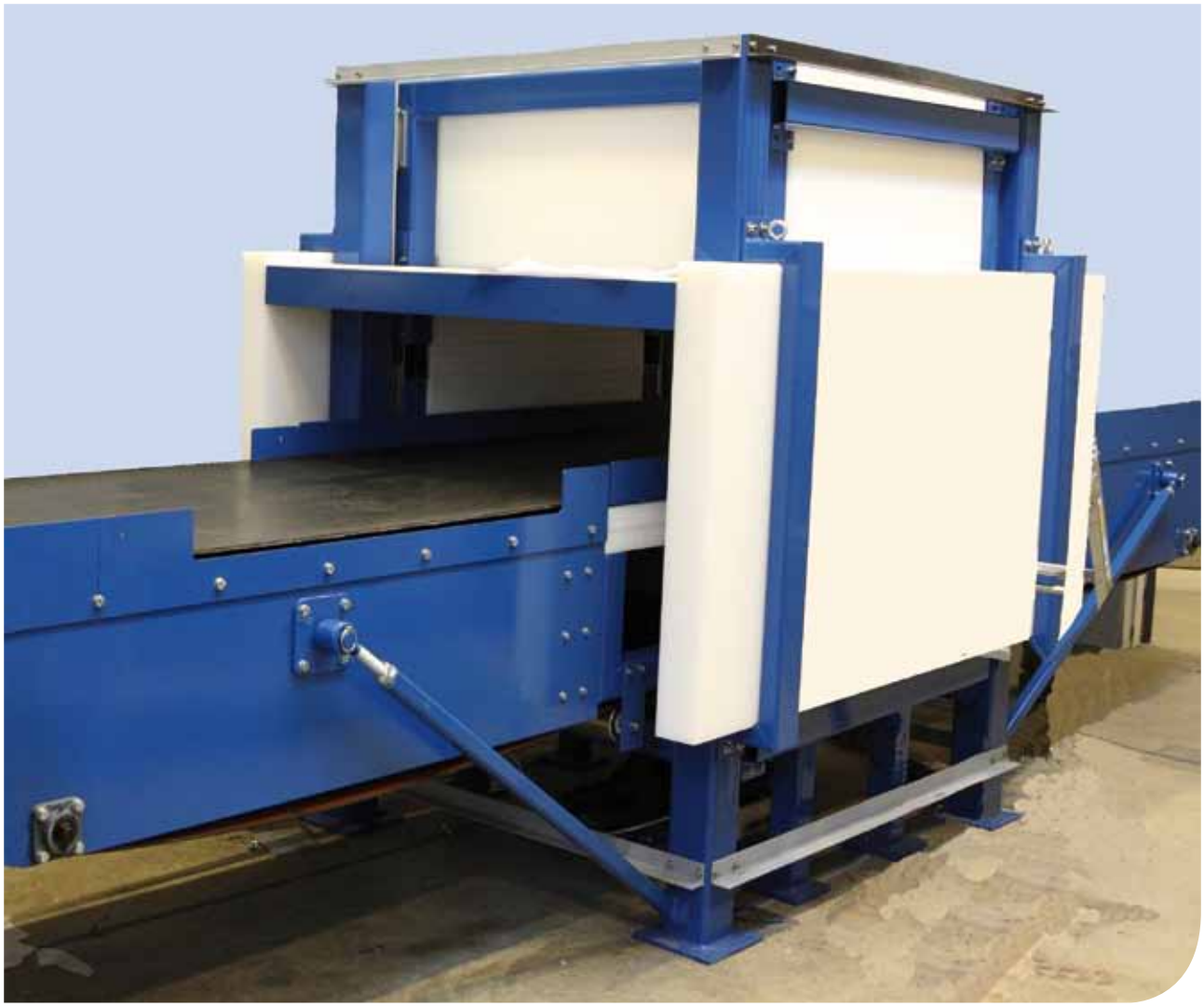
Detecting chlorine in solid waste



Advantages

Identifying the presence of chlorine in solid waste can yield tangible benefits for producers and consumers of combustible solid waste alike.

For the producers (waste processing facilities and such) the identification can lead to a higher price for their product, either through documentation of the chlorine content of the product or through removal of chlorine as a consequence of the identification.

For the consumer (cement factories, central heating plants, power plants or the like) the identification can help maintain better control over the chlorine content of the feedstock, thereby avoiding the negative consequences chlorine can have for the process; for example increased incidence of corrosion or emission of harmful substances (dioxins).

Finally reducing chlorine in combustion processes leads to environmental benefits through fewer harmful emissions.

The device operates without the need for contact, the waste simply passing through the sensor on a conveyor. The sensor then provides the position of the chlorine containing piece of waste (usually PVC) on the conveyor.

The technology employed (see below) is scalable to a certain degree, meaning that if higher speed/capacity is needed the device can be scaled up to accommodate this need. The same scalability applies for lower speed/capacity.

Technology
The sensor utilises the PGNAA technique, or **P**rompt **G**amma **N**eutron **A**ctivation **A**nalysis technique, whereby a radioactive source emits neutrons, which makes the waste emit a characteristic response which can then be detected and used to identify the elements present.

Chlorine is highly susceptible to this type of measurement, having the dual qualities of being easy to excite into emitting its response and having a highly characteristic response which is easy to detect.

Detection limits
The detection limit is dependent on the speed at which the waste moves through the sensor as well as the strength of the neutron source installed, but with a neutron source of reasonable strength and using a conveyor speed of 1 m/s, the sensor would be able to detect the presence of a piece of PVC weighing less than 50 g.

Capacity
Given the same source strength and conveyor speed as above the sensor would have the capacity to treat more than 40 tons of waste per hour, but the sensor is very flexible in design and can be scaled both up and down to suit individual facilities.

Radiation safety and regulatory matters
The sensor employs a radioactive source, which of course means that some extra safety aspects must be considered. However, FORCE Technology has more than forty years of experience in successfully designing, constructing, selling and deploying devices employing radioactive sources and the device is constructed to meet all necessary safety requirements.

The presence of a radioactive source also means that approval is needed to import, install and operate such a device. Again FORCE Technology has extensive experience in the field and is able to assist in these matters.

Basic device form
The chlorine detection sensor is designed as a portal type instrument, through which the material stream passes. The sensor is designed to straddle a conveyor, the width of which is in principle unlimited. Surrounding the sensor is a fence, the size of which depends on the application. Outside the fence the main controls for the device are then located. The fence also acts as a barrier in radiation protection context.

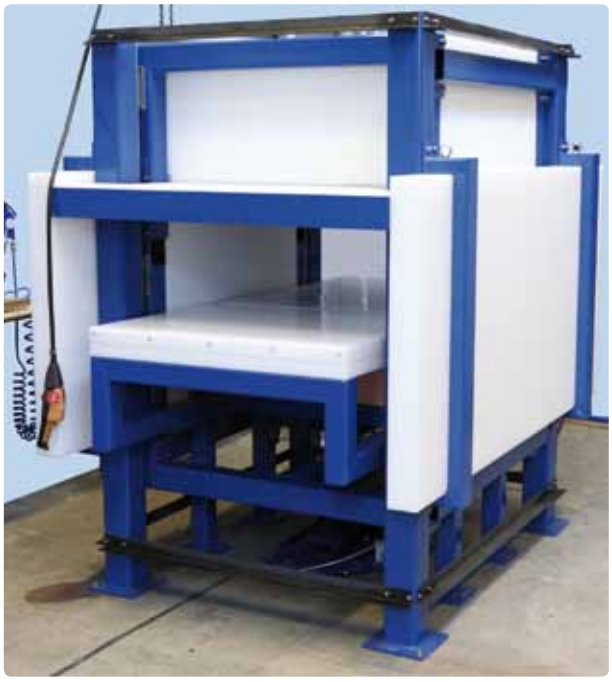


Photo: The chlorine detection sensor (here shown prior to line integration at customer) is generic in design and can be adapted to fit onto most conveyor systems.

The device returns a signal whenever chlorine is detected. Ejector mechanisms and the like would be supplied by the customer, making the device highly adaptable.

Alternate versions; other detectable materials
Alternatively the sensor can be configured to continuously measure the amount of chlorine passing through the sensor and thus act as a tool for production control and or documentation.

The PGNAA-technique in general can be used to characterise most elements and is able to discern other materials besides chlorine. The detection of copper in a stream of other metals is one such possibility and one which FORCE Technology has successfully tested.

Contact details
For further information please visit our website elementsort.eu. It is also the possible to visit our demonstration facility at FORCE Technology company headquarters, located near Copenhagen - see address below.

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