

Sorting waste wood from building and demolition

Danish EPA is generally observing increasing interest from the building industry in future sorting of waste wood from building and demolition, enabling a clean fraction to be combusted meeting the "executive order of biomass waste".

On this basis DEPA has initiated this project having three objectives:

1. to investigate experiences and possibilities for automatic sorting of waste wood from building and demolition.
2. to describe the classification and characterisation of waste wood in selected countries: Sweden, Germany, Switzerland, The Netherlands and Austria.
3. to estimate the Danish potential of waste wood from building and demolition.

Automatic sorting equipment

Our comprehensive investigation is showing that Europe has few automatic sorting plants, sorting out one single fraction of waste wood from building and demolition waste. No plants can sort out waste wood in more fractions. Several manufacturers are supplying shredders for waste wood, but none are producing equipment for separation of waste wood in more fractions.

It is therefore necessary to develop new sorting technology consisting of sensor technologies for identification and measurement of the relevant types of waste wood and mechanical conveying and separation technologies.

Technologies for identification and measurements

This project has evaluated five sensor technologies:

1. Colour indication
2. Hand-held XRF-instruments
3. Online XRF-technology
4. Prompt Gamma Neutron Activation Analysis
5. Online UV-fluorescence

the three last-mentioned being novel technologies.

For sorting out of salt impregnated wood we consider that both the PGNA and the online XRF technologies with strong probability can meet the industrial demands on sorting capacity and accuracy. On the contrary colour identification and hand-held XRF instruments are not suitable for industrial applications due to handling problems and the long time of measurement. Both the PGNA and XRF technologies will probably be able of detecting wood impregnated with Pentachlorophenol (PCP).

For sorting out wood treated with creosote and probably laminated wood too we consider that it will be possible to develop an online sensor based on UV-fluorescence.

A combination of either PGNA or online XRF with UV-based fluorescence could probably separate waste wood in these fractions:

1. Salt impregnated wood (CCA, CCP, (CKB))
2. Halogen containing plastic/wood composites and surface treatments containing halogens and wood impregnated with Pentachlorophenol
3. Creosote impregnated wood
4. Laminated wood
5. Residual fraction containing chemical untreated wood, wood with halogen-free surface treatment and bark.

Developing and adapting the existing and novel technologies requires a substantial amount of work in order to meet the rugged environment and demands on speed etc. meeting an automatic sorting machine.

Mechanical handling and sorting technologies

The development of mechanical handling and sorting technologies is probably a larger task than adapting the sensor technologies. Existing Danish companies can do the job, and in cooperation with European partners the development project(s) could probably get funding from EU, e.g. the CIP-ECO-innovation program which is focusing on recycling and efficient treatment of waste.

Classification and characterisation of waste wood in selected countries

The result from the investigation of the selected countries shows that the basic principles in the sorting are more or less the same, while waste wood typically is sorted visually in the following fractions: Clean wood, chip boards, treated wood, and impregnated wood.

The focus of the countries is aimed at sorting indifferent lengths including specification of the heating value etc. In contrary to the other countries Austria is operating with as many as than seven categories of waste wood.

Potential of waste wood in Denmark

Based on figures from the Netherlands and the Danish statistics on primary sources we estimate that the total amount of waste wood from building and demolition is approx 235.000 t per year. This estimate is rather uncertain and it requires a thorough investigation to get a more specific number

Conclusion on sorting technologies

We consider it likely that it is possible to develop an automatic sensor based sorting machine using PGNAA or online XRF in combination with online UV-fluorescence. PGNAA and XRF sensors could both identify/separate two fractions of waste wood: Salt impregnated wood and halogen containing or surface treated wood. UV-fluorescence sensors could identify creosote impregnated wood and laminated wood..

The task of developing the mechanical conveying and sorting technology is probably larger than that of adapting the sensor technologies, while the equipment must have high capacity (up to 50 t/h) and be very robust.