |

Designed and analyzed the cast aluminum interstage fitting that attaches the solid rocket booster to the boat-tail of the turbofan powered missile, and also the missile restraint fitting that attaches the booster into the launch canister, with detailed NASTRAN models of both.

| 88 to 90 | **Cruise Missile Advanced Programs;** | *Structural design synthesis.* |

Wrote and maintained synthesis code to calculate structural sizing and mass properties that worked in conjunction with aero-propulsion code during systems engineering of missile variants.

| 87 to 89 | **Advanced Laser Radar guidance** (LADAR); | *Optical & beam steering hardware.* |

Integrated the Laser system into a flight test pod. Wrote 2D light ray tracing program using Unigraphics Graphics Interactive Programming (GRIP). Wrote the procurement specification for, and coordinated the installation of the cooling system. Designed a vacuum brazed electronic circuit card chassis, with liquid cooling passages. Lead the efforts of the structural design team, consisting of 3 design engineers and myself. Completed the structural design, and built a small diode laser transceiver for the Army.

| 86 to 87 | **Harpoon missile;** | Integrated a one piece cast fuel tank, replacing a machined assembly. |

| 85 to 86 | **Titan Launch Vehicle Fairing;** | *Structural concept development.* |

Completed the design and analysis of a set of ground support platforms that are mounted on the inside of the fairing during servicing of the upper stage rocket motor.

| 83 to 85 | **Electrophoresis Operations in Space** (EOS); | *Design and build of structure and tanks.* |

Designed the large media storage tanks and heat exchangers on the Electrophoresis Operations in Space (EOS) automated production prototype shuttle payload unit. This system separates various proteins, used for pharmaceutical products, by moving a fluid stream through an electrical field. Worked in clean room environments during the assembly of this system.

| 82 to 83 | **Medium Range Surface Attack Missile** (MRASM) nose cone; | *Detailed structural design.* |

References
Available upon request.

Organizations
Pi Tau Sigma, Tau Beta Pi, AIAA, AOPA, EAA

I am a citizen of the USA and have had a top secret clearance when necessary.