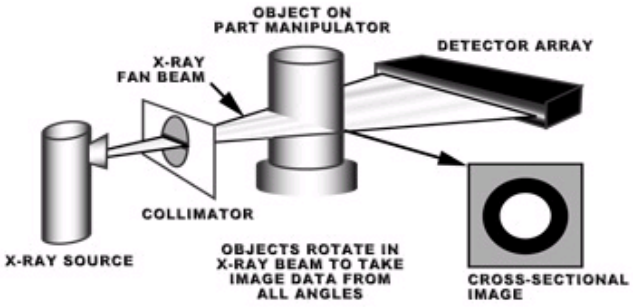

Computed Tomography (CT) creates cross section images by projecting a thin-beam x-ray through one plane of an object from many different angles. As the x rays pass through the object, some radiation is absorbed, some is scattered, and some is transmitted. In some scanners a cone-beam covers an area detector so that many slices, or a volume, can be scanned at once.

The radiation transmitted through the object at each angle is measured and referred to as attenuation data. It is a measure of the reduction in x-ray intensity that results from absorption and scattering by the object.

In CT scanning, the attenuation data is summed over the many different angles from which it was collected using a computer in a method called, reconstruction. Reconstruction essentially "builds" the CT image from the data collected and represents a cross section of the object

CT scanners typically consist of four hardware subsystems: a radiation source, a radiation detector system, a mechanical manipulator, and a computer with display. The radiation detector system is composed of detection elements, such as scintillating crystals and photodiodes. A data acquisition system (DAS) measures radiation data transmitted through the object and digitizes it into a format that can be handled by the scanner's computer system.

A mechanical manipulator is needed to precisely move the object relative to the x-ray source and detector system. Finally, a CT system requires a computer to control the scan motion and the timing of data acquisition. The computer then reconstructs the image from raw scan data.

Cross-sectional CT images are much easier to interpret than conventional radiographic images because features in the image do not overlap. Accurate positioning of internal features can also be identified. In addition, density differences within the object are easily identified as well as quantified, and can be related to desirable or undesirable features of the object or material. Finally, scan parameters such as cross-sectional slice thickness or data collection time can be varied to achieve the best combination of image quality and inspection time.

As computed tomography technology developed, researchers created improved methods of collecting the x-ray projections through an object. These methods were called generations, and use different motions to collect the projections.