

We know how to produce aggregate from sewage sludge

Sewage sludge from sewage-treatment plants constitutes a problem that requires urgent solution. In Poland, each year about 450 hundred tonnes of dry matter from sewage sludge is produced, from which 188 hundred tonnes are destined for storing. It is a serious threat to the environment. The following is an interview with Dr STEFAN GÓRAL-CZYK, General Director of the Institute of Mechanised Construction and Rock Mining.



Q: Why did the Institute undertake the issue of sewage sludge management?

A: For many years, as a research and development unit we have been dealing with waste management issues. Specialists from our Waste Management Centre participate in the European Commission programmes and in creating both national and regional waste management plans. Thus, the issue of waste management is familiar to us. One of the major goals of our works is developing innovative technologies connected with environment protection. Our knowledge and experience enables us to develop methods of processing waste into safe products, especially that recycling dangerous sewage sludge is a must. There is over 900 hundred tonnes of dry matter stored in waste treatment plants. Within the next ten years, due to the growing number of new waste treatment plants the accumulated amount will significantly increase.

Sewage sludge, as a result of using all-navigable sewage collection system, which is based on the disposal of communal and industrial sewage in treatment plants, is contaminated with heavy metals and organic substances, bacteria, fungi and parasites. It causes declassification of the sludge, which precludes its usage in agriculture and significantly reduces the possibilities of composting. Storing such sludge causes a threat of contaminating groundwater. Current legal regulations on the subject are very strict.

Q: How did you manage with that?

A: The only safe possibility of resolving the problem of dangerous sewage sludge recycling is the usage of thermal methods. However, such technologies have many disadvantages. They involve high energy consumption, it is necessary to purify outlet gases and the combustion products are only stored rather than used in agriculture. It is common in

Poland to perform co-combustion in concrete furnaces which reduces the problem of high energy consumption. However, it does not solve the problem of dangerous substances. Ashes from combustion still contain heavy metal compounds and are dangerous waste for storing.

Thermal methods are expensive in exploitation. Their usage in sewage sludge recycling requires additional investments in the system of purifying combustion gases. Our Institute while developing innovative technological solutions, less costly than the current ones has created a new method of sewage sludge utilisation. The end product of the thermal

process is a commercial one – meaning safe light-weight aggregate and not, as up till now, dangerous stored ash. It raises the profitability of this method, which varies from the ones currently used and based on vitrification with applying lower temperature in the thermal process. The next step of increasing the profitability of this method is the usage of industrial and communal waste in aggregate production. The granulate is being made from a mixture of non-treated sewage sludge and rock mining waste such as silica ashes and flax. The granulate baked up to 1100°C creates a sinter with the properties of light-weight aggregate, analogous to the properties of light expanded clay aggregate. It is essential to notice, that as a result of baking, heavy metal compounds from sewage sludge are built into the crystalline structure of silica sinter. They are unwashable and safe for the environment. The test of the dangerous substances elution performed for the aggregate produced from the sewage sludge in Września and from the chalcedonite ashes in Inowódz confirmed that the amount of heavy metals in aqueous extracts according to PN-EN 1744-3 standard has decreased. The artificial light-weight aggregate being the result of the process easily fulfilled the basic requirements of PN-EN 13055-1 and 13055-2 standards. The method is under patent protection number P 384611.

Q: Time to sum up...

A: Currently, preparatory work for the implementation of the method is being carried out. On the basis of our research we believe that the sewage sludge utilisation method can be introduced on a large scale. Combining sewage sludge utilisation and the usage of rock mining waste not only allows to produce good quality light-weight aggregates used among others in geotechnics but also protects the environment by limiting the amount of dangerous dumps. Basing on our economic calculations the sewage sludge recycling plant will generate revenue from sludge utilisation payments and aggregate sales, thus becoming a profitable unit for the local government.