Case Study

Elevator Handling recycled Asphalt Planings: Engineering, Design Guidance & Component Supply

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Design and engineering for a new bucket elevator handling recycled asphalt planings (RAP). Recommending speed, power requirements, shaft & casing sizes, and component specifications (SPS steel buckets and NBR belting), 4B Braime engineers helped the customer to achieve the desired capacity of 250 tph.

The Challenge

(Pictures: ©4B Braime)

Asphalt is made from a mixture of aggregates, binder and filler, and is commonly used in constructing and maintaining roads surfaces. When the surface layer of tarmacked areas is removed, the resulting waste material known as planings, can be recycled and reused.

4B Braime was asked for technical advice on the manufacture of a new bucket & belt elevator to be installed at an Asphalt plant in South Wales. The bucket elevator would elevate RAP (Recycled Asphalt Planings), and use a belt instead of chain, and standard 4B pressed buckets instead of fabricated buckets commonly used in the construction industry.

4B Braime were asked to provide a design proposal detailing suitable speed, power requirements, shaft & casing sizes, and component specifications to achieve the desired capacity of 250 tph.

Due to the abrasive and slow moving nature of the product, special care was to be taken to ensure correct selection of elevator buckets and elevator speed/discharge characteristics.

The Solution

4B offered a detailed engineering proposal along with the supply of all the mechanical components according to the customer requirements.

The SPS style buckets were selected due to their versatility across different speeds, and optimized design which maximised capacity. The SPS500-215's offered sufficient volumetric capacity comparable to bigger fabricated buckets, and were more economical.

3 mm mild steel versions were chosen to maximise the abrasion resistance. The elevator speed was based on gravity discharge to accommodate the non-free flowing nature of the product.

Based on the tonnage, the absorbed power requirement of the elevator was calculated along with the minimum strength rating of the belt. The NBR EP800/4 2+2 mm offered an adequate 20:1 safety factor, along with 2+2 mm nitrile covers offering both abrasion and oil resistance.

4B were able to supply components "off the shelf" which greatly reduced the lead-times involved.

Results

The elevator has been running for 2 years with the original components installed with no issues with the design or discharge.

The customer was easily able to achieve 250 tph based on 4B's recommendations and with a few minor adjustments, is in a position to upgrade the output even further if required.

4B's SPS Industrial Duty Bucket

4B's industrial duty pressed steel SPS elevator bucket has the same design and fill characteristics as the larger SJ bucket, but a wider range of sizes. The bucket is pressed from 3mm pressed steel (s/s available), with a wear lip option. Examples of use; Sand, Cement, Coal, Aggregates, Powders, Fertilizer etc.

Traditional bucket elevators use large and expensive fabricated or cast nylon / steel buckets, which can have inherent flaws expensive, heavy, and bulky, together with poor design and fill characteristics.

The SPS is a pressed steel bucket and is far cheaper than a fabricated version, but stronger and has better capacity characteristics. New bucket elevators can then be designed with a smaller case size, or existing ones can have a capacity

increase.

4B's Bucket Elevator Design Service

4B engineers have designed hundreds of bucket elevators for all industries, from Feed and Grain through to Cement, Coal and other heavy industries.

4B's bucket elevator design and calculation service is offered free of charge. Using key technical data, 4B engineers can give a detailed technical recommendation for the ideal bucket elevator with the ideal capacity and discharge characteristics. This can be for the design of a new bucket elevator or for the upgrade of an existing bucket elevator.