

Performance of the Australian Synchrotron Storage Ring Alignment System.

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The storage ring for the Australian Synchrotron is of double-bend achromat design with fourteen sectors. Each sector has five girders supporting the various magnets, one girder for each of the dipoles, a central long girder with seven multipoles and two short girders with three multipoles. The girders are aligned by a cam and vee-block system that allows fine adjustment of each girder in all six degrees of freedom. The adjustment assembly also contains a constrained layer damping (CLD) plate to minimise the transmission of ground vibration to the magnets. A laser tracker is used to take multi-point measurements on each girder and the 6-D transformation required to place the girder in the correct position is determined from a best-fit of the measured fiducials to the nominal fiducial positions. An algorithm has been developed to calculate the required adjustment of each cam to achieve the desired movement.

The presence of the low stiffness CLD plates in the system limits the adjustment resolution that can be achieved due to the coupling of the adjustment movement and the shearing of the visco-elastic material in the CLD plate. An investigation has been carried out to determine the most effective method for minimizing this effect and the resulting adjustment resolution possible. Vibration measurements have also been taken to assess the effectiveness of the CLD plates in minimizing motion of the magnets.