



111 W. Canyon Crest Road
Alpine, Utah 84004
801-763-8484

Curriculum Vitae NATHAN JAMES MACDONALD, PE, CSP

MECHANICAL ENGINEERING EXPERT

Experienced and licensed mechanical engineering consultant (PE). Worked on the design and analysis of numerous projects, including ziplines, exercise equipment, trailers and towing equipment, aerial lifts, and other hydraulic and pneumatic equipment. Created multiple mathematical programs to systematize complex calculations. Designed and built multiple custom testing devices for acquiring data. Worked on over 70 lawsuits, including 18 patent suits, in the role of associate to retained expert.

CERTIFICATION AND LICENSURE

- Licensed Professional Engineer
- Certified Safety Professional
- Certified forklift operator
- Certified scissor lift operator

EDUCATION

Bachelor of Science degree in Mechanical Engineering, Brigham Young University

- Academic Scholarship, multiple semesters.
- Elective coursework including internal combustion engines, kinematic analysis, and electronics, and control mechanisms.

WORK EXPERIENCE

Began working with Alpine Engineering & Design in 2012. Consulted on projects in the areas of new product development, design analysis, and expert witness support.

Design:

- Aerial lift turret, boom, and structural bracket design for multiple companies including finite element analysis, design iteration, design for efficient use of material, design for assembly and manufacturing.
- Aerial lift controls design, including electrohydraulic controls, fiber optic communications and instrumentation, circuitry design, and firmware development.
- Heavy mining equipment simulation room design, manufacture, and assembly.
- Drill pipe wrench design, analysis, and simulation.
- Consumer printing press reverse engineering and re-design.
- Aerial lift controls design, including electrohydraulic controls, fiber optic communications and instrumentation, circuitry design, and firmware development. Prototyping, implementation, design iteration, cycle testing, thermal, and noise stabilization, hardware, software-based noise filter design and implementation, analog and digital signal processing, provisional patent, and figure drafting.
- Electronics design, instrumentation including strain gauges and load measurement, anemometers, dynamic timing and repeatability timing circuitry, proximity sensing, thermal testing, etc.
- Design of circuitry used in biological testing systems including accelerometer, PWM control of Peltier modules, solenoids, and LED's. Design of circuitry for delicate noise sensitive signals was also accomplished for fluid detection, and thermocouple/RTD reading.
- Design and testing of circuitry for automating common daily tasks, including servo controls, proximity sensing, and microcontroller programming.
- Aerial lift turret, boom, and structural bracket design for multiple companies, including Finite Element Analysis, design iteration, design for efficient use of material, design for assembly and manufacturing.
- Consumer product development in the massage industry, including prototype development, provisional patent and figure drafting.
- Exercise equipment design, and prototyping.
- Consumer product development in racing seat simulation base, including design and prototyping.

Analysis

- Zipline ride ASTM standards compliance analysis, structural calculations, finite element analysis, design modifications for stress alleviation, etc.
- Pneumatic trailer reverse engineering for further analysis and modification.

- Industrial stands modeling, structural analysis, simulation, load rating.
- Amusement park rides standards compliance including zip lines, drop rides, pendulum rides, and sling shot rides. Fatigue analysis including low and high cycle fatigue of welded structures, structural calculations, dynamic and kinematic analysis, finite element analysis, numerical methods programming, engineering calculations automation, etc.
- Mining drill rig inspection, reverse engineering and analysis.
- Trucking and trailer analysis including dynamic analysis, Finite Element Analysis, calculations compilations and documentation, design iteration to alleviate stress issues.
- Physical cycle and fatigue testing, including towing hitch material fatigue testing, energy chain testing, diagnostics, design modification, and recommendations.
- LNG tank testing, detonation circuitry design and implementation.
- Aerospace structural stand element, simulation, fatigue analysis, calculations package compilation, design iteration, and stress alleviation.

Expert Witness:

- 3D animation including, compliant mechanisms.
- Prior art searching and review.
- Drafting of opinions and reports, including invalidity, non-infringement, anticipation and obviousness.
- Drafting of claim charts.
- Illustration and figure creation.
- Evaluation of programming provided for crane controls.
- Construction hardware patent litigation, including claim chart drafting, report drafting, prior art searches, invalidity and non-infringement arguments, exhibit prep, figure illustration, obviousness arguments, motivations to combine arguments, claim construction, etc.
- Exercise equipment patent litigation, including claim charts review, simulation, animation.
- Blender motor testing instrumentation, including diagnostics and solving SNR problems, data processing.
- Blender jar efficiency and benchmark testing including statistical procedure, analysis, and instrumentation/controls repeatability circuitry.
- Molded containers patent lawsuits including claim charts, prior art searching, obviousness/anticipation documentation, and demonstration.
- Oil field site practices, accident reconstruction, simulation, deposition review, etc.
- Automated refuse truck accident reconstruction, deposition review, etc.
- Construction site fire reconstruction, site inspection, thermal imaging.
- Tow truck accident reconstruction, physics simulation.
- Forklift and scissor lift accident reconstruction, deposition review, physics simulation, foreseeable misuse, safer alternative design considerations.

- Commercial mowing patent litigation support in mowing deck construction, steering mechanisms, prior art searches, animation, simulation, etc.
- Printing industry product liability in heated presses, including accident reconstruction, product safety review, hazard analysis, warning labels review, deposition review, etc.
- Bulldozer product liability, including product safety, hazard analysis, foreseeable misuse, safer alternative design considerations, testing, safer alternative design implementation.

Continuing Education:

- OSHA training on Slips, Trips and Falls: OSHA Compliance
- 30 Hour OSHA training (including Machine Guarding)