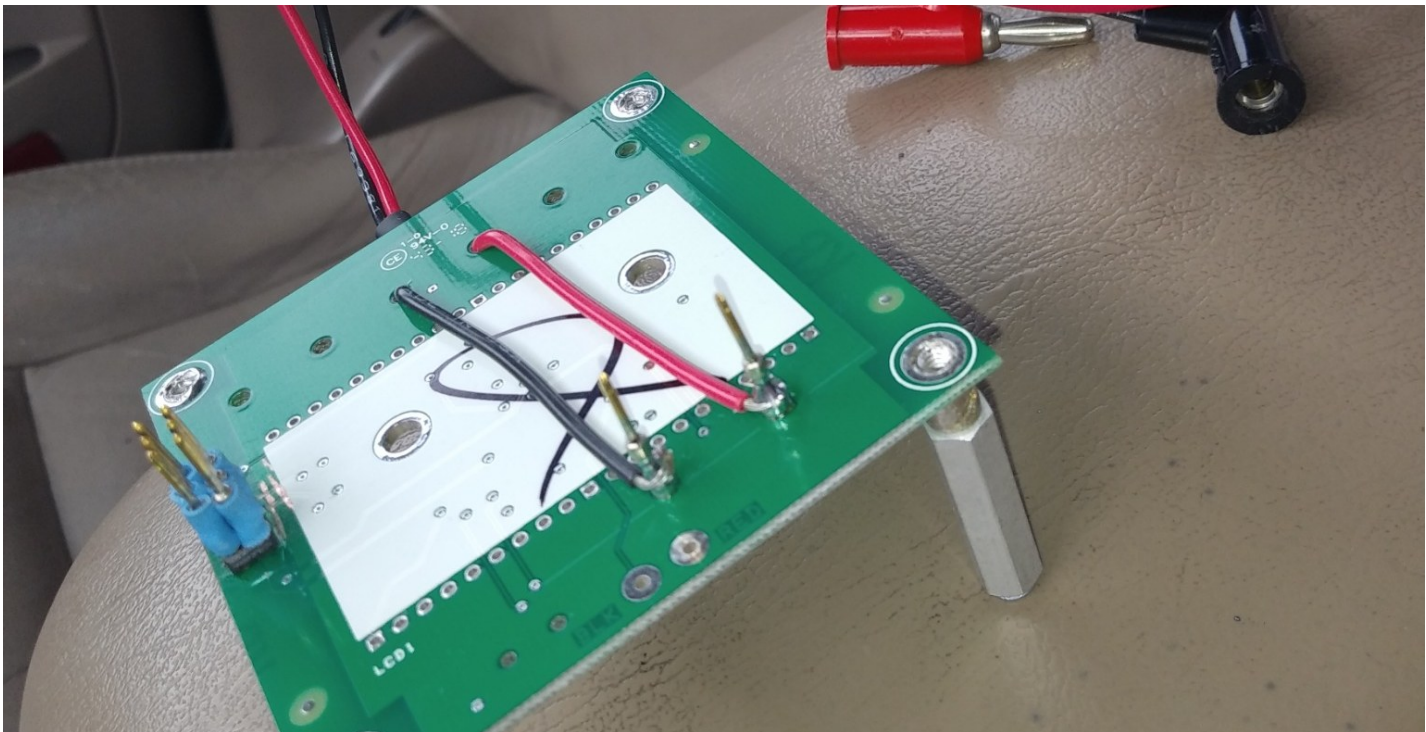


PCB Programming Fixture & Process Improvement

Manufacturing Process Improvement | Electronics & PCB Production



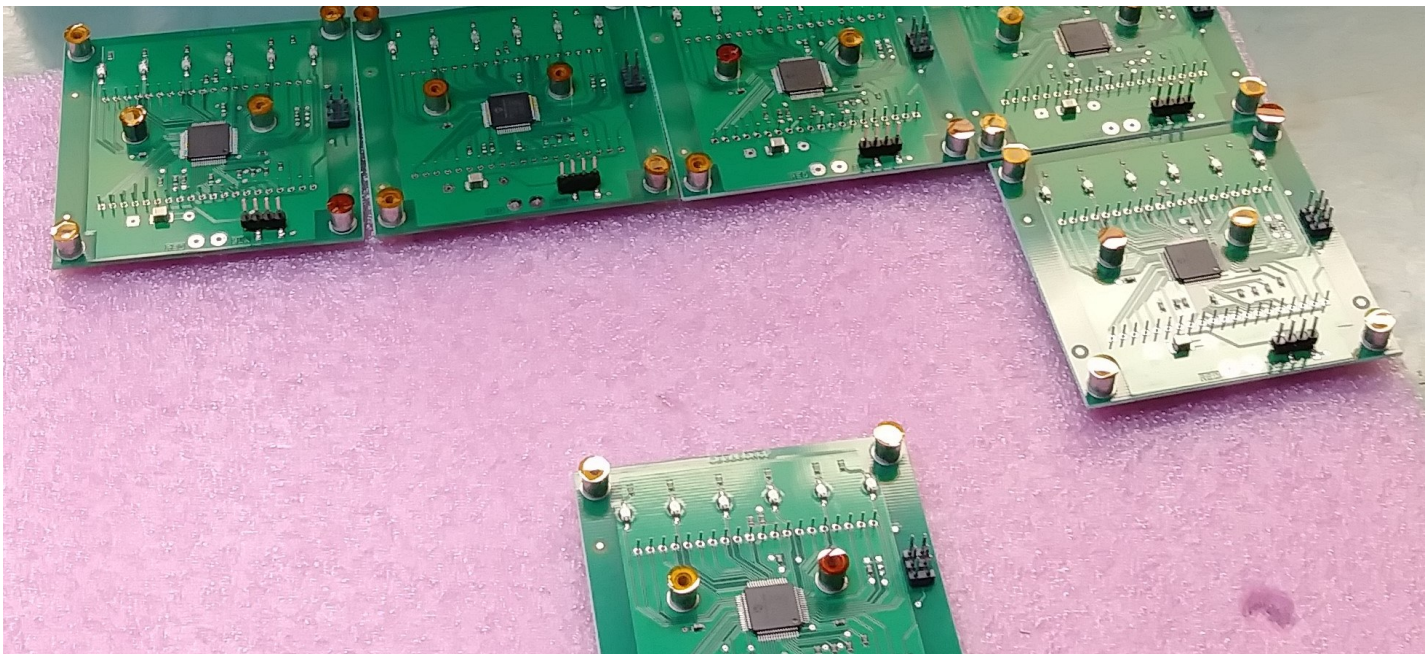
1	6-Pin	8	Reusable
PRODUCTION FIXTURE	CONNECTOR REMOVED FROM EACH PCB	TEMPORARY CONTACTS 6 PROGRAMMING + POWER/GROUND	PROGRAMMING INTERFACE

Project Overview

While working in electronics manufacturing, I identified an opportunity to improve the process used to program software onto production circuit boards. The existing process required a dedicated 6-pin programming connector to be soldered onto each PCB so a ribbon cable could be attached during programming. Once the software was installed, the connector was no longer required but remained permanently installed on the finished board.

I designed and built a reusable fixture that transferred this interface from every production board to a single manufacturing tool. A blank PCB provided the physical layout and alignment, while spring-loaded contacts established temporary programming, power, and ground connections.

From Repetitive Operation to Reusable Tool



Production PCBs - representative populated boards from the electronics manufacturing environment in which the fixture was developed and used.

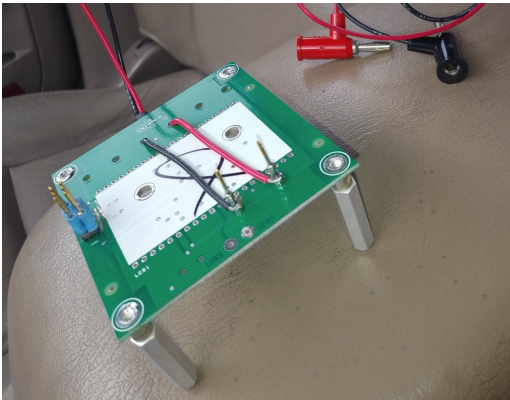
EXISTING PROCESS	IMPROVED PROCESS
Solder programming connector -> Connect programmer & power -> Program PCB -> Connector remains on finished board	Place PCB on fixture -> Align & press -> Program PCB -> Remove completed board

Fixture Design & Construction

The fixture was built around a blank version of the production PCB, using the board's existing geometry and through-hole locations to establish consistent alignment.

Spring-loaded contacts were positioned over the six programming connection points, with two additional contacts for power and ground. Pressing a production board onto the fixture temporarily established the electrical connections required for programming.

A standard 6-pin connector was soldered on the underside at the corresponding through-holes so the programmer's ribbon cable could remain connected to the reusable fixture.



Results & Impact

The completed fixture eliminated the need to install a dedicated 6-pin programming connector on every production PCB. Because that connector was only required during software installation, moving the interface to a reusable fixture removed unnecessary permanent hardware from each finished board.

The revised process also eliminated the repetitive soldering operation associated with that connector and reduced setup and handling between boards. The same fixture could be reused sequentially across production units.

Measurement note: Formal cycle-time and cost-savings data were not recorded. The documented improvement therefore focuses on the eliminated hardware and production steps rather than estimated percentages or dollar savings.

Finished product example shown only to provide manufacturing context for the fixture's role in the production process.



Eliminated dedicated programming connector	Reduced repetitive soldering	Reusable programming interface	Simplified board programming
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Skills Demonstrated

Electronics & Fabrication PCB Assembly • Soldering • Through-Hole Components • Spring-Contact Interfaces • Wiring • Electronics Manufacturing	Design & Problem Solving Fixture Design • Prototyping • Electrical Interfacing • Troubleshooting • Practical Problem Solving	Manufacturing & Process Improvement Process Analysis • Workflow Improvement • Reduction of Repetitive Operations • Material Reduction • Production Support • Design for Manufacturing
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Project Summary

This project demonstrates a practical manufacturing-improvement approach: identify a repetitive operation, isolate the temporary function it serves, and move that function into a reusable tool. The resulting fixture preserved the required programming interface while removing unnecessary hardware and soldering from each production board.