

Proppants

Size and shape analysis for improved product performance

Application

Proppants are used in the oil and gas industry to increase the flow of oil or gas from a well (drilling hole). Proppants are particles that are pumped into the oil well to hold the fissures open so that the natural gas or crude oil can flow up the well.



Resin coated sand



Ceramic proppants

Customer statement

“Having the CAMSIZER allows us to move in one tenth or one fifteenth of the time we could without it. All the forward thinking Frac sand companies that are focused on quality are moving to Dynamic Image Analysis. It should become the gold standard.”

Customer statement (Jerry McGee, CEO of Cadre Proppants, 2012)

Demands of quality assurance

The quality control of the proppants is described mainly in ISO 13503-2, which replaces the earlier API standards RP 56, 58 and 60. Among other tests, the standards stipulate the analysis of size, shape and crush resistance. The particle size range is of great importance. Typical proppant sizes are generally #8-#140 mesh (106 μm -2.36 mm), for example, 16-30 mesh (600-1.18 mm), 20-40 mesh (420-840 μm), 30-50 mesh (300-600 μm), 40-70 mesh (212-420 μm) or 70-140 mesh (106-212 μm).

In addition to the size, the shape of the proppants has to be controlled as well, especially the roundness. In the past, the roundness has been analyzed using a visual method, i. e. by eye. This method is characterized by greatly differing results, depending on the subjective perception of the operator. The roundness can be analyzed with the CAMSIZER in an objective, comparable and reproducible way, totally independent of the operator.

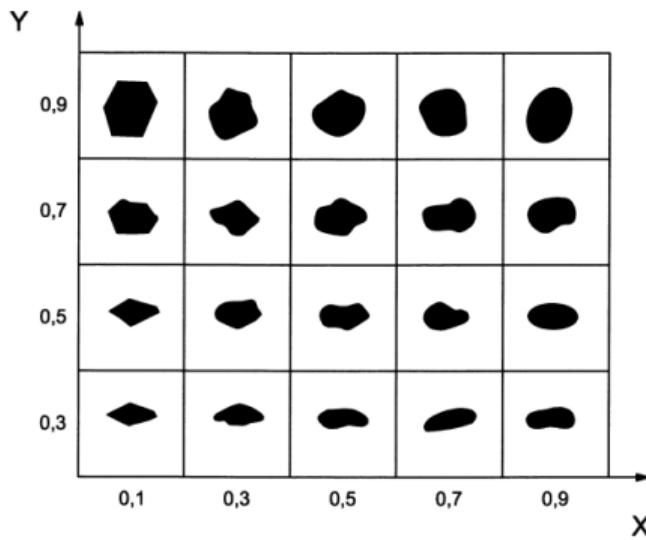
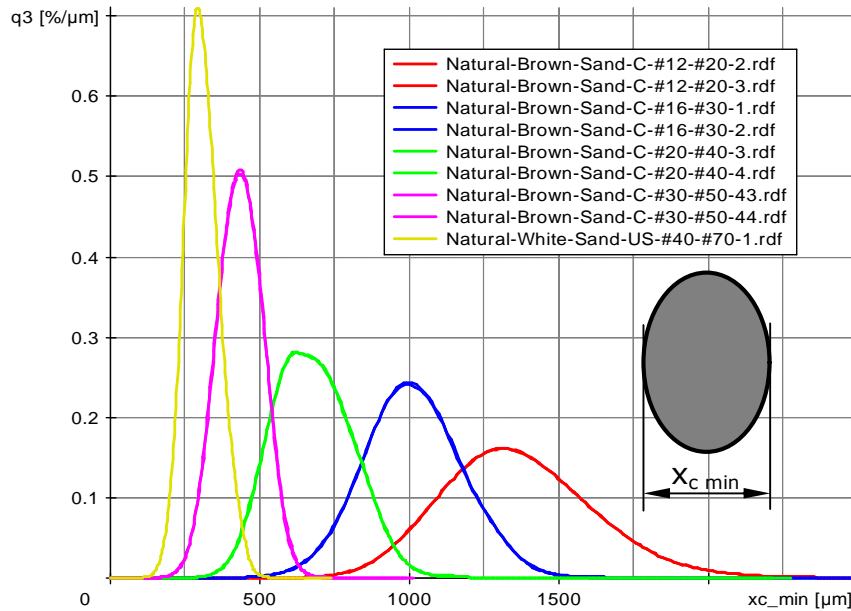


Chart for visual estimation of y-axis „Sphericity“ and x-axis „Roundness“
(from Krumbein & Sloss)

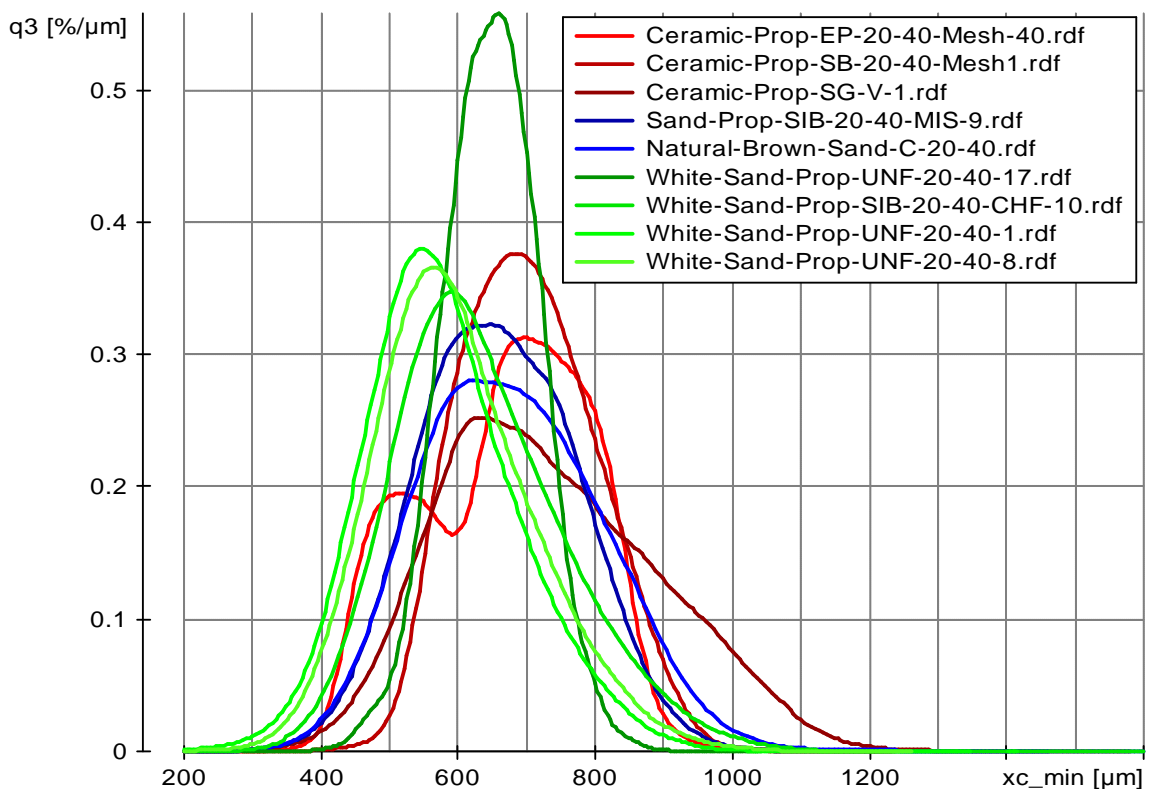
The proppants are an important factor to increase the productivity of an oil well and reduce the drilling costs because of less bore holes and larger distances between the wells. The CAMSIZER can help to establish objective, reproducible quality control criteria, which meet and exceed the requirements described in the API and ISO standards.

Solution

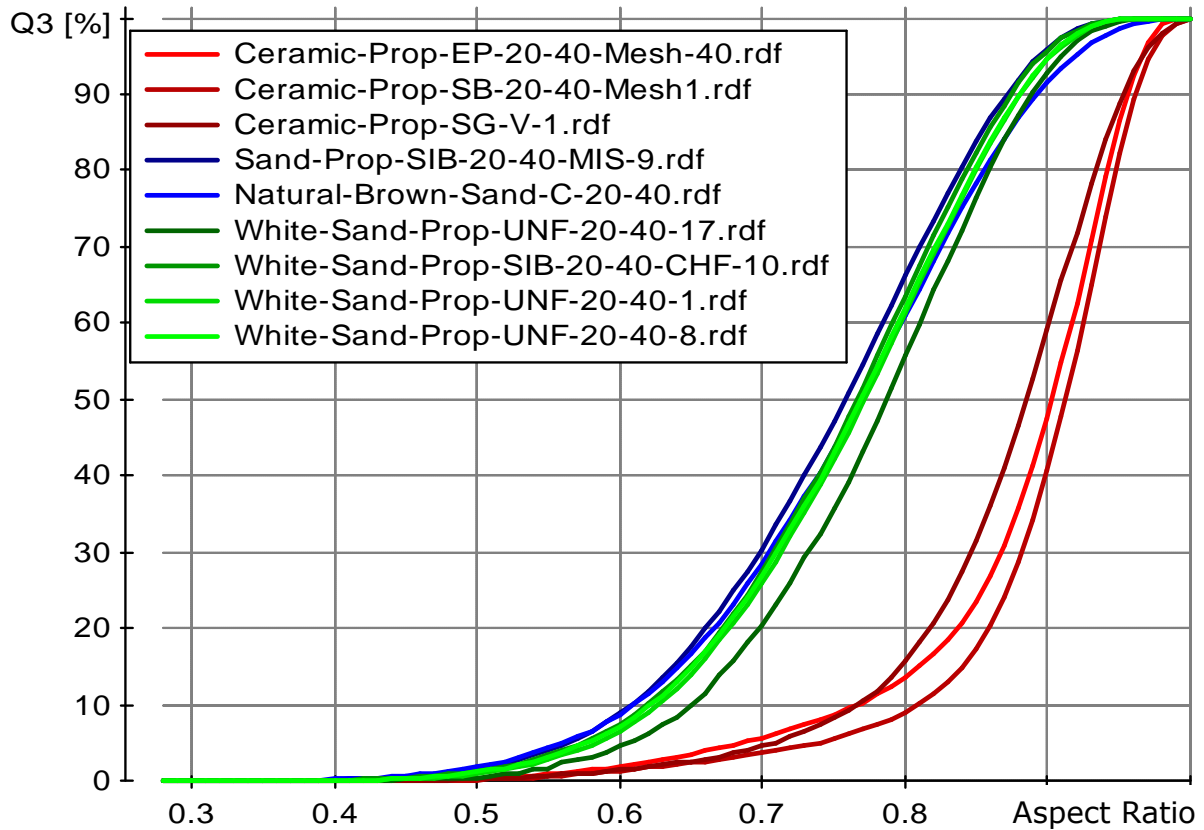


Dynamic Image Analysis with the CAMSIZER® offers a contact free, fast and reproducible alternative. The CAMSIZER is much faster than the traditional visual analysis. It saves time and money in the lab, reduces the work load, increases the effectiveness of the lab staff, and finally helps to improve the product quality by allowing for more frequent and faster testing.

Size analysis of 5 different natural sand proppant samples (**#12/20**, **#16/30**, **#20/40** and **#30/50**). Each sample was measured twice. The repeatability is excellent. One sample of white sand **#40/70** is shown for comparison.



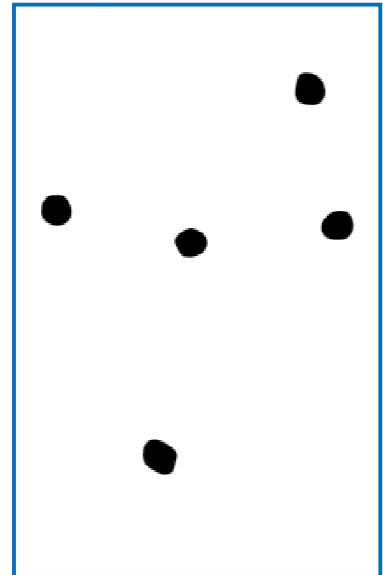
Size analysis of 9 different proppant (sand and ceramics) samples (#20/40). Some have wider, some have more narrow size distributions. One ceramic proppant sample had a bimodal distribution (red "**Ceramic-Prop-EP-20-40-Mesh-40**").



Shape comparison between natural sand proppants and **ceramic proppants**. There are two different ranges of Aspect Ratio (Krumbein's Sphericity). Analysis of other shape parameters are possible as well (Convexity for ceramic bead twins, Symmetry for good and broken ceramic beads, Krumbein's Roundness etc.)

CAMSIZER[®] - Benefits at a glance

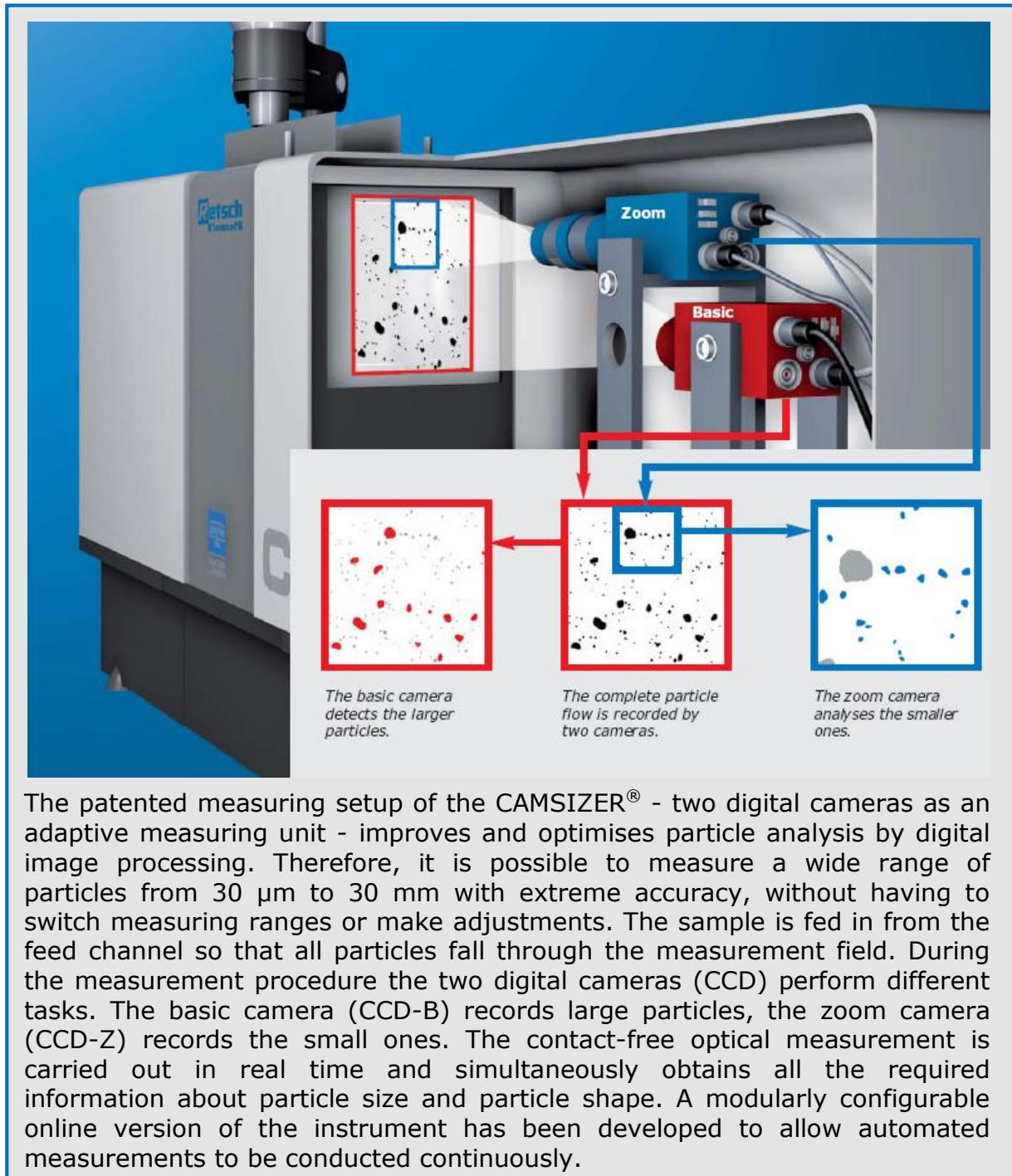
- Reliable and reproducible results
- Short measuring times (1 – 3 minutes)
- Fully automated, operator independent results
→ identical results at different production sites
- Particle size and shape analysis, safe detection of oversized particles
- Online, at line or lab versions available
- Non-contact, non-destructive measurement
- Wide dynamic range 30 µm to 30 mm, high resolution
- Safe detection of fines and dust
- Easy to use, maintenance-free, reliable and simple calibration
- Automated display of results in clearly arranged measurement protocol



Typical CAMSIZER[®] image showing 30/50 ceramic proppants



CAMSIZER® - Measurement principle



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