

# Brian L. Dillinger

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## Professional Profile

Diligent and focused mechanical engineer with a Master of Science degree and 18 years of diverse experience in machine design, analysis, and project management. Ambitious leader who has excelled with design innovation and expanded the capabilities of entire engineering teams. Committed to excellence and project ownership to deliver on time and under budget.

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## Skills

- Design Team Leadership
- Project Management
- Communication
- Relationship Building
- Design: 3D Modeling and 2D drawings
- Tolerance Stack Analysis
- Finite Element Analysis (FEA)
- Mathematical Modeling and Simulation
- Computational Software
- Solidworks: Modeling, Drawings, & Simulation (FEA)
- ANSYS: Workbench and Mechanical (FEA)
- PTC Mathcad
- MATLAB and Simulink
- Maple
- Microsoft Excel, Word, Project, and PowerPoint
- Custom Analysis and Design Tools

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## Experience

JUNE 2022 – PRESENT

### **Lead Mechanical Engineer / Critical Project Services/Caeli, LLC, San Antonio, TX**

- Responsible for several areas of mechanical design for groundbreaking energy storage technology. The prototype system is currently being developed from the ground up as a proof-of-concept backup power solution.
- Purchased/examined API 530 in detail, as heater supplier required Caeli to perform all analyses and assume liability for the heater tube material and wall thickness. Created automated Mathcad analysis to calculate rupture allowable stress, corrosion fraction, minimum wall thickness, and design life per material and design conditions (850 psig/1400°F for this specific case).
- Created a Mathcad analysis tool per API 579-1/ASME FFS-1 as a check to the API 530 analysis due to design life results < 20,000 hours. Analysis provided confidence in API 530 results. API 530 Mathcad methodology also confirmed with short-term design life report for 304 stainless steel piping by The Equity Engineering Group, Inc.
- Requested/attended multiple trainings for ASME B31.3 Process Piping. Performed pipe stress analysis using Mathcad and researched pipe design software for purchase for flexibility analysis. Performed all pressure drop analysis for system from cold side (-320°F) through the hot side exhaust (1112°F). Sized pressure relief devices for equipment protection per ASME B31.3/ASME BPVC.VIII.1. Created Mathcad tool to calculate hydrostatic testing requirements of piping per B31.3.
- Worked directly with suppliers and was lead liaison on 4.85 MMBTU/hr duty heater purchase. Reviewed all approval drawings from all suppliers for system equipment.
- Responsible for system component and piping system layout. Layouts completed in Solidworks (3D), and system P&IDs created using AutoCAD.

MARCH 2019 – JUNE 2022

### **Sr. Research Engineer / Southwest Research Institute, San Antonio, TX**

- Client-facing project manager/technical lead on diverse projects for commercial and government clients (foreign & domestic). Client communication daily for project cost estimates, status updates, and technical discussions.
- Managed \$1MM+ worth of fast-paced projects while at SwRI; served on technical teams in other sections as needed.
- Served on Fitness for Service team responsible for pressure vessel (PV) design, fatigue and fracture analysis, usage tracking, vessel inspections, and periodic nondestructive testing. Trained on PV analysis with SwRI-retired consultant geared towards stress, fatigue, and fracture mechanics.

- Performed stress analysis for SwRI's 13-inch ID, 30,000 psig/650°F rated PVs in ANSYS. Completed 2D analysis for full PV assembly including end closure threads (axisymmetric). Used 2D results as inputs into 3D submodels to determine all fatigue critical locations.
- Created a generic PV fatigue analysis tool in Mathcad per ASME BPVC.VIII.2-2019 for elastic-plastic stress analysis. Tool used to determine costs based on vessel fatigue damage accumulated during cyclic testing. Implemented analysis tool for each of SwRI's PVs (2-inch – 50-inch ID PVs).
- Created a Mathcad tool for generating true stress-true strain curves per ASME BPVC.VIII.3-2019. Tool can be used to create curves for all allowable temperatures; curves can then be imported directly into ANSYS.
- Created a generic bolt pattern analysis tool in Mathcad per 2019 ASME BPVC Section VIII Div. 2 Part 5.7.2, Div. 3 Article KD-623, and ASME BTH-1-2017 Section 3-3.2 (lifting devices).
- Performed design and analysis for custom pressure boundary manifolds and adaptors based on client needs and mating geometry (up to 30,000 psig working pressure).
- Project manager/technical lead on ASTM D2992/D2924, ISO 12736, instrumented buoyancy loss, and custom load cell design projects. Provided both brief and highly detailed/technical reports to clients in a timely manner. Served on ISO 12736 Committee beginning in 2021.
- Recruited to design team for a submarine rescue system for the Commonwealth of Australia; led personnel transfer skirt latch design for mating rescue vehicle to distressed submarine in shallow water.
- Designed custom load cells/data acquisition for harsh environments to measure loads in supports for a Naval ship launch, for subsea battery weight variation tests, and for other critical priority testing. Presented work at 2021 Western Regional Strain Gage Committee conference.
- Responsible for quoting projects for clients and communicating with Contracts department on project setup. Negotiated with clients pre-project and post-project award for compensation discrepancies associated with scope creep and services rendered.
- Specified and worked with Purchasing for obtaining all instrumentation and supplies required for all project activity. Tracked spending and project labor to ensure projects complete under budget.

JUNE 2015 – MARCH 2019

### **Sr. Mechanical Engineer / Mitsubishi Electric Power Products, Memphis, TN**

- Performed mechanical design/analysis of large power transformers ( $\leq 765$  kV) in multi-disciplined team of engineers, designers, and drafters. Awarded mechanical lead position responsible for overall mechanical design.
- Acted as mechanical representative in customer design reviews. Communicated with project management, customers, the design team, and shop personnel daily regarding design requirements and technical issues.
- Realized \$30,000 of savings for each design requiring seismic analysis. Created Mathcad modules from scratch to perform analysis in-house and eliminate expensive third-party consultants. Authored first customer seismic report complete with ANSYS FEA, bolt pattern, weld joint, and column analyses.
- Analyzed conservator and transformer tanks for vacuum and positive pressure loads using ANSYS Mechanical. Provided technical insight regarding analysis methodologies to other team members performing analyses.
- Provided guidance on initial technical report template. Authored many analysis reports to document design and analysis methodologies. Reviewed technical reports written by colleagues.
- Replaced expensive and custom Japanese conduit system with off-the-shelf, US based products yielding huge cost savings (about \$300,000 per year). Completed MEPP's first 3D conduit design with the new system.
- Expanded designers' capabilities instantly with an Excel-based conduit sizing tool. Users could size conduit per the NEC standard with no prior experience with about 15 minutes of training.
- Reduced BOM check times by 75% by developing an Excel tool to instantly compare Solidworks and Syteline ERP BOMs.
- Decreased design time for 35% of solid models by convincing reluctant design team to implement Solidworks weldment tools. An added benefit was the reduction of file sizes for designs converted from assemblies to weldments.
- Elevated team's performance via knowledge transfer and coaching. Provided technical guidance with 3D modeling and drafting tools in Solidworks, FEA (ANSYS and Solidworks Simulation), seismic analysis, tolerance analysis, and GD&T.

MARCH 2011 – JUNE 2015

**Sr. Mechanical Design Engineer / FlexSteel Pipeline Technologies, Houston, TX**

- Promoted to Senior Mechanical Design Engineer in less than two years due to exemplary performance. Mentored engineers with FEA, tolerance analysis, Solidworks, drawing practices, and general engineering best practices.
- Transformed pipe coiling from idea to reality by driving FlexSteel's coiling initiative. Awarded US Patent 8,985,496 B2 for groundbreaking hydraulic coil deployment drum design used in the first ever coiled pipe installation. Designed 80% of the equipment required to drive the coiling initiative to completion.
- Developed test methods and procedures for testing coil deployment equipment. Worked closely with Operations regarding equipment and personnel logistics and with field technicians to perform real-world testing.
- Designed and analyzed steel/HDPE composite pipe for pressures up to 3000 psi.
- Slashed costs for midline pipe fittings through critical tolerance analysis and collaboration with manufacturing. Co-authored patent application for the innovative fitting design; US patent 10,962,154 B2 awarded in March 2021.
- Cut new swage machine costs by 10% using design for assembly (DFA) features. Total cost of ownership saw a tremendous decrease due to regular maintenance savings.
- Initiated the practice of detailed analysis reporting. Put a formal system in place for all technical analyses.

MAY 2008 – MARCH 2011

**Mechanical Design Engineer / National Oilwell Varco, Sugar Land, TX**

- Project lead for mechanical design and testing of large vertical motors, drill motors, and motors used in special applications.
- Uncovered drastic misrepresentation of guaranteed motor specification through tolerance stack analysis.
- Engineered a design solution for failures on approximately 200 drill motors in Ulsan, South Korea. Supervised initial retrofits in Ulsan; coordinated efforts for remaining motors from the US.
- Created a closed-form solution for calculating stepped shaft critical speeds using Castigliano's Theorem. Results verified with FEA.
- Reinvented NOV's sound test post processing by writing new VBA sound analysis code with user-friendly front end.
- Researched and selected vibration software and instrumentation to bring vibration testing in-house. Performed testing using new equipment.

JUNE 2006 – APRIL 2008

**Advanced Development Engineer / Baldor Electric Company, Athens, GA**

- Disproved shaft failure claims with a custom Excel/VBA fatigue analysis tool to prevent a client from taking legal action against Baldor.
- Orchestrated internal and certifying witness tests for multiple projects to obtain industry certifications for AC motors (Underwriters Laboratories, Canadian Standards Association, etc.).
- Motor designs awarded sought after ingress protection ratings through design improvements.

JUNE 2005 – JUNE 2006

**Staff Scientist / Applied Research Associates, Inc., Raleigh, NC**

- Developed the skill of writing Excel/VBA code to compare Integrated Munitions Effects Assessment (IMEA) software results to validated models and experimental data for validation and verification purposes.
- Tested robustness of IMEA software code for quality assurance.

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## **Education**

MAY 2005

**Master of Science in Mechanical Engineering / Clemson University, Clemson, SC**

- Derived equations of motion using Lagrange's equations for a state-of-the-art, non-uniform tire model capable of producing realistic wheel forces for use in related submodels, e.g., steering and suspension models.
- Coupled genetic algorithm optimization with tire model to identify system parameters and simulate laboratory wheel force measurements with a maximum error of only 3.6 lb<sub>r</sub>.

- Published research work in the International Journal of Vehicle Design: Brian L. Dillinger, Nader Jalili, and Imtiaz Ul Haque, *Analytical Modelling and Experimental Verification of Tyre Non-uniformity*.

- GPA: 3.75/4.00

DECEMBER 2001

**Bachelor of Science in Mechanical Engineering / Clemson University, Clemson, SC**

- GPA: 3.52/4.00
- Minor in Mathematical Sciences

FALL SEMESTER 2000

**International Automotive Engineering Prog. / FH Esslingen, Esslingen, Germany**

- Automotive engineering program for international students in Esslingen, Germany.
- Completed program successfully; credits transferred for BS at Clemson University.