11.12.2009

Puu-28.3030 Wood Bonding

1. Explain the following terms (*Selitä seuraavat käsitteet*) (20p):
Adhesion, Adhesive failure, Thermosetting adhesive, Thermoplastic adhesive, Open assembly time, Pot life (Working life), Storage life, Solid content, Hardener, Wood failure percent.

2. Describe and compare the properties of the following adhesives *(Kuvaile ja vertaile seuraavien liimojen ominaisuuksia)*: (40p): Polyvinyl Acetate (PVAc) and Melamine Formaldehyde (MF)

3. Solve the problem (40p):

Finger jointing for window products

Finger jointing company "FJLine" had a problem at the final stage of manufacturing process. Some of the finger jointed bars broke into smaller details when they were lifted up with the truck at the finger jointing mill. Examining the finger joints showed that glue had not been spread equally in every single broken joint, however even those joints with perfectly spread glue had been broken.
Because of the lack of competence and quality control on line, they decided to ask from the specialists.

Wood material dimension:	**Adhesive:**	**Conditions:**
50x 150 mm Average MC of wood 10%	PVAc (D_4) Pot life 6 weeks at 20°C Max. open time for adhesive 5 to 10 min.	Temperature of the production hall for two weeks before and during the production: +10 … +20°C. Temperature outside -20...-30°C

Description of the process:

Raw material for the finger jointing came from the sawmill situated next to the finger jointing mill. Raw material packages used for finger jointing were conditioned after drying for 2 weeks at the external storage of the sawmill.
Finger jointing mill uses PVAc (D_4, with pot life 6 weeks at 20 °C) adhesive for finger jointing, normally one 1000kg container/week. New adhesive container arrived to the mill on Monday and on Wednesday morning it was installed on the line. Because of the minus degrees outside it was not possible to keep the temperature in the hall at the required level, therefore a special room was built for the adhesive container where the temperature was 30 (±3) °C.
Scheduled maintenance of the finger jointing line started on the following week on Monday and lasted for 2 weeks. After the maintenance regular finger jointing process was started (Monday morning). Since the adhesive container was not completely empty before the maintenance the production after the maintenance was continued using the same container.
Usually the packages with wood material were sent to the finger jointing mill the day before finger jointing (this time Friday morning). The packages were stored at the same hall where the finger jointing was started.
Production process was running with faults. There were problems with spreading the glue and for that reason the glue comb was to be cleaned more often. It caused delays also in pressing.
After pressing, the bars were stacked and packed in 3 hours. After that they were lifted with the truck and some of the finger joints broke down into details.