

Late 1970s

Appearance of projection aligners for lithography

~ Process Technology ~

In the latter half of the 1970s, along with the advancement of miniaturization trend, it became difficult to obtain required resolution with the proximity exposure method with a gap between the mask and the wafer. Instead, a projection alignment was introduced that could expose a focused pattern by projecting the mask pattern onto the wafer with a lens or a mirror.

Initially, an equal magnification projection aligner that projected a pattern of the same size as the mask onto the wafer was put to practical use. Canon released Japan's first equal magnification projection aligner PPC-1 in 1970, but it was not widely used, because it was 2-inch wafer type machine. Micralign released by Perkin-Elmer in 1973 began to be used after several model changes in the late 1970s. Canon also launched MPA-500 for 5-inch wafers in 1979, and further developed it into MPA-600 in the 1980s, and it became the mainstream of the equal magnification projection aligners.

On the other hand, in order to cope with further miniaturization, a reduction projection exposure apparatus started to be developed. The reduction projection exposure apparatus is a device which projects the pattern in 1/4 or 1/5 reduction precisely on the wafer, in which the mask pattern is made in 4x to 5x size. In this method, since the pattern is not projected on the whole surface at one time, it repeats the shots of exposure with stepping move of the wafer, instead, and it is called step-and-repeat method, and the aligner in this method is called a stepper. The first machine was DSW 4800 released by GCA in 1978, and in Japan, Nikon delivered a prototype SR-1 to ULSI Technology Research Association. After that the stepper became the main stream of exposure equipment since the 1980s.



First domestic projection aligner (Canon)