



Contribution ID: 36

Type: **Poster Presentation**

## Investigation into the application of Computed 3D Tomography in particle shape analysis of iron ore samples

*Monday, 23 September 2013 15:10 (2h 20m)*

The possibility of using 3D neutron tomography to determine the geometrical properties of iron ore particles is explored in this study. Neutron tomography is a non-destructive technique enabling observation of the surface and interior of solid material and is an ideal tool for 3D geometrical analysis of irregularly shaped particles. Shape and size analysis is done using "Octopus", "VGStudio MAX", "Image-Pro Plus" and "Image J" software packages for the visualization and analysis of volume element (voxel) data.

The quality of 3D tomography data depends on the quality of the acquired tomogram and reconstruction of 3D images. Rock samples vary in composition, resulting in neutron images with a wide range of grey levels, which proves challenging during thresholding of images. The partial voxel problem, i.e., grey levels at the edge of particles, vary and could influence the values obtained for areas and perimeters depending on whether grey levels were added or subtracted from the particle.

Separation of connected particles or particles in close proximity proved to be difficult, as automatic separation techniques cannot handle irregular-shaped particles. Manual separation of particles was done in this investigation, which proved to be time-consuming.

Results show that 3D neutron tomography along with advanced image processing packages could be used in quantitative 3D particle shape determination. This could aid the understanding of particle separation techniques.

**Submit a paper<br>for peer review<br>(SA Journal of Science)?<br>(Yes / No / Maybe)**

No

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**Session Classification:** Posters, Exhibition and Necsas Visit

**Track Classification:** Poster