

Higher cement performance

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STAREX is a powder-based grinding aid and performance enhancer which is dosed with the cement mill feed. The user is able to improve mill output by up to 10 per cent and increase cement performance by up to 40 per cent at early-ages (one day) and up to 15 per cent at late-ages (28 days).

STAREX offers cement producers the following commercial, technical and environmental benefits:

- improved early- and late-age compressive strength
- increased cement mill output with no reduction in fineness
- increased extender (fly ash/pozzolana/slag) content in blended cement with no reduction in strength
- reduced residue at 45µm and 90µm
- improved durability of concrete
- reduced CO₂ emissions per tonne of cement production through reduced power requirement for milling and increased extender content.

The following case study outlines the observations made from a plant-scale deployment of STAREX in southern India.

This plant was experiencing the following inability to increase:

1. cement mill output beyond a certain level.
2. fly ash content in PPC due to low one-day strength of cement.

STAREX was added at the cement mill inlet at a dosage rate of 0.03 per cent of mill feed.

The following observations were made after dosing commenced.

- the three Tromp curve parameters, viz the circulating load, circulating factor and by-pass, reduced significantly. This suggested that the mill feed could be increased to optimise operations.
- the frequency distribution curves of the separator feed, product and reject in circuit sample were plotted and analysed (see Figures 1 and 2). The curves in Figure 2 show

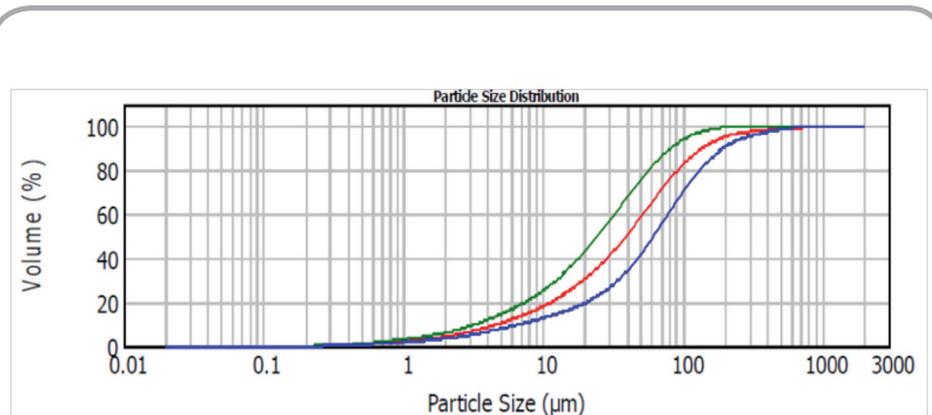


Figure 1: cumulative frequency size distribution of separator circuit sample without STAREX 300 shows clear separation of Reject (blue), Feed (red) and Product (green) curves

that there was little difference between the mill outlet (separator inlet), particle size distribution (PSD) and the separator product PSD after addition of STAREX. This meant that the size reduction had already been achieved in the mill and no further advantage was being derived by the separator. The separator's operating parameters were later optimised further to achieve a higher Blaine. Subsequently,

the mill feed was increased, so that the circulating load could be maintained above 100 per cent and the separator could also be effectively utilised. The separator remains under utilised if the mill feed rate is not increased with the use of STAREX.

- the strength data (see Table 1) showed that with STAREX, no noticeable deterioration in strength of PPC occurred

Figure 2: Cumulative Frequency Size Distribution of Separator Circuit Sample with STAREX 300: Shows Near Merging of Feed (Red) & Product (Green) Curves

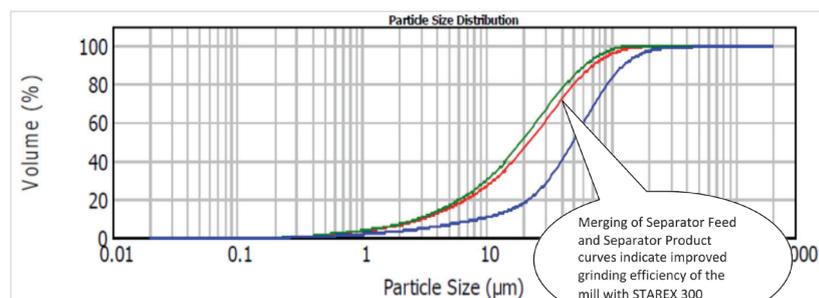


Table 1: data based on circuit samples and physical parameters of final product

<i>Parameters</i>	<i>Control data (without STAREX)</i>	<i>Data after STAREX addition</i>
A. Data based on circuit samples		
Load (tph)	150	150
Circulating load (%)	107	18
Circulating factor	2.08	1.18
By-pass (%)	27	3
Cut-size (μ)	46	121
Sharpness of cut	NIL	0.36
Separator (rpm)	100	103
Sonic level	14.2	18
B. Physical test data		
Blaine in m^2/kg	3167	3280
Residue on $90\mu m$ (%)	4.30	3.50
Residue on $45\mu m$ (%)	25	20
Fly ash (average) (%)	23.50	27
One-day strength (MPA)	8.5	9.1
Three-day strength (MPA)	21.3	20.5
Seven-day strength (MPA)	28.3	28

even after increasing the fly ash content by three per cent and reducing the corresponding clinker content.

After this exercise, the plant deployed STAREX on a commercial scale with automatic weighfeeder based dosing mechanism.

The key benefits were:

1. the mill output increased from 150tph originally to 158tph after addition of STAREX, increasing the circulating load above 100 per cent.
2. higher cement quality and lower residue on $90\mu m$ and $45\mu m$ have translated into improved response from the company's customers
3. lower clinker consumption, higher fly ash absorption and lower power consumption together translate into lower cost of cement production per tonne of cement
4. lower clinker consumption in PPC translates into lower CO_2 emissions per tonne of cement production. Higher fly ash use leads to reduction in waste ash dams.

STAREX has been developed and is being manufactured by STAREX (Pty) Ltd, South Africa. The company, with its main production and R&D centres in Johannesburg, has an extensive focus on research and innovation. Unisol's core strength lies in aligning the advanced technology of its products with the ever-changing needs of the global cement industry. STAREX has divisions in East Africa (Nairobi) and in Delhi, India. STAREX in India and the subcontinent is represented by Unisol Inc.

The company works closely with cement producers to ensure maximum value delivery through the deployment of STAREX range of grinding aids and performance enhancers.