



High Pin Count, High Parallelism Vertical Probe Card Characterization Strategies for HVM Automotive Bump Wafer Testing



Cameron Harker - FormFactor
Yoichi Urakawa - FormFactor

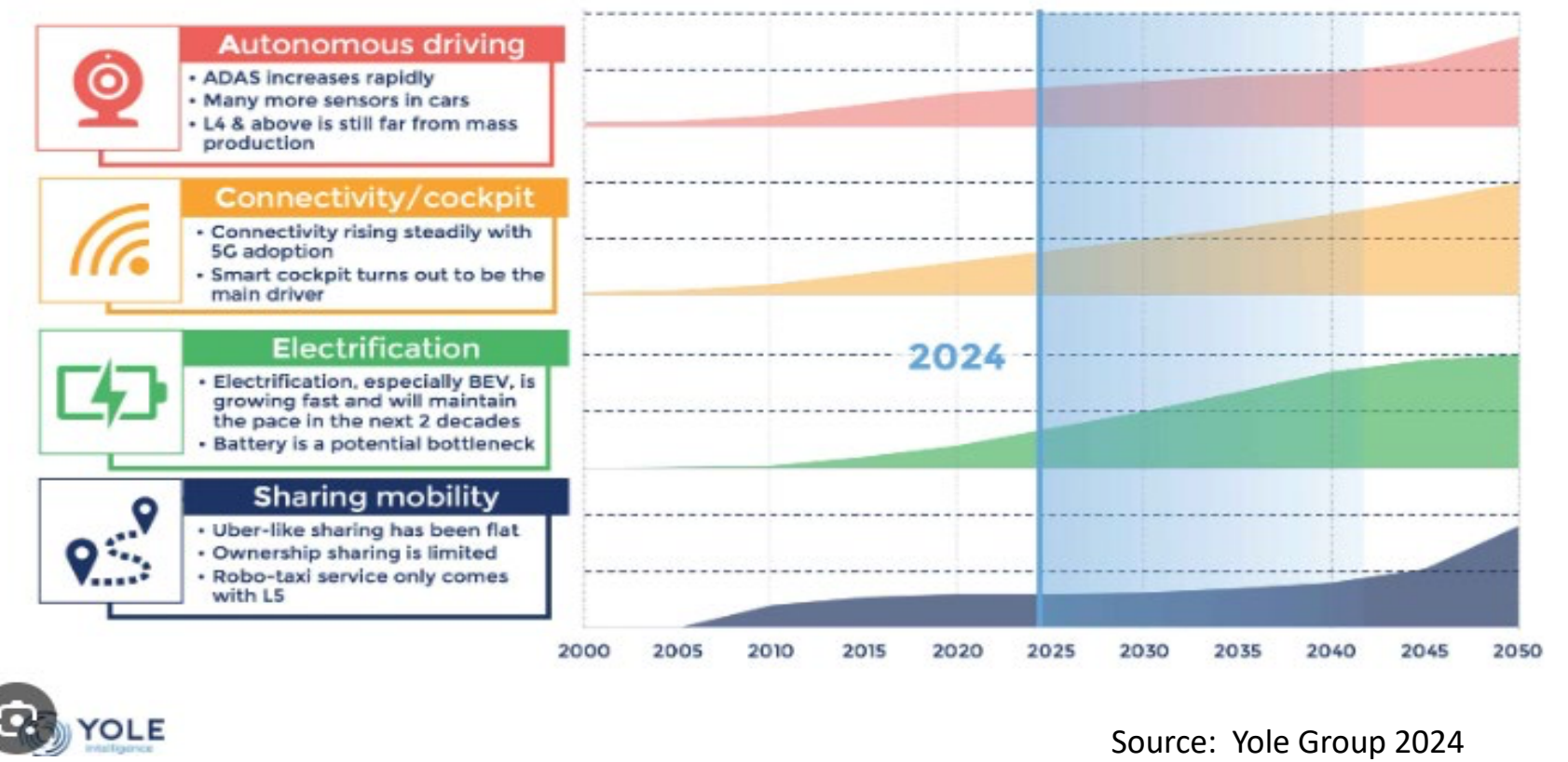
Automotive Chip Demand Drivers

Automotive Device Market Size

- Revenue CAGR 23 ~ 33 at 9.2%

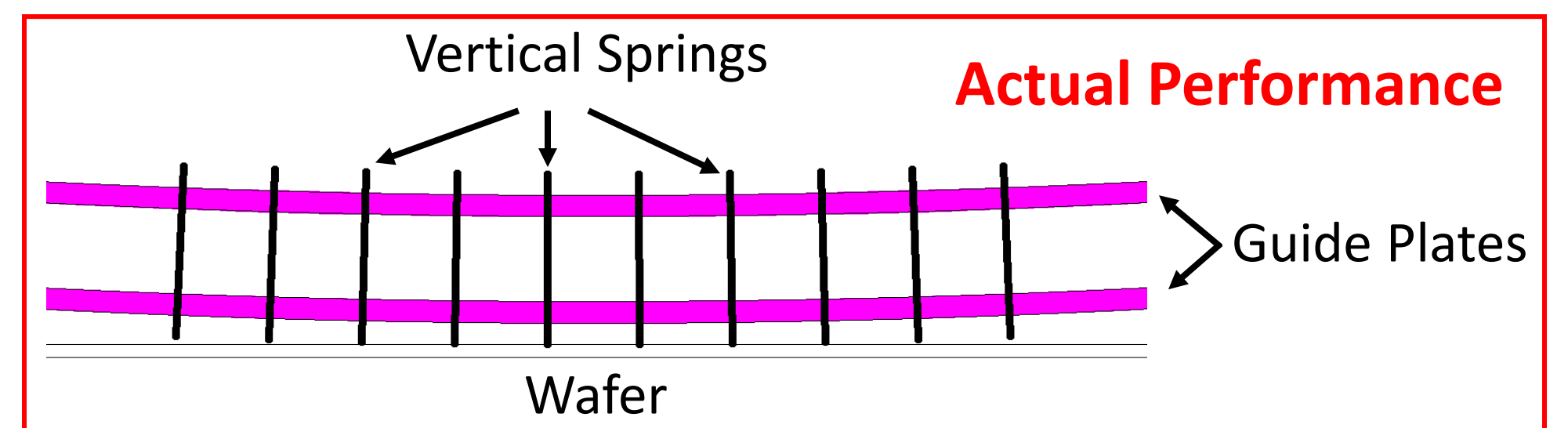
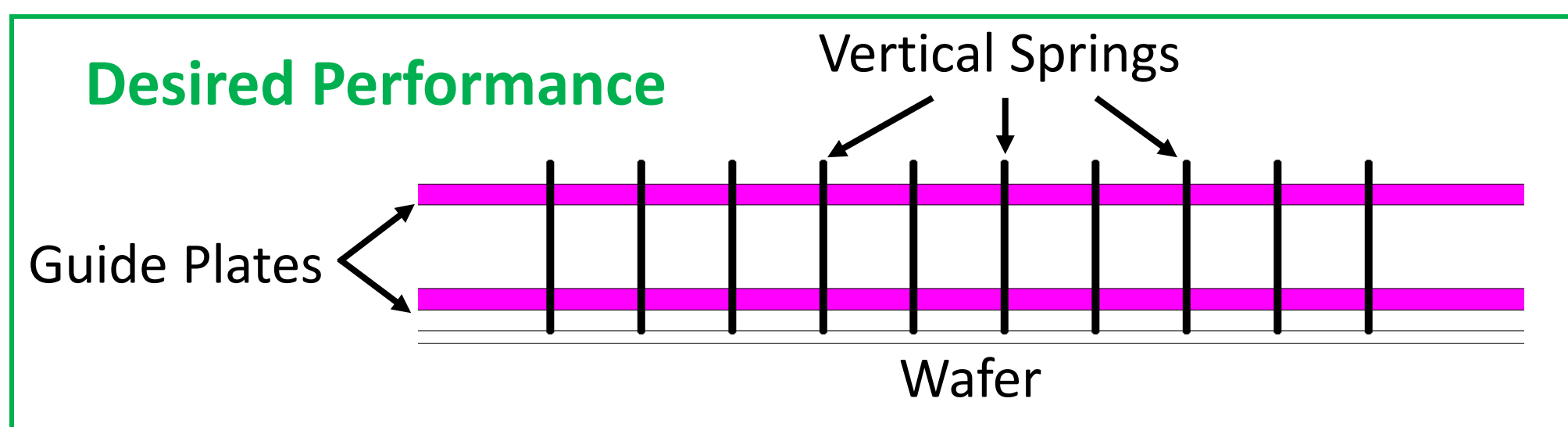
Key growth drivers:

- Vehicle electrification**
 - Shift to EV → power & battery mgmt. systems
- Advanced technologies**
 - Enabling safety, self-driving, control advancements
- Increased chip content**
 - uControllers, ADAS, Infotainment, mobility sharing

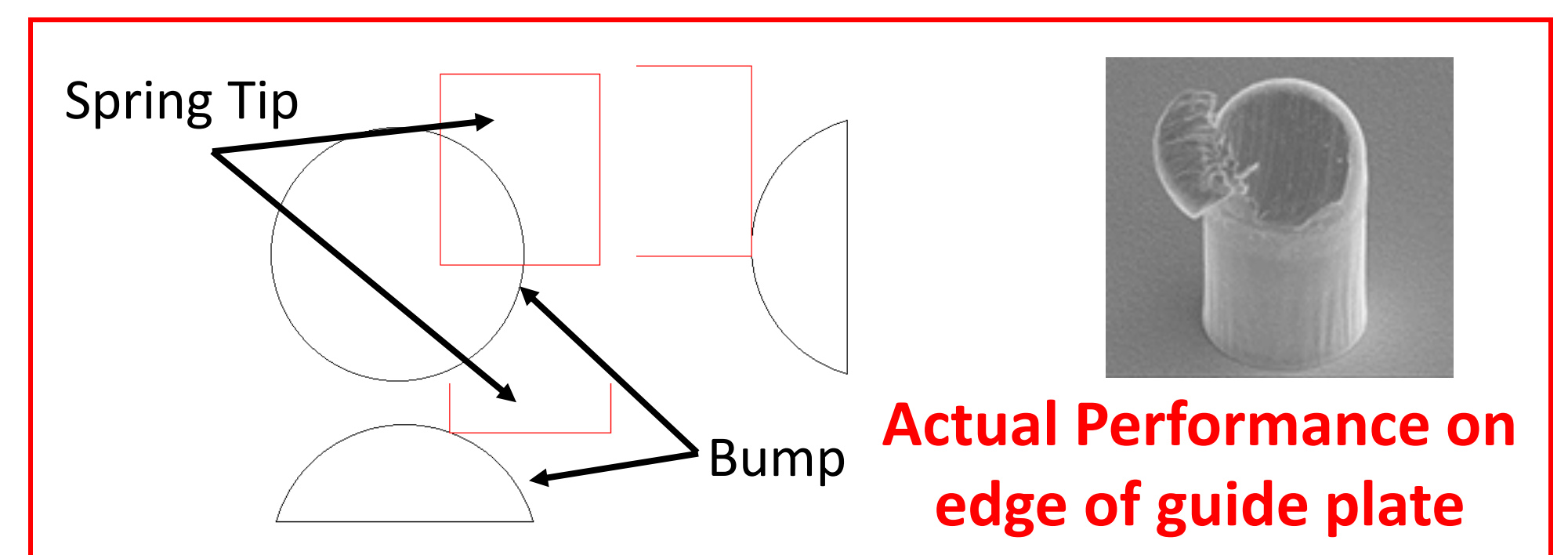
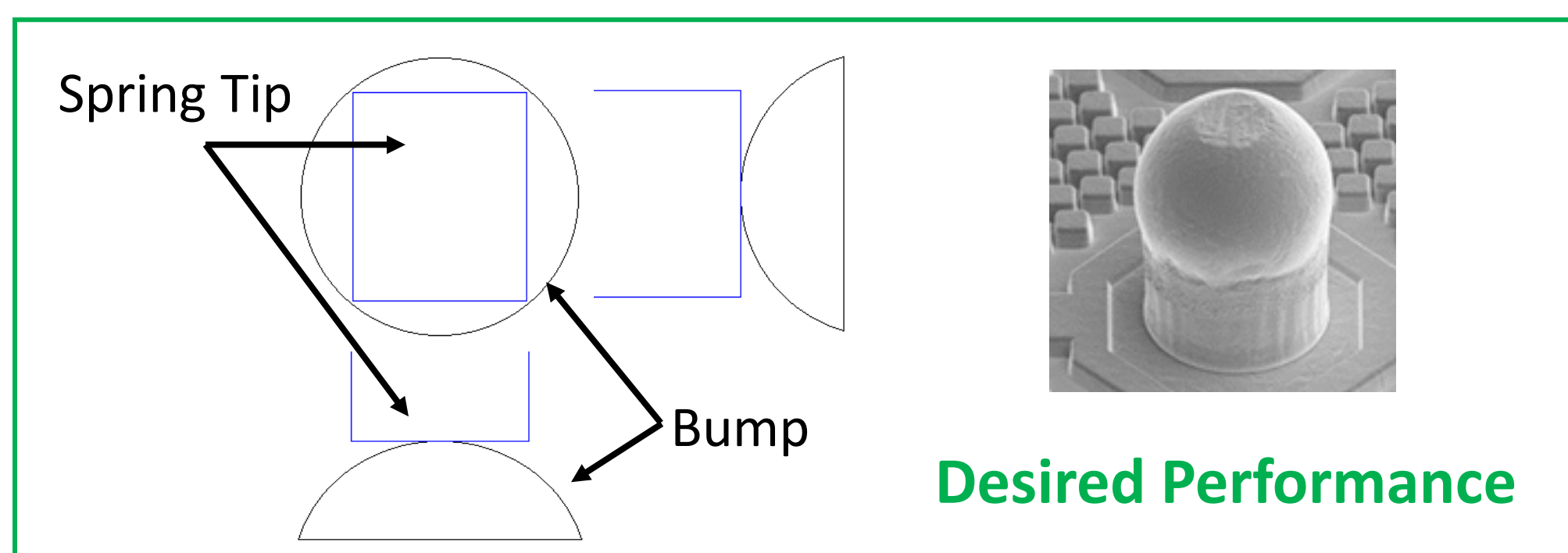


Motivation for Work – Improve Probe Card Performance and Reduce Cost of Test for Automotive Device Wafer Test

- Need to resolve guide plate bowing issue during production

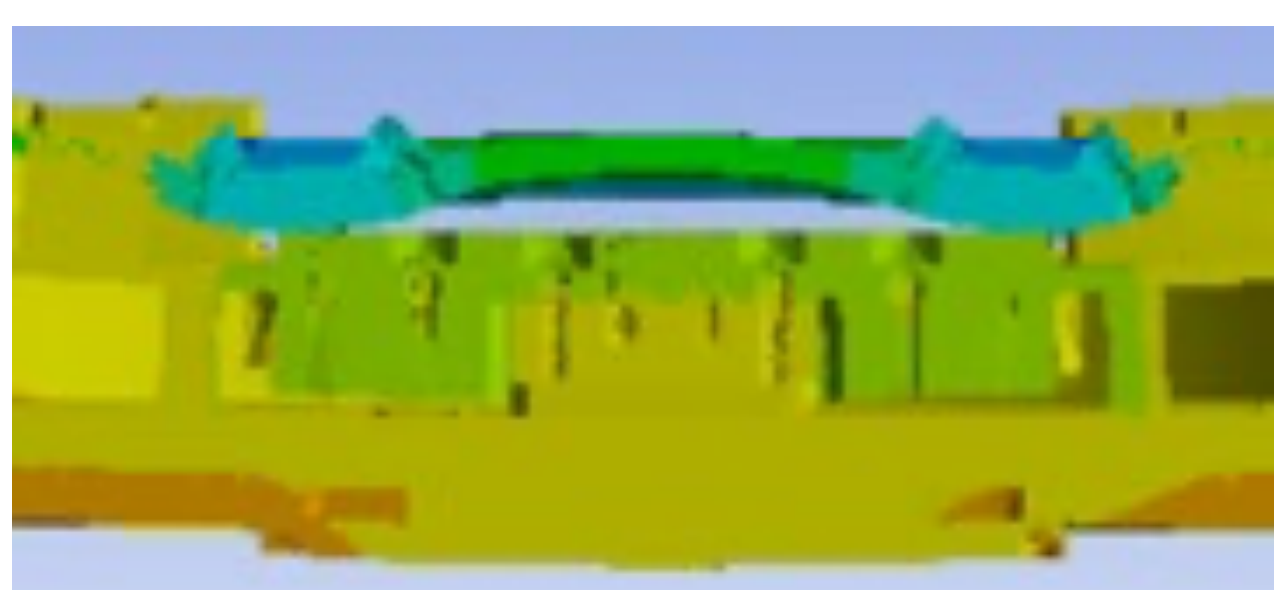


- Guide plate bowing leads to mis-aligned springs (X/Y) causing CRES instability



Guide Plate Bowing Simulation Results

Simulating FFI low force, rigid guide plate material



Simulated Guide Plate Bow showing flat guide plate planarity

Simulating high force, traditional guide plate material



Simulated Guide Plate Bow showing excessive bow

FFI Solution x16 solution reduced guide plate bow vs POR solution
- Utilizes low force springs combined with ridged guide plate technology

Increase Parallelism to Lower TCOO

Key TCOO Model Assumptions

- Comparing current suppliers x4 and x8 vs. new FFI x16 design
- Similar test times between the three configurations
- Same wafer starts per month
- No additional testers required
- 10-year product (device) life-time
- Captured production performance differences between the different probe card configurations

