TARGETING METHOD FOR THE RETROFIT DESIGN OF THE COGENERATION SYSTEM OF INTEGRATED NEWSPRINT MILL

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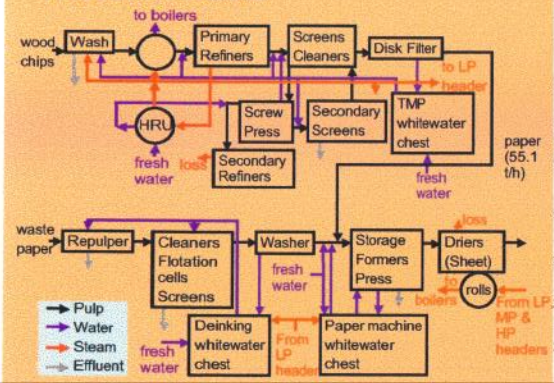
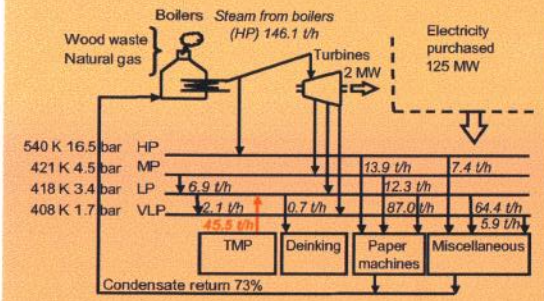
OBJECTIVE

Optimize steam utilization to reduce fossil fuel consumption

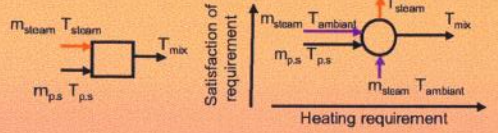
PROCESS DIAGRAM



STEAM DISTRIBUTION DIAGRAM

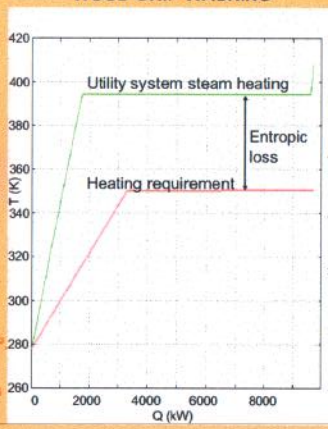


DOUBLE REPRESENTATION OF ENERGY REQUIREMENTS

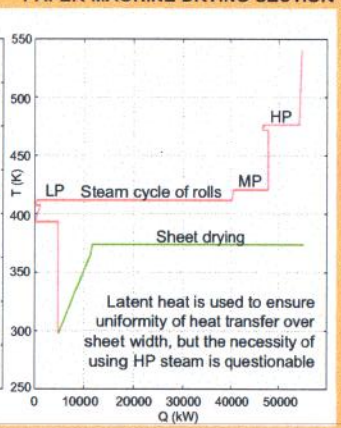


COMPOSITE CURVES FOR DOUBLE REPRESENTATION

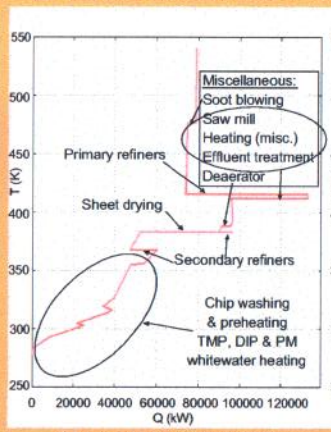
WOOD CHIP WASHING



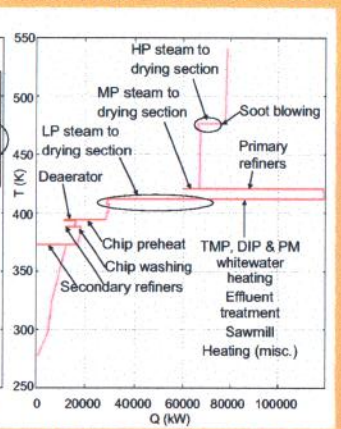
PAPER MACHINE DRYING SECTION



GRAND COMPOSITE CURVE OF PROCESS REQUIREMENTS



GRAND COMPOSITE CURVE OF THE SATISFACTION OF REQUIREMENTS



DT min = 10 K; no pinch point

DT min = 0 K; pinch point at 373 K

Minimum heating energy required = 79 MW

MODIFICATIONS

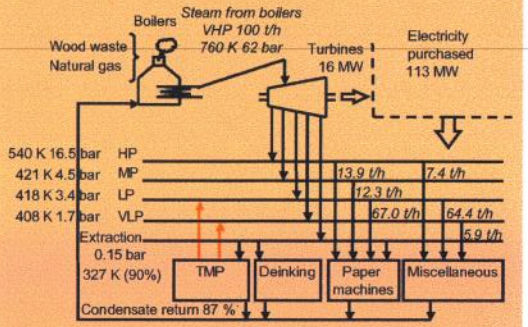
- Recuperation of heat of secondary refiner exhaust steam (21% reduction of utility steam)
- Whitewater heating with heat exchangers and use of a condensing extraction turbine (10 % reduction of utility steam)
- Higher outlet pressure from boilers to improve electricity generation

→ New pressure headers : VHP & extraction

SUMMARY OF RESULTS

Scenario	Turbine efficiency	Electricity cogenerated	Steam required	Steam produced with natural gas
	%	MW	t/h	t/h
Original	48	2	146	
Retrofit	65	16	100	

MODIFIED STEAM DISTRIBUTION DIAGRAM



RECOMMENDATIONS

- Financial analysis of retrofit costs for new equipments
  - High pressure boiler & ancillary equipment
  - Multiple extraction and condensing steam turbine
  - Heat exchangers and piping for retrofit network
- Or consider the use of other means of steam production (e.g. wood waste gasification and combined cycle)
- Revamp paper machine drying section to further reduce steam consumption
  - mechanical vapour recompression
  - preheat drying air with evaporated steam
- Sensitivity analysis of availability and cost of fuels and electricity