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Screw-Assisted Rotary Feeder for Transporting Small Quantity of $CaCO_3$ Powder

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In-furnace desulfurization technique, which uses the injection of $CaCO_3$ sorbent particles into the combustion chamber directly, can be applied to the O_2/CO_2 combustion system. Although various feeding methods have been studied, several drawbacks are still remained (ex. high feeding rate and the usage of high carrier gas volume rate) when they are applied to the lab-scale researches (Reist *et al.*, 2000; Gundogdu, 2004).

Here, we designed and investigated the state-of-the-art screw-assisted rotary feeder which enables transport small quantity of sorbent. The generation characteristics, such as uniformity and stability, were verified using CPC (3022A, TSI Inc.), APS (3321, TSI Inc.), and SMPS (3071&3022, TSI Inc.) systems.

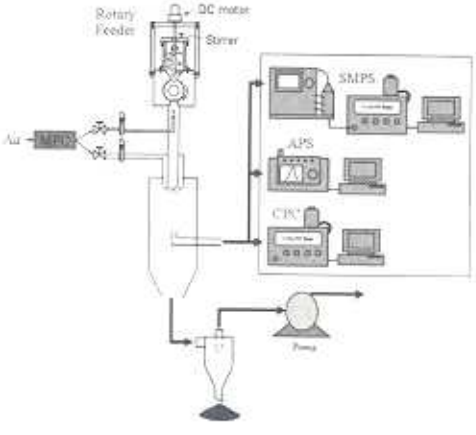

Fig. 1 Schematic of Experimental Setup

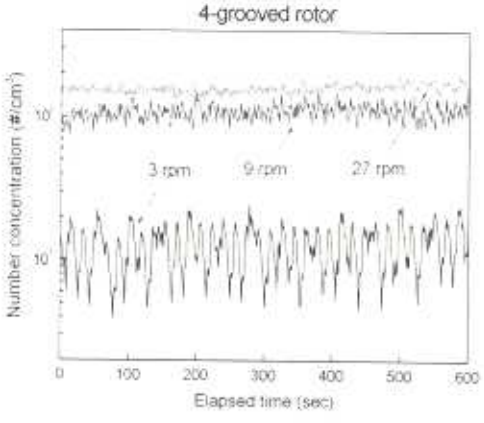

Fig. 2 Number Concentration of 4-grooved Rotor in Rotation Speeds 3-27 rpm

Fig. 2 shows the variance of the particle number concentration of 4-grooved rotor at 3-27 rpm of rotation speed. From real-time method using CPC, the screw-assisted rotary feeder has the pulse-shaped particle generation characteristics repeating on-off operations periodically. As the rotation speed increased, the frequency of discharging sorbent particles

increased. At the same time, the amplitudes of the number concentration data decreased.

From this study, the particle generation condition with high uniformity and stability can be established from the screw-assisted rotary feeder. Also, we can control the feeding rates of sorbent particles by adjusting the rotation speeds of the grooved rotor.

Acknowledgement

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References

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Gundogdu, M. Y. (2004). Design improvements on rotary valve particle feeders used for obtaining suspended airflows, *Powder Technol.*, 139, 76-80.