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# Sensor-monitored wear of the mechanically stressed screw in a screw compactor

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## 1. Abstract

The project deals with the sensor-monitored wear of the mechanically stressed screw in a screw compactor from the company RUNI A/S.
In order to realise this project, a concept was developed that reflects the measurement of the screw in new and worn condition. The concept is based on the inductance of the screw at different material thicknesses. In the first part of the report, the possibilities offered to RUNI by such monitoring are described and the functionalities of the sensors used are explained. Also the choice of sensors is discussed.

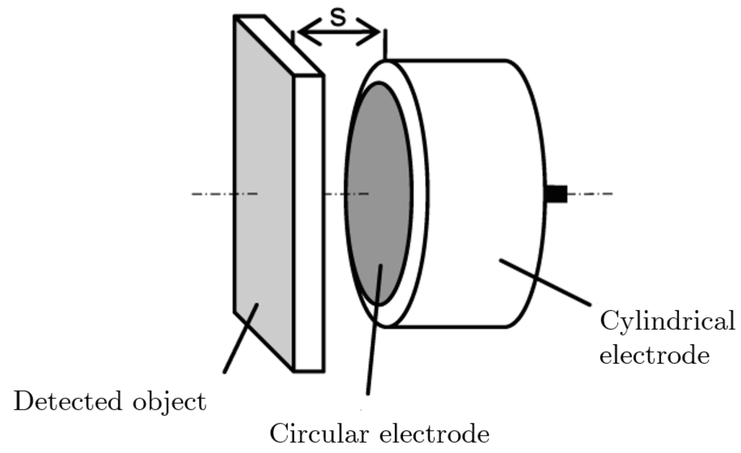
## 2. RUNI and the scope

From 1996 RUNIs main product is the screw compactor which they called "omnivorous" since they supplied more than 2000 screw compactors worldwide for various purposes. Because of their history the compactors are robust, solid machines build out of thick steel plates.

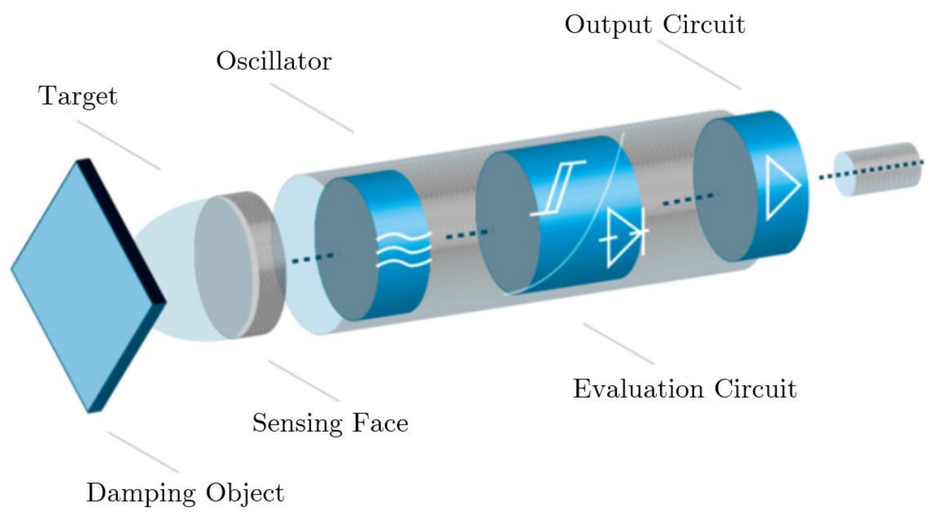

The vision is to create a solution which would mainly be able to correctly measure the wear of the screw, while the machine is operating and be able to collect and display the data to not only the user but also RUNI and their servicemen. The system to measure the wear should be cost effective, precise, measure during the operation of the machine and most importantly should be able to be retrofitted into already existing machines.
The first approach is to research direct measuring methods. Capacitive, Inductive, Ultrasound, and Laser measurement methods can be included in this group. This approach does not require complex calculations to obtain the thickness of the screw, as the output values from the sensor can be directly assigned to the wear value. This makes this approach very attractive in terms of implementation and data evaluation.

## 3. Sensors

The first approach uses capacitive proximity sensors to accurately measure the thickness of the screw. Individual sensors must be positioned to measure the end of the screw where wear is the highest. Capacitive sensors measure changes in the dielectric properties of the material being measured. The sensors can sense wherever there is material in the sensing area of the sensor, or not. Capacitive sensors can also detect non-ferromagnetic materials.




The second approach uses Inductive sensors. Inductive sensors use electromagnetic fields to measure changes in the electrical conductivity of a material. Like capacitive sensors, inductive sensors can sense if there is a component in front of them in the sensing area. The main difference to capacitive sensors is, the ability to sense only ferromagnetic materials.




## 4. Conclusions

It can be said on the basis of the measurements that the developed concept works and that a clear distinction between the new and the worn screw can be measured with inductive sensors. This serves to demonstrate the proposed concept and proves its feasibility and potential effectiveness.

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