

Avery Elliott

Lead Thermal Design Engineer

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SUMMARY

Lead thermal design engineer with 11 years of experience developing **high temperature energy hardware**, solar thermal receivers, heat transfer components, and **validated thermal fluid models**. Work has covered concentrated solar systems, **high flux heat transfer**, optical flux analysis, thermal stress, materials selection, prototype testing, and qualification under severe thermal cycling. Led architecture decisions from requirements through hardware validation, balancing receiver efficiency, durability, manufacturability, cost, and system performance. Hands on leadership spans cavity and tubular receiver concepts, numerical modeling, design reviews, test correlation, and multidisciplinary work across thermal, optical, structural, and materials teams. Experience with high temperature alloys, refractory materials, instrumentation, CFD, **finite element thermal analysis**, and engineering qualification supports dependable receiver development. This background can help advance efficient, durable solar thermal systems from concept through validated hardware.

EXPERIENCE

Lead Thermal Design Engineer

Lone Star Solar Thermal 📅 February 2022 - Present 📍 Austin, TX

Owns concentrated solar receiver development from architecture and requirements through optical modeling, prototype testing, qualification, and production focused technical decisions.

- Set receiver requirements from system objectives, aligning efficiency, durability, cost, and **thermal storage** performance.
- Compared cavity, external, tubular, and particle receiver concepts during architecture reviews and selection studies.
- Built optical flux models and correlated predictions with instrumentation during high flux **prototype testing**.
- Selected alloys and refractory materials for 600°C to **1000°C** operation and severe **thermal cycling**.
- Led **qualification** planning, **design reviews**, and cross functional decisions across thermal, optical, structural, and materials teams.

Senior Thermal Engineer

Desert Sun Energy Research 📅 May 2019 - January 2022 📍 Albuquerque, NM

Directed high flux receiver analysis and materials evaluation, connecting thermal stress predictions, cyclic testing, and experimental evidence with design choices.

- Developed receiver models for **flux distribution**, **heat transfer efficiency**, and transient thermal response during testing.
- Analyzed **thermal stress** from concentrated solar loading and repeated cycles, guiding geometry and material changes.
- Screened **high temperature materials** against oxidation, fatigue, conductivity, and manufacturability requirements.
- Correlated **CFD** and finite element results with thermocouple data from receiver test articles.
- Presented **architecture trade offs** and qualification evidence during reviews with engineering and research stakeholders.

Thermal Design Engineer

Mesa Advanced Energy 📅 July 2016 - April 2019 📍 Phoenix, AZ

Designed high temperature heat transfer hardware and supported CFD, finite element analysis, **prototyping**, instrumentation, and test correlation for energy systems.

- Designed heat transfer components for high temperature service using CFD and **finite element thermal analysis**.
- Mapped temperature fields and thermal gradients, identifying stress concentrations before prototype fabrication.
- Built instrumented prototypes and analyzed test data to validate predicted thermal performance.
- Improved geometry through iterative analysis, balancing **heat transfer**, **durability**, access, and fabrication constraints.
- Documented design methods, assumptions, results, and verification evidence for engineering release decisions.

Thermal Engineer

Rocky Mountain Thermal Sciences 📅 June 2015 - June 2016 📍 Boulder, CO

Supported experimental heat transfer programs through instrumentation, model correlation, material evaluation, and clear technical reporting for engineering clients.

- Configured thermocouples and data acquisition hardware for controlled **heat transfer** experiments.
- Compared measured temperatures with analytical predictions, identifying model assumptions needing refinement.
- Evaluated candidate materials against conductivity, temperature limits, cycling exposure, and test compatibility.
- Prepared concise technical reports linking experimental findings with design recommendations for client review.
- Supported **prototype testing** and calibration activities under guidance from senior thermal engineers.

PROJECTS

High Flux Receiver Qualification 2024

Led a distinct qualification effort for a high flux receiver, combining optical flux mapping, thermal stress analysis, cyclic testing, and material evidence for design acceptance.

Tubular Receiver Trade Study 2021

Compared tubular and cavity receiver options through thermal modeling, optical analysis, material screening, and system performance reviews.

LEADERSHIP & AWARDS

- 2024, Technical Leadership Recognition for advancing receiver qualification practices
- 2022, Engineering Excellence Award for high temperature thermal analysis and prototype validation
- 2020, Research Collaboration Award for cross discipline solar thermal modeling

EDUCATION

Bachelor of Science in Mechanical Engineering

University of Colorado Boulder GPA: 3.8 2015 Boulder, CO

Coursework: Thermodynamics, Heat Transfer, Fluid Mechanics, Finite Element Analysis

CERTIFICATIONS

- ANSYS Thermal Analysis Certificate 2021
- Solar Energy Engineering Continuing Education Certificate 2023

TECHNICAL SKILLS

- Thermal Analysis:** ANSYS Thermal, CFD, finite element analysis
- Optical Engineering:** Flux distribution, ray tracing, optical modeling
- Receiver Architecture:** Cavity receivers, external receivers, tubular receivers
- Particle Systems:** Particle based receivers, thermal storage, high flux loading
- Heat Transfer:** Conduction, convection, thermal efficiency
- Materials Engineering:** High temperature alloys, refractory materials, oxidation screening
- Thermal Mechanics:** Thermal stress, thermal gradients, cyclic fatigue
- Testing And Qualification:** Prototype testing, cyclic testing, qualification planning
- Instrumentation:** Thermocouples, data acquisition, temperature mapping
- Engineering Delivery:** Requirements, design reviews, verification documentation

SKILLS

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|-----------------|-------------------------|-----------------------|----------------------------|
| Thermal design | Optical modeling | Materials selection | Design reviews |
| Solar receivers | Thermal stress | Thermal cycling | Architecture trade studies |
| Flux analysis | CFD | Prototyping | Requirements definition |
| Heat transfer | Finite element analysis | Qualification testing | |

PROFESSIONAL AFFILIATIONS

- Member, American Society of Mechanical Engineers
- Member, SolarPACES technical community
- Participant, professional thermal engineering review forums

LANGUAGES

- English (Native)
- Spanish (Proficient)

ADDITIONAL INFORMATION

Work Status : Authorized to work in United States. No sponsorship required.

REFERENCES

AVAILABLE ON REQUEST