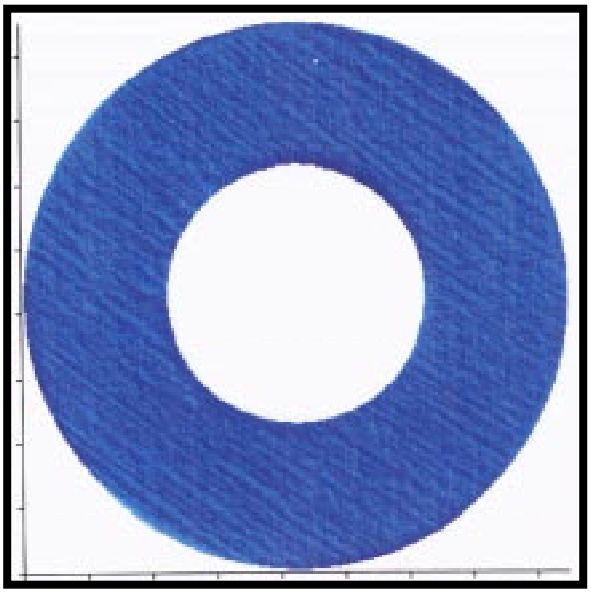
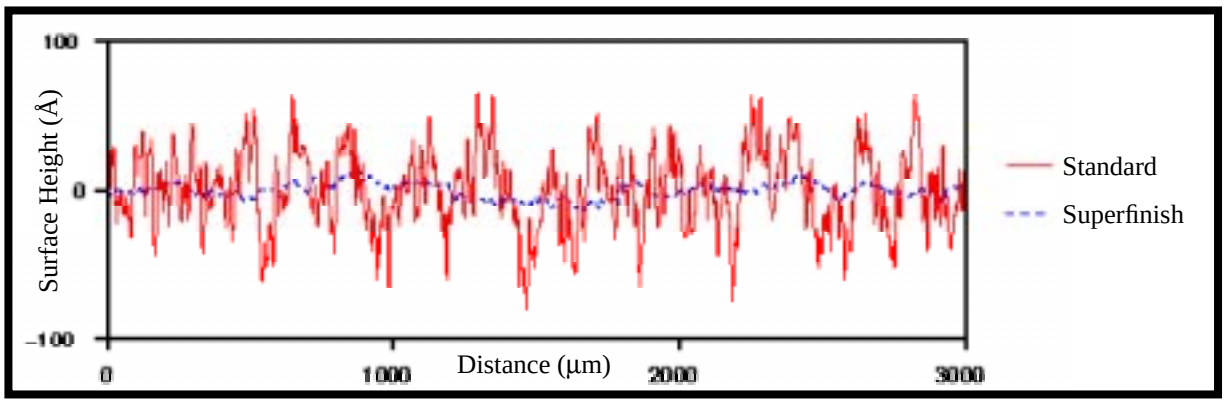
# IBM Corp: Storage Systems Division

## Characterization and reduction of hard disk substrate waviness. Summer 1997



My project was to identify sources of surface waviness on the substrates used to make magnetic hard disk drives. The maximum achievable areal memory density of a disk drive is limited, in part, by the separation between the disks and their read/write heads. Because this "fly-height" is defined by the disks' surface waviness and roughness, minimizing substrate waviness is very important. Toward this end, my work helped give my group an understanding of the effects that processing and material composition have on substrate waviness.

To characterize disk waviness, I used several tools, including: an optical microscope, an optical profiler, a microscope-coupled interferometer, and two types of full disk imaging interferometers. Using some thermo-mechanical modeling, I attempted to predict/explain how a substrate's waviness changes when it is run through the sputtering system used to deposit the disk's magnetic material. I also executed an experiment matrix (baked many disks of differing compositions and heat treatments) to see how substrate waviness changed with baking temperature and time, and to determine what processing and which materials parameters yielded the most stable substrate surfaces. The procedures and findings of my work were presented in a final technical report: "Thermal crumpling of Ni-P plating on hard disk substrates."




Benjamin Nunes