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A Review on Design and Stress Analysis of Tail Cone Rotary Agitator in Horizontal Feeder

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Abstract – The proposed work of a cone hub stirring device in pulp feeding, the work proposed will be carried out for validation and anti-deflection solutions. It is a horizontal heavy work application to generate pulp feeding and horizontally screening in order to prevent height inlet feeding. This chaos operation is distinct from traditional methods of those in vertical position. The tail cone agitator has been designed to satisfy the application for this application finish. The results show that all built parameters can withstand the given limits. Boundary requirements to be determined often provide rotary parameters for pulp capability and vessel volume. Pulp is the medium in which this method is used, pulp is basic wood bleaching from a hot bleaching preheater and all these machineries form part of the paper and pulping industry as the feeder to a screw conveyors method. Gusseting rings for optimum stability and thickness of the covering board. To reduce the weight of the entire cone structure. The wide frame, which would form within the cone, was so well intended to be shaped. The results show the comparison with validation for stress analysis and deflection analysis in multiple built tail cone agitators as well as demonstrate stability with modal analysis.

Key Words: Tail Cone, Rotary Agitator, Horizontal Feeder, Stress Analysis, Anti-Deflection Solution, Cone Hub, Agitation System

- X -

INTRODUCTION

Agitation causes material movement in a certain manner. Many industries rely to a large extent on successful agitation and mixing of fluids in chemical and other processing. Agitation typically involves causing a fluid to flow through a circulatory or other pattern through a vessel by agitator steps. Agitation is a means of mixing a phase, which enables mass and heat transfer between phases or with external surfaces to be increased. Different processes occur in paper making, in which bleaching is also a significant process. In the blanching process, raw materials are heated with water, where fibers are separated. After bleaching the pulp is agitated, the additive mixture with the pulp takes place during the agitation process. This project offers a quick conceptual insight into the mechanical parameter of the agitator's installation and workings. This was previously used in separate vessels, which with the bleaching plants had been dismantled. Agitators were also cast because the agitator has only one uniform uniformly built unit, so that no room is required for casting. Thus, we are able to manufacture it in the welding process. Tail-cone structure principle taken out of the process of constructing an aircraft, if the same structure is used in the horizontal vessel for making a mixing and stirring system, this tail-cone shall be used as a hub for holding blades outside.

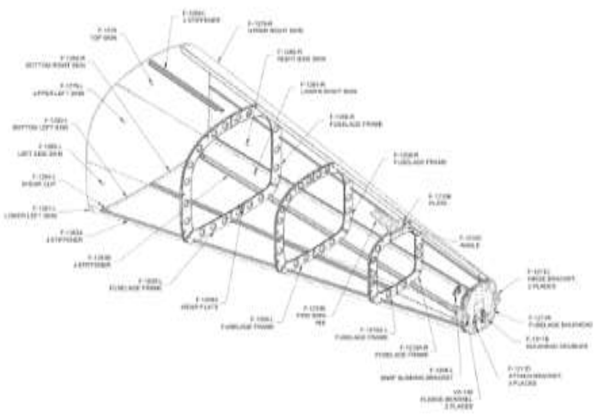

Fig 1: General tail-cone structure used in air craft design

When applying a big tower of about 10 metres in height, pulp with bleaching processed this material should be washed through dewatering processes using a large twin roller press before passing to dewatering twin rolling press pulp pulp must be mixed with chemicals to make fibre soft and stable.

LITERATURE REVIEW

Saeed Asiri (2012) design and implement the differential agitator is a new category of agitators. The Electro-mechanical Differential Agitator is made up of two shafts. The first wave is the axis of the carrier, and the second wave the axis of the quartet upper and lower rotor group is defined as a group of agitations. The differential agitator stops the vortex from forming in the liquid and gives the fluid an extremely even motion since the vortex is moved from the outside to the internal container. The ideal container form is the maximum open intakes for suction and discharge.

Kazuhiko Nishi et al (2013) In chemical engineering, mixing is one of the most critical operations. Stirred tanks are commonly used in the processing of chemicals, paints , inks, electronics, ceramics, fruit, pharma and cosmetics. For the achievement of a process, adequate mixing is indispensable. The energy consumption and mixing times for marbled, a form of large impeller, have been examined. The energy consumption p and the mixing time, in total mixing time, were calculated under different excentricious conditions. The relationship between the power number (np) and the number (re) of Reynolds and the dimensionless time mixture (n timer) and re has been examined. As excentry mixing is used in industry, the horizontal load to an agitated shaft should be of interest to us. The wide horizontal load oscillated causes severe problems including lowering of the impeller or engine failure, mechanical screening or gearbox. Therefore, when designing a blending system and deciding the operating conditions, it is important to consider the relationship between these values and the rotor speed of the impeller. They have been tested, and in excentric mixing in different excentric conditions torque and horizontal load were measured. The torque and horizontal load averages and standard variations corresponding to the fluctuation amplitude were showed.

PRODUCT WOKING STRUCTURAL SKETCH

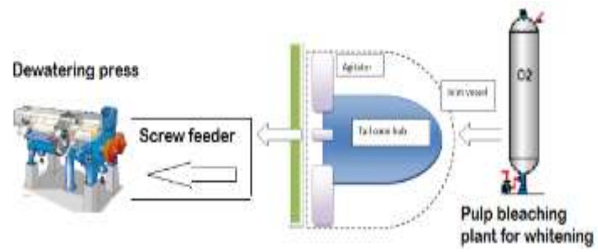

Fig. 2: Tail cone agitator hub assembly

Tail cone agitator hub assembly showing that our design is works in between pulp bleaching and dewatering press.

WORKING

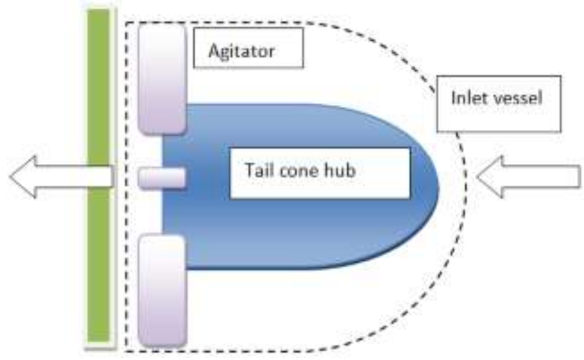

Fig. 3: Tail cone rotor assembly in application

Agitation: It refers to the induced motion of a "homogenous" material in a specified way.

"Agitation is the process of keeping a mixture that has been mixed state required for end product"

Agitators are instruments used for removing or mixing fluid, particularly liquid, which is one of the fundamental operations in mechanical process engineering. In essence, agitators are used to homogenise fluid and liquid-solid mixtures by horizontal and vertical flow generation. The rotating turner blades produce these flows.

Fig. 4 Agitation process

Mixing: It is the random distribution, into and through one another, of two or more initially separate phases. "Mixing refers to actual stirring of diff liquid or material to blend together into end product or mixture.

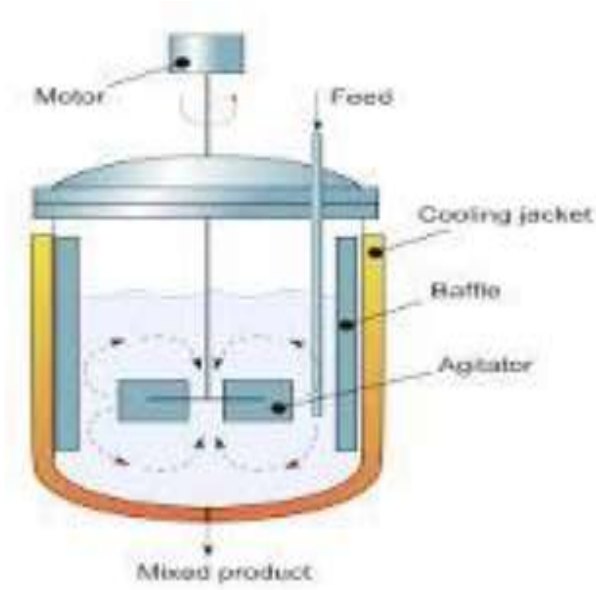

Fig. 5 Mixing process

Design and implementation of differential agitators to maximize agitating performance

This investigation is to develop and introduce a new form of agitator called a distinguishing agitator. The differential agitator consists of two shafts, an electric mechanical set. The first wave is the axis of the carrier, and the second wave the axis of the quartet upper and lower rotor group is defined as a group of agitations. The group of agitators is housed in a specially fitted cylindrical container that includes flat entry square managers and square managers called the fluid exit group. The attachment group is mounted containing the agitating group from top to bottom in any tank. The agitating method is done by the agitating group holding the liquid, creating a reduction in pressure on the upper group, which allows the liquid to be taken out of the plaza of the entrant fluid. Then the liquid pass under the agitated group to the high pressure region, allowing the liquid to leave the square managers at the container's bottom. Parametric research and type optimization were conducted for the improvement of performance. The differential agitator has been developed and implemented through numerical analysis, production, and laboratory experiments. In order to ensure the optimal configuration of the geometric parameters of the differential agitator elements during the experimental analysis, FEM used ANSYS11 to validate the advantages of differential agitators to provide an example of high lime agitation efficiency in water, in recognition of material prosperity and charging conditions. Moreover, experimental work has been carried out to demonstrate an effective agitation of the internal container form. The study concluded with conclusions for maximising the efficiency of the agitator and optimising the geometry for the development of the differential agitator.

1. Axial Impellers
2. Centrifugal Impellers
3. Multi Stage Impellers
4. Inclined Impellers
5. Helical/Screw Impellers

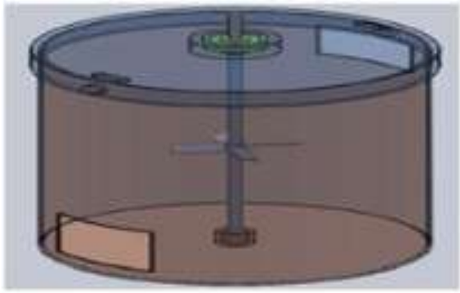

Fig 6: Normal Agitator

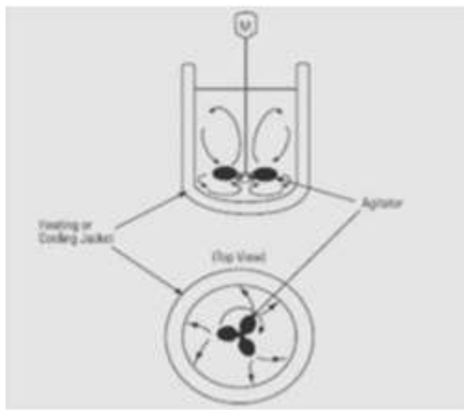

Fig.7: Agitators Cycle Motion

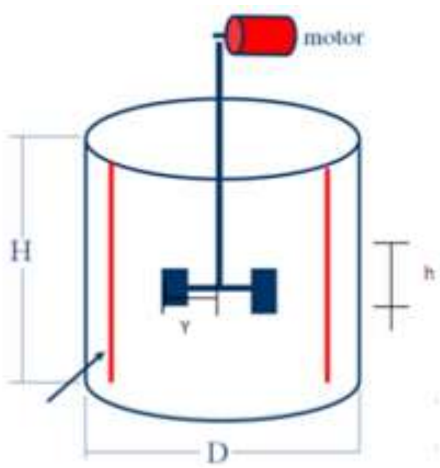

Fig.8: An example of Classical Agitator

Agitator and wiper design modification for milk khoa machine

B. Kumar suggests the new milk machine stirrer and wiper style. He studied that blending in any food processing industry is a highly critical unit activity. For example, mixing in one form or another is important for all operations involving blending of homogeneous, preparing emulsions, mining, dissolution, crystallising, liquid phase reactions etc. This project is concerned in particular with a complex mixer of a food processing industry with milk production. This newly designed automated agitator is suggested to achieve uniform agitation with the optimum preparation time for the desired output and to eliminate the plots of humans. The current stirrer cannot be used for comfortable working loads and therefore creates problems with the distribution of the various efficiency parameters such as consistency, quantity, delivery schedules and workforce capacity. The new concept for the agitators is proposed for this project. One will be taken for final development by careful analysis of three separate models in all aspects. Simulations are used to carry out the required experiments to complete the best design. Different literature surveys have taken the requisite inputs, and consultations with specialists on the field and in real-time research have been carried out to meet the customer 's exact demands.

The flow pattern in an industrial paper pulp chest with a side entering impeller

Daennis Beatty studied Test stand for the side entrance agitator. At RIT in conjunction with Lightnin Mixers, SPX Corporation, a side entry agitator test stand is being built. The test stand includes the ability to calculate torque, RPM, axial pressure, translation, angular movements and vertical translation movement. The device is needed for filling a vacuum in the industry and is made from steel using bolted and welded joints. The sensing process is performed via load cells, a variable frequency drive and a Lab View interface with the necessary data gathering equipment. In Microsoft Excel and/or Matlab the data is output into a text file for easy integration.

Design of multiple impeller stirred tanks for the mixing of highly viscous fluids using CFD

Joelle Aubin design of the CFD was used to blend highly viscous liquids with several impellers. He researched the effect of several variants of the internal impeller on hydrodynamics and examined mixing efficiency in a stirred vessel with computational fluid dynamics. Lagrangian particle tracking was used to test the relation between the rotor stages and the compartment. The findings show that a rotating 45 ° Intermit impeller allows a greater number of operating conditions and lower numbers of Reynolds flows to be managed rather than a 90 ° rotation as demanded by the manufacturers. Moreover, fluid exchange between impellers is ensured up to Re = 27 by slightly decreasing the distance between the lower two impellers.

Mixer mechanical design- fluid forces

Ronald J. Weetman describe Fluid strength mechanical mixer concept. It is the mechanical nature of a mixer with emphasis on the fluid forces that the fluid continuum in the mixing vessel opposes on the impellers. The study shows that the forces originate from the transient fluid circulation of the mixing impeller by symmetries. These loads are complex and are passed to the mixer shaft and gear reducing from impeller blades. An overall result can be produced for the form of the fluid force equation. The importance of the mechanical contact between the mixing phase and the vessel and impeller are underlined.

Design and implementation of differential agitators to maximize agitating performance

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CONCLUSION

The tail cone shape agitator is modified design of old flat agitator. It consists of the process of welding. This agitator has three stirrer, central nave and blade components. This agitator makes it easier to work. The vessel is fitted with agitator, generator, generator, engine shaft opening for the screw feeder. The engine is mounted on the base of the vessel and the turner rotates horizontally in the mixing vessel. The entire agitation group must locate at the bottom of the bleaching factory, from where the pulp comes direct in the agitation group and the additives have been mixed in the pulp. In a single setting, the best features of these different instruments were combined to create some of the strongest available meshing. It is easyer to produce the following mesh styles Tetrahedral, Hexahedral, Hexahedral Center, Cartesian-matched corporeal inflation layer with a highly automated mesh setting. Tetrahedral inflation plate, cell Cartesian Cut Consistent user controls make switching approaches very simple and several strategies within the same model can be used. The mesh connectivity is automatically preserved. Various physics involves different approaches to meshing. Fluid dynamic simulations involve very high quality meshes in both the form of the element and the fluidity of sizes. The mesh must be used effectively by simulated structural mechanics because running times can be influenced by high numbers of components.

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