



Recovering oil from grinding sludge

Zahnradfertigung Ott uses RUF briquetting unit

A large volume of sludge is produced in the grinding of high-precision gears. In most cases, this grinding sludge is disposed of at high costs. Zahnradfertigung Ott, a specialist manufacturer of gears, found a better solution: since 2005, the company is using a briquetting unit from RUF to recover 500 litres of grinding oil per day from the sludge. Through this measure, it could drastically reduce the disposal costs and also reduce the labour involved in the disposal process.

Zahnradfertigung Ott based in Bodelshausen, is an industry leader as regards know-how, experience, technical expertise and product range. Apart from the worm gear set with patented Ott gearbox for the machine tool industry, the workers at the plant in Bodelshausen mill, plane and grind gears and hollow wheels, which are designed for 5 to 10 MW and classified in the top bracket. They are for example used in large gear systems in ships and wind turbines, ensuring reliable force transmission. Zahnradfertigung Ott has experienced a huge growth over the last few years, especially in the wind energy sector. This does not come as a surprise to Erwin Haag, managing director of the company: "Wind energy has become a significant technology for today and the future. We identified its potential many years ago and have for the last decade been producing hollow wheels and other components for this industry. As a result, we have acquired a lot of know-how in this field and invested in the relevant technology."

Manufacturers of wind turbines - and also other customers of Zahnradfertigung Ott - require high-precision products. Apart from milling and planing, gears must thus be processed by grinding. At the moment, the company operates four large-scale profile grinding machines, catering for diameters of up to 3200 mm. They are run 24 hours a day in three shifts, seven days a week. Due to the increase in demand, Erwin Haag has already ordered another profile grinding unit.

While grinding is indispensable to achieve the necessary precision and surface finish, the company would gladly do away with the grinding sludge produced in the process, admits Erwin Haag. This sludge consists of minute metal chips and grinding oil. Depending on its consistency, disposal of the sludge can be very expensive.

"In the past, we attempted to recover oil by processing the sludge in a hand-operated centrifuge. The metal wool of the mixture was then thrown by hand into a container and disposed of against a charge. Nobody liked to do this work, which occupied two people full-time every day", remembers the manager.

Pay-back time of the RUF briquetting unit: about one year

Just about three years ago, things changed radically: the company invested in a RB 4/2800/60S briquetting unit from RUF, who now deals with the difficult sludge. Zahnradfertigung Ott now saves money in more than one way, as Erwin Haag explains: "In the old days, we needed two full-time staff to deal with the grinding sludge. With the briquetting unit, all work can be done by a single worker, who fills the sludge into the press, handles the recovered oil and disposes of the metal briquettes, while having ample time to deal with other supply and disposal tasks at the plant. The machine does not need continuous supervision and the recovered grinding oil can be used again. We need less storage space, as the metal briquettes can be easily stacked and we even get some money for our metal scrap instead of paying for its disposal. Taking all this into account, the RB 4 paid for itself within one year."

The currently used four grinding machines produce about seven tons of grinding sludge per week, as they are operated around the clock. The sludge is continuously transferred to the centrally located briquetting press, which is equipped with a 4 kW hydraulic unit generating pressures of more than 2800 kg/cm². The sludge produced during a day can thus be compacted into convenient briquettes within about a shift and a half.



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Above the RB 4, we have installed a specially designed 2000-litre hopper with an integrated shredder consisting of three macerators with blades that are adjusted to process the material in the hopper. It cuts the intertwined metal strands in the sludge into small pieces so that the material can be fed into the briquetting machine.

Erwin Haag explains how it works: "The employee in charge of the machine works a normal day shift. He ensures that the hopper is always filled and that the RUF press is kept clean. He also returns the recovered oil to the grinding department and removes and stacks the briquettes. In other words, he deals with all work in connection with the briquetting process. Before he finishes his shift, he fills the hopper to the brim. The RUF machine then continues briquetting the material for another two to three hours without supervision. Another employee working the second grinding shift refills the hopper one more time, so that it can continue processing the material for another two to three hours. The sludge produced afterwards in the grinding department is collected in suitable barrels for briquetting the next morning." The labour cost reduction that could be achieved by installing the RUF machine was the key factor for Erwin Haag. Another aspect of the process should however not be overlooked. "With the press, we recover about 90 per cent of the grinding oil, which amounts to more than 100,000 litres annually. This means that we only need to buy about 10,000 litres per year. The oil recovery rate is higher than the one we achieved with the hand-operated centrifuge." The pump pressed out during the briquetting process is pumped directly from the RUF machine into tanks. From there, it is passed through a filter unit and can then be re-used in the grinding machines. Less important for the company is the revenue it achieves from selling the metal briquettes. As Zahnradfertigung Ott works for several different customers, the alloy composition of its products changes all the time. As a result, the composition of the grinding sludge varies constantly, which has a negative effect on the price the company can achieve for its briquettes. It must however be said that some income is generated from the briquette production, which is definitely preferable to the previous situation where the company had to pay for the disposal of the sludge. In addition, the compact briquettes require much less space than the previously used sludge containers or the grinding wool produced with the centrifuge. Erwin Haag is delighted with the briquetting unit and only remembers one minor issue they

had: "When processing sludge with high oil content, there is sometimes some oil leakage at the seals, caused by the high velocity of the piston." The company did however not need to deal with this problem on its own. Erwin Haag contacted Andreas Jessberger, his sales partner at RUF, explained the problem and discussed several possible solutions in detail. In the meantime, one of the solutions has already been implemented. "We have integrated an electronic switching system that enables the machine operator to reduce the piston velocity at the push of a button," explains Andreas Jessberger. "As a result, the pressure in the machine is built up at a slower pace, and oil only escapes where we actually want this to happen."

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Zahnradfertigung Ott GmbH & Co. KG ...

... is a family-owned company with around 200 employees. As a supplier of drive elements for transmission system manufacturers, Zahnradfertigung Ott operates in three fields: 1. Production of worm gear sets with patented Ott gear system for the machine tool industry; 2. Contract production of gears for European plant manufacturers and large-gear system specialists; 3. Hollow wheel production for wind turbine gear systems. Depending on the actual application, the company uses milling, planing and grinding technologies.



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CAPTIONS



B1
Erwin Haag, managing director of Zahnradfertigung Ott GmbH & Co. KG is delighted with the short payback time of only one year of the RUF RB4. "What was previously done by two employees is now done by a single worker. By processing the grinding sludge with the briquetting machine, we not only recover grinding oil but also save space and have done away with disposal costs.
Pictures: RUF GmbH & Co. KG



B2
In 2005, Zahnradfertigung Ott acquired a RUF RB4 briquetting press. It squeezes the oil from the grinding sludge and presses the waste metal into briquettes of convenient size and weight



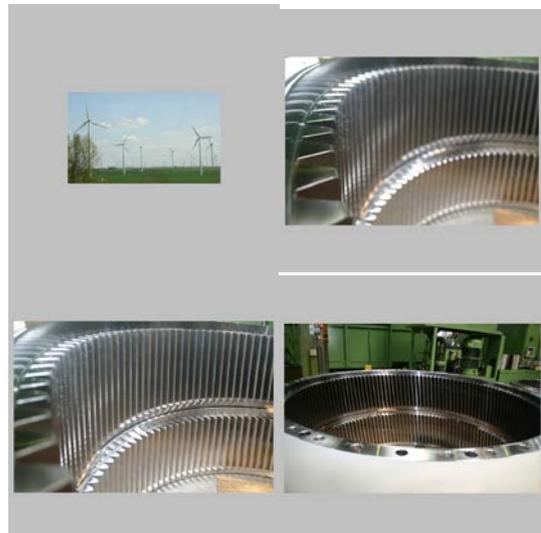
B3
With the RUF briquetting press, Zahnradfertigung Ott recovers about 90 per cent of its the used grinding oil. This corresponds to more than 100,000 litres per year, saving the company considerable money



B4
The grinding chips leave the RUF press in the form of easy-to-handle briquettes that can be neatly stacked to save space



B5
Containing large and intertwined metal strands (B5a) is macerated in a 2000-litre hopper equipped with three screw conveyors (B5b) and subsequently fed in this form (B5c) to the briquetting machine



B6
These huge hollow wheels manufactured by Zahnradfertigung Ott are installed in wind turbines.