The grate plate is wildly used in Ultrahigh precision instrument due to its various advantages such as high hardness, good processed technology, absorbing vibration, low coefficient of expansion, high abrasion hardness, corrosion-resisting, etc. Exacting flatness measurement is key to the success of precision equipment. The HP5529A Dynamic Calibrator is a well-established tool for the Ultrahigh precision measurement of flatness, linear, longitudinal displacement, etc. However, its outstanding disadvantage is that it can not measure by non-contact, a flexible, automated system is necessary to manufacturing process. By way of research and development of "Dual Optical Laser Direction Writing Equipment", a new sensor flexible automated system SFAS 2000 designed and made at CIOM is presented. The theory is that light from a HP5519A laser head passes through a pair of phase diffraction gratings to illuminate the test surface with two beams at different angles of incidence. The same pair of gratings recomines two beams, resulting in an interference pattern with an equivalent wavelength. During this measurement, a sensor will receive the signals and send them into the software package. Meanwhile a CCD camera captures a sequence of phase-shafted interference patterns, which the computer analyses to obtain an accurate map of the shape and topography of processing surface. The resulting measurement data can be displayed as high-resolution rotatable three dimension graphics, numeric displays or sliced cross section. By means of self-instructed mode and programmable attenuator, the sensoring system SFAS 2000 can automatically determine the attenuation degree and calculate the processing feed amount. The self-instructed mode is required only for the first of a configuration of workplace position. This allows the processor to instantly interact with the machine process and quickly identify scrap-production flatness error sources, then give crucial feedback at stage of the process, from milling and turning to grinding; from polishing to lapping and super-finishing. Powerful software package based on MATLAB running in a Microsoft windows 95,97 or 98 environment allows processor to set the parameters within which he wants to measure using a protocol that is comfortable to most users. The real-time, on-screen graphics is helpful of quickly identifying trends and variability within the whole production process. The precision and reliability of this new system ensure that the grate plate meets the demand of ultrahigh precision.

Key Words: Ultahigh precision; Flatness; Grate plate