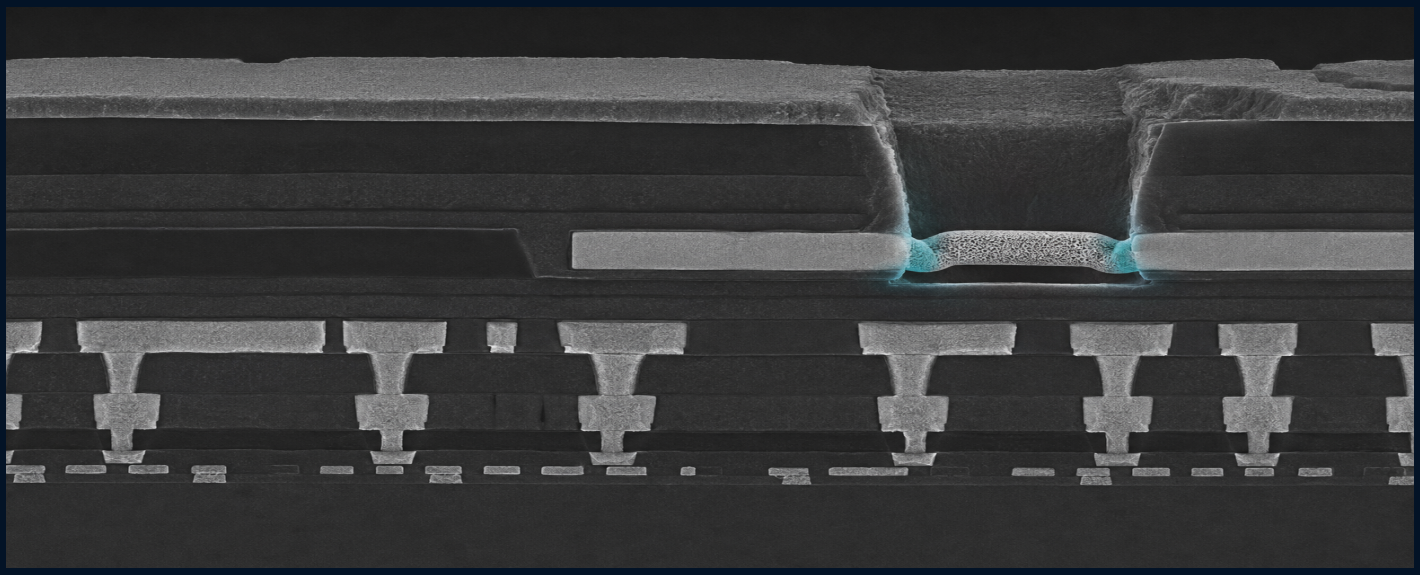
APVERION
BRINGING ENGINEERING KNOWLEDGE INTO FOCUS

FIELD NOTE 03 / FIB CIRCUIT EDIT

Modify the circuit.

Preserve the experiment.

A circuit-edit workflow for turning a hypothesis-driven physical modification into a traceable experiment - connecting navigation, milling, deposition, electrical verification, functional response, and failed attempts.



01 **HYPOTHESIZE**

02 **REGISTER**

03 **EXPOSE**

04 **EDIT**

05 **VERIFY**

06 **LEARN**

01 Hypothesize

Define the electrical or design behavior being tested, expected response, edit strategy, risks, and conditions that would falsify the hypothesis.

EVIDENCE TO PRESERVE

- Circuit hypothesis and expected response
- Candidate cut, reroute, or probe geometry
- Success, failure, and abort criteria

DECISION GATE

Will this edit produce a discriminating result?

02 Register

Correlate layout, navigation images, fiducials, layer depth, alignment offset, and device orientation before exposing the target.

EVIDENCE TO PRESERVE

- CAD-to-image registration
- Target coordinates and keep-out zones
- Alignment uncertainty

DECISION GATE

Is the intended net unambiguously located?

03 Expose

Open the edit window while controlling protective deposition, milling depth, redeposition, charging, endpoint, and adjacent structures.

EVIDENCE TO PRESERVE

- Window geometry and protection
- Beam conditions and endpoint images
- Observed artifacts and corrections

DECISION GATE

Is the target exposed and neighboring circuitry intact?

04 Edit

Sever, isolate, deposit, reconnect, or create access using recorded geometry, materials, process parameters, and intermediate verification.

EVIDENCE TO PRESERVE

- Cut and deposition geometry
- Precursor, dose, beam, and dwell history
- Intermediate images and operator decisions

DECISION GATE

Does the physical edit match the intended circuit change?

05 Verify

Confirm continuity, isolation, geometry, collateral effects, and functional behavior using imaging and electrical evidence.

EVIDENCE TO PRESERVE

- Post-edit SEM/FIB imagery
- Resistance, leakage, or functional test
- Artifact and damage assessment

DECISION GATE

Did behavior change in the predicted direction?

06 Learn

Preserve successful and failed edits as knowledge linked to design intent, execution, verification, and outcome.

EVIDENCE TO PRESERVE

- Result vs predicted response
- Failure modes and recovery actions
- Reusable geometry and process precedent

DECISION GATE

What should the next edit inherit from this one?

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THE DURABLE ENGINEERING RECORD

What should survive *after the work is complete.*

01 Original hypothesis and design intent

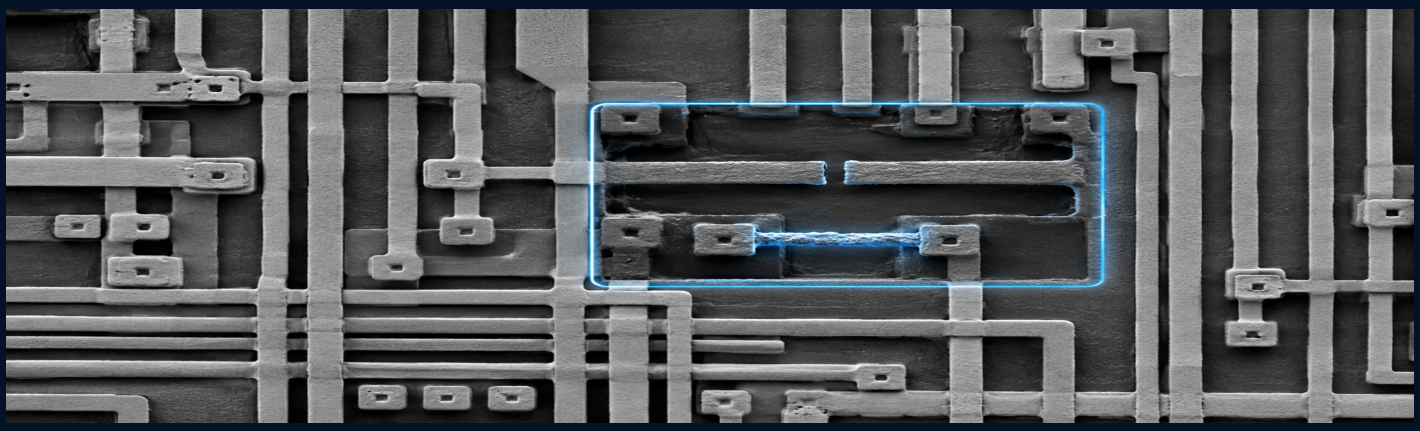
02 Layout registration and navigation history

03 Complete cut, mill, and deposition parameters

04 Before, intermediate, and after imagery

05 Electrical and functional verification

06 Failed paths, artifacts, confidence, and next action



COMMON KNOWLEDGE FAILURES

The instrument can succeed *while the record fails.*

01 Saving only the successful final image and losing the hypothesis that made the edit meaningful.

02 Assuming CAD registration is exact without preserving alignment uncertainty and fiducials.

03 Attributing behavior to the intended reroute without checking shorts, leakage, damage, or incomplete isolation.

04 Discarding failed edits that reveal process limits, geometry sensitivity, or recovery methods.

OPERATING PRINCIPLE

The value of circuit edit is not only that the device changed. It is that the change tested a specific engineering belief.

Can the final behavior be traced to the intended edit rather than an unrecorded artifact?