White Paper

4D Obstetric

esaote
Creativity in Healthcare

"Thanks to the latest graphics hardware technological developments, we could move 3D related algorithms from the main PC to dedicated graphics processors with a huge step forward for both voxel resolution and volume rate"

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What is Volume Rendering?

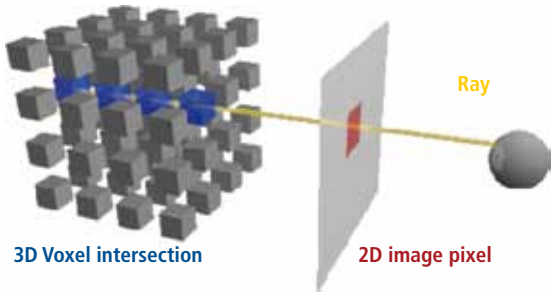
The term *volume rendering* is used to describe techniques which allow to display three dimensional data. Volume rendering is a technique used to display sampled functions of three spatial dimensions by computing 2-D projections of a colored semitransparent volume.

Medical imaging is currently the leading volume rendering application area, with volume data available from several modes including CT, MR, PETand US scanners. The availability of parallel data stacks produced by CT scanners, for instance, prompted the development of techniques to display data in a threedimensional plane rather than in individual planes. This supplied the immediate advantage of being able to view the information from any angle.

Ray Casting

The basic goal of ray casting is to allow the best use of three-dimensional data and not to attempt to impose any geometric structure on it. It solves one of the most significant limitations of surface extraction techniques, namely the way in which the projection of a thin shell in the acquisition space is displayed. Surface extraction techniques fail to take into account that, especially in medical imaging, data may originate from fluid and other materials which may be partially transparent and should be modelled as such. Ray casting doesn't have this limitation. Ray Cast rendering algorithm projects Three-dimensional space on a Bi-dimensional image corresponding to the screen by propagating the rays coming from the observer and covering the space to be rendered (fig. 1).

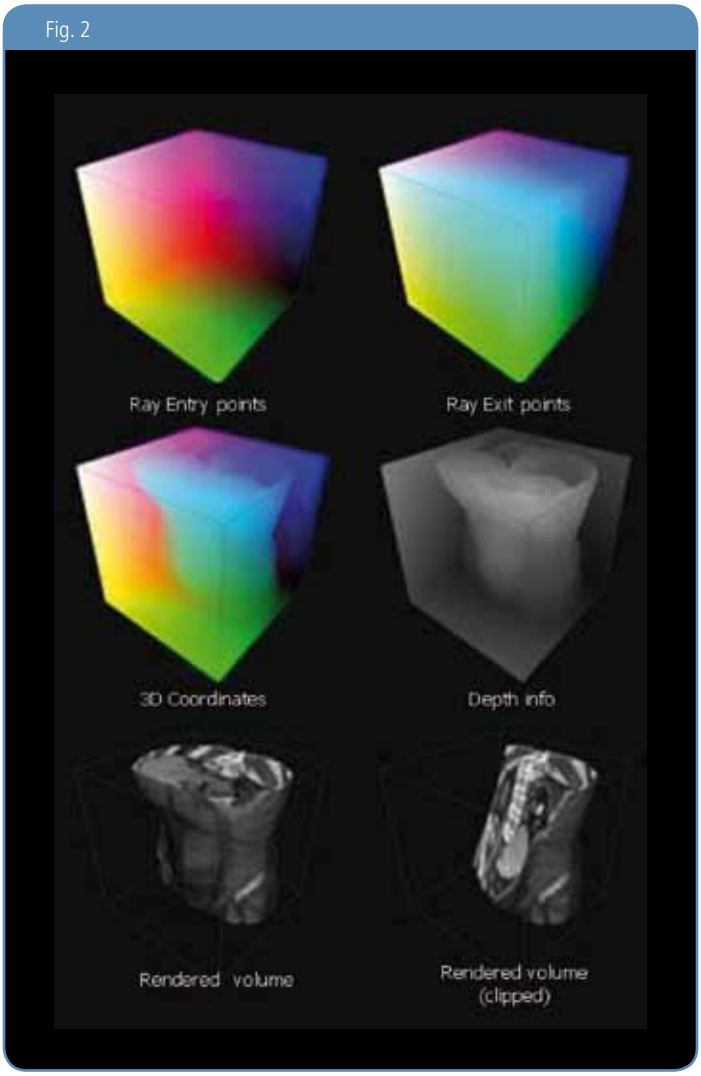
Fig. 1



With the latest innovations in graphics hardware platforms, algorithmms may be managed in a new way, which includes splitting rendering into the following different steps.

Please note that ray entry and ray exit coordinates (volume) are also determined with one rendering step (top pictures).

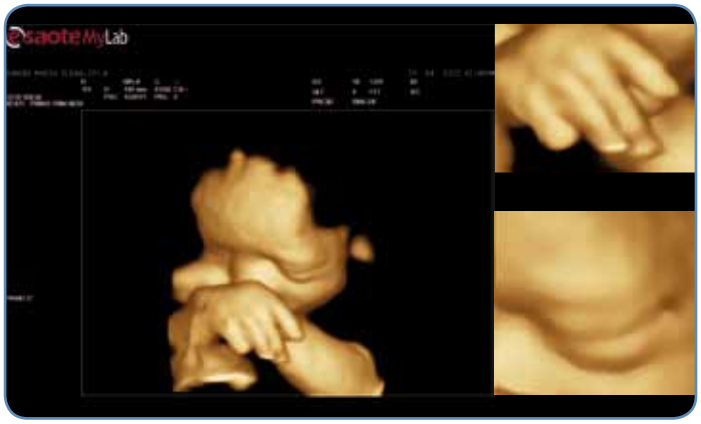
Fig. 2



Esaote 3D-4D highlights, full power voxel res and volume rate are now at your fingertips

The new algorithm management combined with signal acquisition focused on region of interest (ROI), allows for much quicker three dimensional reconstruction and volumetric display with volume rates that are equal or superior to 40 V/sec*.

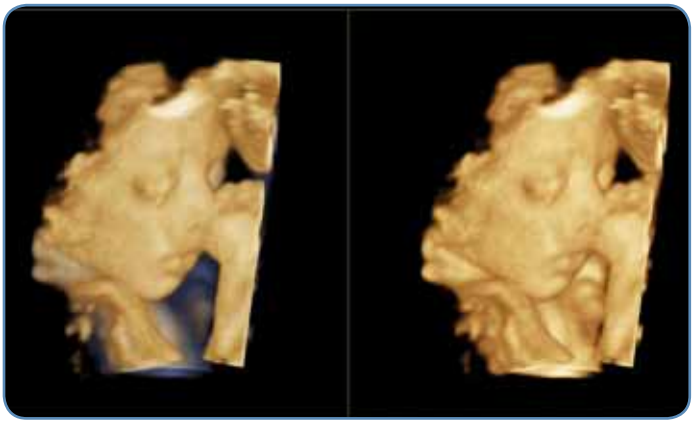
Acquisition is based on vectors mode, which also means a step forward as far as full screen resolution accuracy with detailed districts, such as fetus eyes or eye-lids, now represented with an extraordinary imaging quality.

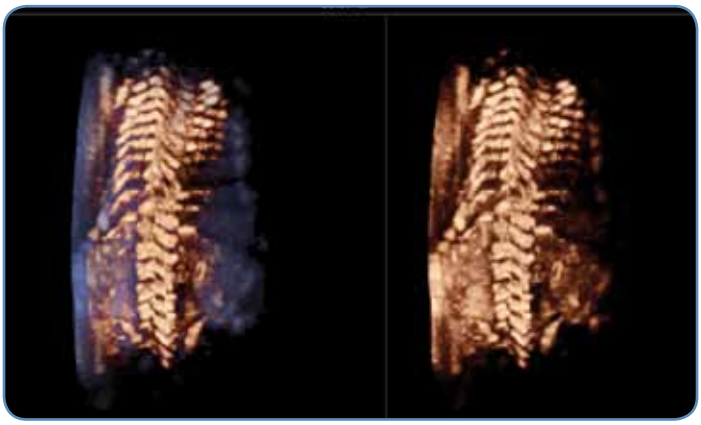


Esaote 3D-4D Depth-Colour, your new dimensional prospective

When the third dimension (represented by depth) is associated with colour coding, rendering takes on a further Depth-Color and new dimensional prospective. Thanks to innovative R&D engineering, we can attribute a colour coding to signal processing whenever the depth factor is involved. Such a technique, devoid of any image resolution loss or reconstruction speed, provides more readable images and improves picture-lighting perception.

A terrific result applied to fetus volume rendering.





*available with optimized parameters

Esaote 3D-4D POP-Platform, when the user interface makes the difference

Based on the revolutionary POP (Productivity-Oriented-Platform) the new user interface of the Esaote 3D-4D is extraordinary. The high-resolution LCD touch screen, newly supplied e-touch and Smartouch functions and an extremely user friendly keyboard, provide a magic operator-machine interface. The result is a quicker procedure approach with a complete examination supplied in no time.

Custom setup

By pressing the e-touch button, the user can display the controls and functions he really needs in clinical practice: improved comfort and reduced examination time.

MyMacro

e-touch dedicated session allows user to record different macros. Based on any single user's needs and preferences, multiple functions can be included with just one touch: **less keystrokes and faster diagnosis**.

Smartouch

Wide ranging image settings, user preferences and clinical targets, normally require time and attention. Smartouch delivers dedicated setting for any anatomical district. Optimal image is **displayed with just one touch**.

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