Improvement of control system for MeV ion beam lithography using the PPAL technique.

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Background

The existing system has been in use for about 6 years. While it has proved to be a useful workhorse system, future requirements require new developments and support for the existing operating system hastens the need for modernisation and upgrade.

The new system will be based on a LabView based system on a PC. For stability it proposed the operating system is a LINUX variant such as Ubuntu which has a Window user interface with a Mac-like feel.

i) Develop compensator algorithm that corrects over a small position range (< 50 μm) for the aperture positioners to allow writing of sub-μm channels (100 nm wide) with good precision.

ii) Curved corner and circle approximations in PPAL by combining X and Y and positioner X', Y' movements with acceleration, velocity control and incremental fluences based on exposure characteristics.

iii) Move beam blanking to AUX output of ESP 300 freeing the NI card for other duties.

iv) High speed movement with acceleration, constant velocity, deceleration of stage to speed up movements.

v) Exposure end-point determination from integrated aperture current, or RBS monitoring of integrated fluence from primary aperture.

vi) Automatic beam current fluence with F-cup at start and end of exposure.

vii) Input of pattern data from G-code (CAM) or Gerber file. The idea to use standard development software to write the layout. Our standard files should be writable as well.

viii) Integrated as LabView routine for integration into DREAM.

The system should have a user-friendly interface via a control panel. Key information should be readable at a distance. (Large text, colour -coded indicators etc.) In addition there must be a check before anything is moved that all the new positions are within the safe operating range. i.e. no collision of mechanical parts can occur.