THE EFFECT OF SCREW CONVEYOR STEP COUNT ON FEED DELIVERY RATE

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Abstract. *This article analyzes the effect of the number of steps in a screw conveyor on the parameters of feed transportation. The study evaluates the uniformity and inconsistency of feed delivery using screw conveyors with different step counts. Based on the results obtained, recommendations for selecting the optimal parameters of screw conveyors are provided.*

Keywords: *Screw conveyor, step count, feed delivery, uniformity, inconsistency, mechanical transmission.*

Introduction. *Feed transportation is one of the essential processes in various industries, especially in agriculture, food production, and processing technologies, where different conveying mechanisms are utilized. Screw conveyors play a crucial role in this process, ensuring smooth and efficient material delivery. They are widely used for transporting, storing, and processing various material resources [1-5].*

Screw conveyors have multiple parameters, the most critical of which is the step count. The step count determines the speed and uniformity of product delivery during the conveyor's rotation. If the step count is incorrectly selected, several issues may arise, such as uneven feed distribution or excessive mechanical loads, which negatively affect system efficiency. Additionally, improperly configured screw conveyors may increase energy consumption and cause premature mechanical failure.

Research indicates that optimizing the step count of a screw conveyor improves feed delivery uniformity and enhances process efficiency. Furthermore, factors such as the conveyor's geometry, rotation speed, and material properties also influence the movement of feed. Therefore, selecting the optimal parameters is essential when designing screw conveying systems [6-8].

This study analyzes the effect of the screw conveyor step count on feed delivery parameters and suggests methods to improve its efficiency.

Methodology. *The study involved the use of screw conveyors with varying step counts. Special test stands were used to measure feed delivery uniformity and inconsistency. Each step configuration was tested ten times, and results were evaluated based on average values.*

The following parameters were monitored during the study:

- Screw conveyor step count (10, 12, 14, 16);
- Feed delivery uniformity (%);
- Feed delivery inconsistency (%);
- Feed delivery speed (g/s);
- Physical impact on feed (losses, compression rate).

Results.

Figure 1. Scheme of a small-sized quantizer-loader.

The graph below illustrates how increasing the step count of the screw conveyor impacts feed delivery uniformity and inconsistency. Higher step counts result in improved uniformity and reduced inconsistency, indicating more stable feed transport.

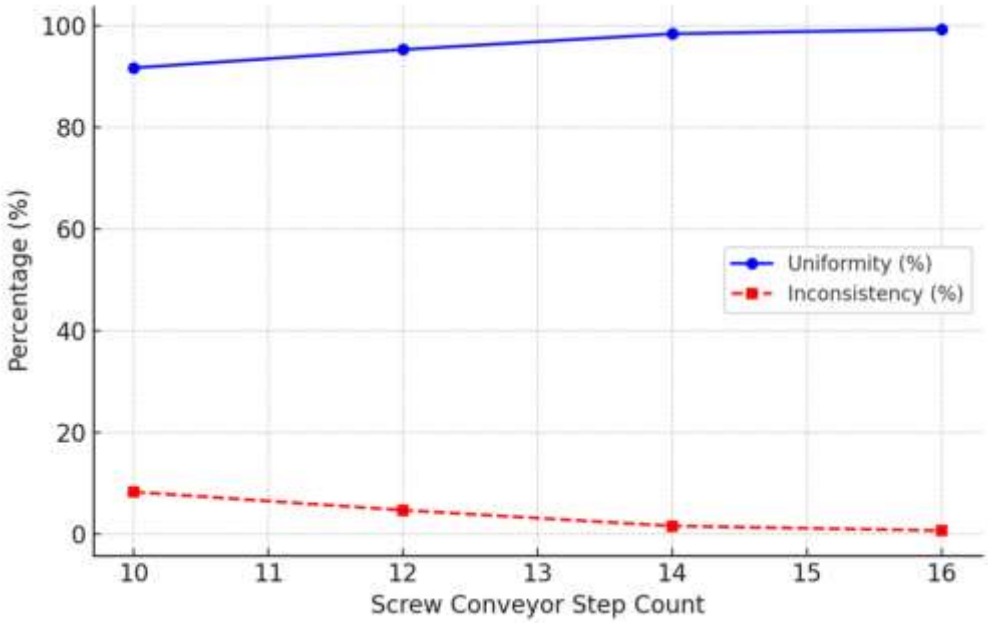

Figure 2. Effect of step count on feed uniformity and inconsistency.

The graph below demonstrates the relationship between step count, feed delivery speed, and feed losses. As the step count increases, the feed speed also increases, while feed losses decrease, leading to a more efficient system.

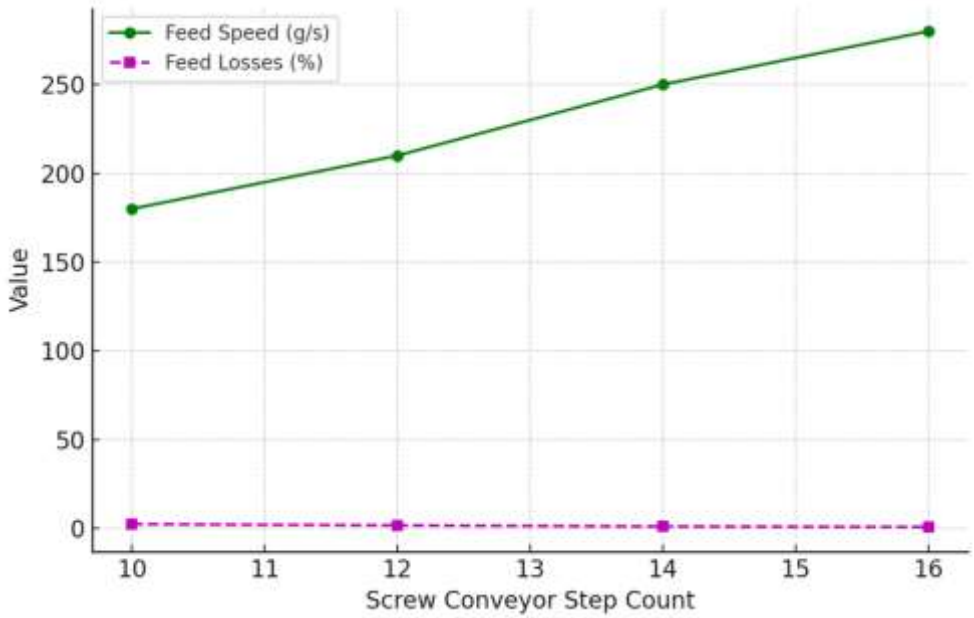

Figure 3. Effect of step count on feed speed and losses.

№	Parameter	10	12	14	16
1	Feed delivery uniformity, %	91.7	95.3	98.4	99.3
2	Feed delivery inconsistency, %	8.3	4.7	1.6	0.7
3	Feed delivery speed (g/s)	180	210	250	280
4	Feed physical losses (%)	2.5	1.8	1.2	0.9

Summary. According to the table, an increase in the step count of the screw conveyor leads to improved feed delivery uniformity while reducing inconsistency. Additionally, the feed delivery speed increases from 180 g/s for a 10-step screw to 280 g/s for a 16-step screw.

Moreover, feed physical losses are minimized, indicating that the structural integrity of the feed is better preserved when using screw conveyors with a higher step count. This is crucial for maintaining product quality.

Thus, increasing the step count in feed delivery systems is an effective technical solution. By selecting optimal parameters, it is possible to enhance delivery efficiency and maintain product quality.

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