

Ana Lizette González Cataño

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Summary

Mechanical Engineer with a strong foundation in design for manufacturability, tooling, and process improvement. Experience includes 3D-printed assembly aids, failure analysis, and factory-level design changes. Committed to optimizing manufacturing workflows and increasing reliability through practical, hands-on engineering

Education

Cranfield University

Cranfield, United Kingdom

M.Sc. ADVANCED MOTORSPORT ENGINEERING

Sept. 2023 - Sept. 2024

- Modules: Powertrains, Motorsports Electronics and Data Acquisition, Business of Motorsport, Vehicle Dynamics, Aerodynamics, Computational Fluid Dynamics, Composite Structures, Structural Analysis
- Extracurricular Activities: F1 Design Sprint

Tecnológico de Monterrey

Chihuahua, Chihuahua, México &

Monterrey, Nuevo León, México

B.Sc. MECHANICAL ENGINEERING

Aug. 2019 - June 2023

- Extracurriculars: Gravity Racecar CUU (building & driving, 1st % second place), Familia Tec CUU (math & english teacher the first year, directive board on the second year), Violin Workshop
- Electives: Mathematics & Data Science for Decision Making (1st Semester), Humanities & Fine Arts; Image Culture (2nd Semester), Argumentation, Debate, & the Art of Public Speaking (4th Semester), Ethics, Sustainability, & Social Responsibility (5th Semester), Automotive Engineering (7th Semester)
- Grade: 92.32, with Academic Distinction and 40% tuition scholarship based on academic performance & entrance evaluation

Work Experience

Emerson

Chihuahua, Chihuahua, México

DESIGN INTERNSHIP

March 2023 - June 2023

- Designed and 3D-printed a plastic prototype of a rubber seal for the orbital weld heads which improved fit and ensured airtight sealing, supporting weld integrity by minimizing contamination and leakage
- Verified and updated legacy blueprints to eliminate production flaws in a holder fixture by modifying 3D dimensions and revising technical drawings in compliance with ASME Y14.5 standards
- Designed a compact tray to hold bobbin handles for different-sized coils, ensuring minimal space usage, rotational freedom, isolation to prevent contact or static buildup, and reduced assembly time
- Designed and 3D-printed a rapid tracing fixture for welding repellent pens (stop-offs), enabling consistent, straight, and uniform application at the correct height around the full pipe circumference
- Designed and 3D-printed an ergonomic tooling prototype to handle thin copper wires in small coils, enabling precise placement into slots without pinching or causing damage
- Developed single-piece 3D-printed clamps for brazing Coriolis mass flow sensors, designed to avoid thermal damage or weld contamination, reduce setup complexity, and streamline furnace preparation
- Developed a tray prototype to maximize the number of coils of varying sizes transported per tray, incorporating design features to address electromagnetic sensitivities and protect delicate components using bone-shaped slots of varying depths and chamfers for both product and user safety
- Presented a project summary and design analysis to senior supervisors and the factory's head manager, showcasing current designs, evaluating effectiveness through DFA/DFMA principles, and proposing improvements for cost and time reduction.

Academic Projects

Mechanically-Assisted Screw Dispenser Design

Tecnológico de Monterrey,

Chihuahua, Chihuahua, México

CLIENT-SPECIFIC FIXTURE PROTOTYPE FOR ELECTRONICS MANUFACTURING (SMTC)

May 2023

- Designed a fixture prototype aimed at reducing assembly time by 40% for high-tension, multi-contact industrial connectors in an electronics manufacturing context
- Defined SMART goals and conducted a risk analysis, enabling on-time delivery and reducing risks related to both manufacturability and end-use reliability
- Generated multiple concept solutions using market research and mechanical analogies from non-related systems (e.g., Wankel engine rotary motion, centrifugal effect in turbochargers, and magnetically driven realignment)
- Developed a full CAD model using real-world, market-available components and performed FEA simulations to validate load paths, motion smoothness, and high safety factors under varied operating conditions
- Selected materials for both structural integrity and electromagnetic compatibility, while considering cost-efficiency and supplier availability
- Outlined a proposed manufacturing process based on internal capabilities, identifying potential bottlenecks and proposing alternatives to support future prototyping or production
- Conducted strain and angle validation calculations to ensure consistent screw orientation, smooth feed behavior, and long-term reliability
- Created 3D technical drawings following ASME Y14.5-2018 dimensioning and tolerancing standards to reduce production errors and ensure manufacturability
- Applied DFMA (Design for Manufacturing & Assembly) principles, TPM (Total Productive Maintenance) considerations, and Part Reduction (PR) strategies to improve simplicity, maintainability, and scalability

Jaguar I-PACE Battery Tray Redesign

Tecnológico de Monterrey,
Monterrey, Nuevo León, México

AUTOMOTIVE ENGINEERING COURSE FIRST MIDTERM PROJECT

August 2022

- Redesigned the Jaguar I-PACE battery tray for lightweighting, transitioning from steel to aluminium to improve efficiency and sustainability
- Reduced overall weight and material usage without compromising structural integrity or required battery protection standards
- Performed material selection based on mechanical performance, availability, cost, and environmental considerations
- Carried out structural analysis using FEA and vibration simulations at key frequency ranges to validate performance
- Applied DFA, DFMA, and DFMEA methodologies to evaluate manufacturing feasibility, cost efficiency, and potential failure modes

AGV Vehicle Design and Manufacturing

Tecnológico de Monterrey,
Monterrey, Nuevo León, México

AUTOMOTIVE ENGINEERING COURSE SECOND MIDTERM PROJECT

November 2022

- Collaborated in a multidisciplinary team to design and manufacture an autonomous guided vehicle (AGV) for hospital logistics applications
- Led the design and manufacturing of the chassis using ASTM A36 steel, ensuring compatibility with component integration and hospital size constraints
- Performed FEA simulations to validate structural integrity, load distribution, and overall durability of the chassis
- Defined optimal suspension anchor points in CAD, balancing spatial constraints and suspension performance requirements
- Produced technical 2D drawings following industry standards to support precise steel cutting and fabrication
- Participated in hands-on chassis welding and assembly

Engine Piston Rod Analysis

Tecnológico de Monterrey,
Chihuahua, Chihuahua, México

BACHELOR'S DEGREE PROJECT

February 2022

- Performed a metallographic failure analysis on a TEO-540-C1A boxer engine piston rod removed from service due to mechanical failure
- Evaluated the piston rod assembly to identify potential failure modes and mechanisms
- Conducted fatigue analysis using both mathematical modeling (Marin equations) and CAD-based loading simulations
- Prepared metallographic samples by mounting in bakelite using a metallurgical press, followed by sequential polishing with alumina powder
- Examined microstructure using brightfield optical microscopy to assess grain boundaries, cavities, and phase distribution
- Determined base material through comparison with literature, supplemented by non-destructive testing and microscopic analysis

Carbon Fibre Wing Airfoil with Flax C Spar/Core

Cranfield University, Cranfield,
United Kingdom

COMPOSITE STRUCTURES PROJECT

January 2024

- Manufactured a carbon fibre wing airfoil with a flax fibre C-spar and core, documenting each step to minimise manufacturing errors and ensure process repeatability
- Calculated expected wing deflection under load and evaluated performance against defined acceptance criteria
- Performed 3-point bending tests on the prototype, compared experimental and theoretical results, and analysed discrepancies considering material properties, manufacturing variations, and structural behaviour

Skills

Technical Skills

- Power tools & workshop tools, CAD Simulations, welding, MATLAB, Solidworks, NX, Python, AVL Boost, ANSYS, Pi Toolbox, MiniTab, MoTec

Volunteering

- Support to a motorsport-themed student group "Sucesso Motor CUU" with logistics, coordination, and general assistance
- Assistance in the construction of an economic kitchen and general cleaning of the home for children "Casa Hogar"

Other Experience & Projects

Event Support Staff

Chihuahua, Chihuahua, México

"CLÁSICO" CLUB HÍPICO CAMPESTRE DE CHIHUAHUA

May 21 2025 - June 5 2025 (Contract)

- Provided broad event support before and during the club's main annual show jumping competition
- Designed graphic materials (cards & others)
- Assisted in the delivery of prizes and awards to winning participants
- Assisted in the management sponsor-related logistics (mentions, utility acquisition, etc.)
- Assisted in vendor logistics such as placement
- Supported the event secretary with on-site administrative tasks

Hackathon

Chihuahua, Chihuahua, México

INNOVATIVE TECHNOLOGY & CODING COMPETITION

2018

- Project proposal with the aim to solve a local need; the selected issue of our team was lost pets
- Came in 2nd place with the proposal of e-collar for pets mainly with information storage and GPS-tracking

Workshops

Chihuahua, Chihuahua, México

TEC DE MONTERREY

2013-2019

- Various cultural workshops
- Violin, musical ensemble, traditional art, cartoon & digital art, literature creation & genres, social skills and dynamics

Ford Driving Experience 2019 Edition

Chihuahua, Chihuahua, México

FORD MÉXICO

2019

- Participated in the advanced 1-day driving education, learning from professional drivers the adequate maneuvers for accident evasion and risk minimization