

## Aalto – Pulping technologies

The **woodworking workshop** is equipped with all the necessary woodworking equipment, such as: cross-cut saw, circular saw, bandsaw, board saw, jointer, thicknesser, sanding machines, upright drill, and vertical spindle moulder. For wood chips, a screen can be found (designed according to the SCAN-CM 40:01 standard). For wood meal manufacture, two Wiley mills are available.

Aalto University has several autoclaves, mostly designed for pulping and fractionation experiments, but the equipment is very well suited also for chemical pretreatment of biomass (see the table below). For further information, click on this link: [http://puu.aalto.fi/en/research/tutkimuslaitteet/#Wood\\_products\\_equipment](http://puu.aalto.fi/en/research/tutkimuslaitteet/#Wood_products_equipment)

Table 2. **Aalto reactors for pretreatments.**

Volume [L]	Reactor type	Mixing / heating	p <sub>max</sub> [bar]	T <sub>max</sub> [°C]
10	10 L digester	Liquid circulation / oil	60	250
6 x 2.5	Air bath digester (6 autoclaves)	Agitation with rotation / air	20	180
8 x 0.2	Oil bath digester (8 autoclaves)	Agitation with rotation / oil	50	200
1.6	Büchi bep 280 glass reactor	Propeller / water	6	100
0.5	Parr 4575	Propeller / electricity	345	500
0.19	Shrinking-bed reactor	Percolation / electricity	130	300

In addition to the reactors mentioned in the table above, two CRS Engineering medium consistency mixing reactors are available. The reactors are capable of handling 200 g batches of pulp at consistencies of 10-15%, and both reactors consist of a reactor vessel, fluidization mixer and reactor lid.

Additionally, water bath units are available for e.g. pulp bleaching experiments at temperatures below 100 °C. The bleaching chemicals readily available are hydrogen peroxide, chlorine dioxide, and ozone. For the two latter chemicals, Aalto University facilities are equipped with gas generator units. Aalto University has also 8 l and 16 l rotating digesters of which the bigger one can be used also for oxygen delignification and peroxide bleaching. Currently these digesters are not in use due to renovation of the pilot area of the Department of Forest Products Technology.

In respect of mechanical pulping, a wing defibrator and a disc refiner (Sprout Waldron 105-A) can be used. The laboratory disc refiner is designed for the first stage in production of thermomechanical (TMP) or chemithermomechanical (CTMP) pulps. The laboratory disc refiner is also suited for the production of refiner mechanical (RMP) and chemimechanical (CMMP) pulps.

