

# MIXING OF TWO- INGREDIENT GRAIN SYSTEM IN ROTATING AGITATOR

**Biłos L., Szwedziak K.**

Department of Agricultural and Forest Technology, Faculty of Mechanical Engineering ,  
Opole University of Technology, 5 Mikołajczyka Street., 45-271 Opole, Poland

E-mail: lukasz206@wp.pl

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## **ABSTRACT**

That thesis has been a first step to establish the correlation between the mixing process parameters, physical parameters of components used in the mixing process and the quality of mixture obtained after mingling. In order to do that the research has been carried out in which ingredients were mixed in two-cone, drum mixer. As for ingredients, coal dust and biomass pellets, the two- ingredient system varying in physical features, have been used. The research was to analyse the arrangement of key component concentration in cross-section mixer. As tracer biomass pellets have been used.

**Key words:** Non homogeneous materials mixing, biomass pellets, co- combustion

## **RESEARCH DESCRIPTION**

Biomass intended for energetic purposes can be used as individual fuel for heating power production or as mixture with coal in co-combustion process. As the first method of biomass usage, is concerned the main factors that influence the firing conditions are biomass moisture and connected with it calorific value. Fuel co-combustion conditions besides factors mentioned above are depending on good mixing of fuel components. Mixing biomass with coal fuels is claimed to be scientific researches object because of necessity of providing homogeneous mixture to the heating boiler and revision of product value sold by coal fuels store houses in Poland, offered ready mixtures of biomass with main fuel. Ready mixtures are not described by mixing degree value and there is possibility of mixture segregation during car transport. Co-combustion are supposed to be conducted due to the desire of decreasing pollutants to the atmosphere and according to authors of this paper homogeneity of mixture used in co-firing has a fundamental value.

## **RESEARCH METHODOLOGY**

Four series of non heterogeneous materials mixing research have been made. Materials were different by physical parameters . Components where mixed. Mixer drum was filled with 20 kg. Fraction was pour to the mixer drum in the same manner one after another for all sample in this same way, mixing parameters had been set. Drum content was discharged to 10 rings system. (rings were arranged one upon the other). Mixture was photographed, and pictures were recorded in bmp format. To evaluate quality of mixture „PATAN” application was used. Content of each ring was additionally analysed by tracer distribution by weight. For each research series process parameters and components physical parameters were the same. For measuring distribution of key-component in mixture, which were always biomass pellets computer application “PATAN” has been used. Contents of each ring were additionally analysed by distribution of key-component (traser) in mixture with weight measuring method usage. Each of token pictures were filtrated by “erosion” computer filter in GIMP 2.6. computer application. Erosion filter is a basic morphological picture transformation. Forty digital pictures of non homogeneous mixtures had been compared for each method. Influence of erosion filter used to correctness revision of “PATAN” results had been compared. Mixture picture analysis with computer applications usage is one of modern methods proposed because of mixture quality evaluation rationalization purposes. Standard methods used for mixture quality evaluation are based on manual separating of mixture and it becomes big problem because of time-consumption and strenuous of performed actions. According to that facts we had decided to use innovative methods based on computer picture analysis in the purpose of making analysis easily and speeding them up.

## **RESULT’S AND CONCLUSION**

Findings from computer picture analisys where different in very large scale from results received from traditional method of mixture quality measuring. Analysis of digital picture of mixture, realized with usage of computer applications, can provide possibility of applying many different kinds of filters and transformations, and that can give us chances for mining interesting data of mixing process characteristic. During pictures analysis it turned out, that light reflexes occurred on coal dust surface are

making problems with "PATAN" quality measuring ability. After erosion filter application there were observed an improvement of difference between two compared methods results. In spite of fact, that differences in results between proposed methods even after erosion filter application are steel on high level we supposed, that further search of the way of picture conversion without influence on physical sense of mixing process may lead to decreasing differences between results from methods proposed in article.

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Aplikacja komputerowa Patan, autorstwa dr. Marka Krótkiewicza, Uniwersytet Opolski