



Volume computed tomography (CT), also known as cone beam or 3D scanning, is a recently developed technique that can greatly speed up collection of CT data from an object. The term Volume CT has been in use for many years to refer to the 3D visualization of an object from a contiguous stack of separately scanned CT images, or "slices" made up of a conventional CT system.

True Volume CT scanning is a variation of that method which uses an area detector (such as a camera coupled to an image intensifier, or scintillating screen) to collect 2D radiographic projections of the object while it is rotated 360°. A conventional CT scanner of any generation collects 1D projections from a fan beam of x-rays.

In Volume CT, the x-ray beam is opened from a fan to a pyramid or cone. Thus, it is sometimes called cone-beam CT. By collecting 2D projections, the Volume CT scanning method makes more efficient use of the x-rays emitted from the source. A special reconstruction algorithm, such as those developed by Feldkamp (L. Feldkamp, Ford Motor Co.) and others, processes the 2D cone-beam projections into a volume that is the equivalent of many simultaneous, contiguous CT slices. A special feature of this data set is that oblique slices through any part of the object can be easily generated for 2D display.

Several technical problems must be overcome when collecting data from an area detector, particularly data collected away from its center. BIR's years of research in area detector CT and volume scanning have led to sophisticated data processing algorithms to correct for geometric, magnetic, and other distortions. These would otherwise render the Volume CT data less accurate than the single slices produced by conventional CT. Concurrently, BIR has made advances in CT reconstruction hardware that eliminate the processing bottleneck introduced by the enormous data loads of volume scanning. Standard image processors could take hours to process the captured data whereas, a custom-designed BIR parallel image processor can reconstruct a 256 X 256 X 256 Volume CT image in a few seconds, delivering the productivity scans sought from volume scanning.