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, Extender, Hardener, Solid content.
- **2.** Describe and compare the properties of the following adhesives (Kuvaile ja vertaile seuraavien liimojen ominaisuuksia): (40p): Phenol-Formaldehyde (PF) and Polyvinyl Acetate (PVAc)

3. Solve the problem (40p):

Finger jointing for window products

Finger jointing company "Sormijatkos" 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. Also some bars were curved after pressing.

Because of the lack of competence and quality control on line, they decided to ask from the specialists.

Wood material	Adhesive:	Conditions:
dimension:	PVAc (D ₄)	Temperature and RH% of the production hall
50 x 50 mm	Pot life 6 weeks at 20 °C	for two weeks before and during the
Average MC of wood	Max. open time for adhesive	production: +25+30 °C and RH 40%.
after drying 10%	5 to 10 min.	Temperature outside +25+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 (D₄, 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.

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 3 days before finger jointing (this time Thursday morning). The packages were stored at the same hall where the finger jointing was started.

Since the calibrating capacity before finger jointing is considerably larger, the material that was meant for finger jointing on Monday was calibrated and cross cut already on Friday. The material was stored in the same hall over the weekend.

Finger jointing 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. Bars were stacked and packed after pressing in 5 hours. After pressing, some of the bars were curved. Also after they were lifted with the truck some of the finger joints broke down into details.

	week 1						week 2								week 3							week 4		
	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Мо	Tu	We	Th	Fr	Sa	Su	Мо	Tu	We
Conditioning of wood				Vien			188		No.				5	PAYS.	A			1						
Wood at finger jointing mill																		No.		1000	Total I			
Adhesive arrives and is being installed	1 2																	THE WILLIAM CO.	31386	- SPECIAL SECTION	-			
Line maintenance									7	1					100	100								
Finger jointing starts again																								