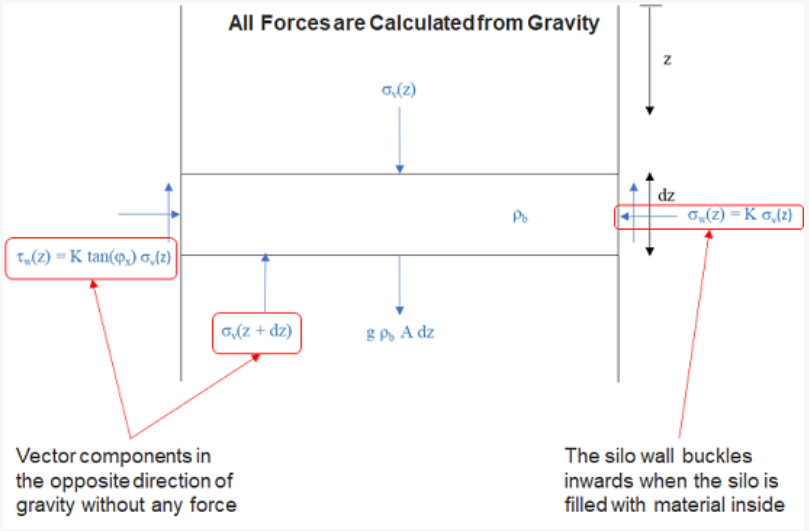
Leading Expert Discusses Insufficient Safety Parameters and Operation for Silo Design and Operation

Silo Safety - Insufficient Safety Parameters and Operation for Silo Design and Operation



Janssen's Theory (year 1875)

PERTH, WA, AUSTRALIA, February 3, 2022 /EINPresswire.com/ -- Is the silo I'm working near correctly designed and operated? Flow Without Quake Director Dr. Phung Tu believes personnel working in close proximity to silos should be asking this question, given worrying facts around silo safety.

Silos have the highest rate of failure comparative to other structures. Since technical errors were uncovered by Dr. Phung in 2017, a number of accidents resulting in serious injury and even fatalities have occurred in Australia, USA, and around the globe.

Dr. Phung is the structural engineer and designer of the 2007 Rio Tinto Brockman 4 Train Loading Silo whose efforts were integral to ensuring the avoidance of strong vibrations often encountered in iron ore silos.

Technical shortcomings in current silo theories were revealed when Dr. Phung completed his doctorate on the back of the Brockman 4 Train Loud Out silo. As a result, he now advocates for increased scrutiny of industry standards pertaining to design, construction and maintenance of these storage structures.

Janssen's theory of 1895 has been the go-to basis for the majority of today's silo designers. Yet Dr. Phung's doctorate uncovered technical shortcomings in the silo theories built upon Janssen's ideas.

The popular theory and its derivatives suggest the discharge pressure or load, which often

governs silo design, is independent of the overall motions of the silo, and the rate at which the material inside the silo is taken out, or discharge rate.

However, decade-long research into the design of silos uncovered the load generated during discharge is governed by:

1. Structural properties of the overall silo.
2. Properties of material stored inside silo.
3. Discharge rate of stored material.

This means such load can be higher than what the silo was designed for if it is not operated within governing parameters. Significant overloading can cause the silo to collapse – resulting in injuries, fatalities, and substantial costs for the silo owner.

Dr. Phung likens this phenomenon to an archer firing an arrow. According to Janssen's theory and its derivatives, the arrow flies as far and fast irrespective of how the cable is stretched, and how fast grip on the arrow is released.

Comparatively, Dr. Phung instead believing how far and fast the arrow flies depends on how far the archer stretches the arrow, and how quickly grip on the arrow is released. He finds the present popular theory that infers otherwise, deeply concerning,

In this context, the generated discharge pressure or load depends on the structural properties of the overall silo structure, discharge rate and properties of the material inside the silo.

Furthermore, the popular theory suggests the wall of the container buckles inwards when filled. But Dr. Phung likens this idea based on Janssen's theory to the impact of popcorn filling a box. Does the structure buckle inward? The answer of course, is no.

Many organisations and governments around the world use international design codes such as Australian AS 3774, European EN 1991-4 and American Standard Committees. These rely on the efficacy of Janssen's theory.

Yet recently Standards Australia withdrew AS 3774 the go-to standard for designing silos in Australia, following a number of accidents since late 2017 resulting in injuries, and in some cases fatalities.

The industry has not been collaborative and supportive of Dr. Phung's findings, for various reasons. Due to the present reluctance around accepting Dr. Phung's discoveries and hence adopting better design methods, YOUR SAFETY MAY BE COMPROMISED.

Dr. Phung's co-authored papers on the topic can be found online. The most recent publication "Comment on Maraveas, C. Concrete Silos: Failures, Design Issues and Repair/Strengthening

Methods. Appl. Sci. 2020, 10, 3938” can be downloaded from the publisher MPDI
https://www.mdpi.com/2076-3417/11/12/5675

Dr. Phung’s goal now is to revolutionise silo performance on a widespread scale, eliminating silo failures and associated industrial accidents, thereby reducing capital and operational expenditures through the implementation of better design methods.

Passionate about moving silo design forward, Dr. Phung believes making silos safer will reduce capital and operational expenditures. Consulting Dr. Phung (phung.tu@flowwithoutquake.com) in regards to silo design has the potential to transform your business practice.

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