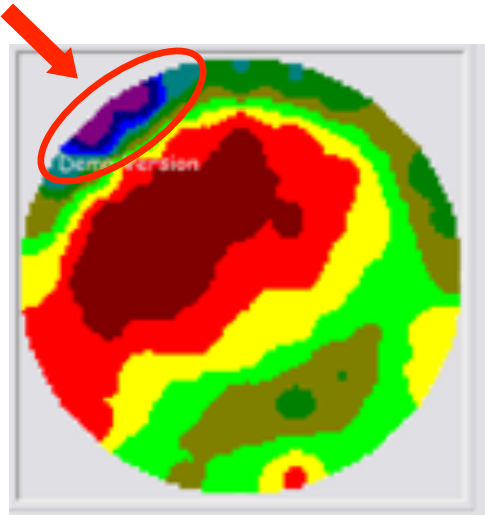


IBM Problem Resources

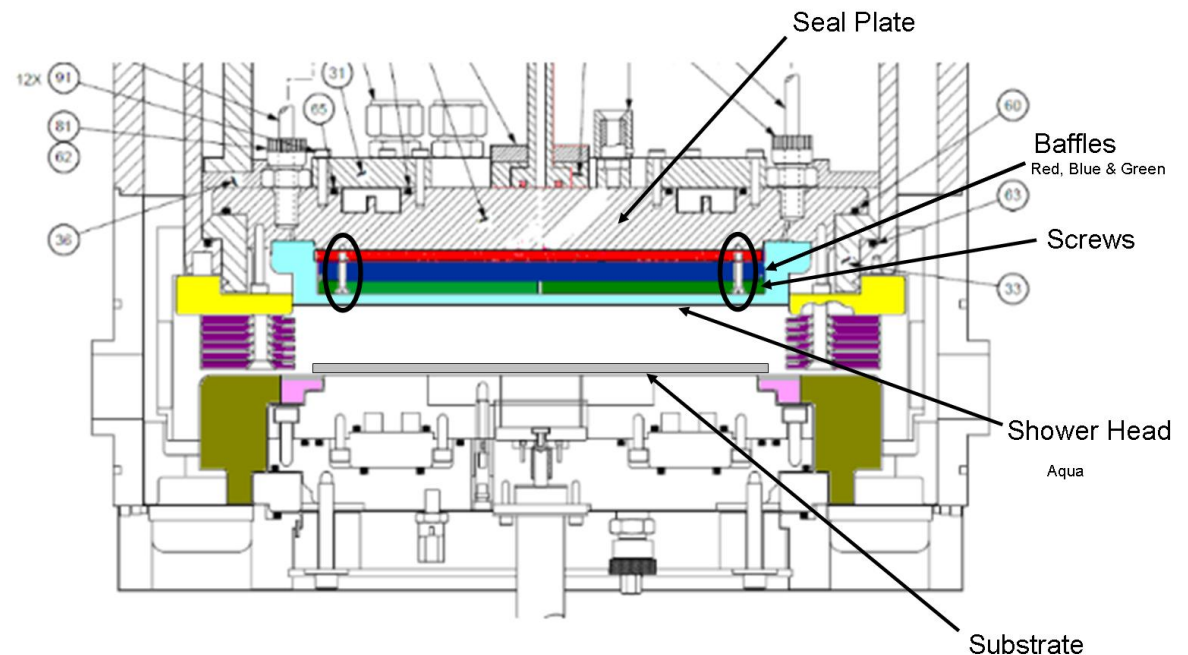
A process designed to uniformly etch a film on a substrate was having a problem that intermittently resulted in a localized area at the edge being significantly under etched. The problem happened on 3 occasions across different machines over a period of 5 months. In each case, when the machine was examined, it was observed that the baffles directly above the substrates were loose on one side. In some cases, the baffles also looked scratched or otherwise damaged. The baffles are a set of 3 plates with hole patterns designed to uniformly distribute gas across the substrate surface in order to provide a uniform removal rate (etch rate).

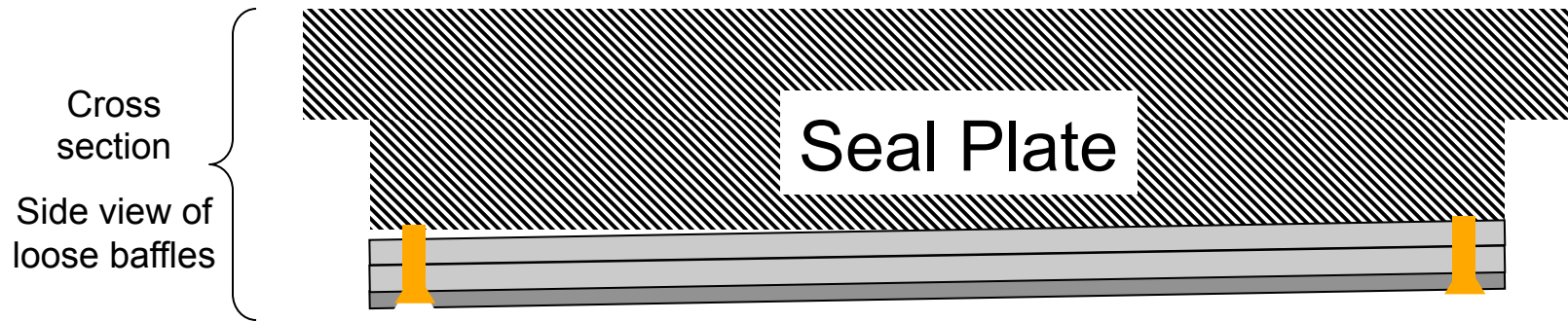
Top down view of substrate

Under etched area



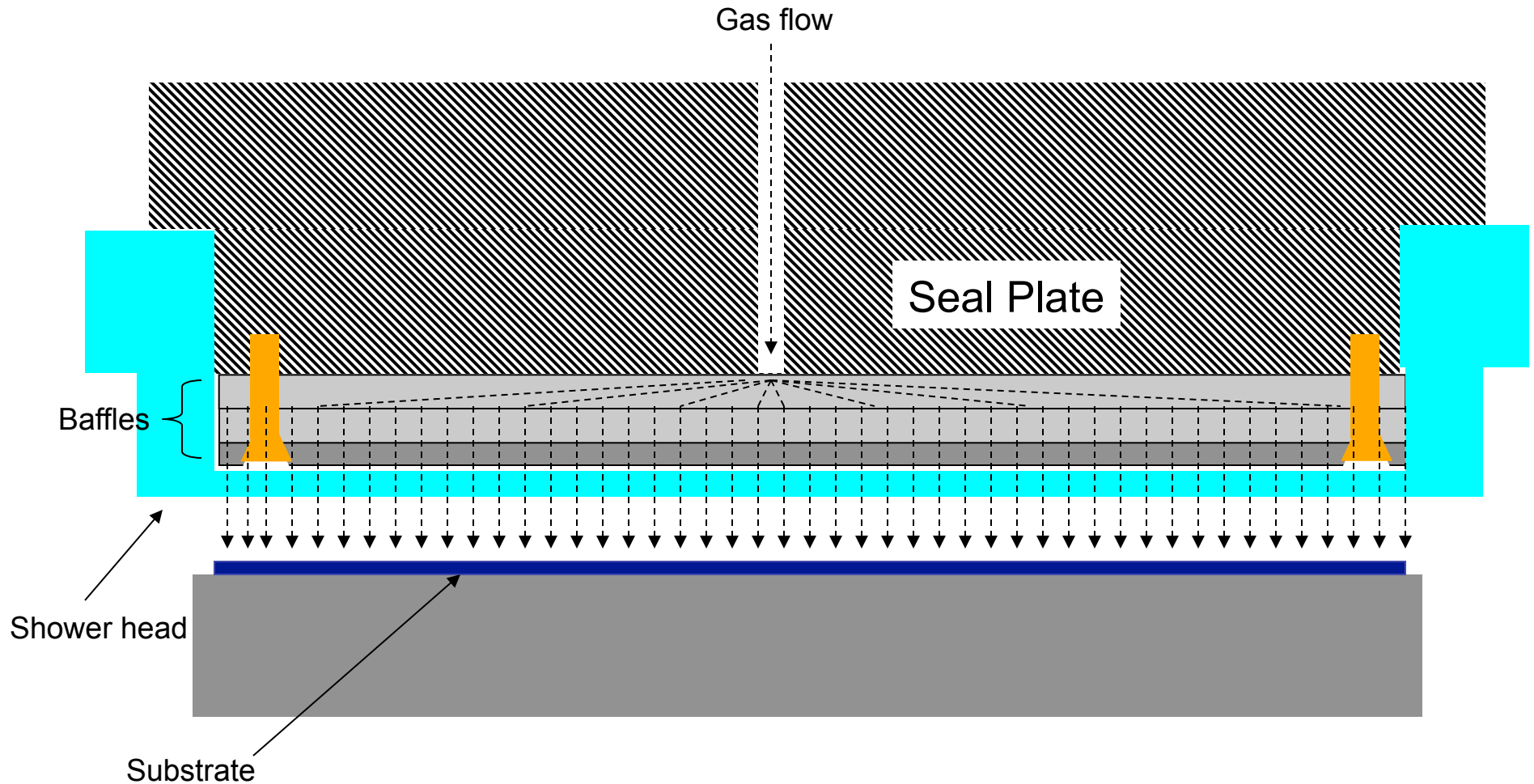
Side down view of machine chamber



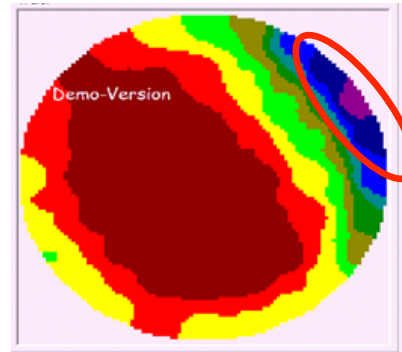
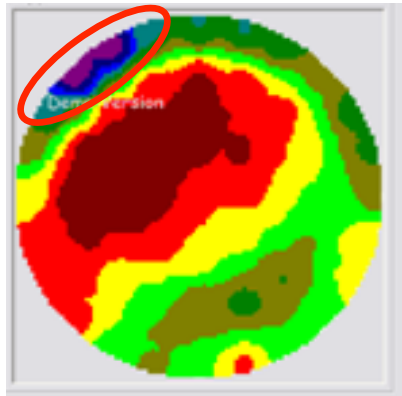


Screw conditions
at time of fail

Process gasses flow through the seal plate and are uniformly directed across the substrate surface by way of the hole patterns in the 3 baffles



The team first set out to confirm that the loose baffles were indeed causing the localized under etching problem. This was done by purposely installing baffles that were loose in a reverse fashion from the original incident. When this was done, the signature moved as expected to the opposite side of the substrate. Now the team knew that the loose baffles were indeed the point of cause and set out to understand why the baffles were coming loose.



The effort first focused on whether the screws were being installed at the proper torque spec. Torque wrenches were provided and the installation procedure modified to ensure the screws were being installed to the proper specification. Initially this was thought to have remedied the problem, but then there was another occurrence (about 3 months later). The highly intermittent nature of the fail added to the difficulty.

Additional Data on Screws

The screws are made from a material known in the industry as PEEK (Polyetheretherketone).

Screw length: 5/8 inch

Screw type: 6-32

Seal plate: Aluminum