

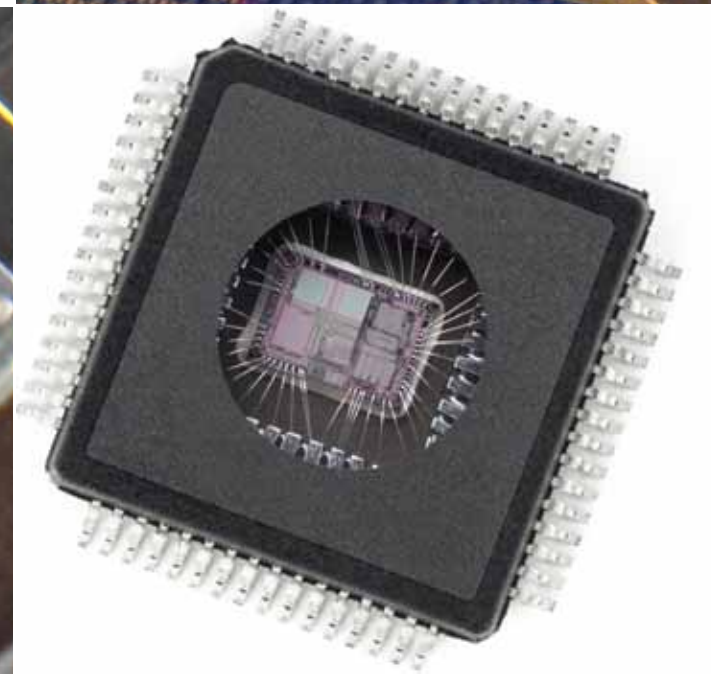
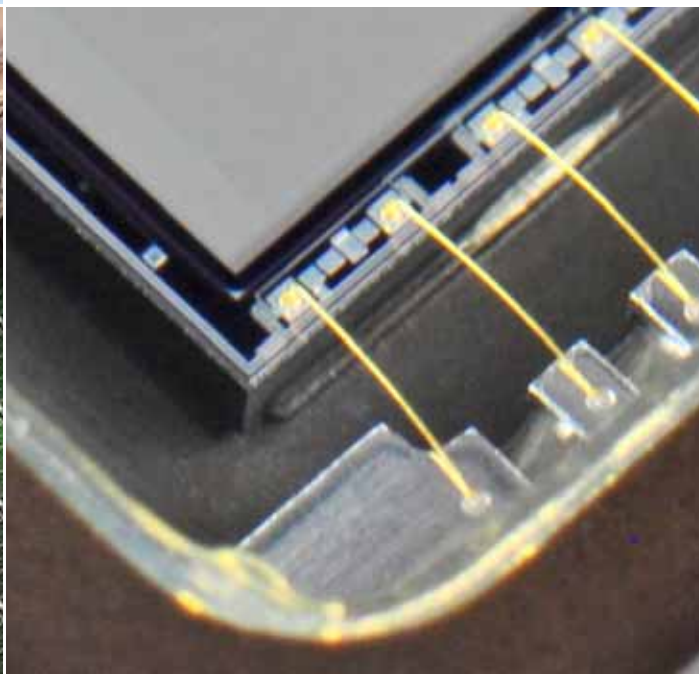
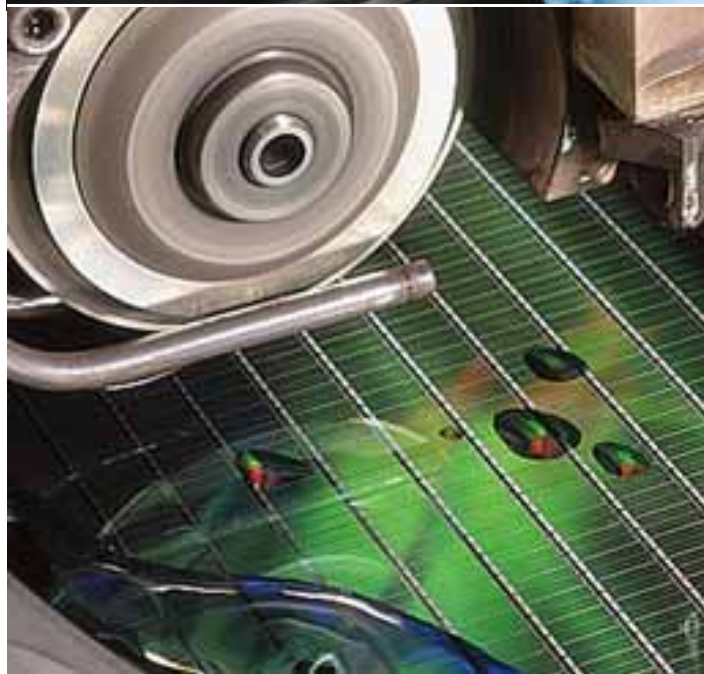
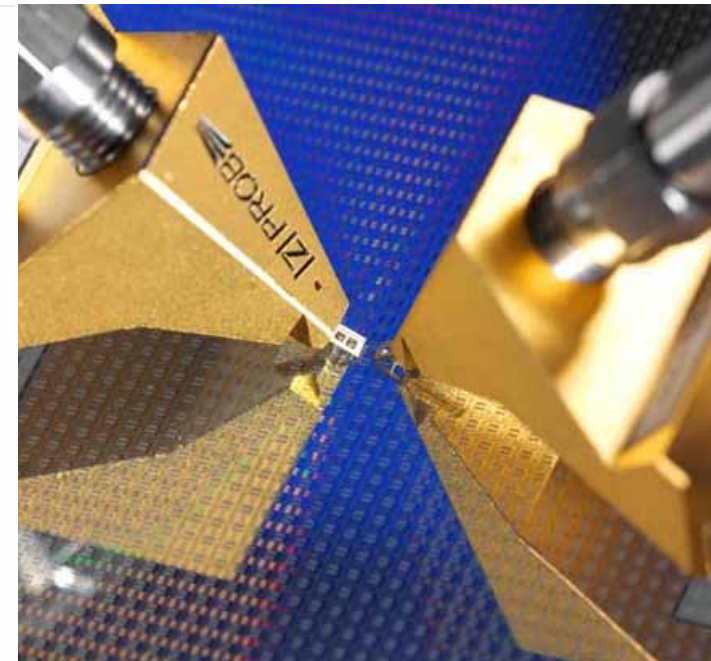
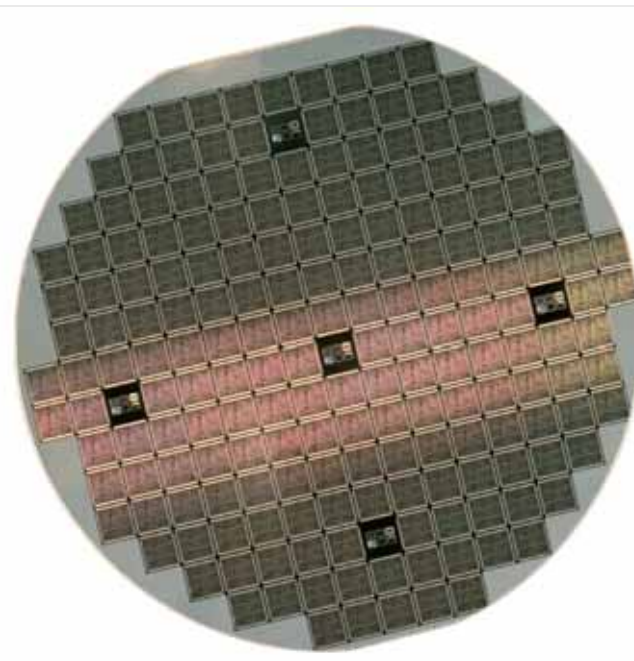


the Power of Machine Vision

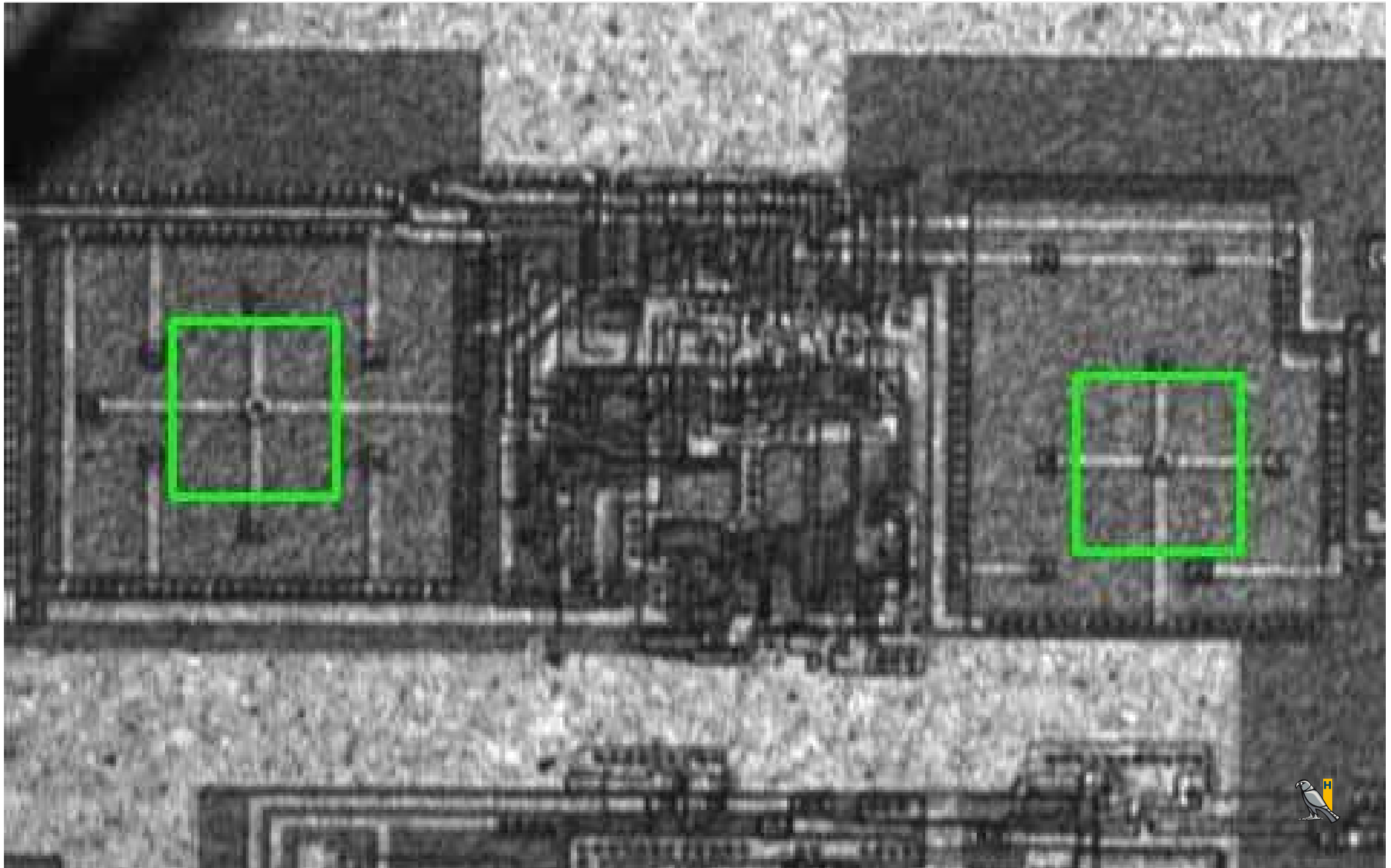


Precision Vision Measurement in Electronics

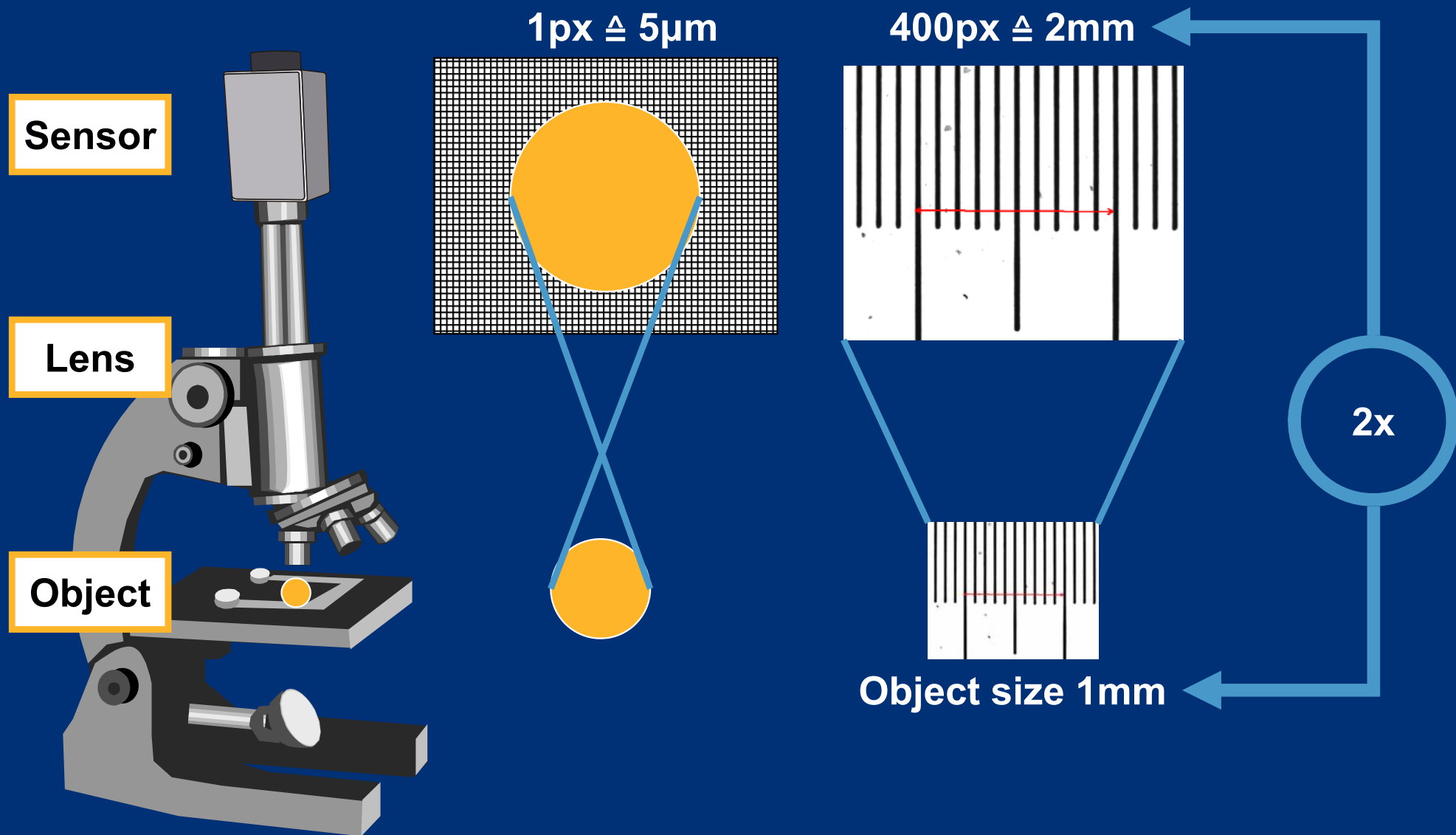
Wafers are processed in many steps



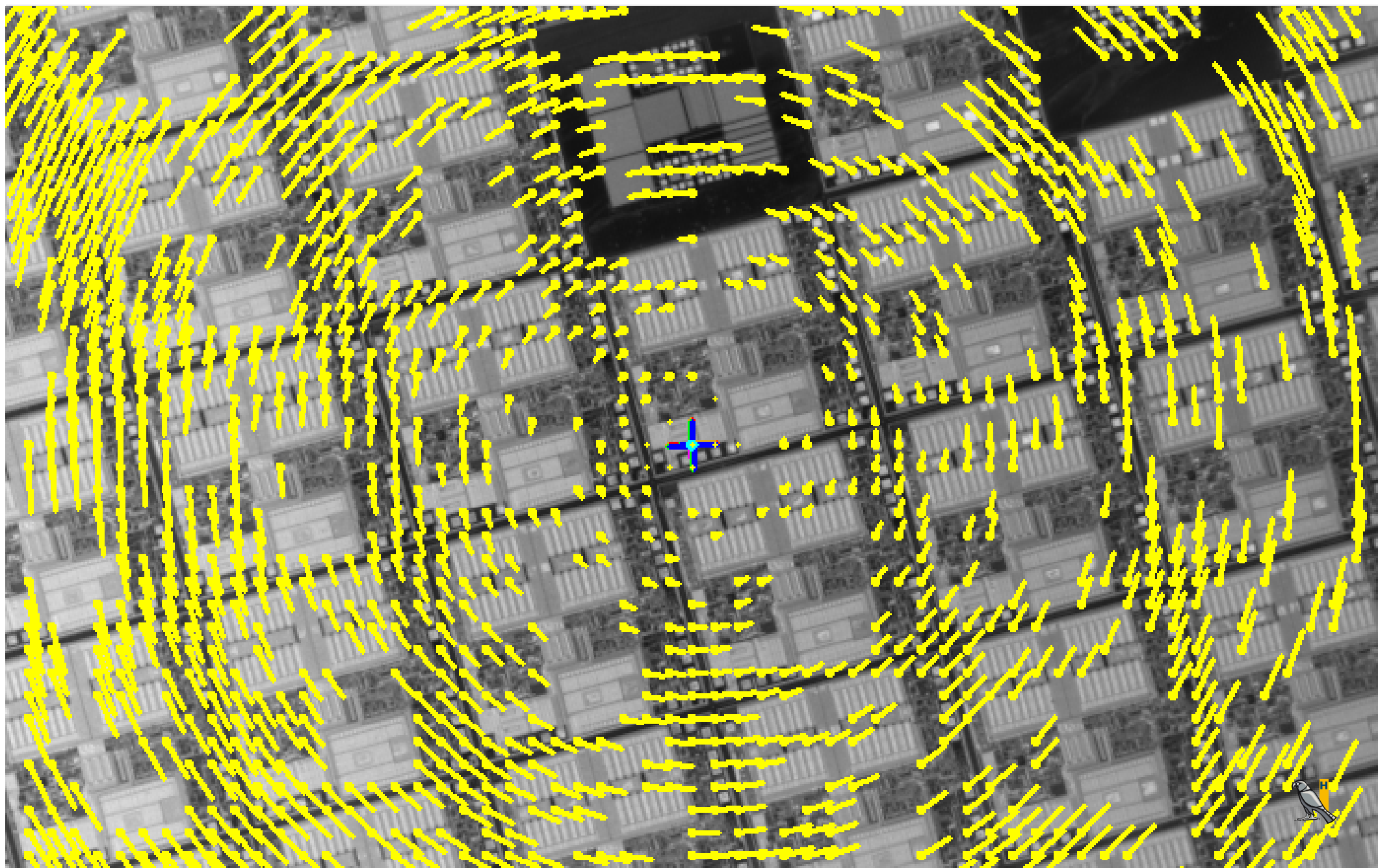
HALCON offers powerful tools for alignment



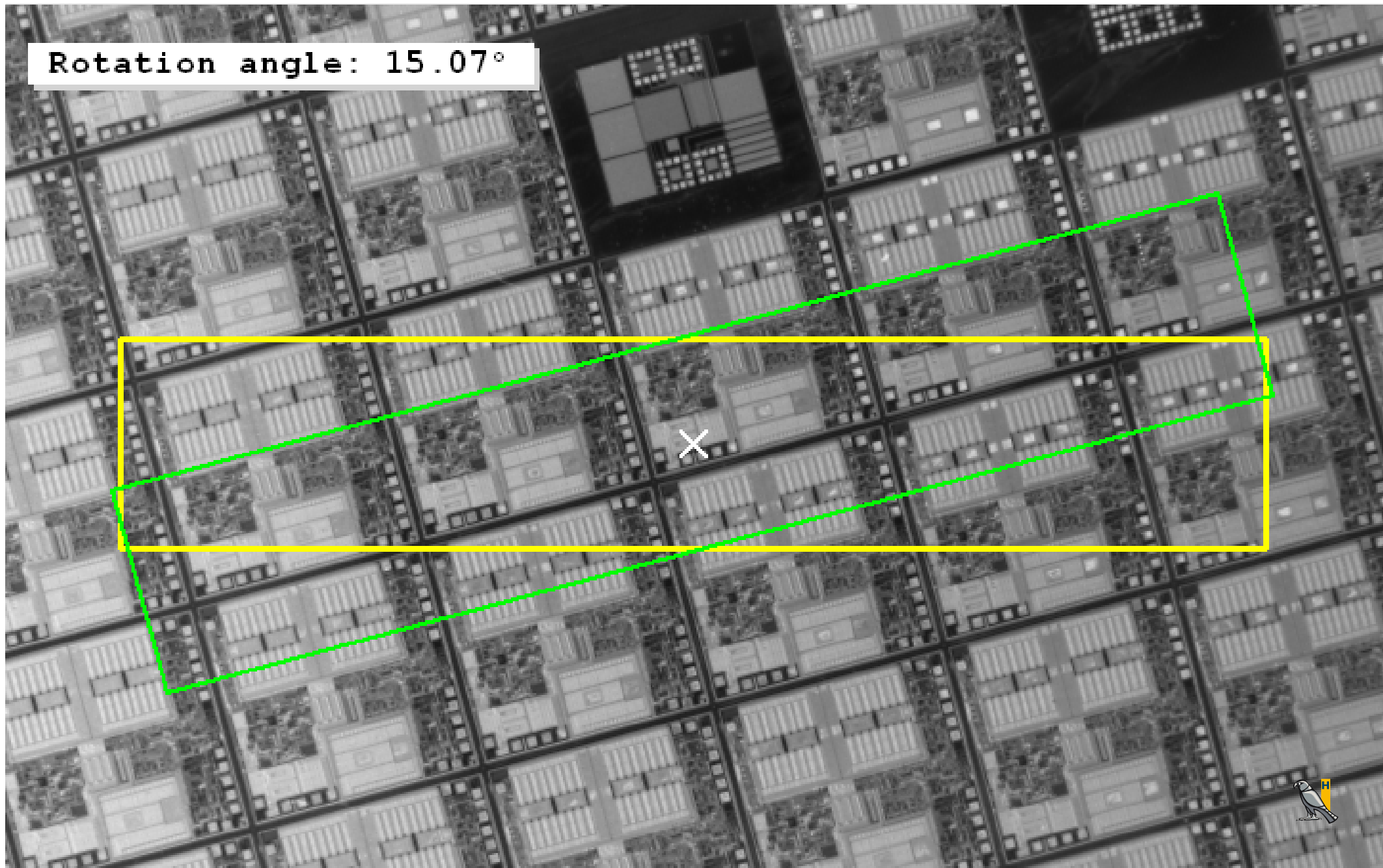
Calibrate the microscope with a ruler



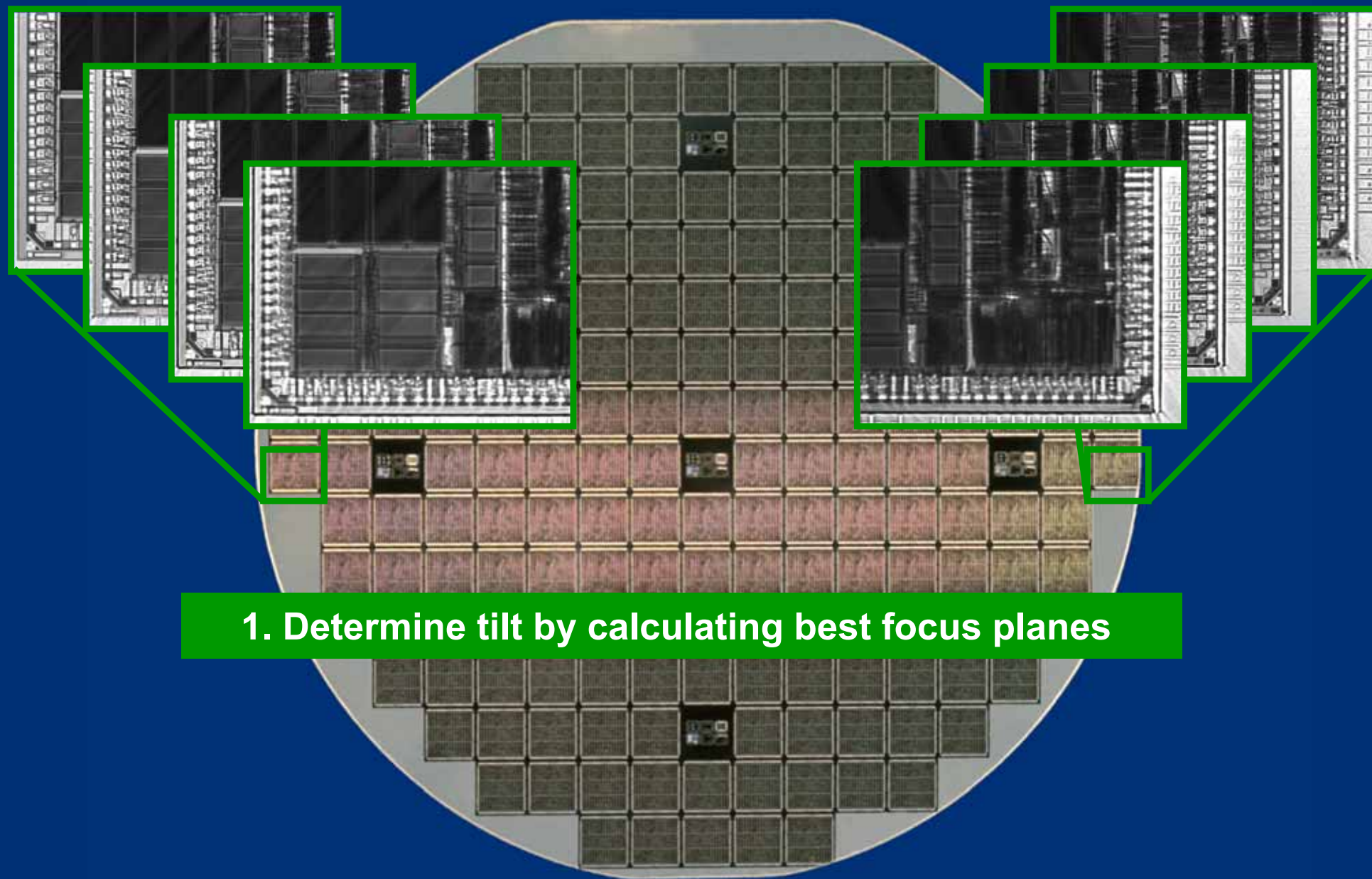
Estimate the rotation center for machine setup



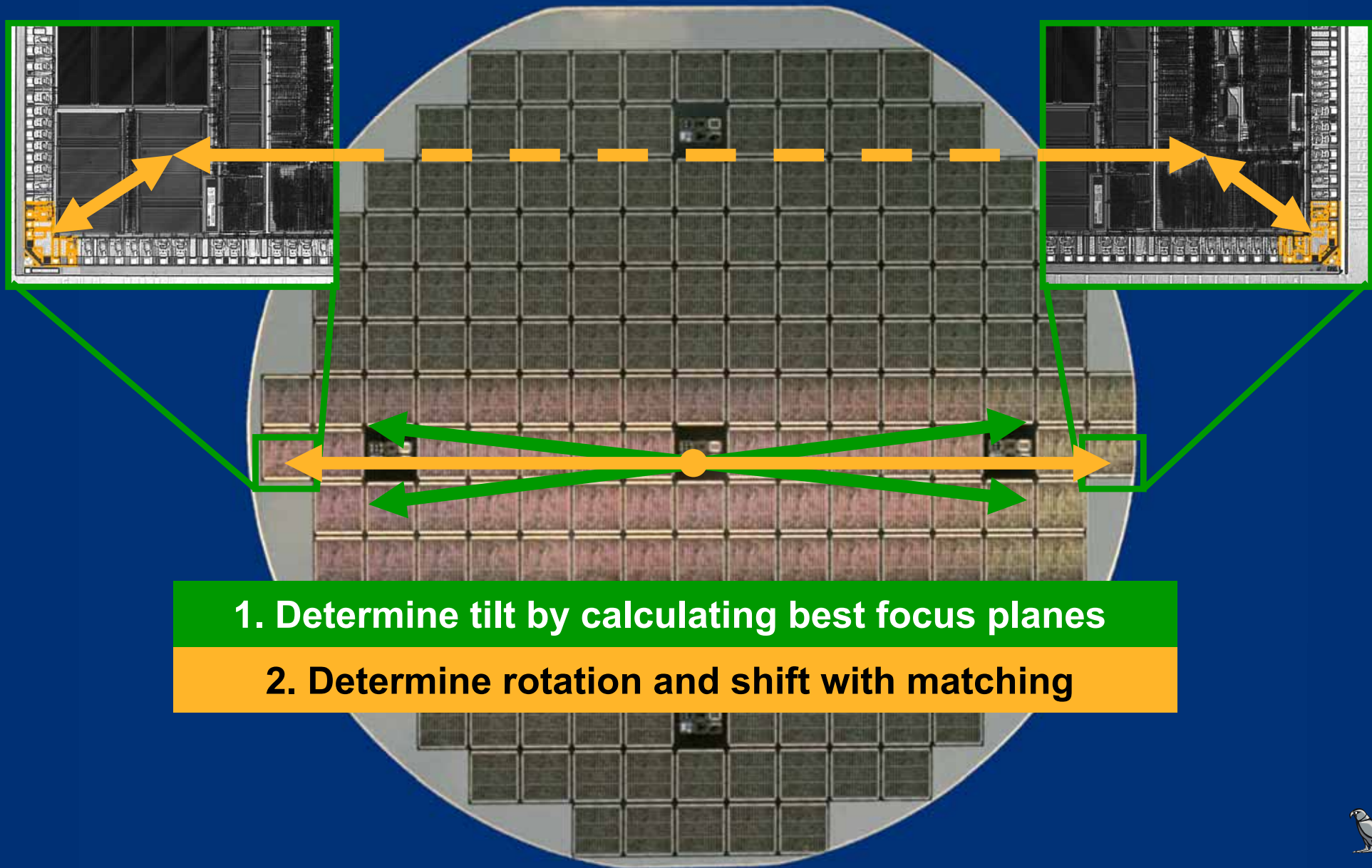
The wafer rotation can be easily determined



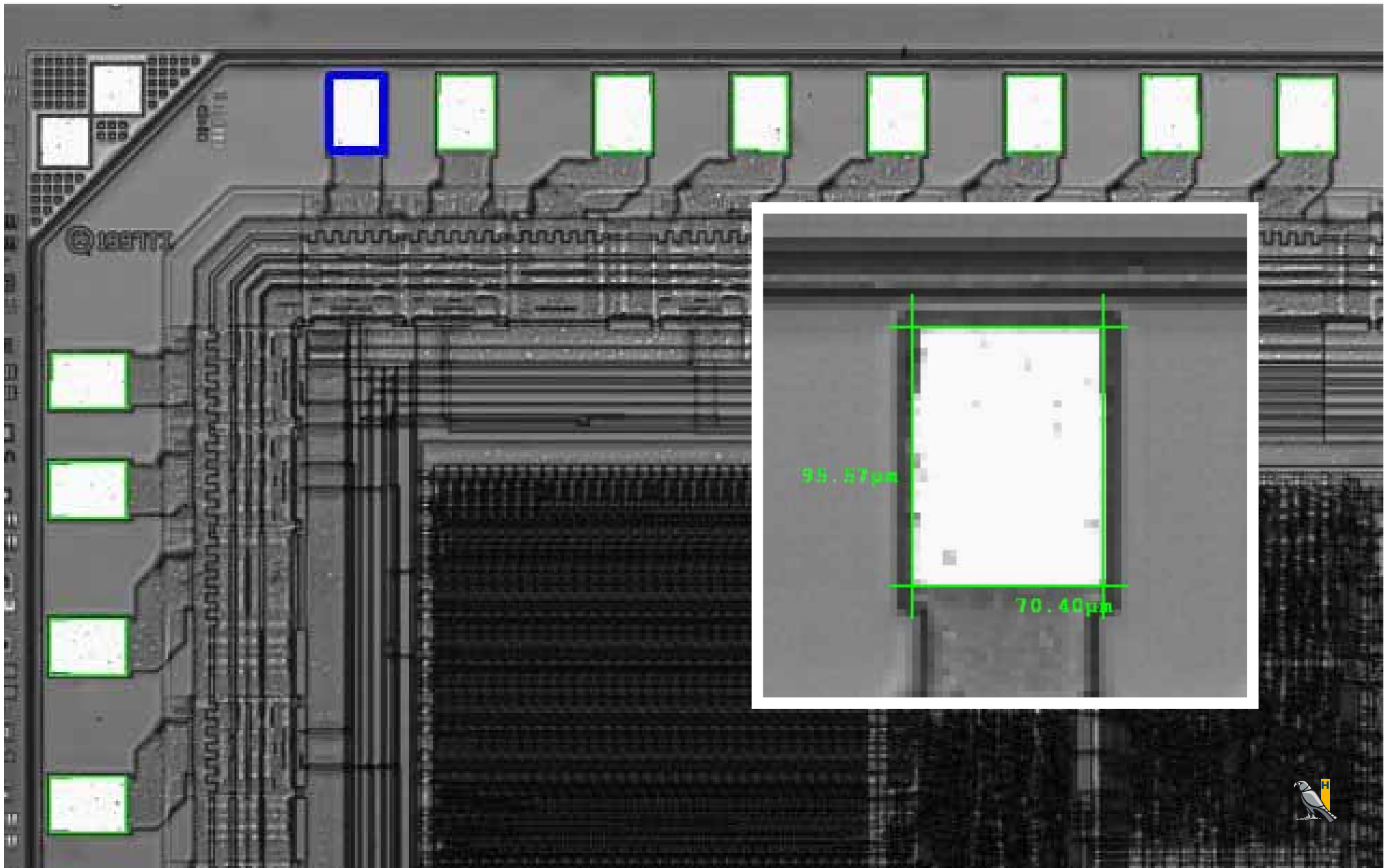
Fine align wafer before prober test



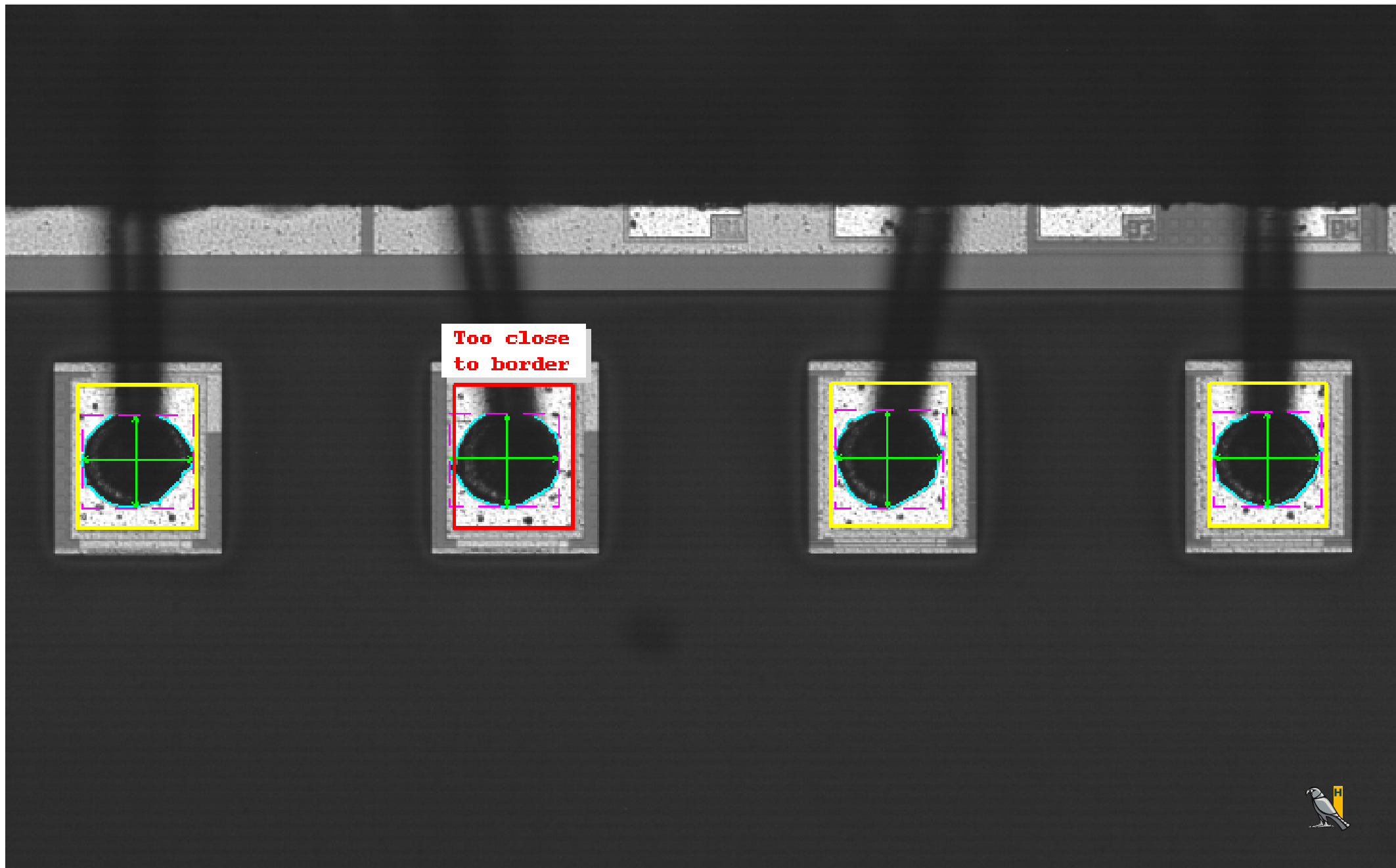
Fine align wafer before prober test



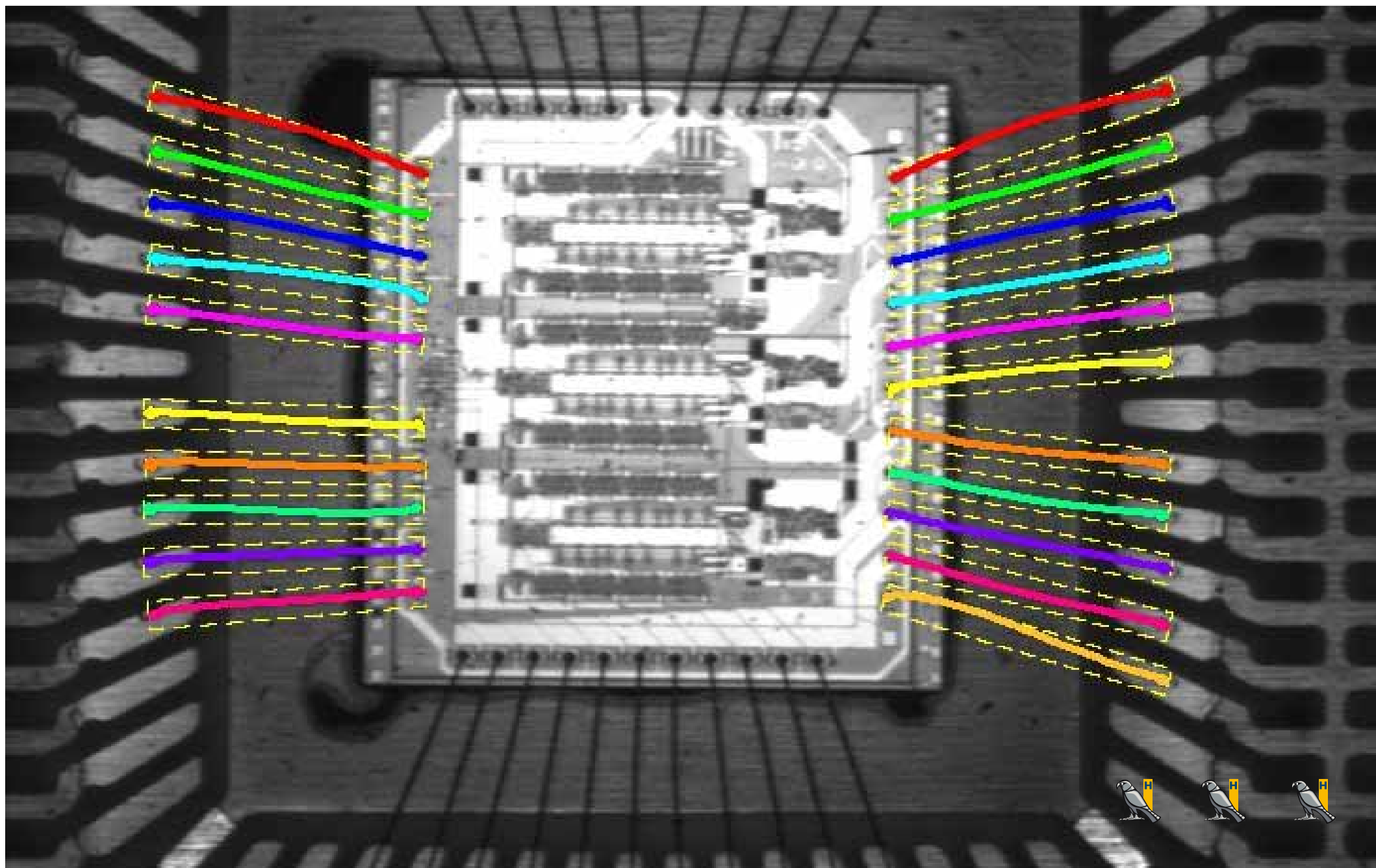
Measure pads



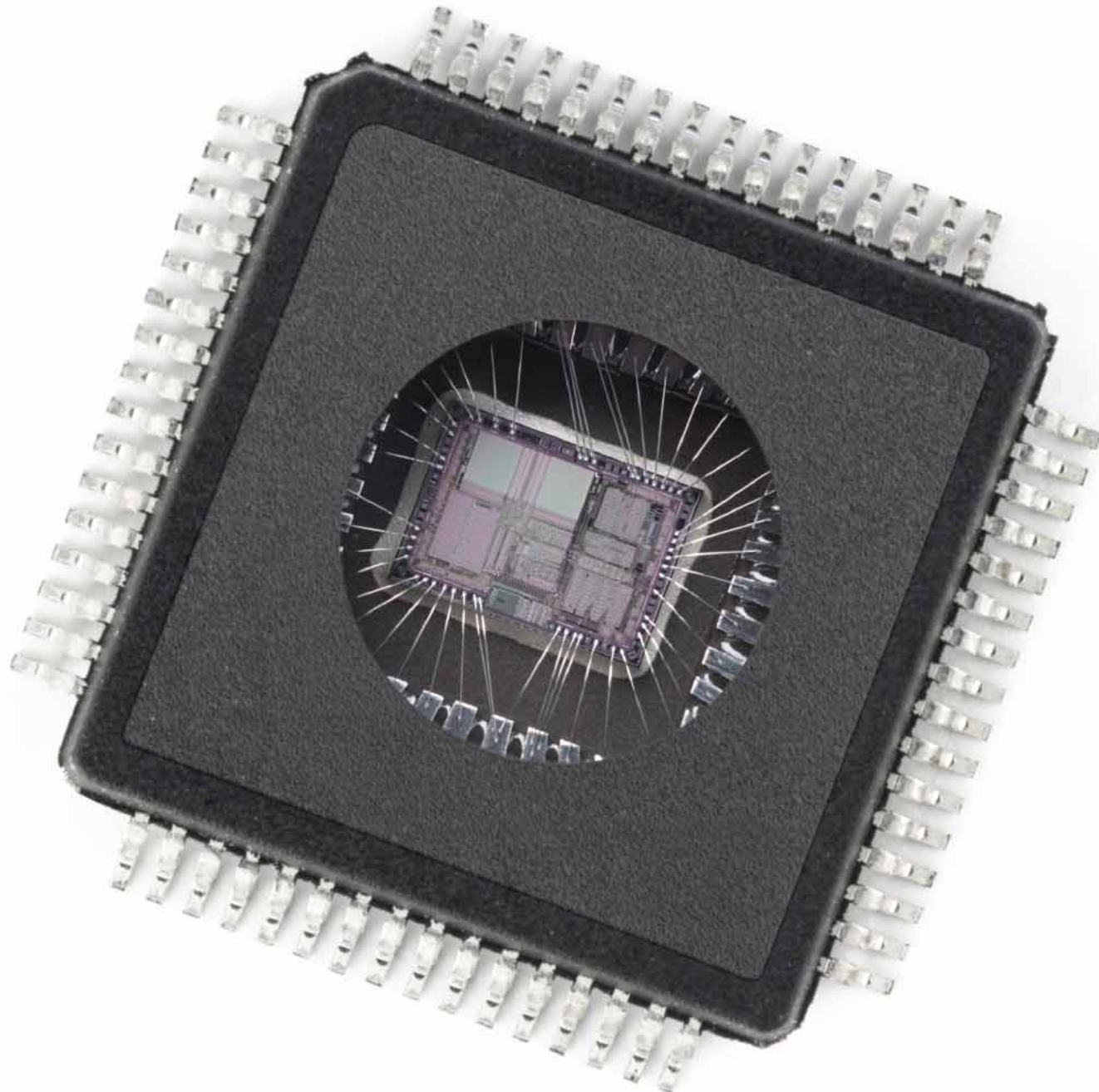
Check ball bonds



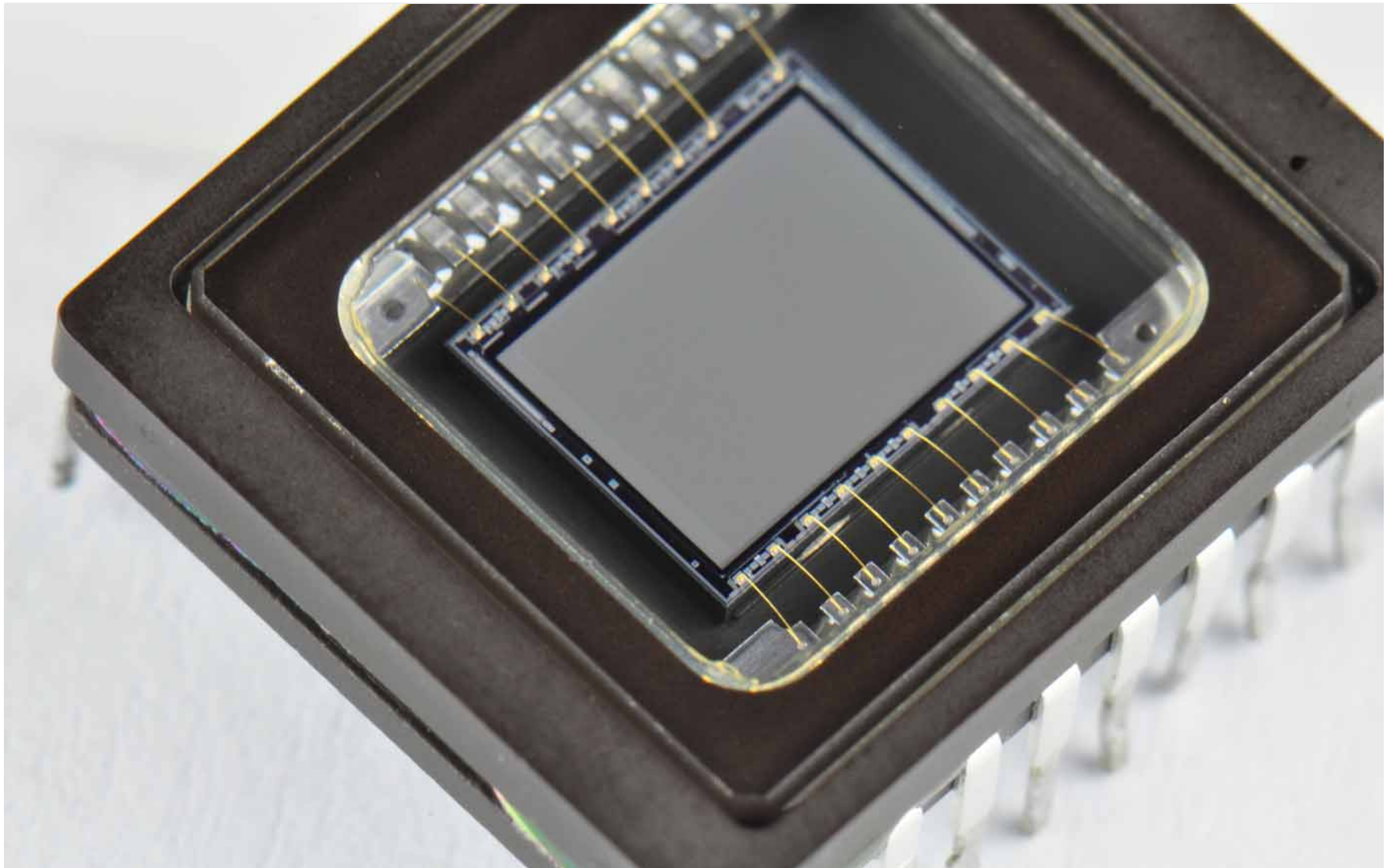
Find wires with HALCON



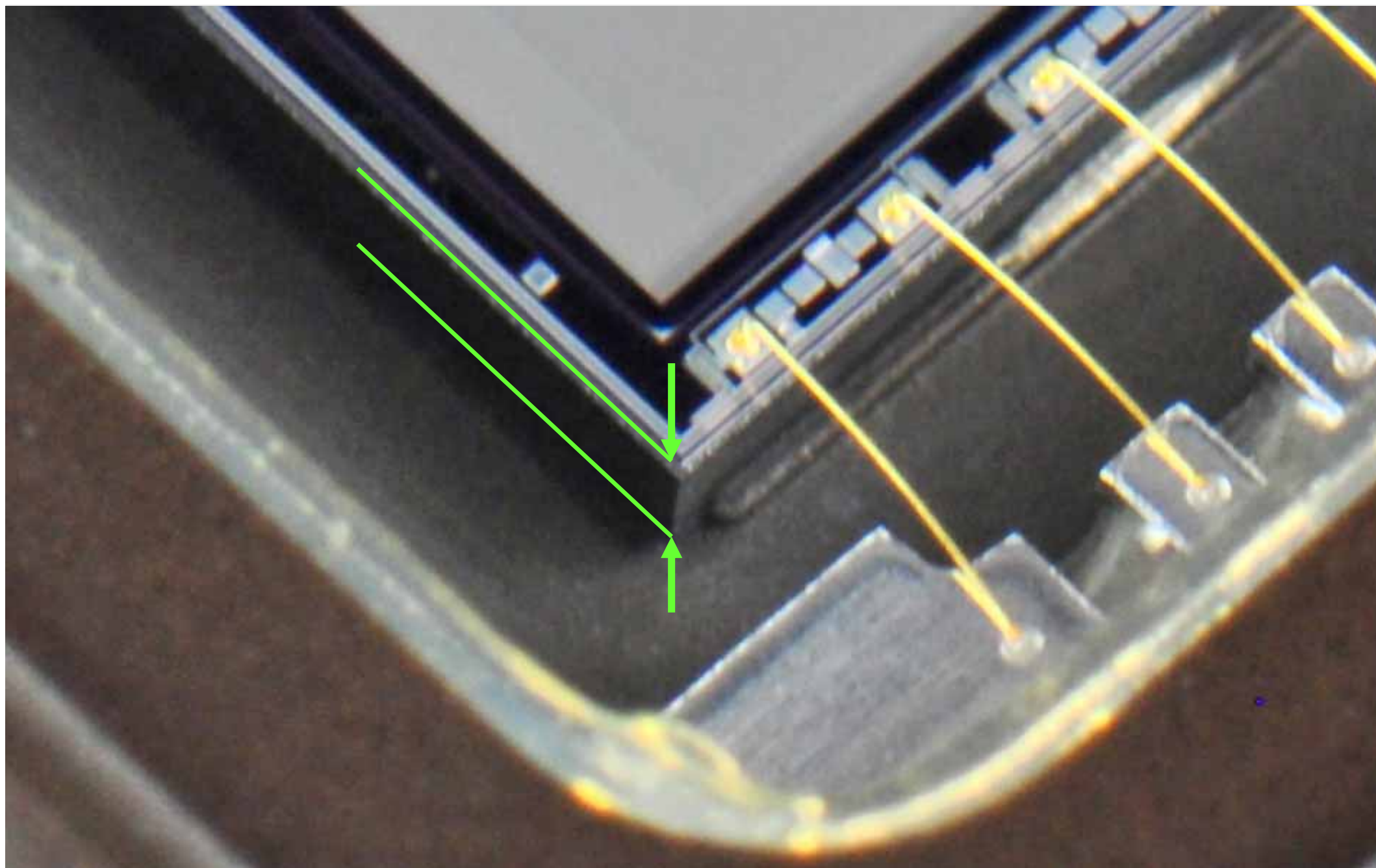
Packaging



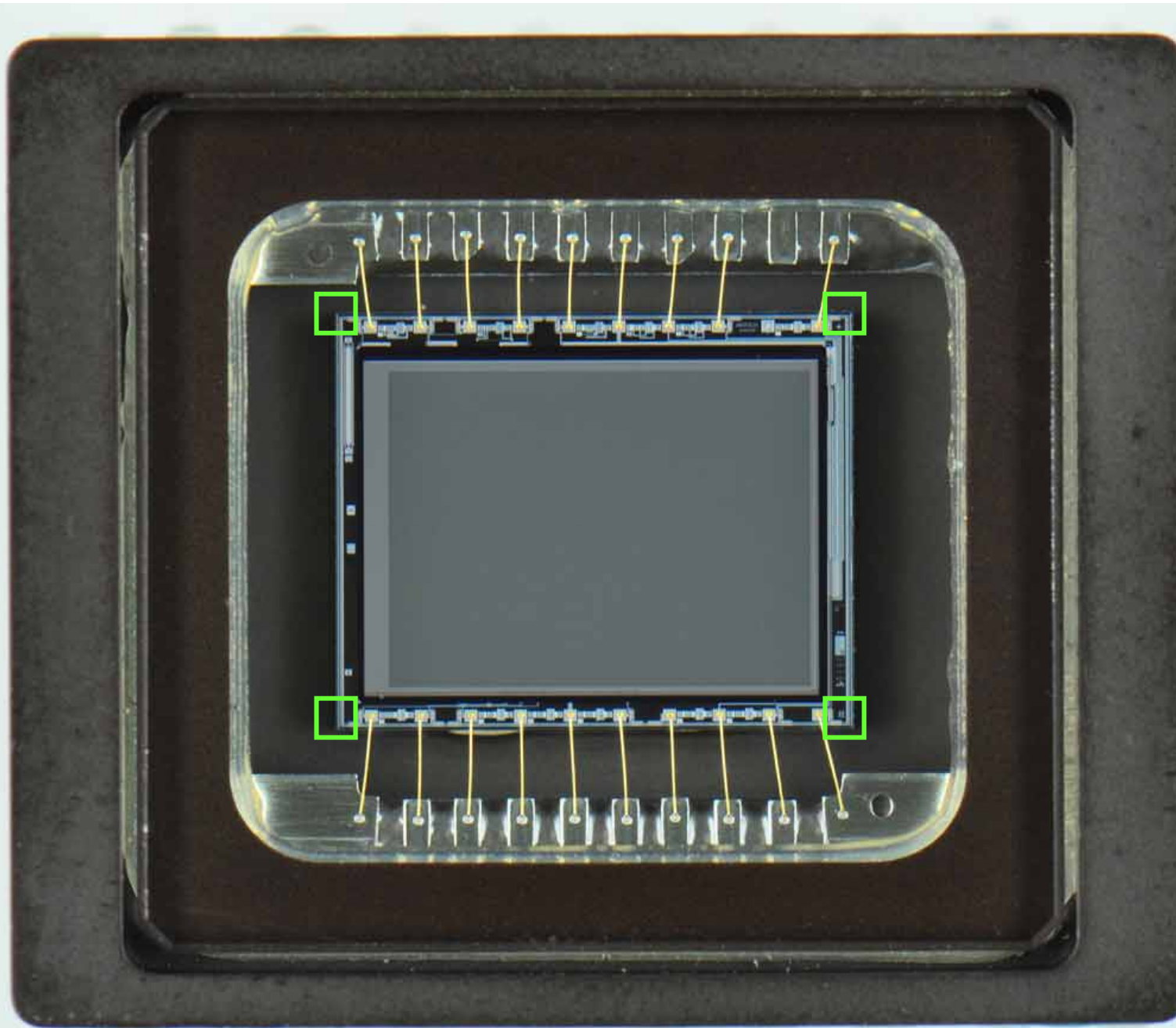
Inspection of the CMOS sensor tilt



Determination of the die height relative to the housing

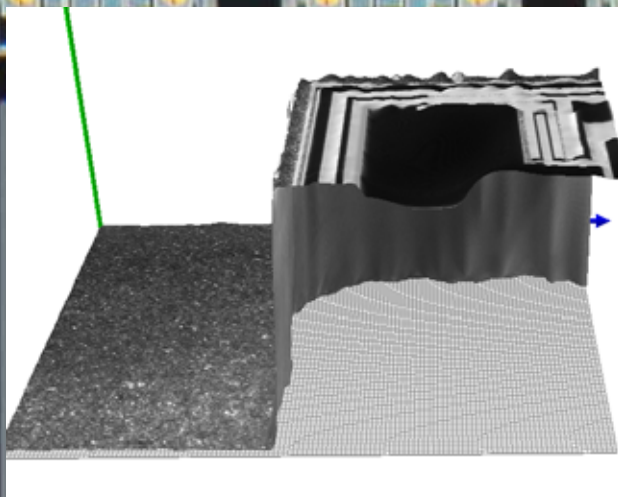


Perform one measurement for each corner

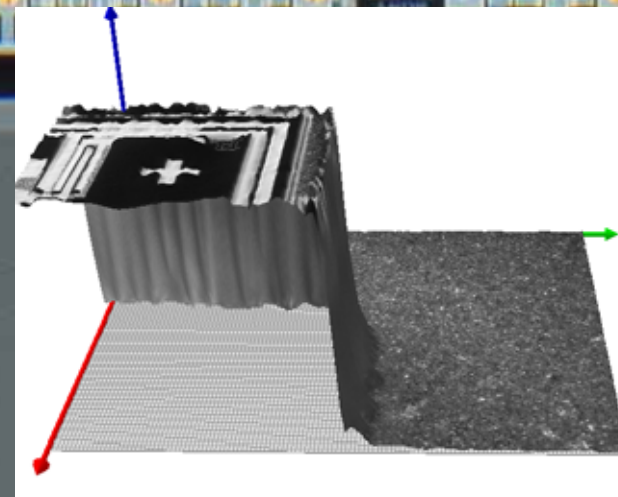


Perform one measurement for each corner

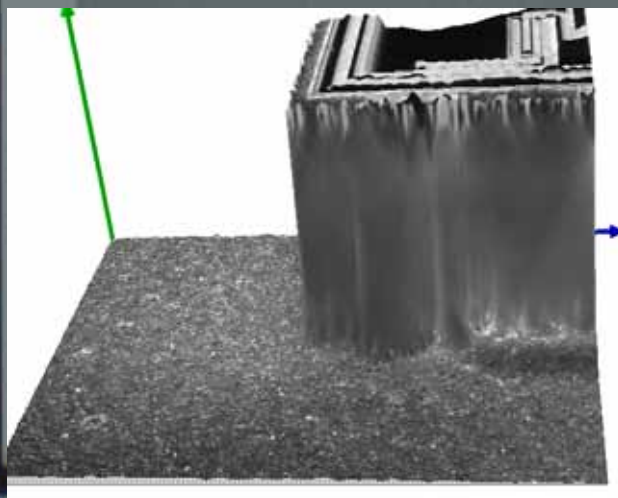
310.9 μm



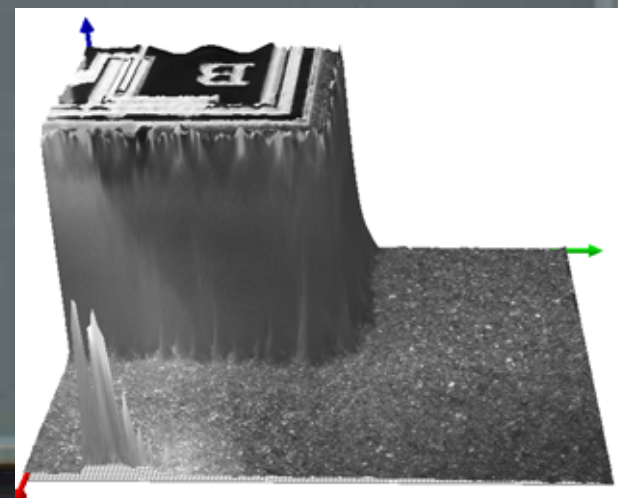
321.9 μm



317.7 μm



325.7 μm



Checking the coplanarity of leads with stereo

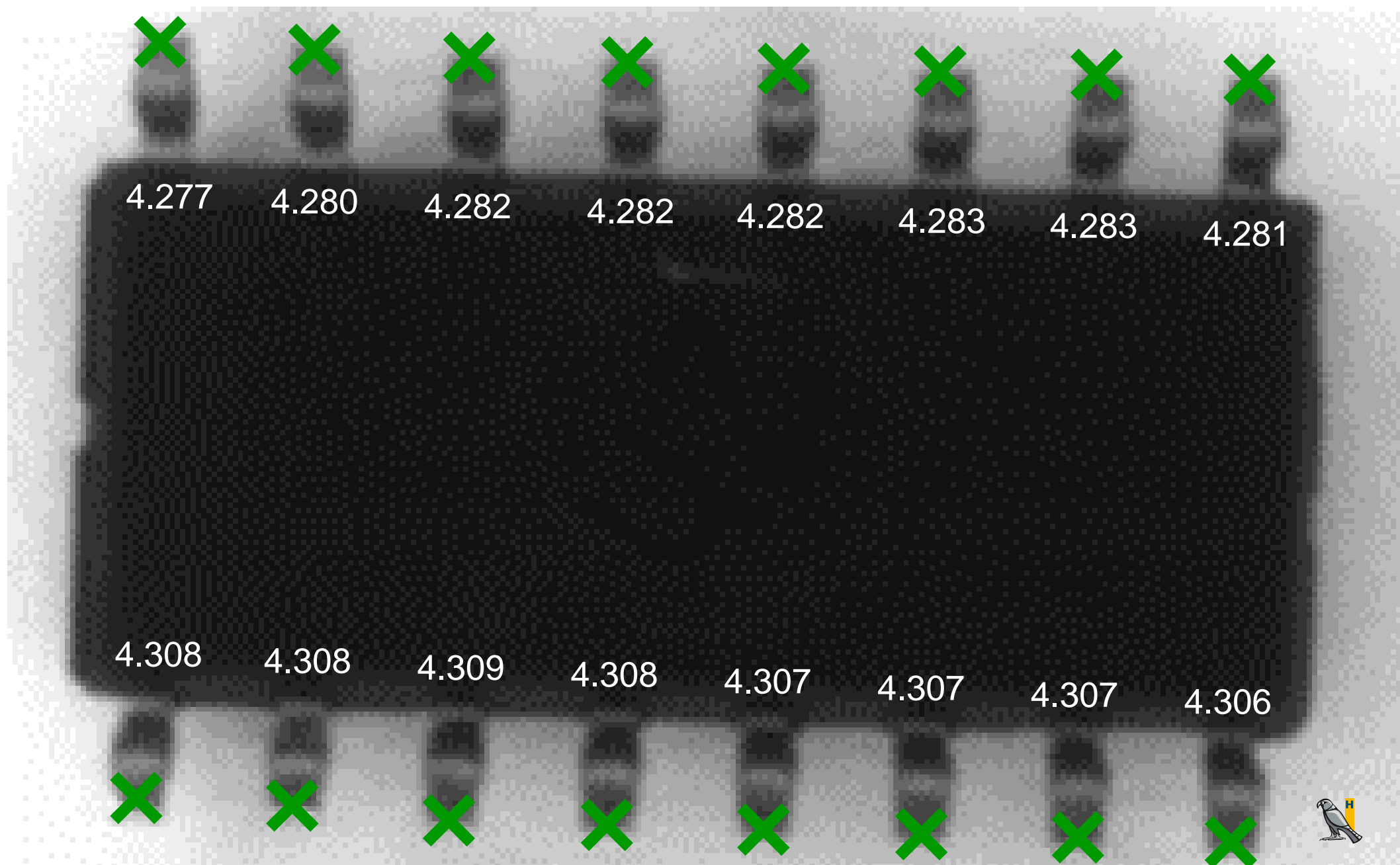
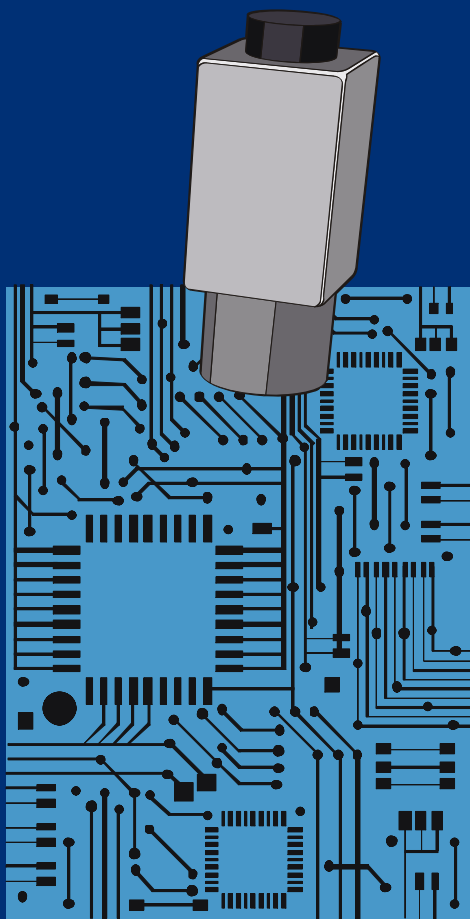
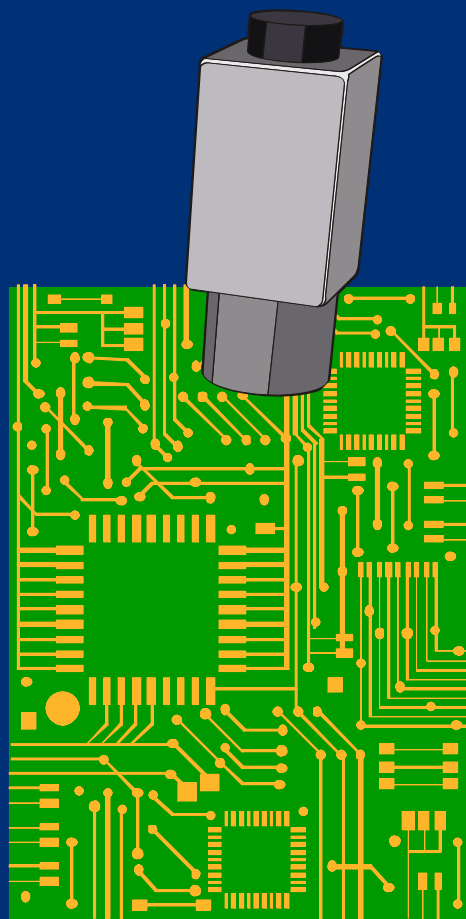


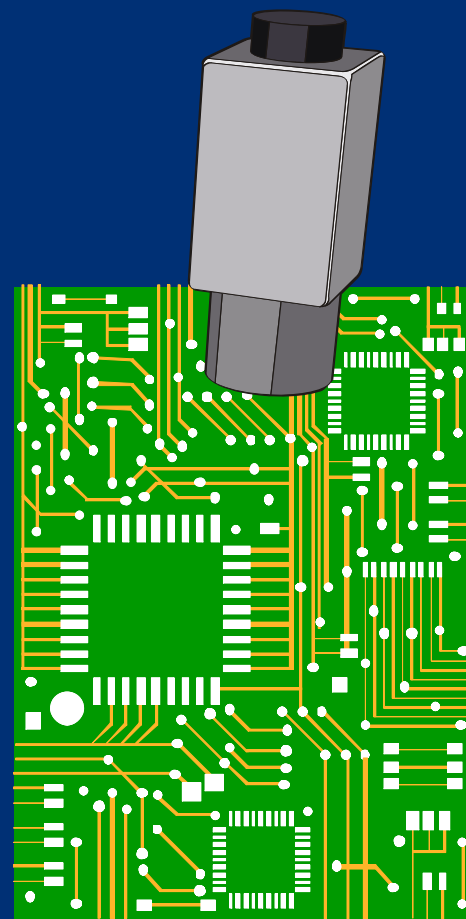
Image processing is essential in PCB production



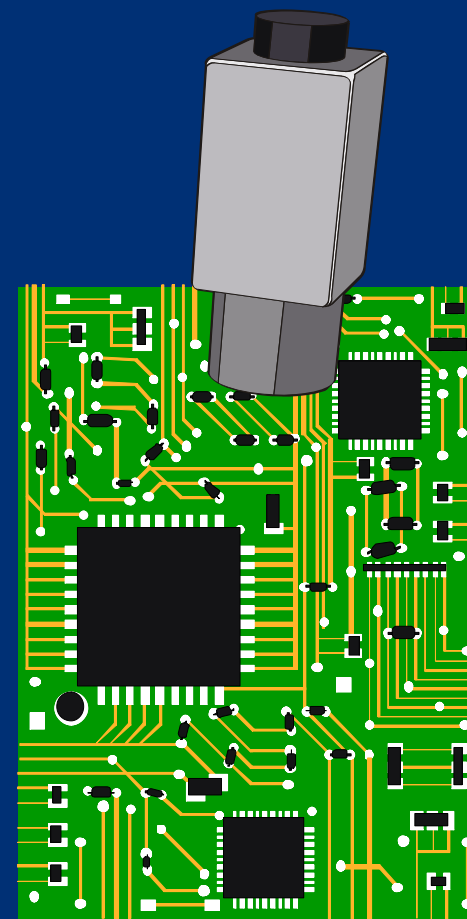
Print circuit



Etch circuit

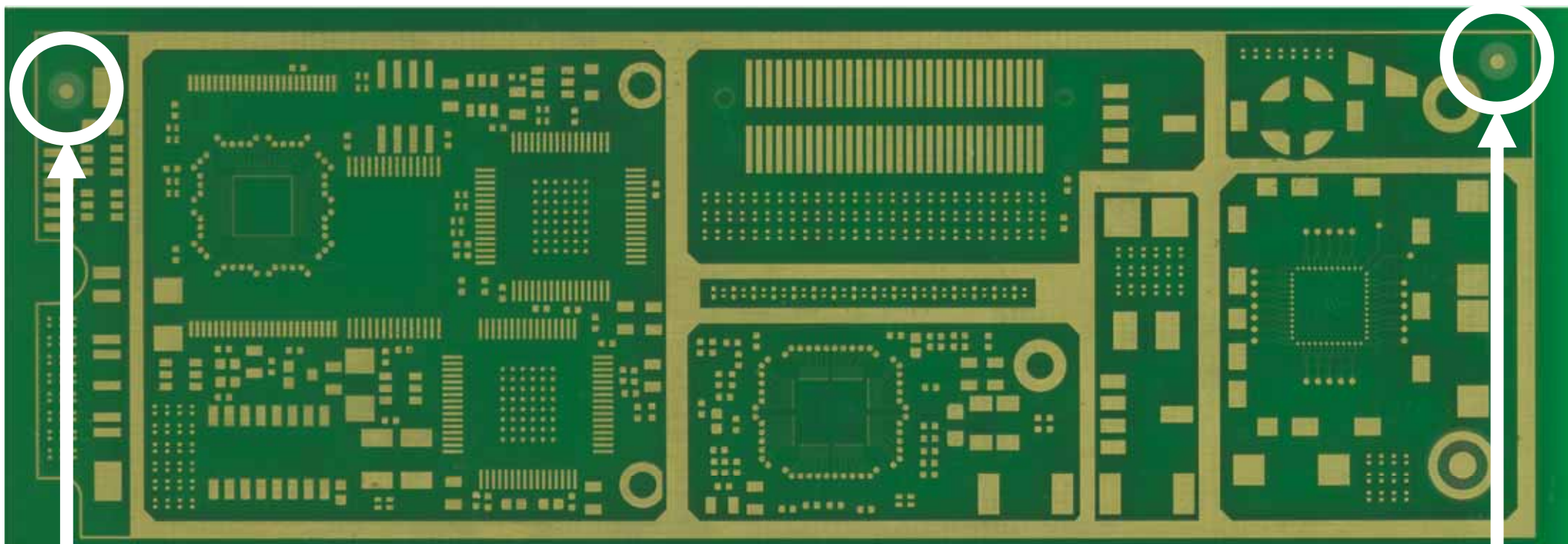


Print solder



Pick and place

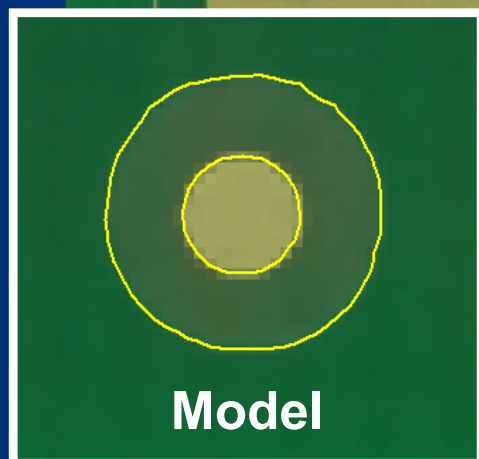
The PCB is aligned using fiducials



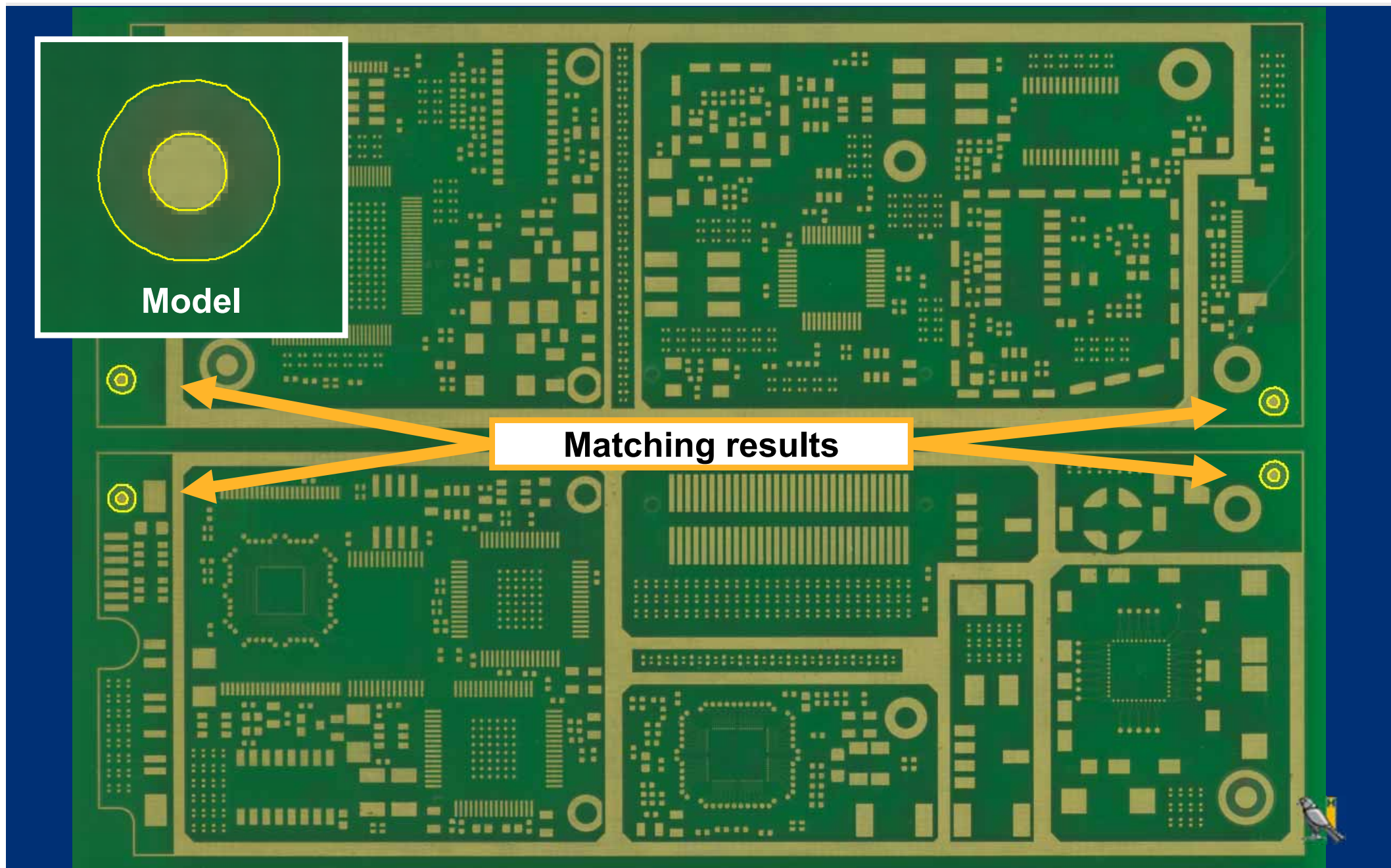
Typical fiducials



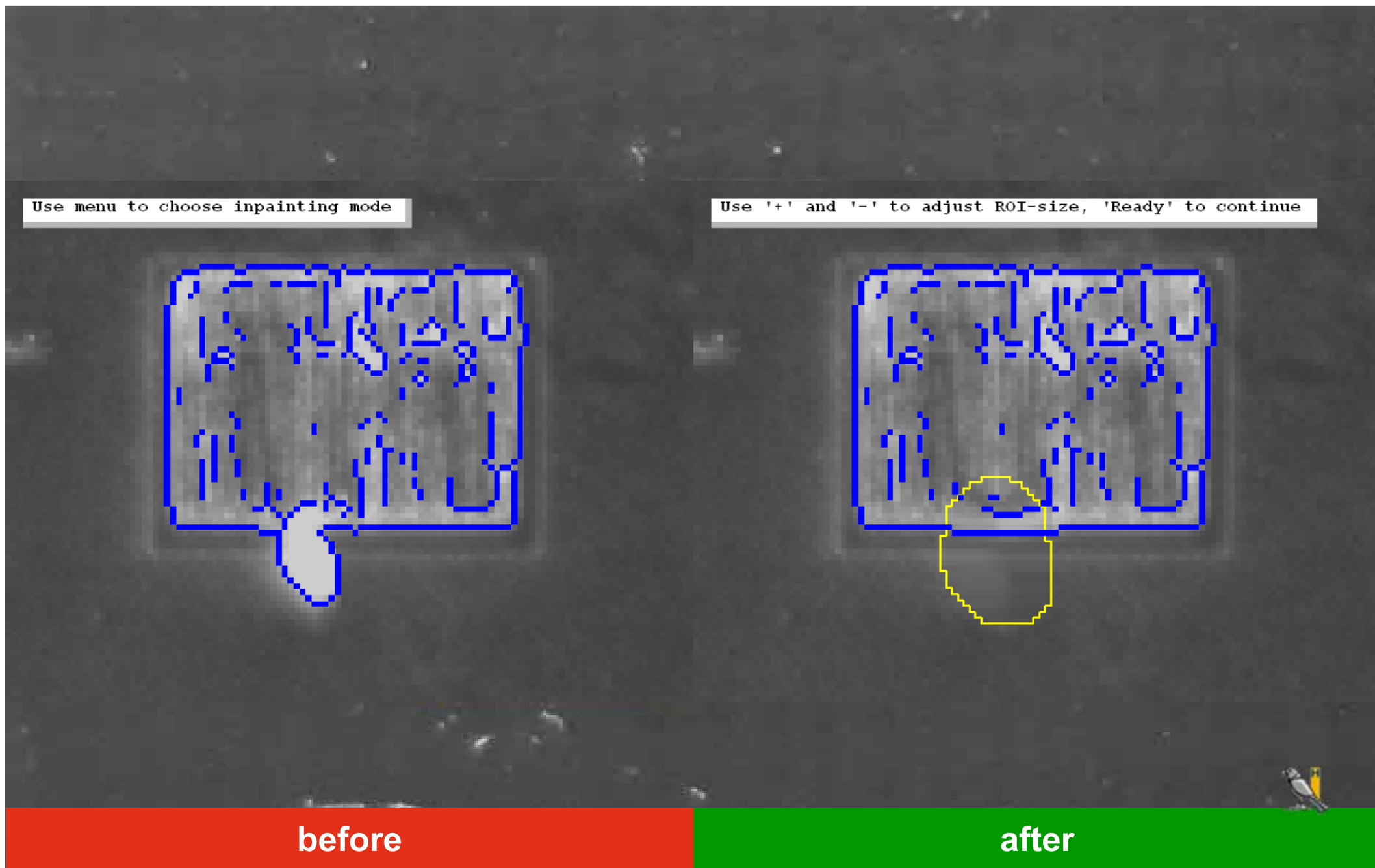
Find the fiducials with shape-based matching



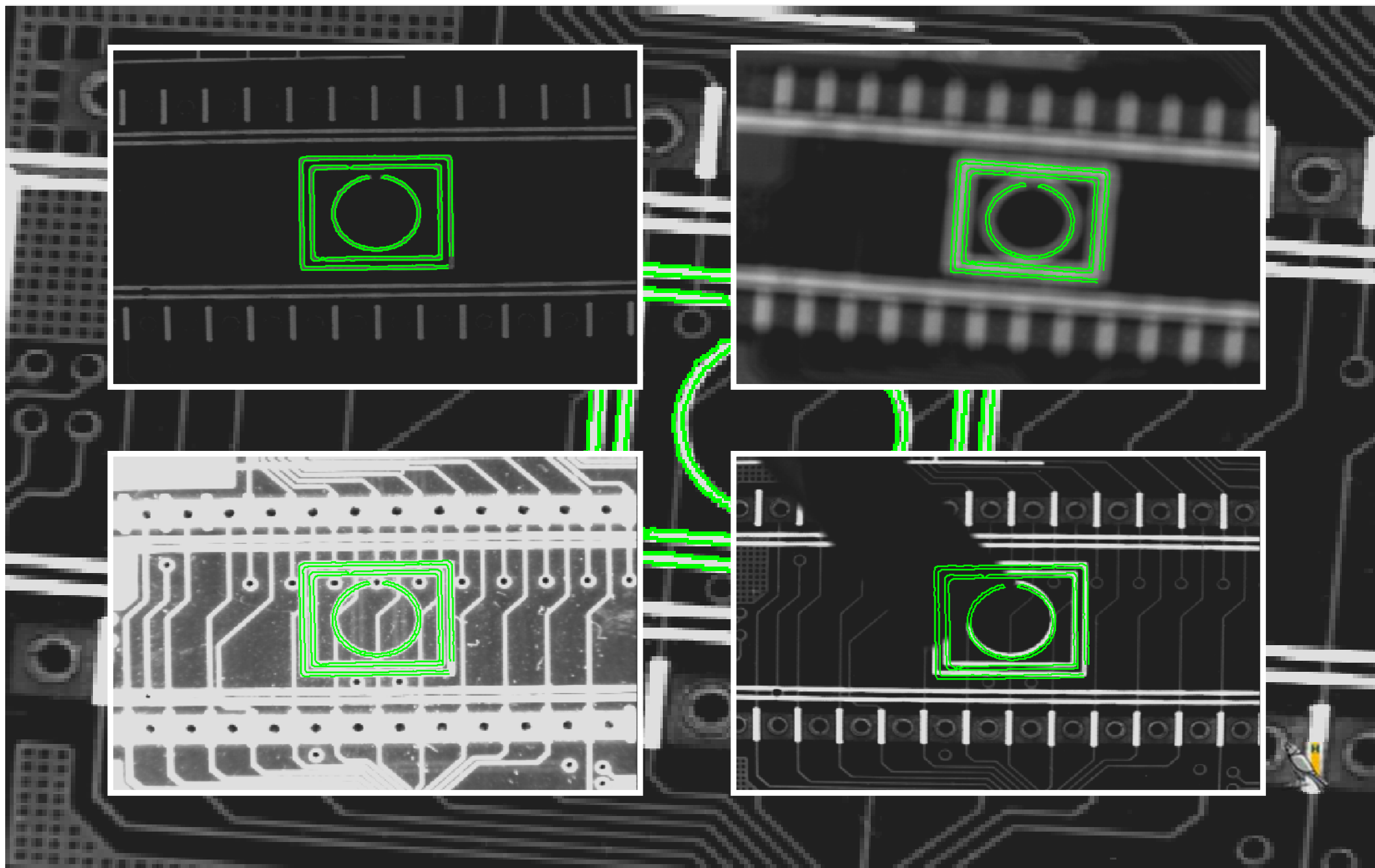
Matching results



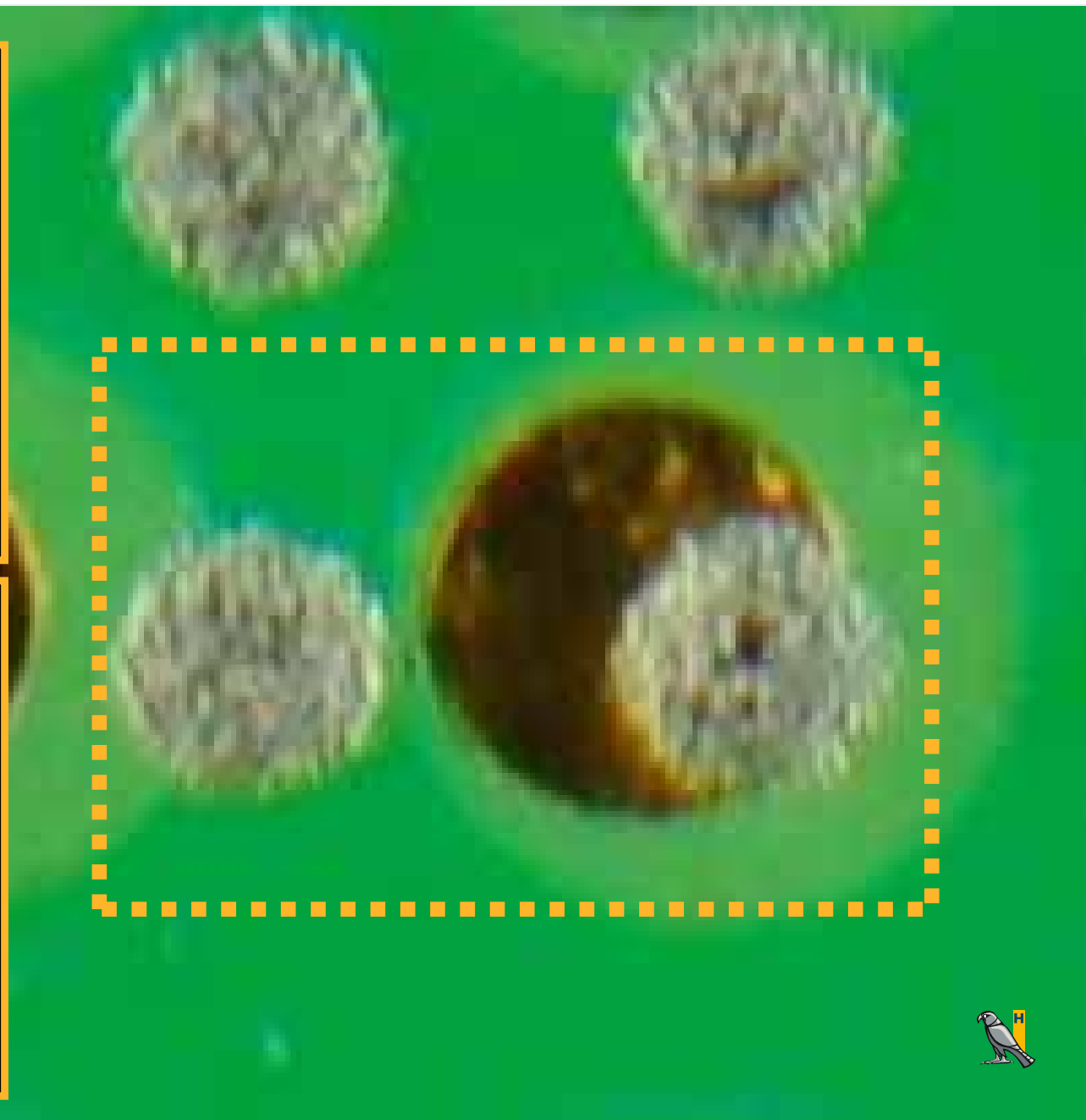
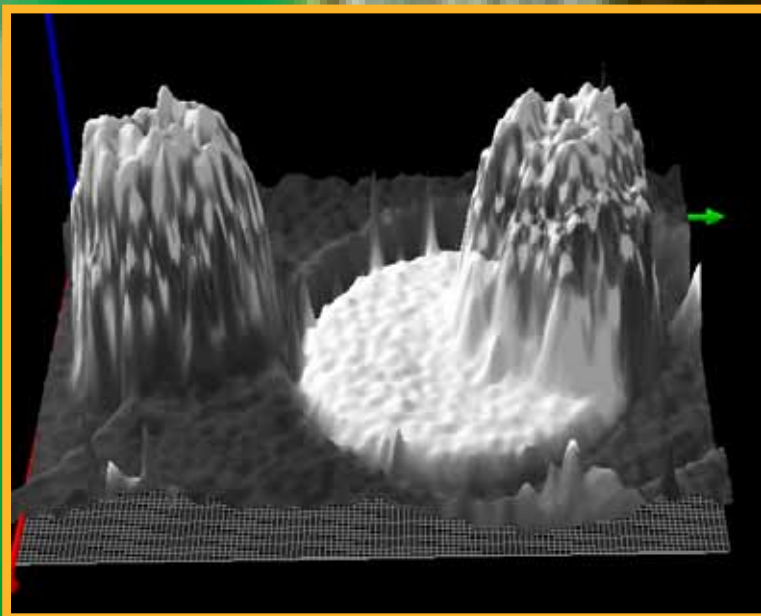
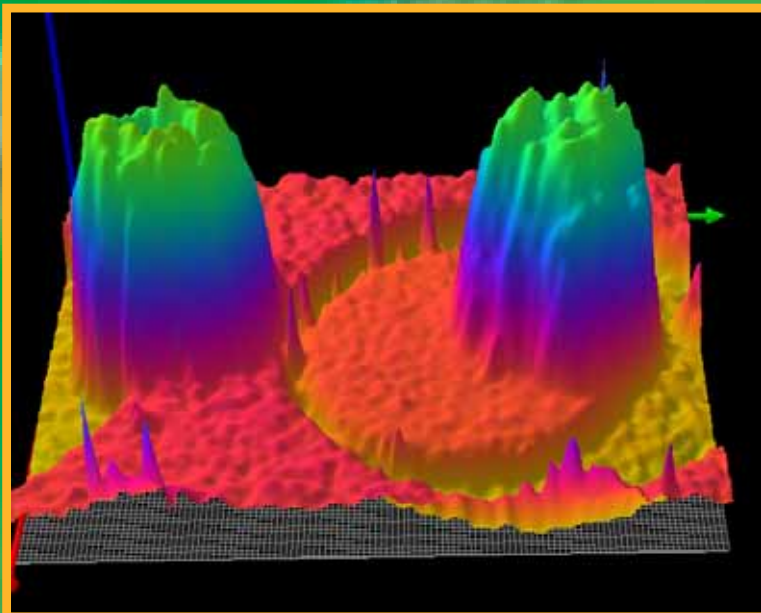
Bad fiducials can be improved interactively



Matching is robust



Inspect solder with Depth from focus



Pad with little Solder Paste

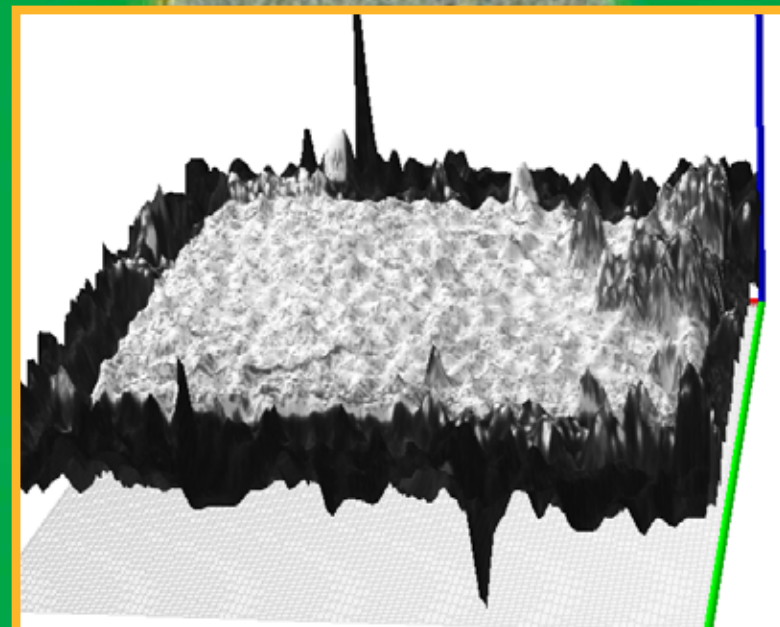
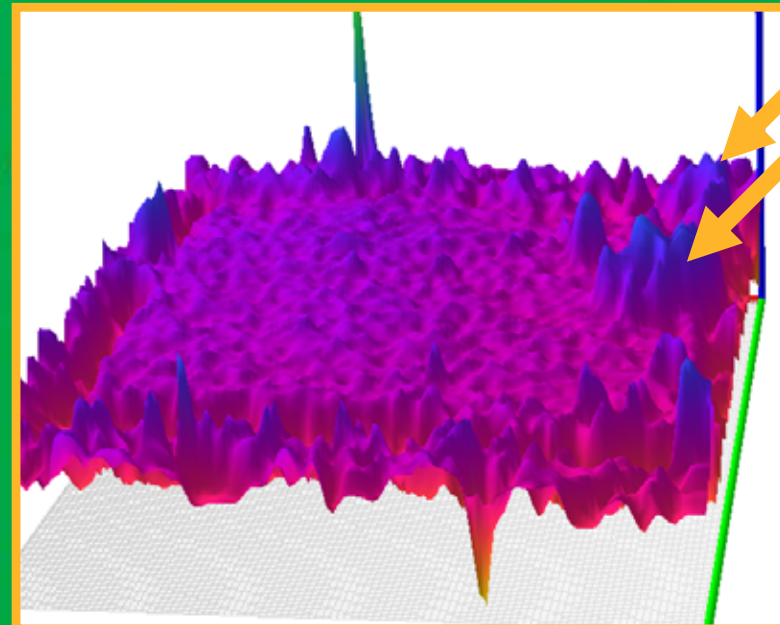
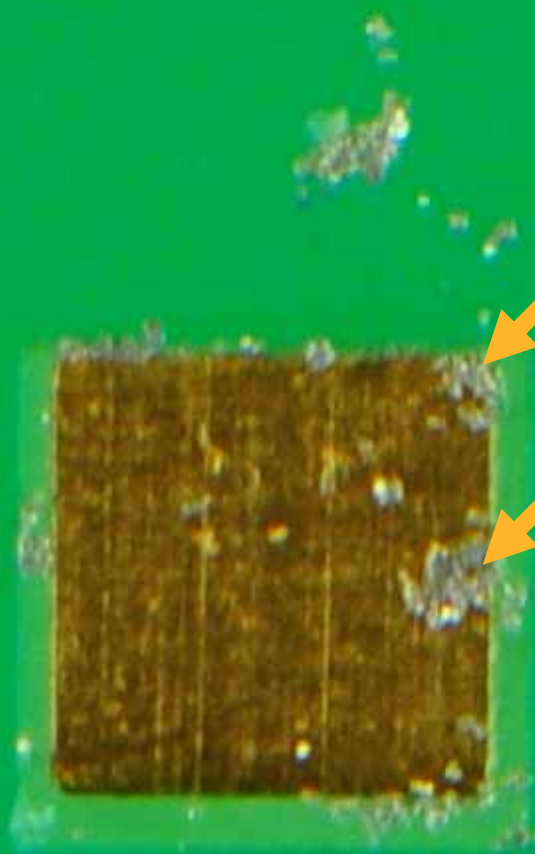


Image processing helps to place the components

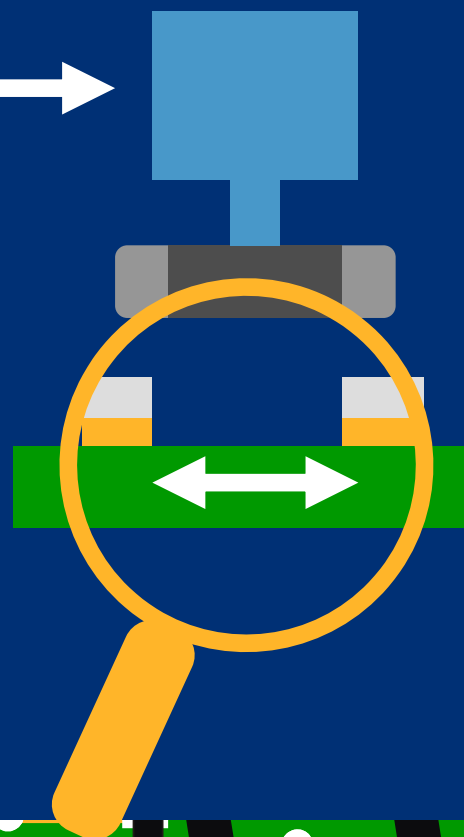
1. Check



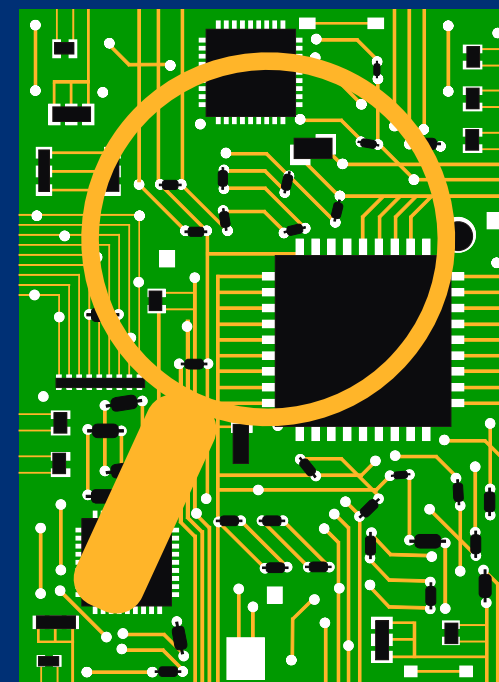
2. Pick



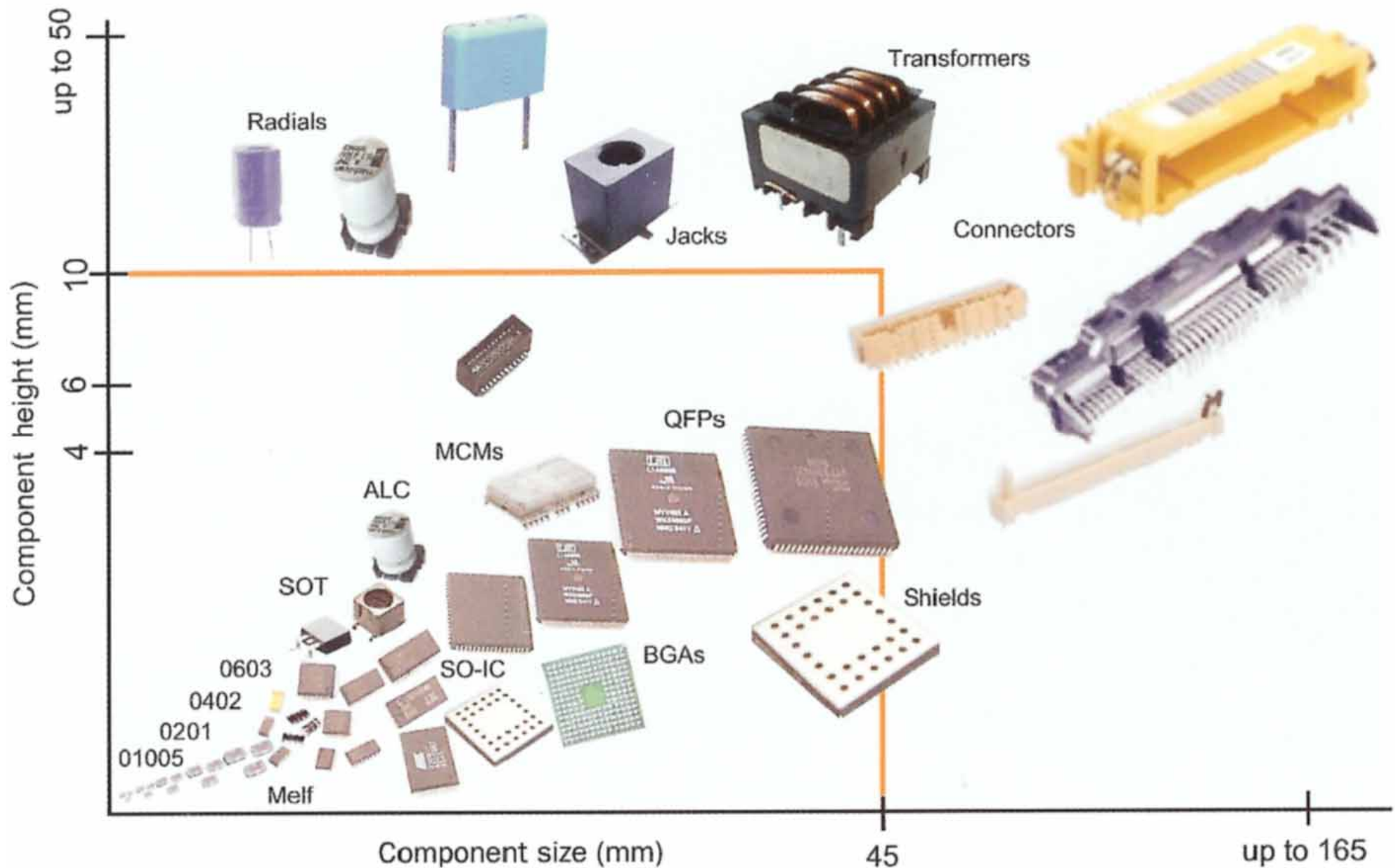
3. Align



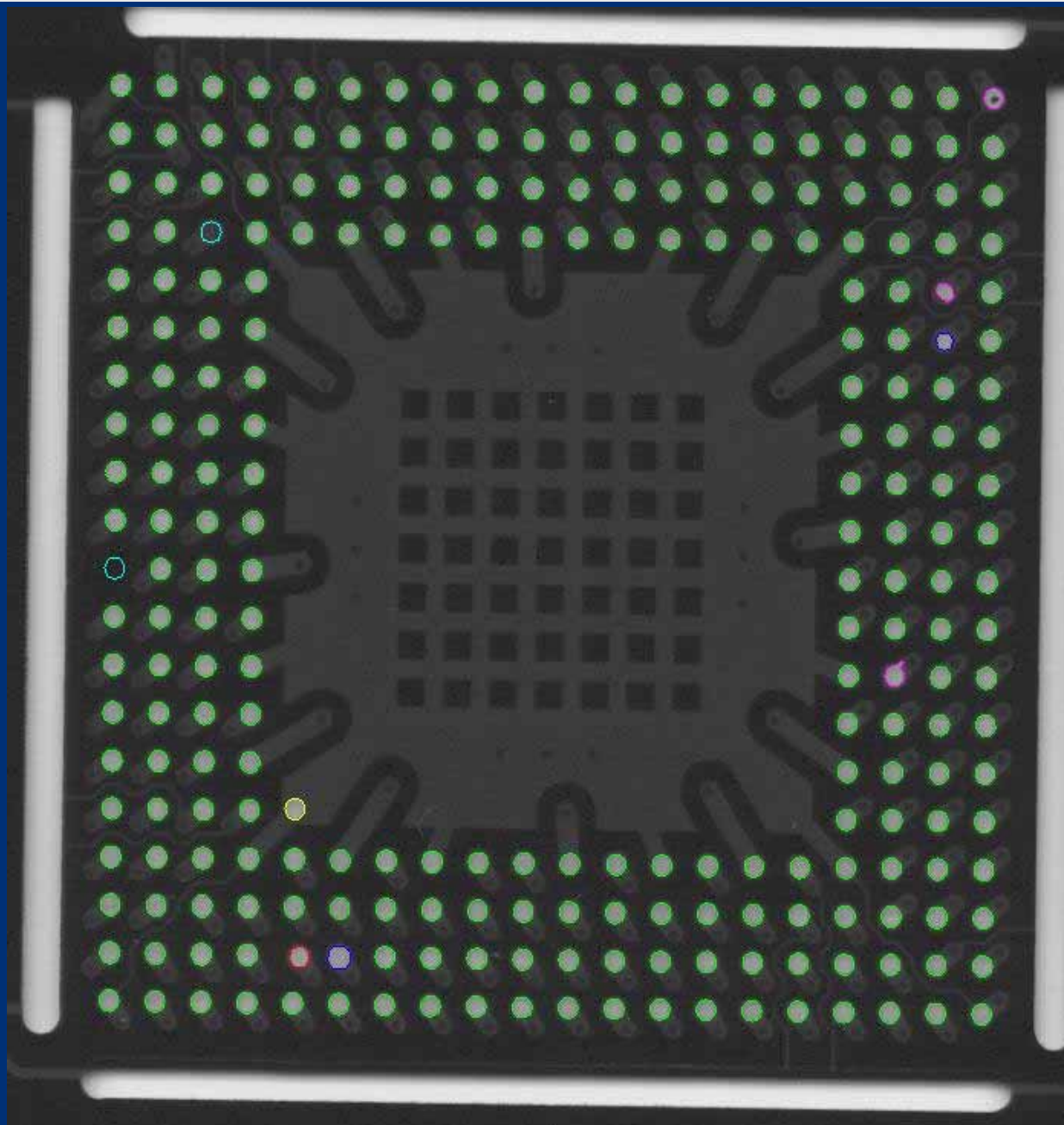
4. Place



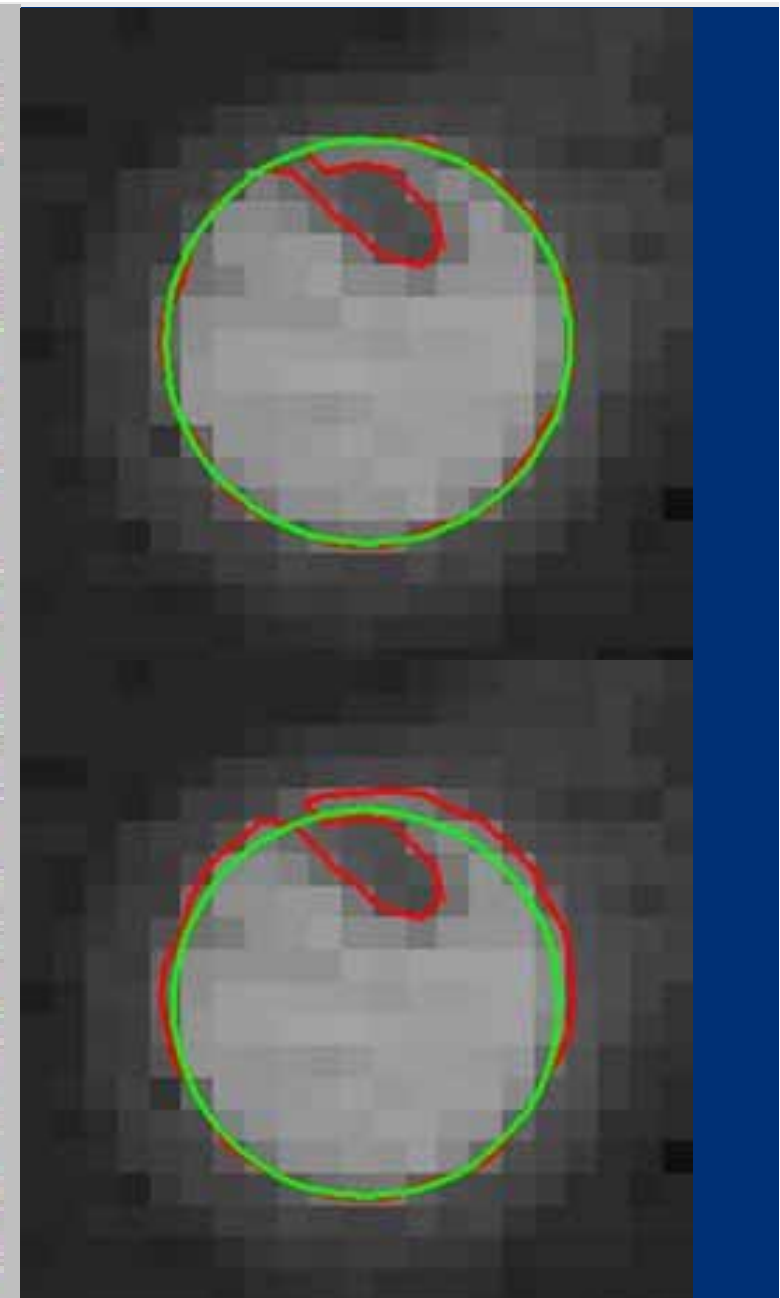
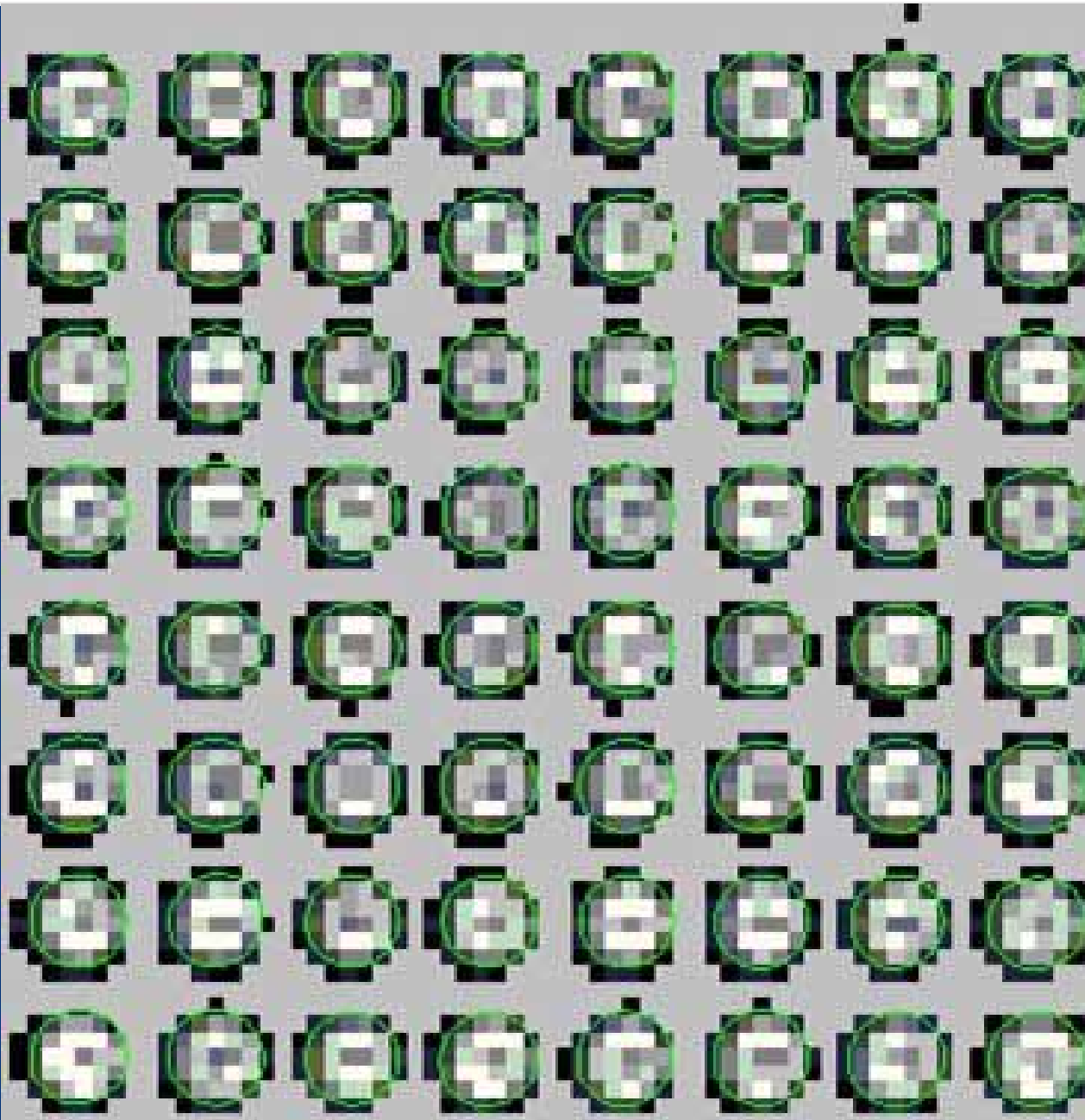
Pick-and-place machines can handle many different components



Inspect BGA using a model



HALCON offers gray value features for subpixel precise BGA Inspection



Pick-and-Place machines



Tilted SMDs must be rejected before mounting

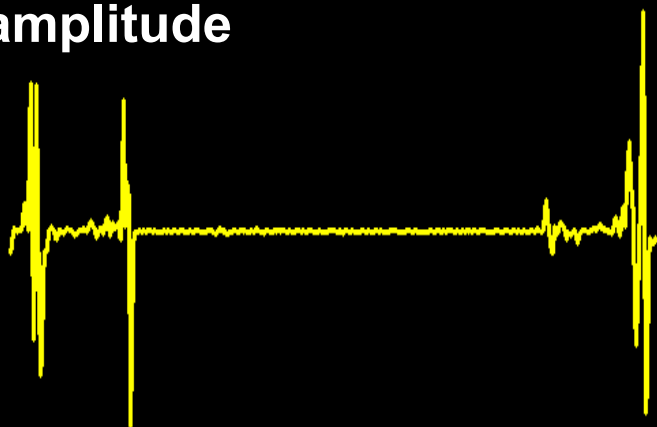
OK:
Smd chip is aligned



Not ok:
Smd chip is tilted



Edge amplitude



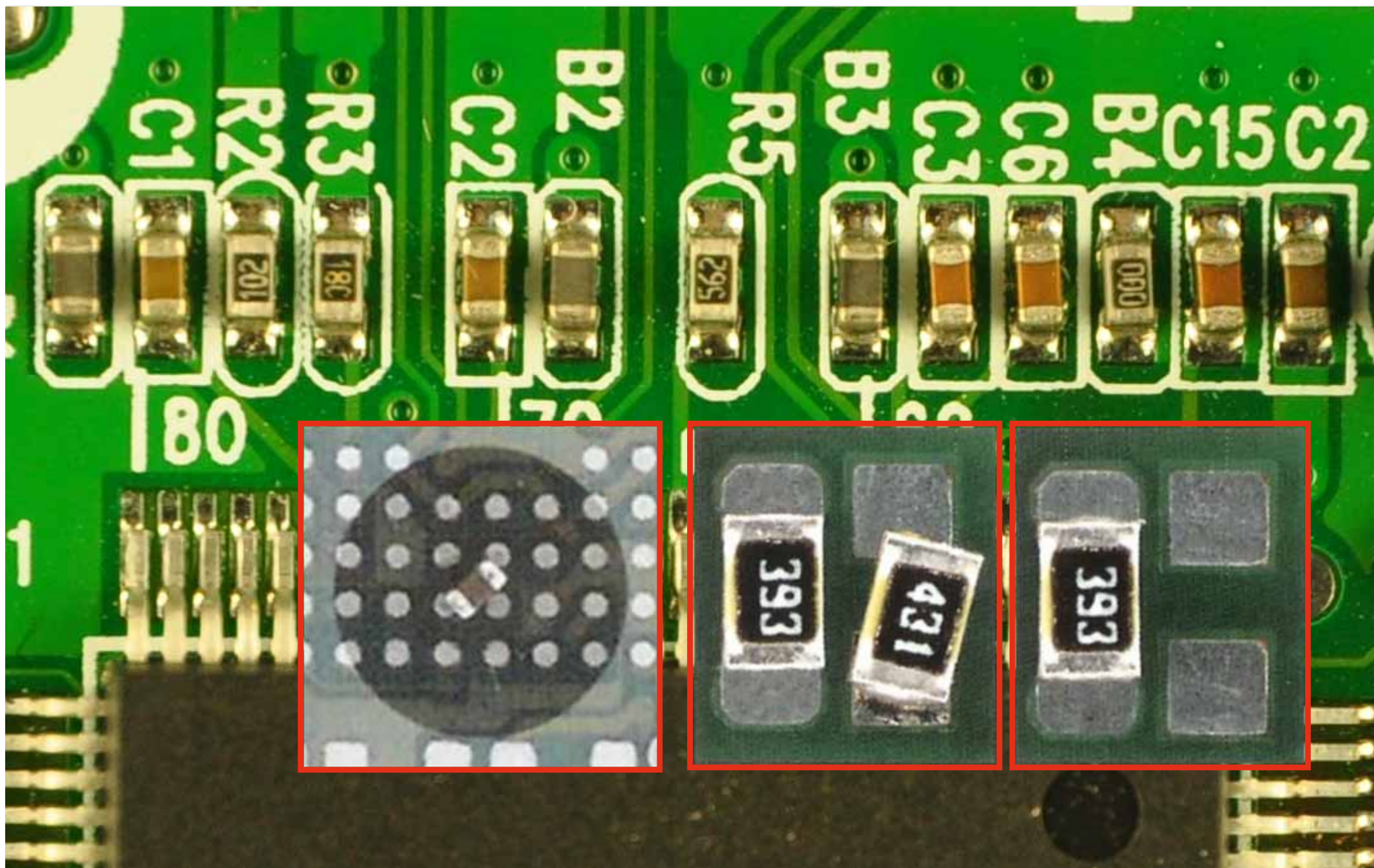
Edge amplitude



Post pick-and-place inspection machines



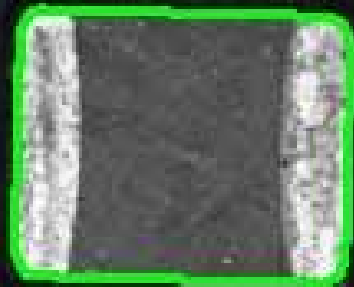
Inspect board after pick-and-place



HALCON finds anisotropically scaled objects

5 models found in 18.23 ms

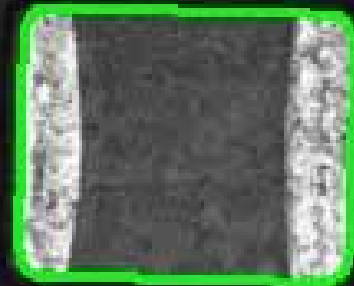
ScaleRow=1.617
ScaleCol=1.004



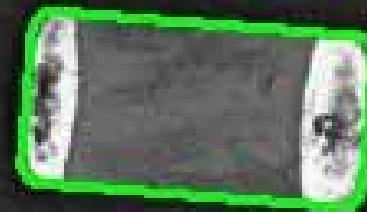
ScaleRow=0.975
ScaleCol=1.010



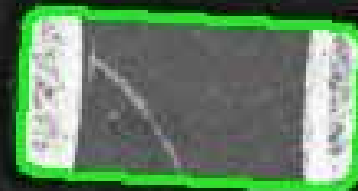
ScaleRow=1.625
ScaleCol=1.005



ScaleRow=1.043
ScaleCol=1.040



ScaleRow=0.985
ScaleCol=1.022



HALCON is the tool of choice for measurement applications in the electronics industry

