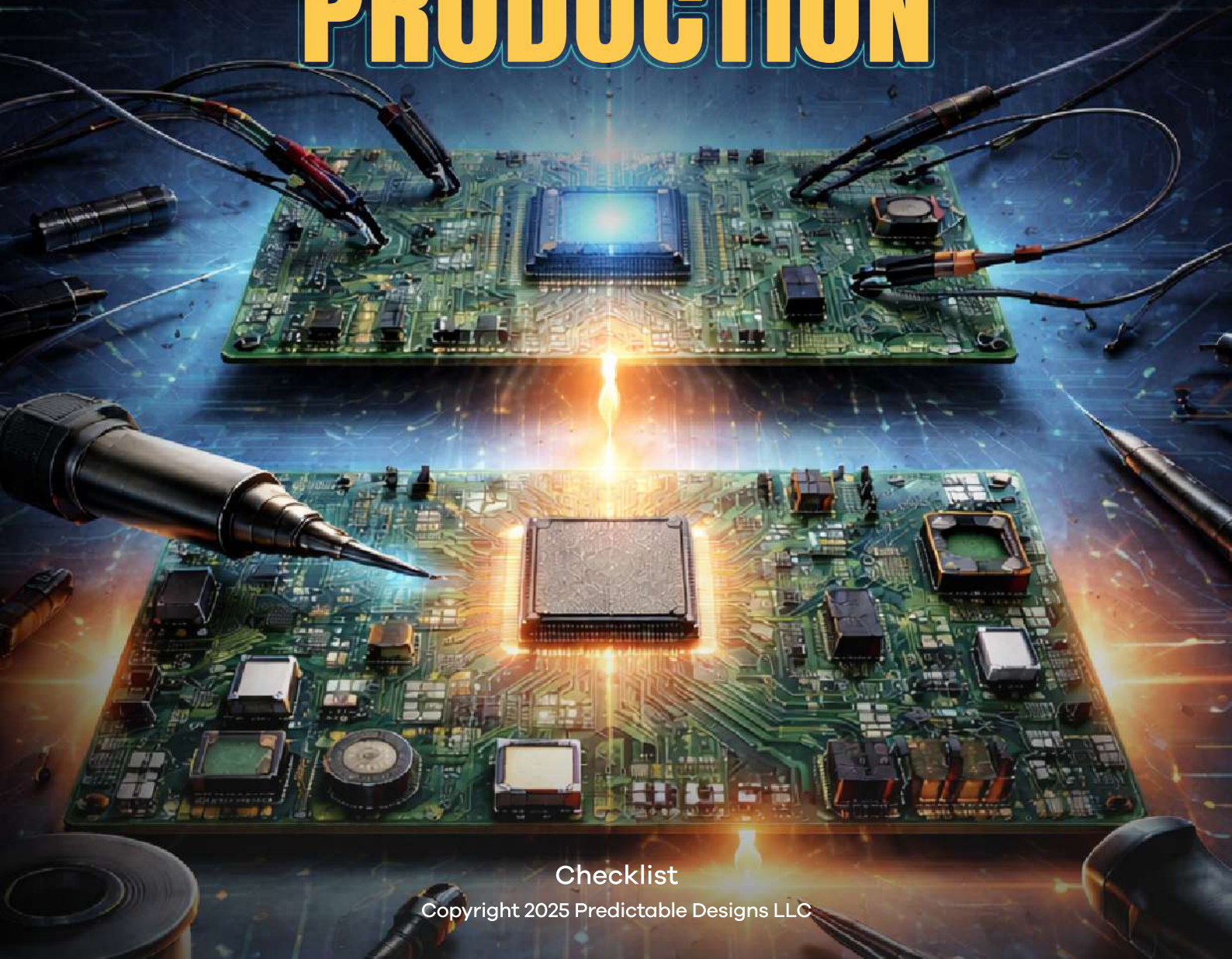


# 10 HIDDEN STEPS BETWEEN PROTOTYPE AND PRODUCTION



Checklist

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**STEP #1*****Freeze the engineering design***

- 1.1 Stop feature changes and layout tweaks once the prototype works.
- 1.2 Manufacturing requires stability across hardware, enclosure, and firmware.
- 1.3 Continuous changes prevent tooling, documentation, and test processes from locking down.

**STEP #2*****Design for Manufacturing (DFM)***

- 2.1 A functional prototype isn't automatically manufacturable at scale.
- 2.2 Consider trace widths, solder mask spacing, clearances, panelization, and assembly rules.
- 2.3 Optimize for repeatability and yield, not just performance.

**STEP #3*****Sourcing and Supply Chain Validation***

- 3.1 Parts that are easy to buy in prototype quantities may fail at production scale.
- 3.2 Check lead times, price stability, and single-source risks early.
- 3.3 Prevent redesigns and delays caused by unavailable components.

**STEP #4*****Design for Test (DFT)***

- 4.1 Testing thousands of units requires built-in testability.
- 4.2 Include test pads, jigs/fixtures, firmware test modes, and automated pass/fail logic.
- 4.3 Reduce test time without sacrificing coverage, since seconds add up at scale.

**STEP #5*****Design for Certification***

- 5.1 Certification must be engineered into the product, not added at the end.
- 5.2 Plan EMC behavior, grounding, filtering, isolation, antenna placement, and shielding.
- 5.3 Avoid predictable failures that force expensive redesigns.

**STEP #6*****Reliability and Stress Testing***

- 6.1 Problems often appear only when more units are built.
- 6.2 Look for issues like cracked solder joints, connector failures, drift, or thermal hotspots.
- 6.3 Expose units to vibration, temperature cycles, and humidity to reveal weaknesses.

**STEP #7*****Firmware for Manufacturing***

- 7.1 Production firmware is different from development firmware.
- 7.2 Support automated tests, calibration, serialization, and predictable boot behavior.
- 7.3 Design firmware so the line can run without manual intervention.

**STEP #8*****Test Fixture Development***

- 8.1 Fixtures provide repeatable physical and electrical connections for testing.
- 8.2 Good fixtures reduce test time and improve consistency.
- 8.3 Treat fixtures as critical tooling, not an afterthought.

**STEP #9*****Production Validation: EVT / DVT / PVT***

- 9.1 EVT verifies the electronics function as intended.
- 9.2 DVT evaluates the complete product, including enclosure and reliability.
- 9.3 PVT validates the production line and yield before scaling volume.

**STEP #10*****Quality Assurance and Yield Optimization***

- 10.1 Expect variability when production starts, then iterate to remove it.
- 10.2 Analyze failures, refine processes, and stabilize yields.
- 10.3 High yield comes from repeated cycles of testing and improvement.

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## Meet your guide: John Teel



Hey there, I'm a former microchip design engineer at Texas Instruments and founder of a hardware startup that sold products in hundreds of retail stores. My chip designs are in devices from Apple, Intel, and more.

Now, my full-time focus is helping people like you bring new electronic products to life, without wasting time, money, or risking everything.

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