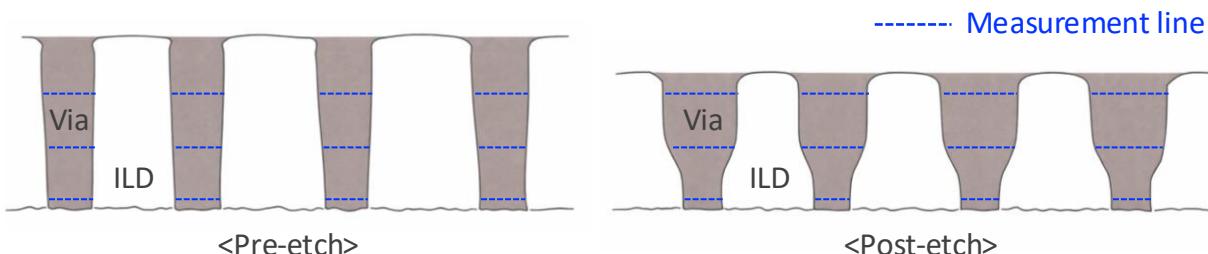


Reduced TEM analysis time by 97%, enabling data-driven process optimization

Background

Via Etch Development

- Increase via metal volume using a reactive ion etching (RIE) tool
- Evaluate tool performance with TEM etch profile analysis



Motivation

Time-intensive manual analysis

- ~6 minutes per image using ImageJ or Quartz PCI

Process condition evaluation requires:

- 3 via locations
- 2 cuts: X, Y
- 3 images per cut/location → **18 images total (~108 min)**

Inconsistent measurement

- Results vary by person due to:

- Reference line placement
- Measurement line/ROI selection
- Pixel interpretation and click accuracy

Throughput bottleneck

- DOE generates a large number of images:

One demo involves 20-25 conditions

→ Total analysis time: ~36-45 hours

Approach

Develop a Python-based automated TEM profile analysis workflow to:

- Automate measurement for **consistency and speed**
- Provide **structured data** for comparison and trend analysis
- Generate annotated images for **traceability and outlier detection**
- Enable **custom measurement** rules on IP-controlled images

Outcome

Reduced Analysis time

Manual measurement

~6 minutes per image

One condition (=18 images) → ~108 min

Quantified etch profiles

Automated measurement

~30 seconds per image

One condition (=18 images) → ~3 min

