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INVESTIGATION OF THE GRANULAR SULPHUR FLOW-ABILITY TO MODIFY THE DESIGN OF GRANULATION UNIT

Roya Moradifar[1(*)], Mohammad Hassan Kadivar[2], Eshagh Saharkhiz[3]

[1]Department of Principle Engineering, South pars gas complex (SPGC), Assaluyeh, Iran
[2]Department of Mechanical Engineering, Shiraz University, Shiraz, Iran
[3]Department of Maintenance, South pars gas complex (SPGC), Assaluyeh, Iran
[(*)]*Email:* roya.moradifar@gmail.com

ABSTRACT

The purpose of this study is to investigate the related parameters affecting flow-ability of granular sulfur in storage silo and also its application for design modification and silo clogging prevention at granulation unit of South Pars Gas Complex, which convert liquid sulphur to solid granules and ultimately the sulphur granules are loaded into silo for export. Solid granular is relatively hard and friable crystalline material that tends to break up into smaller particles when subjected to force or stress. Conglomeration of the dust clogs silos therefore the operator had to hit the silo with a hammer to get the flow-ability of the granules.

Keywords: granular materials, flow-ability, silo, clogging.

INTRODUCTION

Solid granular sulphur is relatively hard and friable crystalline material that tends to break up into smaller particles when subjected to force or stress. Conglomeration of the dust clogs silos therefore the operator had to hit the silo with a hammer to get the flow-ability of the granules. Moisture is also increase caking of sulphur especially in case of dust. Some investigation was done by Jenike, Jansen and shuldze about the silo design and solving their problem. In the present investigation some site observation record, design of silo geometry based on EN1991-4 and DIN 1055-part 6 was checked, Silo wall normal Stress and mean vertical stress during filling and discharging was calculated by Silo Stress tools. Sample granules were classified into different size fractions (300 μm - 4.75 mm) by sieve analysis, and friability tests were done by the Fines 28-inch tumbler S5-77 test. Friability, granule size and moisture content data that have been collected over five years are studied.

It is observe that that silo was design correctly as per En 1991-4 and size over rane of SUDIC specification (6mm) will increase the rate of friability, so the only granular material with proper mechanical characteristics and moisture content is stored in the silo. A process air line, another type of vibraton screen and return belt convior was proposed to add to the mechanism of granulation unit to solve the silo unloading problem and also facilitate start-up of the unit and reduce environmental pollution and explosion potential.

RESULTS AND CONCLUSIONS

Wall normal stress and mean vertical stress in silo from the granular sulphur in Filling state and Discharge state is as Fig.1 , also the result of friability is shown in Fig. 2 .

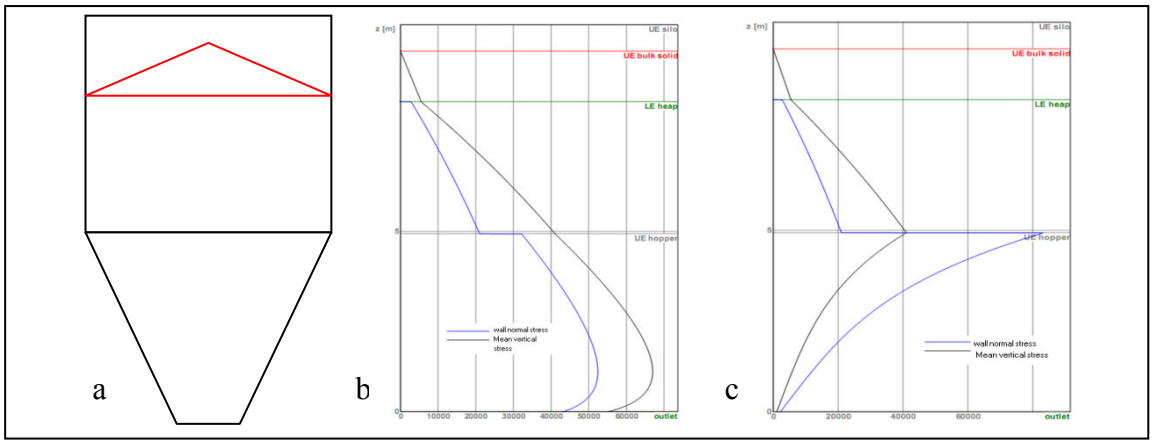

Fig. 1 - Wall normal stress and mean vertical stress in silo from the granular sulphur b: Filling c: Discharge

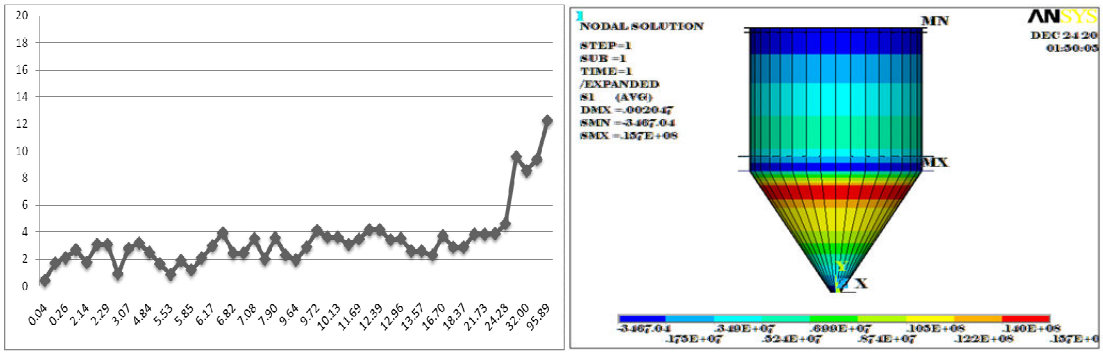

Fig. 2 - a: Correlation of measured friability and particle size (bigger than 6 mm) b: stress on silo wall

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