



## 1970s

### CAD tools appear

#### ~ Integrated Circuit ~

As CAD (Computer Aided Design) systems for semiconductor layout design, systems such as Calma and Applicon in the US appeared. Both were turnkey systems with minicomputers as the host computers. Both companies disappeared after subsequent acquisitions, etc., but the data format of Calma for photomasks, the GDS II (stream) format, is still used today. Also in Japan, the same type of systems were commercialized by the Seiko Electronics Industry and Zuken around the same time.

Since CAD systems at the time were very expensive, designers did not use them directly, but full-time dedicated operators did data input and correction. Based on a handwritten layout drawing, the operator digitized the layout drawing using a CAD tool such as Calma and Applicon and converted to the design data. The plot diagram outputted with the same magnification from the digitized data was superimposed with the enlarged photograph of the master for mask production and was inspected and verified.

Calma: Operated from 1965 to 1988

A vendor of CAD system for semiconductor layout design, equipped with a digitizer and a minicomputer-based graphic system. By the end of the 1970s, Calma's systems were introduced in virtually all major semiconductor manufacturing companies. Calma released GDS (Graphic Data System) in the stream data format in 1971, which was the de facto standard format of LSI layout design data in the semiconductor industry, and subsequently GDS II in 1978. GDS II is a binary format that expresses LSI layout design data by number of layers, data type, text information and the like. Currently, many EDA vendors use the phrase "from RTL to GDS II" to show that it covers from logic design to layout design broadly, and GDS II is standardized as much as that.

Applicon: Operated from 1969 to 1981

Early Applicon products ran on PDP-11. In cooperation with DEC, the single user OS was modified to be the world's first multi-user OS.

A command input method using handwritten character recognition was adopted. The user interface adopted a stylus and a tablet as the substitutes for a mouse, and the tablet was arranged at the upper left and lower right on the display. In the latter half of the 1970s, in addition to LSI and VLSI design, it was used for various purposes such as designing mechanical design drawings like designing power plants.



Fig. Design operation using Applicon system

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