

## SCIENCE AND RESEARCH

Application: Semiconductor Physics



In the field of semiconductor research atomic particle sources are needed with defined particle speeds and thus energy levels ( $E=mc^2$ ). These sources are mounted next to atomic research reactors, which produce a wide spectrum of sub-atomic particles of different masses and energy levels. A mechanical chopper system is used to select particles within a narrow energy band, by allowing only those particles to pass, which are travelling at a very closely defined speed.

### Project: Neutron Chopper

The chopper employs high-speed servomotors and electronic controls, driving multiple disks of around 700mm diameter in vacuum.

These disks have small apertures at one spot at their periphery and are driven at speeds of 15,000 to 30,000rpm and held with a programmed angular offset to each other with an accuracy better than  $\pm 0.1^\circ$ . The higher speed choppers employ active magnetic bearings.

### MACCON contribution:

For this project MACCON supplies the motors to run in vacuum as well as the motor drivers. Due to the precise angular offset requirement between the fast rotating chopper disks, motor position feedback is needed, which is provided by resolvers and special reference sensors, especially suited to this environment. The coordination of the 3 to 7 disks is mastered by high-speed, real-time control, integrated in the motor drivers.

