Optical computed tomography of radiosensitive gels has been proposed for radiation dosimetry[1,2]. In order to reduce scan times for 3D applications, we modified a commercially-available document scanner (Hewlett Packard ScanJet 5P) to measure light transmission profiles much more efficiently. An external He-Ne laser beam (λ = 543.5 or 632.8 nm) is first made divergent with a cylindrical lens and then recollimated with a second cylindrical lens (width = 25 cm) to form a non-divergent line source. The flatbed scanner is operated vertically with the phantom cylinder positioned between a pair of 45^{o} deflecting mirrors and the scanner. As projection data are collected, one of the mirrors and the scanner's photodetector head move together vertically, sweeping the slit beam along the gel cylinder. After passing through the gel, the transmitted beam is incident upon a white scattering surface forming an image of the profile which is then focussed onto the color CCD linear detector. By rotating the phantom between translational movements, the full projection data set for multi-slice reconstructions is collected. For a phantom diameter of 20 cm, scan times of 15 seconds per angular projection have been achieved. The result is a fast inexpensive 'third-generation' optical CT scanner with submillimeter spatial resolution, good linearity, and capable of imaging full 3D dose distributions in less than 45 minutes.

[1] Kelly, R, Jordan, K, Battista, JJ, Med. Phys. 23, 803 (1996).

[2] Gore, JC , Ranade,M, Maryanski, MJ, Schulz, RJ, Phys. Med. Biol. 41, 2695-2704 (1996)