

InTechFibres

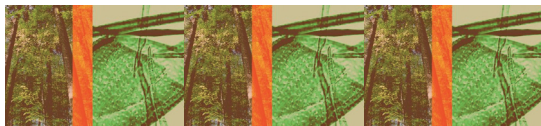
research in fibres

Tools and Facilities



InTechFibres enables mutualising fundamental to applied research efforts around essential themes common to lignocellulosic materials, their derivatives, their production and their use; themes that are critical for the future of the pulp, paper and board industry.

CTP and FCBA institutes, involved in InTechFibres, develop fields of excellence and expertise, with tools and facilities in common and complementary.



CONTACTS

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From Laboratory...

COOKING

Simulation of all chemical pulping processes on any lignocellulosic material (wood chips and annual plants) in industrial conditions

Computer systems for cooking programming and digester temperature regulation

Laboratory

- Autoclaves from different sizes (20ml to 3.5l)
- Liquor recirculation digester (2x 6.5l)
- Two screening systems to eliminate knots or shives before bleaching

Pilot

- Two batch digesters of 1.3m³ (200kg wood chips capacity) up to 190°C
→ Possibility to preheat liquors, to recover black liquor and to reuse it for new pulping
- Calorific exchanger for liquor heating and cooling
- Draining chest
- Screening system (slot 0.16mm/ hole 2-3mm)



BLEACHING

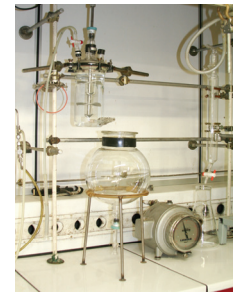
Simulation of any bleaching stages (Z, O, D, C, H, P, FAS, PAA, enzymatic treatment...) and sequences on any pulps in industrial conditions

Laboratory

- Low, medium and high consistency ozone treatments
- Oxygen reactors (3.5 to 5l)

Pilot (Unique tool in Europe for all types of bleaching processes research)

- Pressurized reactor (capacity 1,7m³ (100 to 150kg), 6 bars, temperature up to 120°C, stirring 30 to 130 rpm)
- Upflow and downflow towers (capacity 0.3m³ to 1.8m³)
- Fluffer for preparing pulp at high consistency
- Twin wire press (out put at 20 to 35%, production 100 to 1000kg/h)



REFINING

Chemical pulps refining from any lignocellulosic raw material

Laboratory

- Valley beater, PFI mill, Jökrö mill

Pilot

- 12" single disc refiner at low consistency
→ speed: 1000-2000rpm, capacity 5 to 10kg, energy acquisition
- Conical refiner JC00 with capacity 75-400kg
- Double disc refiner DD20 with capacity 75-400kg
→ A great diversity of plate patterns for adapted refining conditions

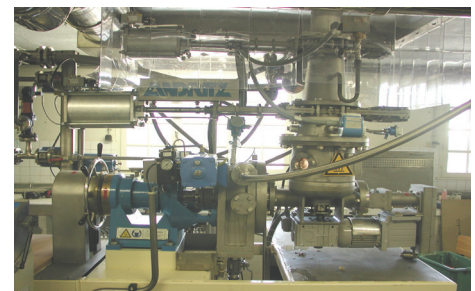


HIGH-YIELD PULPING

Simulation of all refiner mechanical pulping processes in industrial conditions

→ RMP, TMP, CTMP, APP processes for any lignocellulosic raw material

- Possibility of raw material impregnation in a plug screw feeder/ the MSD 6" Pressafiner (Modular Screw Device Pressafiner)
- Digester (up to 4 bars, 5 to 30min, up to 150°C)
- Primary refiner (varying speed 1500 to 5000 rpm, 12" diameter disc, up to 5 bars)
- Second refiner (12" single disc refiner) under pressure



NAMICELL

Manufacture of micro- and nano- fibrils of cellulose

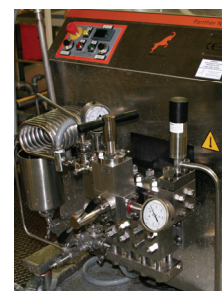
→ Chemical, enzymatic and mechanical pre-treatments

Laboratory

- Panther NS3006L from GEA Niro Soavi- 50 L/h, 5 kW motor, 1500 bars maxi
- Microfluidizer from Microfluidics

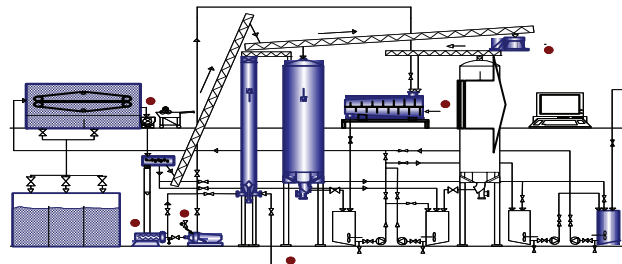
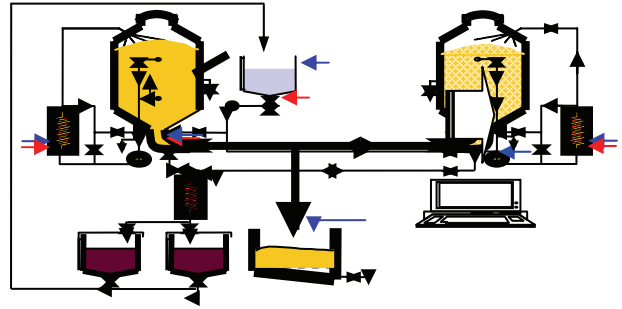
Pilot

- Ariete NS3075H from GEA Niro Soavi- 1000 L/h, 55 kW motor, 1500 bars maxi (30 to 70 kg/day)

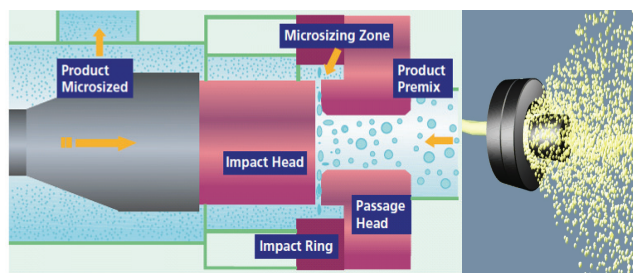
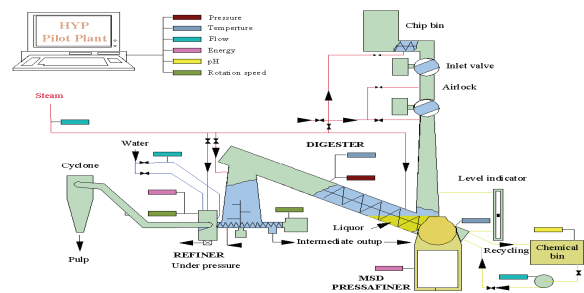
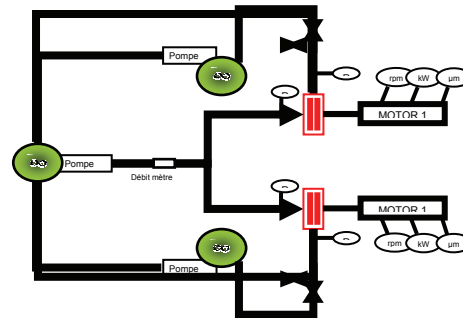
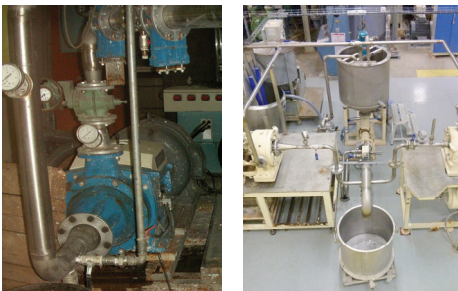


→ Possibility to dry all produced pulps

... to Pilots!



● Chemical introduction



Homogenizing valve

ANALYSES

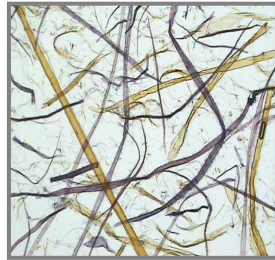
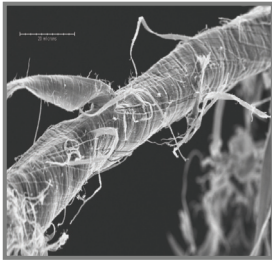
LIGHT MICROSCOPY

- Useful for pulping or papermaking (bleaching, refining, drying,...) process control
- Determination of fibres composition in papers and boards

SCANNING

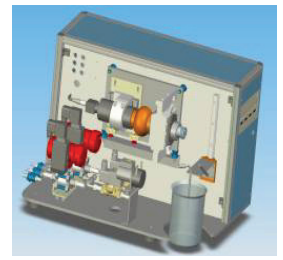
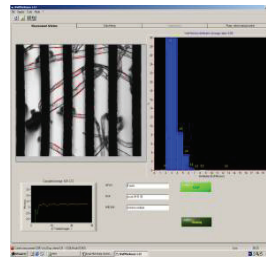
ELECTRON MICROSCOPY (SEM)

- Fibre or paper surfaces and paper cross sections examinations



MORFI WALL THICKNESS

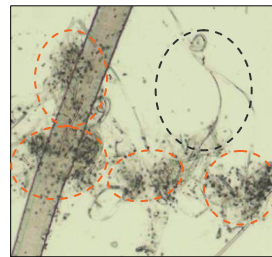
- Accurate measurement of fibre cell wall thickness ($<0.5 \mu\text{m}$) with good repeatability: Average, value distribution and pictures
- Optical microscopy in transmitted light with many measurements on each fibre
- Innovative measurement cell with fibres stop-and-go, anti-retention design, auto-calibration and auto-cleaning



TRANSMISSION

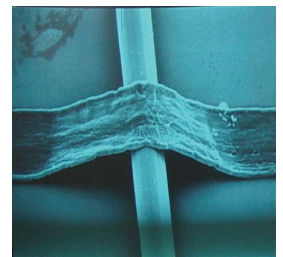
ELECTRON MICROSCOPY (TEM)

- Examinations of chips', fibres' or papers' ultra-structures, after polysaccharides labelling (PATAg technique)
- Localisations of the different fibre wall constituents after immunocytochemical labelling through specific antibodies



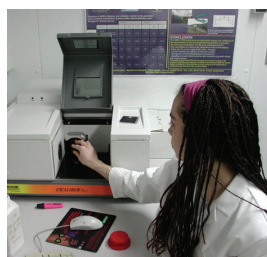
CYBERMETRICS

- CyberFlex : Flexibility and conformability index (Steadmand and Mohlin 's method)
- CyberBond : Relative bonded area index (Clarke 's method)
- CyberSize : Width, fibrillation index, kinks, curl index (image analysis)



ANALYTICAL TOOLS

- Lignin extraction by acidolysis and by enzymatic dissolution of carbohydrates
- Lignin structure analysis by ^{13}C NMR and ^{19}F NMR
- Molecular weight distribution of lignin (GPC) and cellulose
- Functional groups on cellulose (carbonyl, carboxyl)
- Sugar analysis of lignocellulosics
- GC-Mass spectrometry
- Pyrolysis of lignocellulosics
- HPLC analysis with various detectors
- Ionic chromatography, electrophoresis
- Near InfraRed spectrometry



MORFI

- Measures the fibre main dimensions and morphological characteristics (length, width, coarseness, curl, macrofibrillation, ...)
- Studies the impact of mechanical and/or chemical treatments and monitors the fibre characteristics
- Measures the vessels main dimensions
- Measures the shives main dimensions (length, width, surface)
- Measures the fines characteristics (length, surface)

