

# Conversion of a sifter plant

## Exchange of sizers with directly excited screening machines

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Be it refined, raw, fruit or milk sugar as well as various sugar substitutes - RHEWUM screening machines have a decades-long tradition in the sugar industry where screens are also called "sifters". Already in 1956 - in the early years of industrial sugar production - the first three so-called "sonic screens" with electromagnetic vibrating heads for the sifting of fine sugar were delivered. Many hundreds of screening machines followed, first in Europe and later all over the world.

A few years ago, a well-known European sugar producer was looking for a technical solution to replace worn-out sifters in one of its factories with new screening machines.

### Initial situation

The producer had four screens of the so-called "sizer" type running parallel in the main screening. "Sizers" are screening machines with linear vibration and several short screen decks. Their advantages are relative high throughput rates on a small area at manageable investment costs.

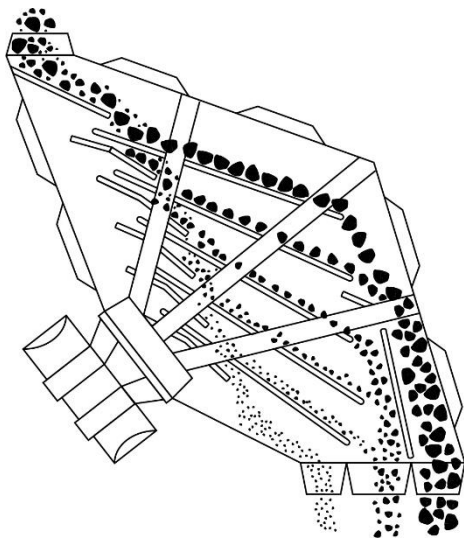


Figure1: Sketch Sizer

Regularly, these screens are not equipped with cleaning devices, so the screen meshes get clogged with stuck particles, especially during fine separations. The stuck particles reduce the actually usable

open screen area. Furthermore, the screening efficiency is comparatively low due to the short screen decks and the short dwell time of the feed material on each deck. As the entire machine moves, the vibration amplitude cannot be individually adjusted for each screen deck. In addition, all inlets and outlets must be sealed with the infeed and discharge chutes via compensators. Due to the strong vibrations, the compensators are sensitive to cracks from which potentially explosive sugar dust escapes. This has to be avoided due to applicable ATEX guidelines. Frequent replacement of the compensators is reflected in maintenance costs that should not be neglected.

At the time of the plant inspection, one of the four machines was already out of operation with cracks in the drive traverse and side walls. Cracks were also visible in the building, which were caused by the strong vibrations of the four parallel running linear oscillators.



*Figure 2: Cracks in the building*

The existing sifters were designed for a throughput of 30 tons of granulated sugar per hour each with five separation cuts. Since the lowest screen deck with a separation cut of 0.2 mm did not achieve the required product qualities, additional tumbler screens were installed for re-screening the finest fractions, which further intensified the vibration problem in the building and got clogged with stuck particles after a short time.

### **Finding the right technology**

Due to the numerous problems, the customer was looking for a sifter technology that could replace both of the screening machine lines in use while observing the required product qualities and, in addition, transferring as few dynamic loads as possible into the already damaged building. As a static sifter was requested, RHEWUM was contacted, as it has proven to be a reliable supplier for different plants of the same company for decades.

First screening tests were carried out in RHEWUM's technology center on the machine types WA and WAU. During these tests, process relevant parameters of the screening machine were determined and the compliance with the required product qualities for numerous sugar types was considered and proved. The dimensioning of the screening surface and inclination was set for a capacity of at least 30 tons per hour, for some sugar types up to 40 tons. The mesh shape and size of the screen cloths, the type of drives and the vibration amplitude were also specified for each of the five screen decks. After

the successful screening tests which confirmed the compliance with the permissible amount of off-spec particles the customer was technically convinced by the RHEWUM sifters.

### Advantages of direct excitation

Screening machines in which the housing is static and only the screen cloths are set in vibration are called "directly excited". Depending on the required separation several small unbalance motors (type WAU) or the electromagnets (type WA) developed by RHEWUM are available as types of drive, which are mounted on the sides and get the screen into vibration via the swing axle. The stronger unbalance motors are used for coarser separation cuts, the high frequency electromagnets for finer separation cuts. The advantages of both drive technologies are combined in the RHEWUM type WA(U).

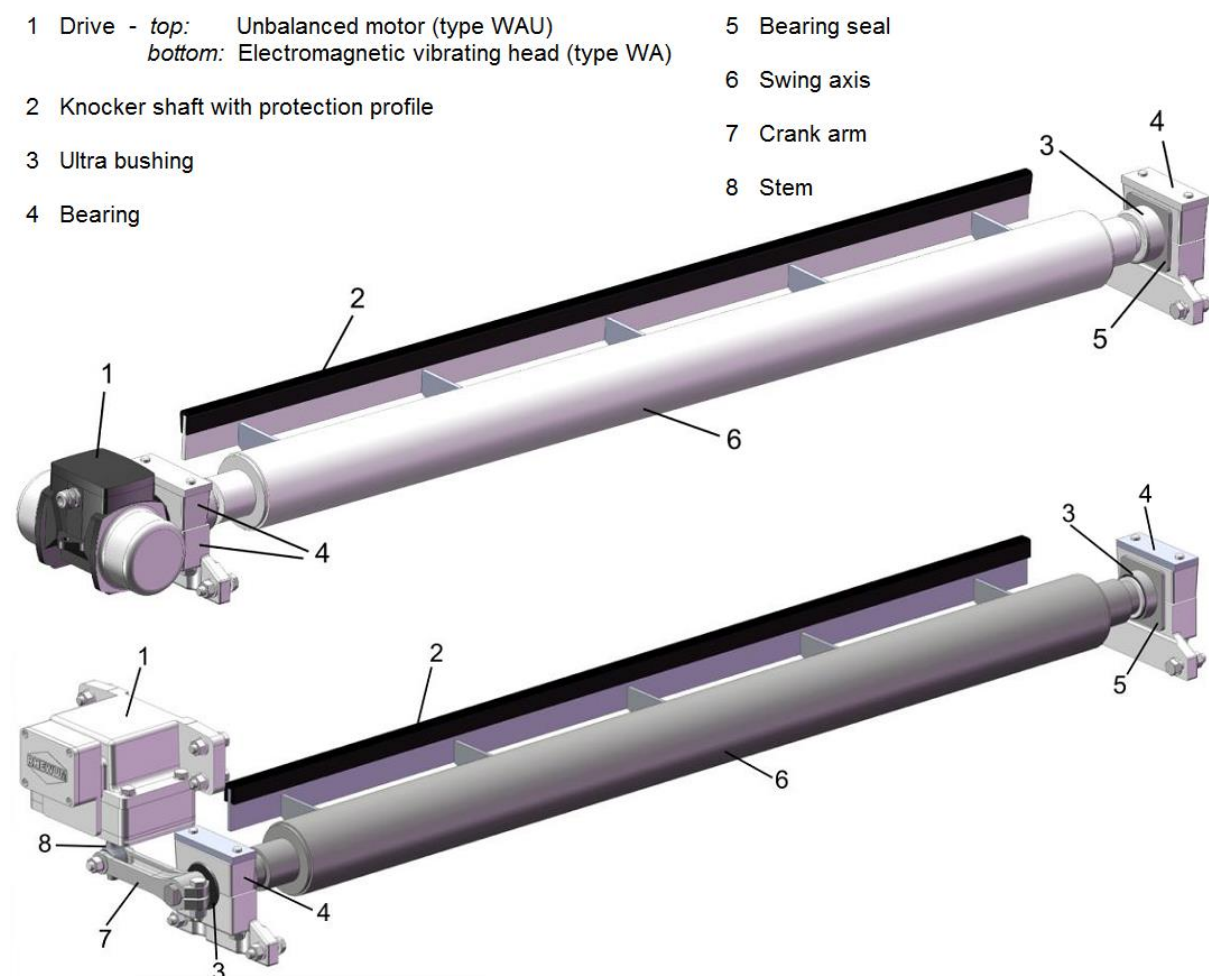


Figure 3: WAU/WA drive units

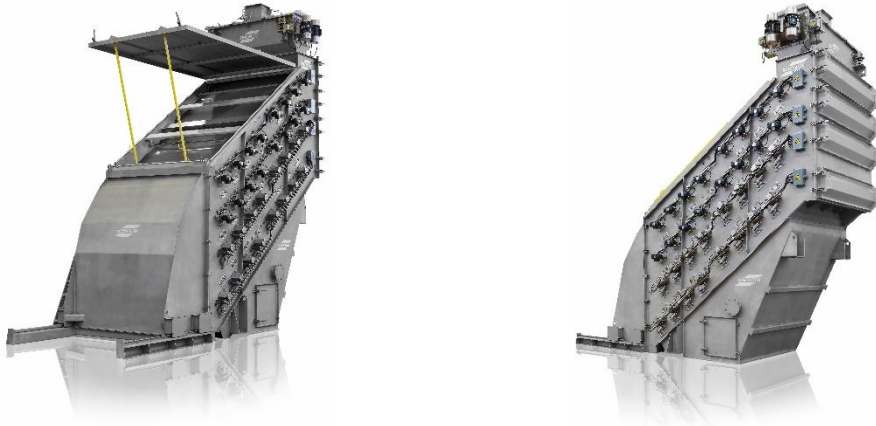
The swing axes are mounted in rubber bushings which prevent the transmission of vibrations into the static housing. Common to both variants is the low energy consumption of only 0.16 kW per drive. The larger number of small drives used by RHEWUM ensures a high reliability of the screening machines.

If one drive fails the machine can continue to run with little impact on the screening process. Defective drives can be replaced at the next opportunity, if necessary even during ongoing production.

In addition, the vibration amplitudes and cleaning intervals for the inlets and outlets can be individually adjusted on each screen deck to optimize the screening efficiency of each fraction. The programmable automatic cleaning cycles by increasing the amplitude for a short time, ensure the reliable function of the screen mesh. If the screens, which are also available in magnetizable stainless steel, wear out after a few months in use, they can be replaced individually without having to remove the other screens. In this way, individual replacement intervals depending on wear are taken into account and maintenance requirements are minimized.

The screen overflow of each deck is discharged separately through the hinged overflow chute, which provides access to the screen mesh tensioning device on the outlet side of each screen deck. The screen mesh tensioning device on the inlet side can be conveniently accessed through the inspection covers located at the back of the machine directly below the feeders. The tensioning system is optimized for fast tensioning and easy mesh change, which requires only about five to ten minutes per piece for skilled operators.

In addition to technical suitability, economic efficiency must also be ensured. Due to the longer machine length and the more complex design, directly excited screening machines are generally higher in investment costs than simpler sizers. In order to present further arguments for the purchase of RHEWUM sifters besides the technical advantages the customer compared the total costs of both technologies over the expected lifetime including the operating costs. The following could be determined: As the directly excited screening machines of RHEWUM type WA(U) do not vibrate completely and therefore less material fatigues, a longer service life can be expected. This means that the higher investment costs are almost equalized during the life cycle. In terms of energy costs the RHEWUM sifter clearly stands out from the sizer; while the sizer needs a total drive power of approx. 20 kW to drive the complete machine the total power of all drives of the directly excited screening machine is only 4 kW because less vibrating mass is moved. When looking at the maintenance costs, once again an advantage of the sifter with static housing was evident. This is mainly due to the possibility of dust-tight flange connections to all inlets and outlets. With the linear vibrators, on the other hand, an immense effort was needed for the regular replacement of the required compensators to prevent the escape of sugar dust, both in terms of spare parts costs and the associated personnel expenditure. The result of the cost comparison calculation was that the higher investment costs could be offset by the lower operating costs after just a year.



*Figure 4 : RHEWUM WA(U) screening machine*

### **Replacement of the sifters**

Therefore the customer instructed RHEWUM GmbH to deliver the first directly excited sifter to replace the defective sizer with an option for a further delivery to replace the second line in the following year. The design in mild steel with food grade surface coating and other materials approved for use in the food industry as well as in the area of explosive atmospheres caused by sugar dust was chosen. The interior of the screening machine is designed in accordance with the ATEX guideline to Zone 21, the exterior to Zone 22. For feeding and even distribution of the sugar over the entire width of the screening machine, a speed-controlled rotary valve feeder has been installed to regulate the feed quantity.

In the final installation planning of the first new sifter, a narrow passage between two beams in the plant was identified, through which the machine would not fit on the way to its destination in its standard design. By dividing the screening unit at the height between the third and fourth screen deck and transporting the machine parts upright in lengthwise through the narrow, also this challenge was quickly overcome. Installation and commissioning was carried out under supervision of a RHEWUM engineer. Afterwards the customer made use of the option of delivering the second sifter. In the following years RHEWUM was instructed to replace the third and fourth sifters so that the complete main screening in the factory is now done on direct excited sifters type WA(U).

### **Individual solutions from Remscheid**

In close and trustful cooperation with the long term customer RHEWUM was able to provide a solution especially tailored to the conditions of the plant and further proved to be a reliable supplier of the sifting technology.

Do you also wish an individual consultation for an efficient screening/sifting of your sugar?  
Please do not hesitate to contact our screening experts. We also look forward helping you to optimize your sifting process.