



# Technical Note

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## Wafer Scratches and Robot Droop

Blade-related wafer scratches occur when the robot, extended into the cassette either to extract or return a wafer, directly contacts the topside of a wafer. The dominant cause of wafer scratching is robot droop.

Droop occurs naturally as a robot ages and wears. As droop worsens, the robot blade uses more of the vertical clearance area between wafers within the cassette. While much of this area is already used by the blade thickness, additional space is required when robot droop is considered. As blade-to-wafer clearance becomes smaller, wafer scratches become more likely. Due to design and wear issues, droop is unavoidable in the OEM robot design.

When robot droop becomes evident, a tool is typically taken out of production and equipment maintenance is performed to realign the robot. Over time, however, robot droop gradually returns and wafer scratching can again occur. As the time interval between robot alignments increases, the risk of wafer scratching increases and more lots can be affected (Figure 1).

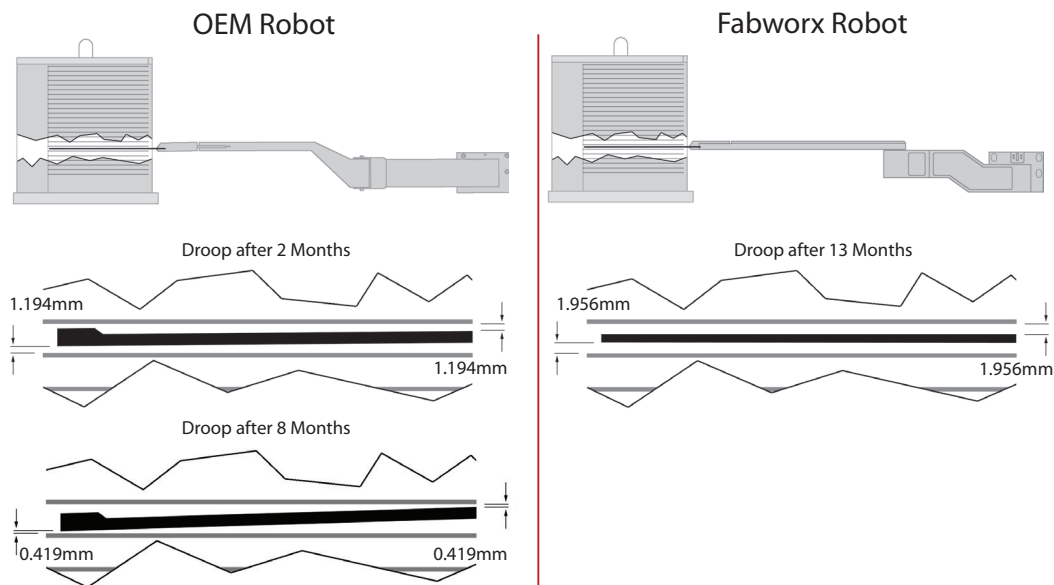


Figure 1. Robot Droop Comparison

Fabworx robots have a more robust design, using stronger materials and tighter tolerances to eliminate droop and associated wafer scratching. Hub bearing spacers are thicker and stronger, and a higher spring preload is used to create an extremely solid base. Elbow and wrist joints incorporate pressed-fit

bearings, and arm components are rigidly connected to increase stiffness. Fabworx end effectors are stronger and less susceptible to heat-induced warping, and their thinner profile provides more vertical clearance between wafers within the cassette.