

THE INFLUENCE OF THE RAW MATERIAL DRYING TEMPERATURE ON THE BIOMASS AGGLOMERATION PROCESS

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ABSTRACT

The studies on biomass agglomeration still not covers all aspects of this process. The main goal of the agglomeration is to get granulate with the desired qualitative features with as low as possible energy used. Usual research takes into account various factors affecting this process. This are: biomass type, moisture content, degree of fragmentation, binders, time, temperature and compaction pressure. The impact of these factors is known - there are difficult (eg. straw, miscanthus) and easy (softwood) materials for agglomeration. Increase in time, pressure and temperature, improves the process as well as the degree of fragmentation increase. Raw material moisture content should fluctuate in the range of 10-15%. But there is lack in literature how drying process (especially the temperature level) affects compaction? Biomass as a lignocellulosic material consists of: cellulose, hemicellulose and lignin. Besides to them there are also sugars, proteins, starch, tannins, oils, organic acids, resins and waxes. Depending on the drying temperature, except water, different substances may evaporates from the material. The temperature rise may also cause the decomposition of different biomass components (eg. lignin which is the main binder). Raw material may change their physical properties (eg. elasticity, plasticity, brittleness), what will affect the quality of obtained granulates.

This paper presents complex research on drying temperature on compaction process. To omit the raw material moisture factor, the samples were dried over a wide temperature range until the moisture was completely removed. Compaction, at selected pressure levels, was conducted on dry material at about 20°C, as quality parameters were considered: granulate specific density, relaxation and durability. As the research material was selected biomass of: miscanthus, pine, beech and cup plant. For each drying temperature of the raw material, the course of changes in quality parameters, depending on the compression pressure was determined