

Thesis Title	Performance study of humidity control by silica gel for drying system
Thesis Credits	6
Candidate	Mr. Prateep Khownarumit
Supervisors	Assoc. Prof. Dr. Jongjit Hirunlabh Assoc. Prof. Dr. Joseph Khedari
Degree of Study	Master of Science
Department	Energy Technology
Academic Year	1998

### ABSTRACT

The thesis aim was to investigate the feasibility of controlling air humidity by silica gel regarding its application for modular drying process of limited capacity. To this end, two cases were considered : with the first, the silica gel bed was located inside the modular dryer cabinet in order to remove the moisture of outgoing air ; In this case, the product was simulated by saturated cotton and the cross section of silica gel bed was equal to that of the drying cabinet ( $0.60 \times 1.00 \text{ m}^2$ ). Whereas with the second, the study was performed using the cabinet fixed-tray dryer. In this case, three various type of silica gel beds were considered. The cabinet fixed-tray allows to control the air temperature and flow rate. Finally, a study of regeneration of silica gel by solar energy was undertaken.

It was found that silica gel could be used for controlling air humidity that would increase the performance of drying system. Installing silica gel inside the cabinet is not a good option as it has lower performance and required big amount of silica gel. The optimum performance of silica gel was obtained when ambient air (about  $38^\circ\text{C}$ ) passed the silica gel bed (before the heater). The best bed was type c because it has the biggest surface area of silica gel that led to increasing of the adsorped moisture. In addition, it has lower pressure drop and, therefore, lower energy consumption of blower. The suitable velocity of air was  $1.10 \text{ m/s}$  in the humidity controller corresponding to  $0.06 \text{ kg/s}$  of air flowrate. The passive regeneration of silica gel by solar energy using a simple box is also feasible. The suitable period for regeneration is between 11.00 a.m. to 3.00 p.m.

Finally, The air humidity controlled by silica gel for drying system is viable option as the cost of silica gel is reasonable and, due to decreased moisture of drying air, less energy would be consumed as the drying time will decreased too.

**Keywords :** Humidity control / Drying / Silica gel