Career Options for Electrical & Power Engineers

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A Collection of Career Options for students once they understand circuit design.

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Purpose

This presentation of generic career options demonstrates:

1. Electrical circuit design knowledge is a stepping-stone to many diverse career options.
2. Research in industry is sometimes buried in job descriptions.
3. This list is not all inclusive (just a sample to get started with the exploration process) as there are still many ways to take careers forward.

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Test Engineer

Assess

- Performance
- Reliability
- Safety

Ideally through quick, inexpensive, and non-destructive methods

Verification = evaluation of whether or not a product, service, or systems complies with regulation, requirement, specification or imposed condition. It is often an internal process.

Validation = assurance that a product, service, or system meets the needs of the customer and other identified stakeholders. It often involves acceptance and suitability with external customers.

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Quality Engineer

Inspect/Audit to identify quality issues

Address quality issues proactively

- Avoid mistakes

Improve processes

Ensure regulations compliance

- Safety
- Environmental
- Industry

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Reliability Engineer

Ensure that a product, equipment or service will function as intended for a specified period of time

Analyze risk of failure

Prevent or reduce failures
- Identify design flaws
- Find cost effective measures

Predict realistic preventive maintenance & lifetimes
- Avoid recalls
- Minimize warranty claims and costs

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Failure Analysis Engineer

Investigate product failures

- Typically uses very advanced tools such as a scanning electron microscope (SEM), focused ion beam (FIB), x-ray diffraction, etc.
- Use fault isolation methods

Identify root cause of failures

- Think critically
- Analyze data

Recommend corrective actions

- Proactive communication

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Application Engineer

Implementation specifics

Create evaluation boards

Teach customers

Document
- Application notes
- Technical articles

Field Application Engineer

Customer support
  Troubleshoot or debug designs

Implement/Install

Provides recommendations/advice to customers

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Manufacturing Engineer

Improve manufacturing process flow, costs & production efficiency
- Ensure manufactured products are within specifications or tolerance
- Requires strong software skills (CAM)
- Requires adaptable mindset
- Works well in a team
- Continuous improvement & efficiency mindset

Ensure equipment maintenance
- Prevent downtime issues
- Manage spares
- Hands on process

Troubleshoot problems

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Procurement Engineer

Communicate technical needs to suppliers

Evaluate supplier qualifications & options
- Validates products meet needs

Negotiate with suppliers on price, schedule, quantity, types, etc.

Review legal & contractual requirements

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Device/Component Engineer

Design, implement & test a device or component that makes up a circuit or system

Research key materials and structures to optimize the device or component performance

Characterize the device/component

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Circuit Design Engineer

Designs an electrical circuit for testing, manufacturing, reliability and sustainability in volume.

- May deploy analog, mixed-signal, RF or digital design approaches
- Design must meet performance requirements
- Design must be completed within market constraints
- Specifies which components are key
- Conducts design reviews

Verifies circuit design using simulations.

Lays out the circuit either on a printed circuit board (PCB) or as an integrated circuit (IC)

System Designer Engineer/Architect

Partitions & maintains large systems into manageable subsystems.

Decides the overall framework in both hardware or software.

Challenges include:

- Dealing with complexity & uncertainty of large & evolving systems
- Tradeoffs between competing & conflicting factors
- Communicate and deal with people
- Being accountable & responsible for decisions & outcomes

Product Engineer

Design product

Develop product

Test product

Launch product
- Ensure adequate documentation

May require project management skills

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Project Engineer

Manage project
  Team Leadership

Responsible for project
- Scope
- Schedule
- Budget
- Resources

Proactively manages risk
  Avoids risk or mitigates effects

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Software Engineer

Responsible for software programs (typically embedded for digital power)

- Create
- Test
- Maintain
- Improve

Develop & maintain supporting scripts & instrument interfaces

Optimize size & execution time

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CAD, Modeling & Simulation Engineer

Responsible for software models

Acquire, modify & deploy software models & tools for circuit design, circuit layout/implementation

- Identify circuit design or layout issues early in the design process
- Implement design rule checks
- Implement layout versus schematic checks

Identify & resolve simulation bottlenecks

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Technical Sales Engineer

Combines technical knowledge and sales skills to provide advice and support on products.

Recommend products and services.

Key point of customer contact for pre- & post-sales.

Build and maintain long term relationships with customers.

Note: This job description has some overlap with Field Applications Engineers and varies between companies.

Reverse Engineer

Tear down analysis to determine how a system works

Cost analysis
- Materials used

Competitive benchmarking

May be used for patent litigation

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