Saurashtra Specialities Pvt. Ltd.

extends a
very warm welcome
to all

This is - Saurashtra Specialities (SSPL)

- A Rajkot, India based company.
- Has a strong team of 100+ employees.
- Has four divisions
  - Modified Starch and Chemical Division
  - Fibertech Division
  - Box Division
  - Trading Division

About SSPL

- Located in the state of Gujrat on India's western coast
  - » Rajkot
- Nearest sea-ports are Kandla and Mundra

Modified starches & chemical division

- Products – Modified Starches
  - Oxidized Starches
  - Cationic/Amphoteric Starches
  - Spray Starches
  - Thin boiling starches

- Products –Functional Chemicals
  - Aquatite (Size Press additive)
  - Printbond (Spray additive)
  - Printfast (Spray additive)
  - Aquabond (Paper to paper lamination additive)

Fibertech division

- Plant & machineries for Recycle based Paper Mills
  - High consistency pulpers, dumping screens and high density cleaners
  - Fine slotted and drilled hole screens
  - High efficiency Floatation deinking cells
  - Complete HOT DISPERSION PLANT – right from belt press, screws & the disperger
- Other equipments
  - “SPB-Atomizer” – a starch and chemical addition system for the wire part
  - Disperger Disks
  - MG High velocity hoods
  - Paper to paper lamination machines

Introduction

to

Floatation Deinking

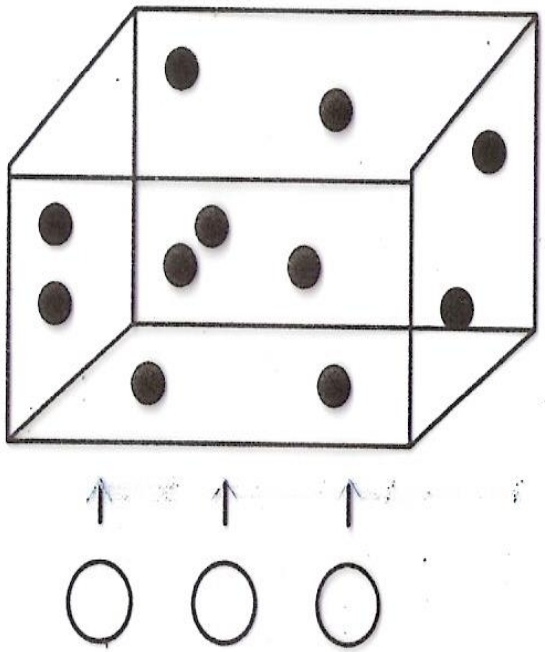
Three steps in deinking

- Detachment of ink from fibers
- Removal of detached ink from pulp
- Disposal of removed ink and water clarification for re-use

Floatation Mechanism

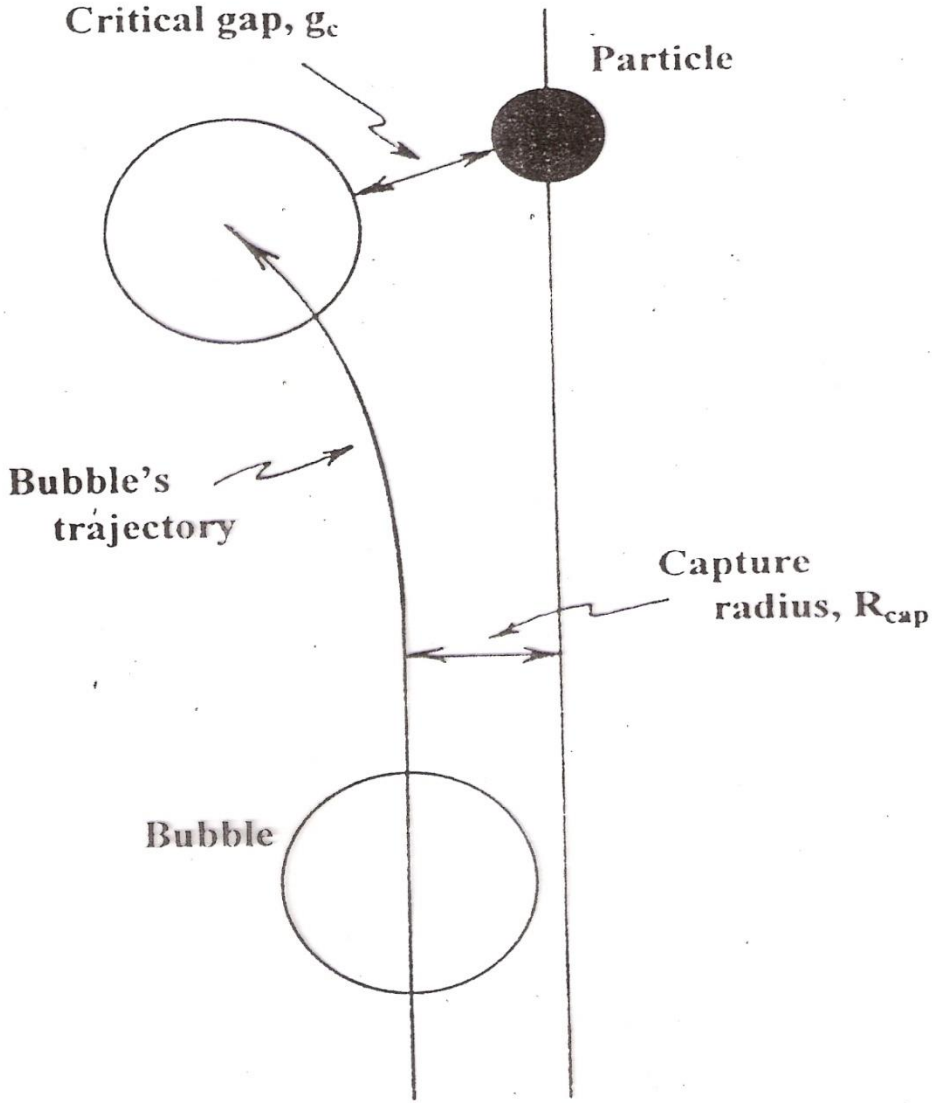
- Bubble /particle approach and collision
- Bubble/particle attachment
- Bubble/particle stabilization & transport to froth

SCHEMATIC DIAGRAM OF MODEL SHOWING RANDOMLY DISTRIBUTED PARTICLES AND RISING BUBBLES



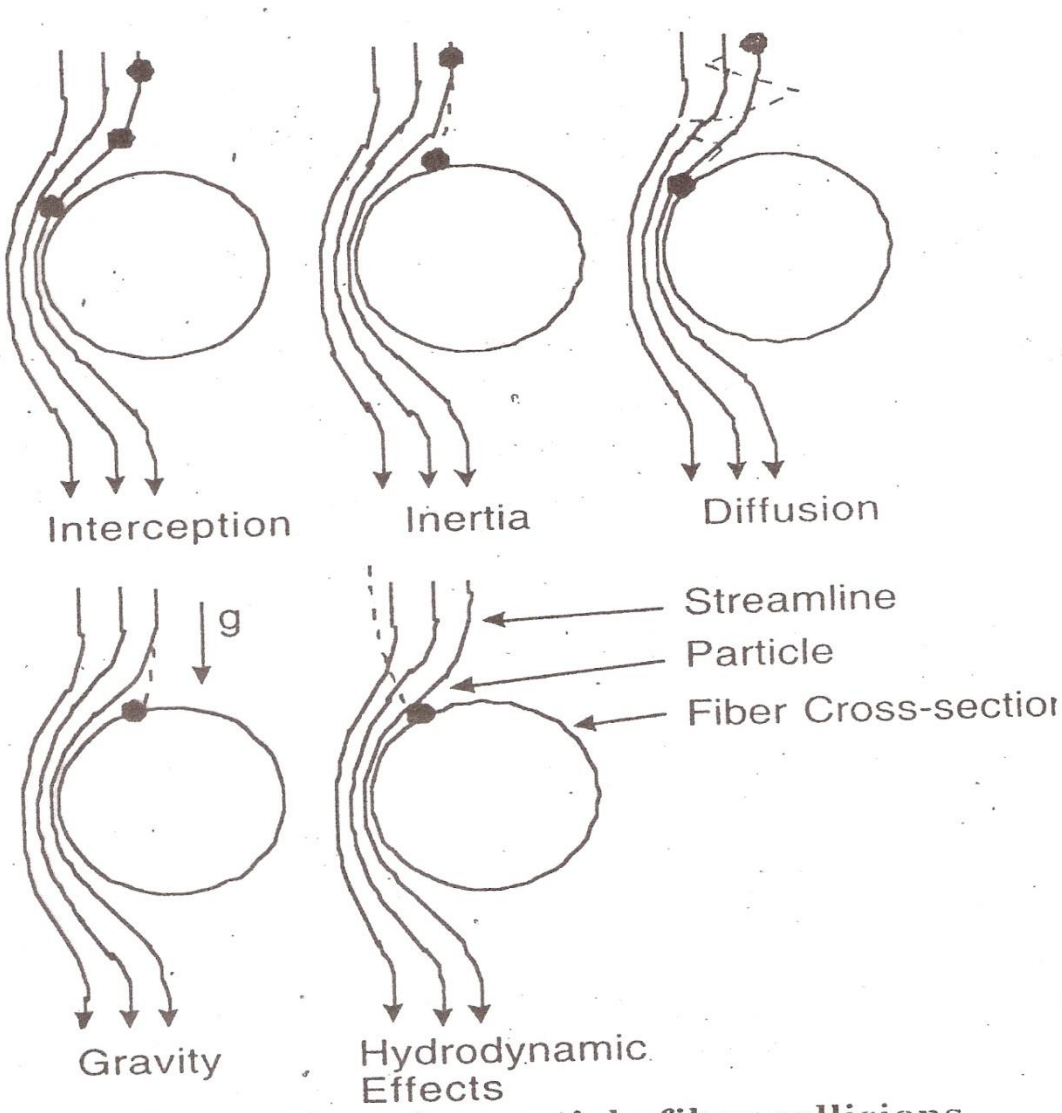
INK PARTICLES

AIR BUBBLES



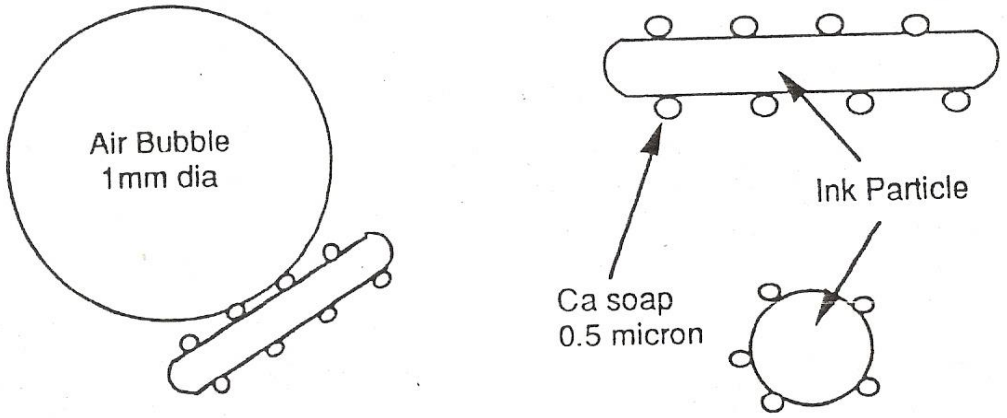
Schematic representation of relative bubble/particle trajectories, and definition of capture radius, R_{cap}, and critical gap, g_c.

Mechanisms for particle-fiber collisions



Mechanisms for particle-fiber collisions.

Floatation



- **Removes ink particles, stickies and other hydrophobic contaminants**
- **Alters wettability of ink particles with water**
- **Ink particles made water repellant (hydrophobic) by collector (soap)**
- **0.8 - 1.2% consistency**

Floatation Deinking – some facts

- It is a chemi-mechanical process
- Ink particle size range of floatation deinking effectiveness is 10-100 microns
- Greatest effectiveness in the range of 30-80 microns

Floatation Deinking – some more facts

- Min. dia of 0.3 mm is needed for the air bubble to rise thru the pulp slurry
- Bubbles smaller than 0.1 mm adhere to fibers promoting their removal during floatation
- Optimum bubble size is 5 times that of the particles being removed
- Since pulping produces range of ink particle size, floatation cell injectors need to produce a range of bubble sizes to remove ink efficiently
- Typically air flow rates 30-50% of pulp flow rate provide desired range of bubble size

Factors that affect flotation deinking efficiency

- Ink particles to be removed must be of proper size range and surface chemistry
- air bubbles must be of proper size range and numbers
- Floatation cell turbulence should be sufficient to allow good mixing of air and stock without promoting too rapid a rate of bubble collapse

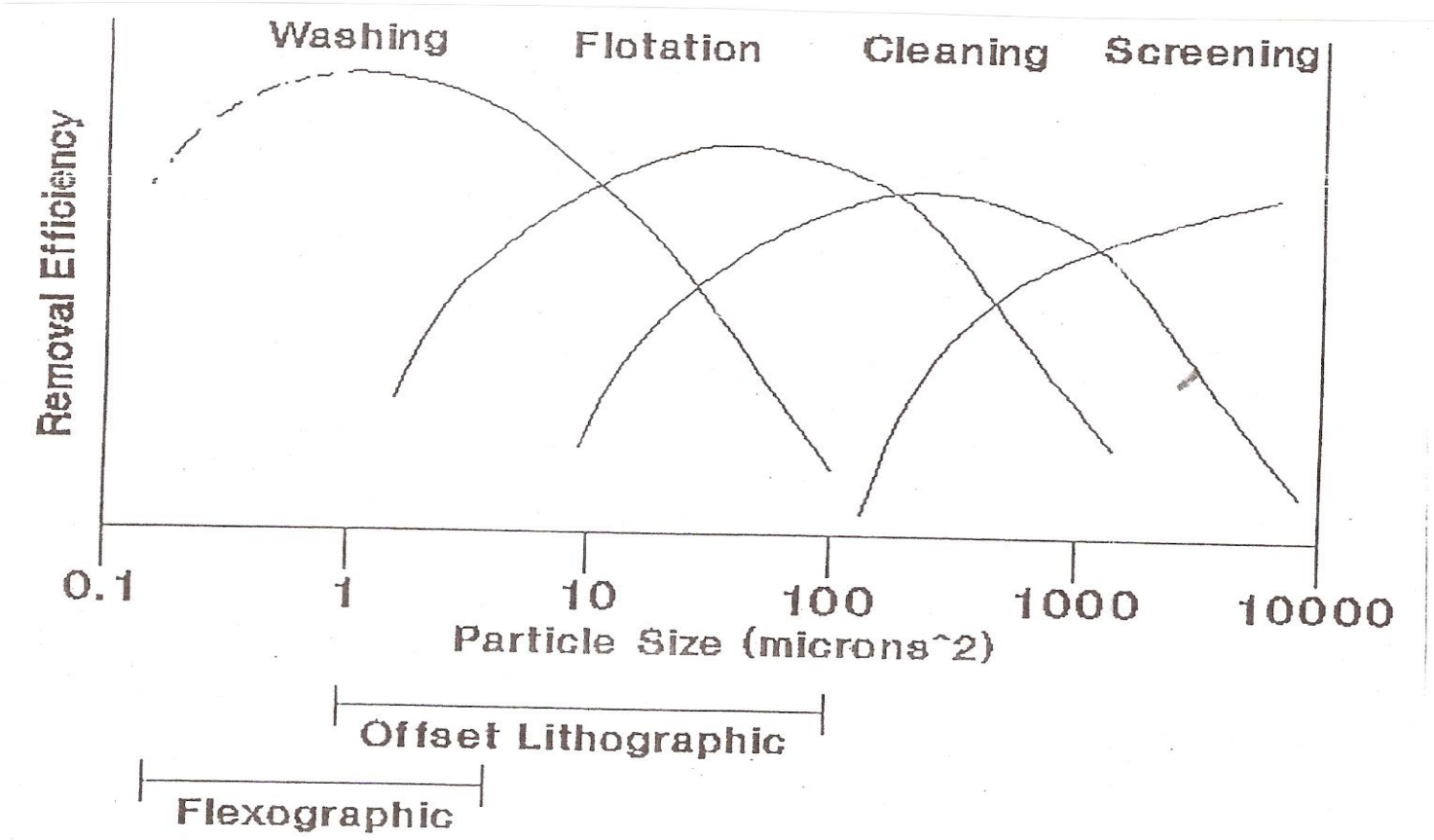
Major printing processes

- Impact printing
  - Letterpress
  - Offset (cold or hot set inkis)
  - Flexography
  - Gravure
- Non-impact printing
  - Laser
  - Xerographic

Ink particle size (in microns) after pulping old papers

PRINTING PROCESS	UN-COATED PAPER	COATED PAPER
Letterpress	2 – 30	10 – 100
Offset	2 – 30	5 – 100
Flexography	0.3 – 1	0.7 – 2
Gravure	2 – 30	5 – 30
Laser, Xerographic	40 – 400	40 – 400

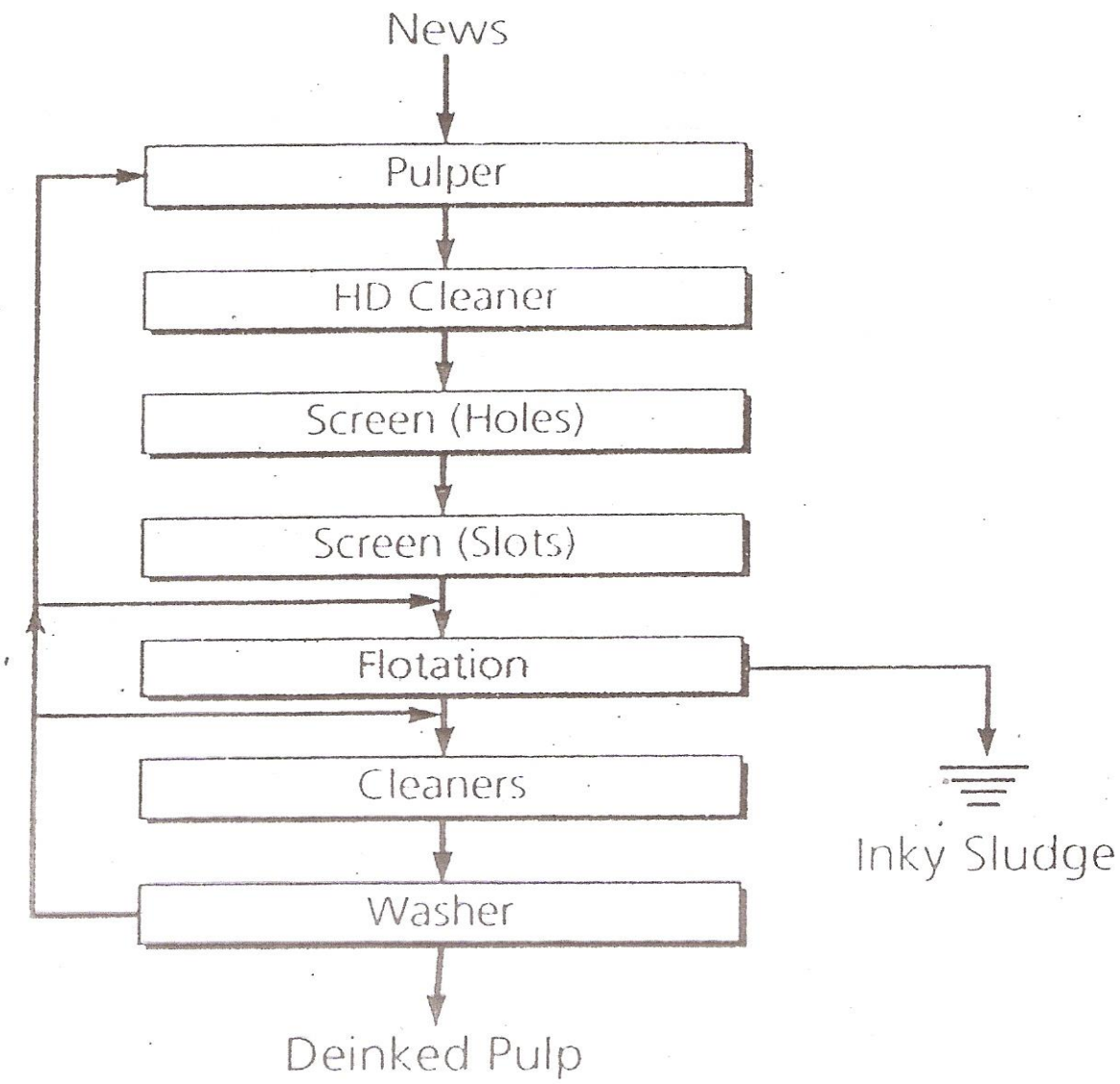
Ink particle size formed during deinking of newsprint



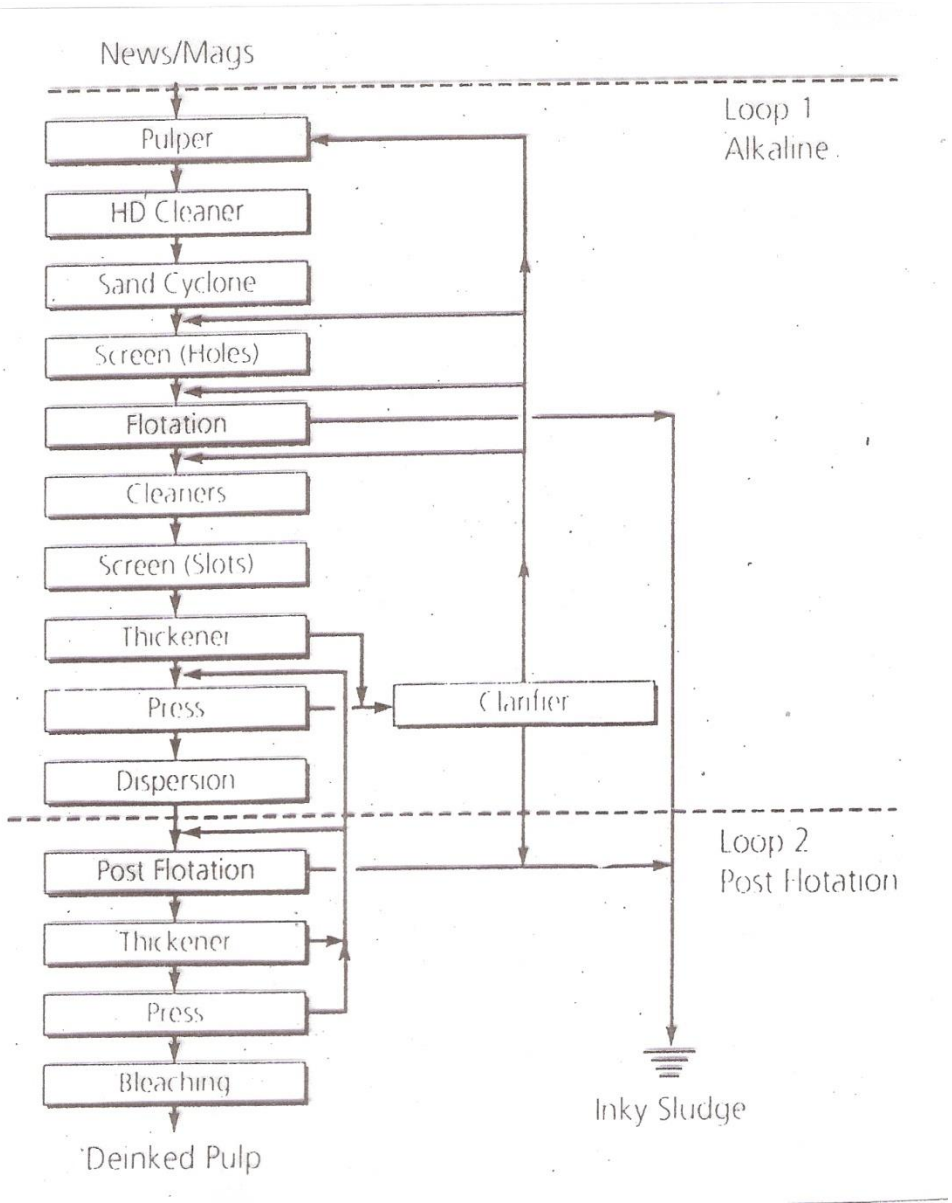
SSPL's Deinking System

- Deinking of laser UV printed papers, newspapers, magazines, flexo printed papers
- 99% ink removal efficiency in large particle range
- Brightness gain of up to 20 points
- Low cost installation, simple yet flexible operation with virtually no maintenance.
- Highly power efficient

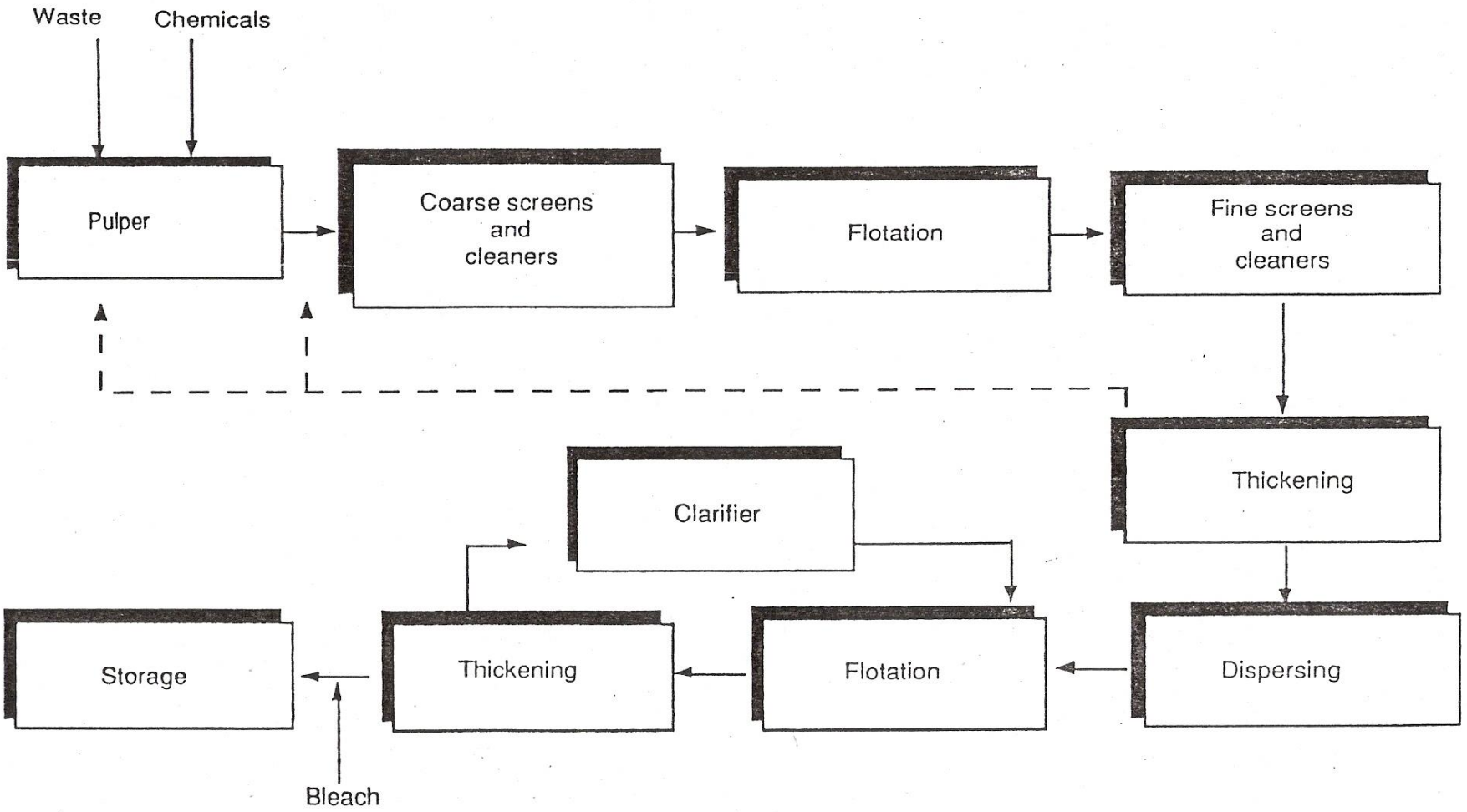
Single loop floatation deinking



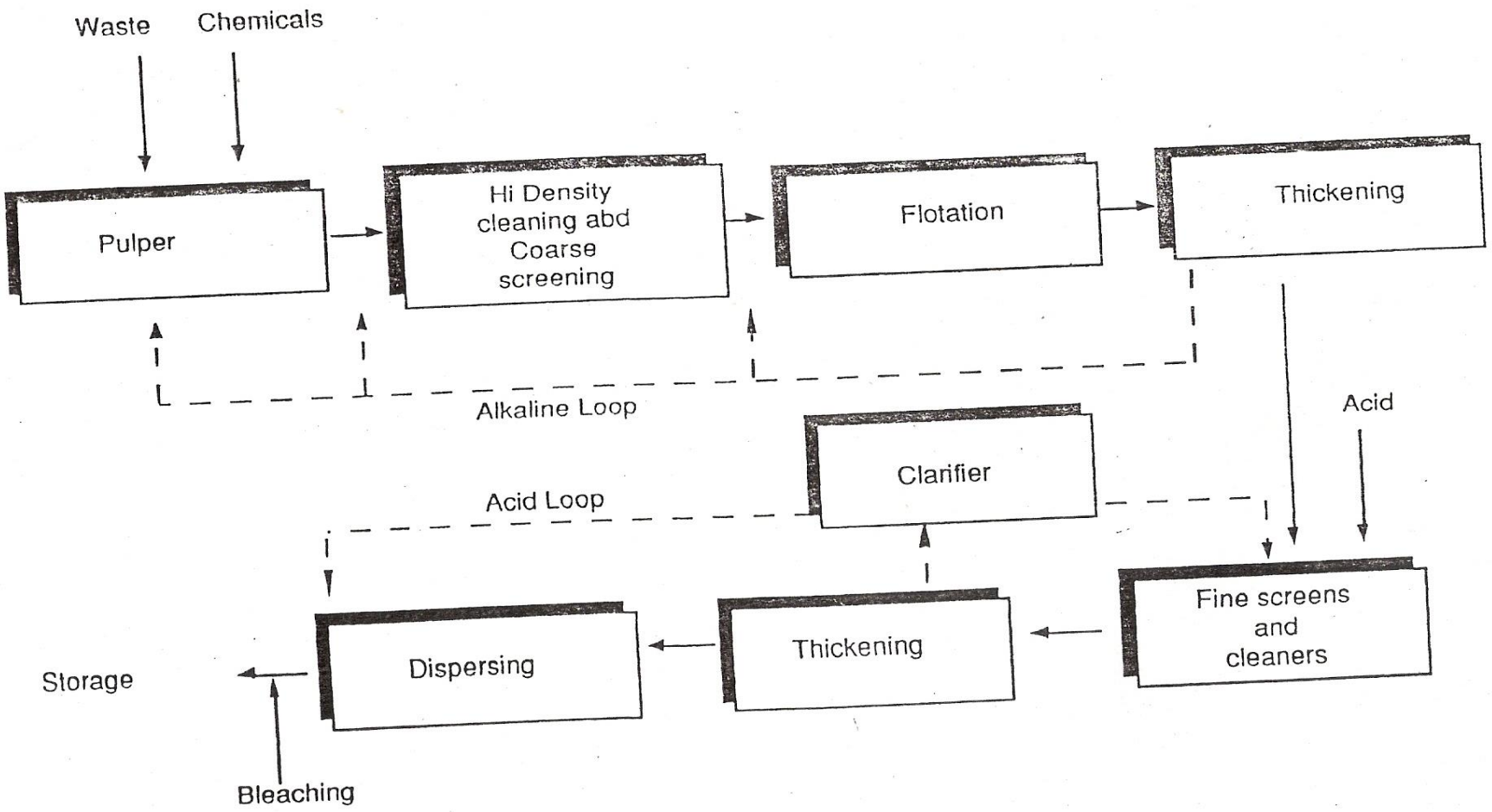
Two loop deinking system



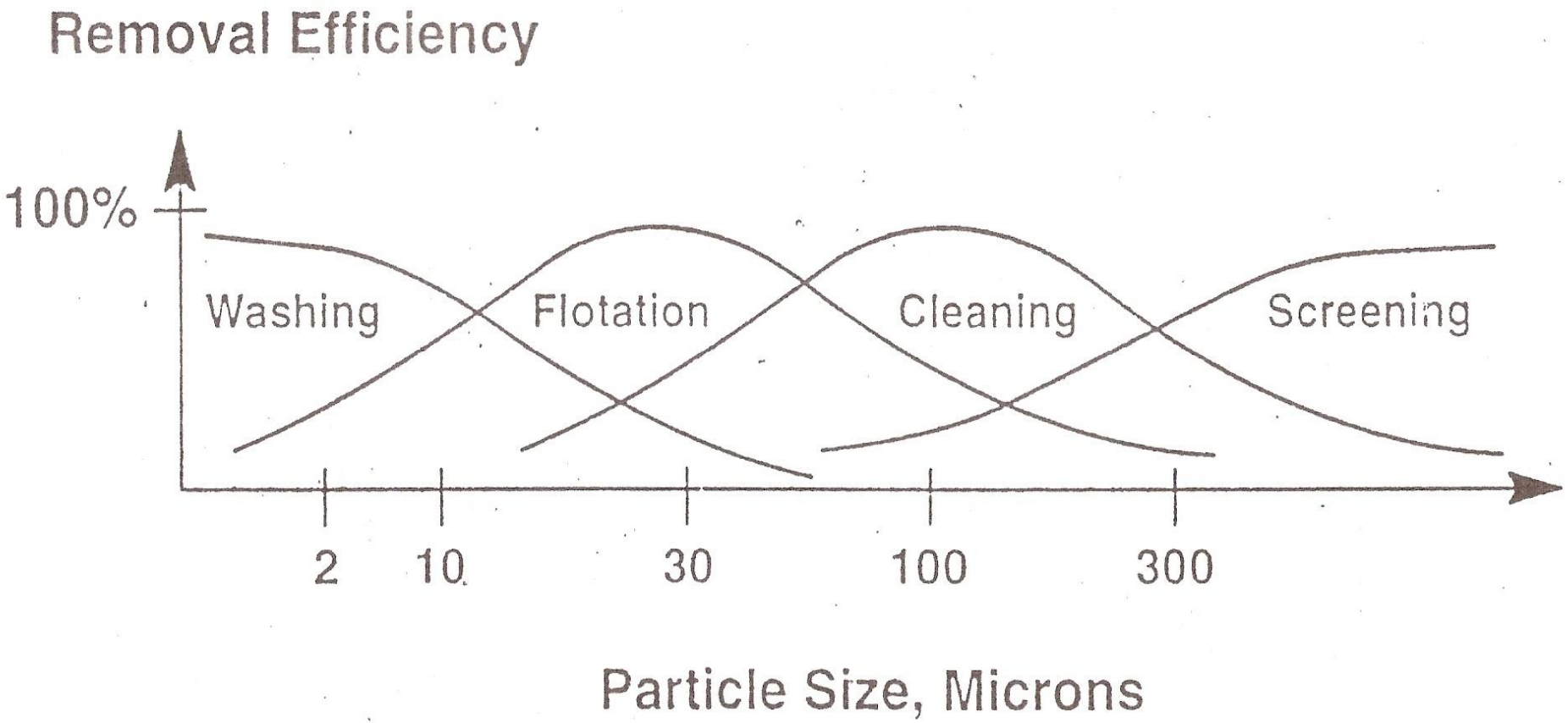
Newsprint deinking (1 chemical loop)



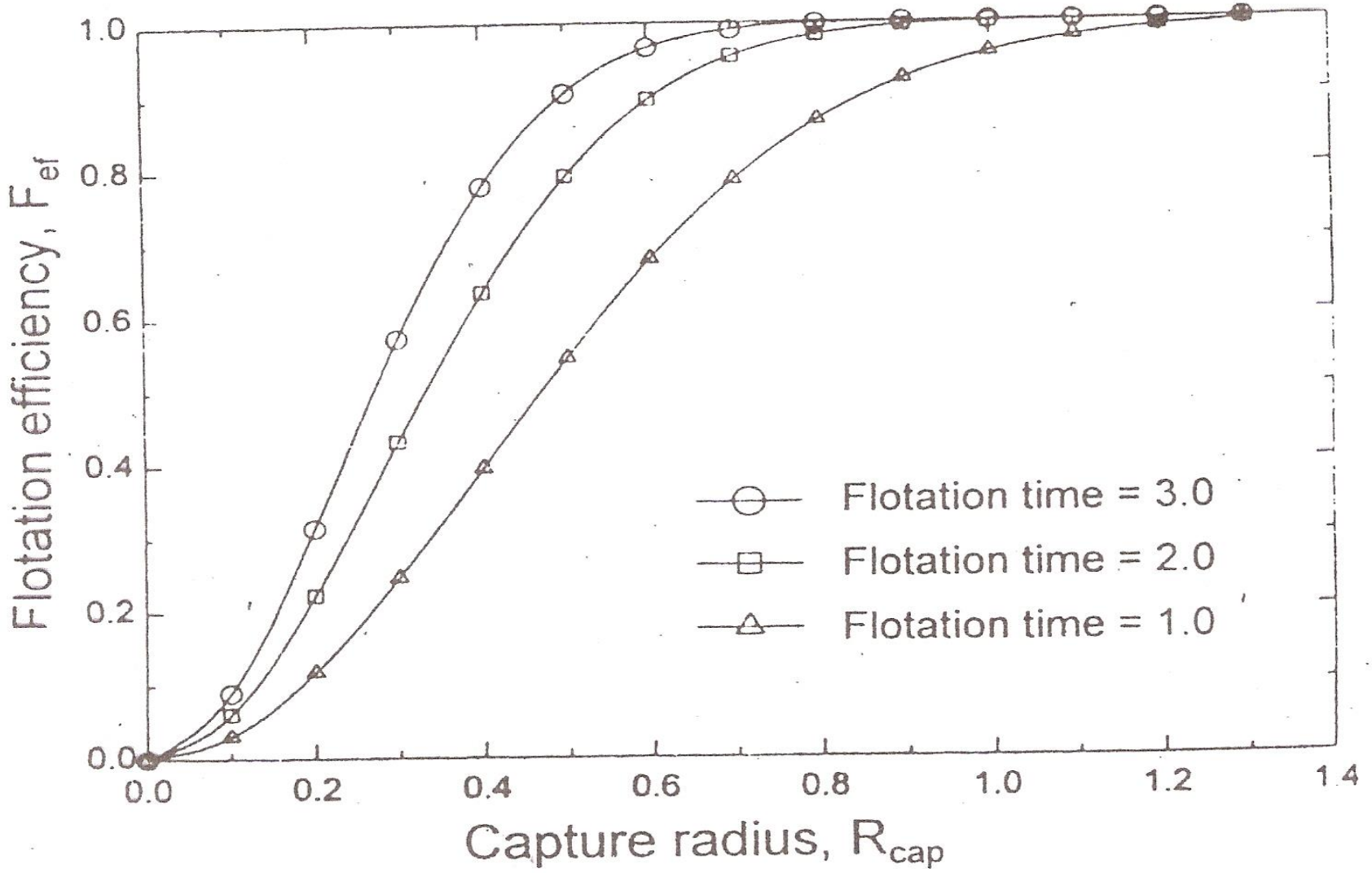
Newsprint deinking (2 chemical loops)



Ink removal efficiency v/s particle size

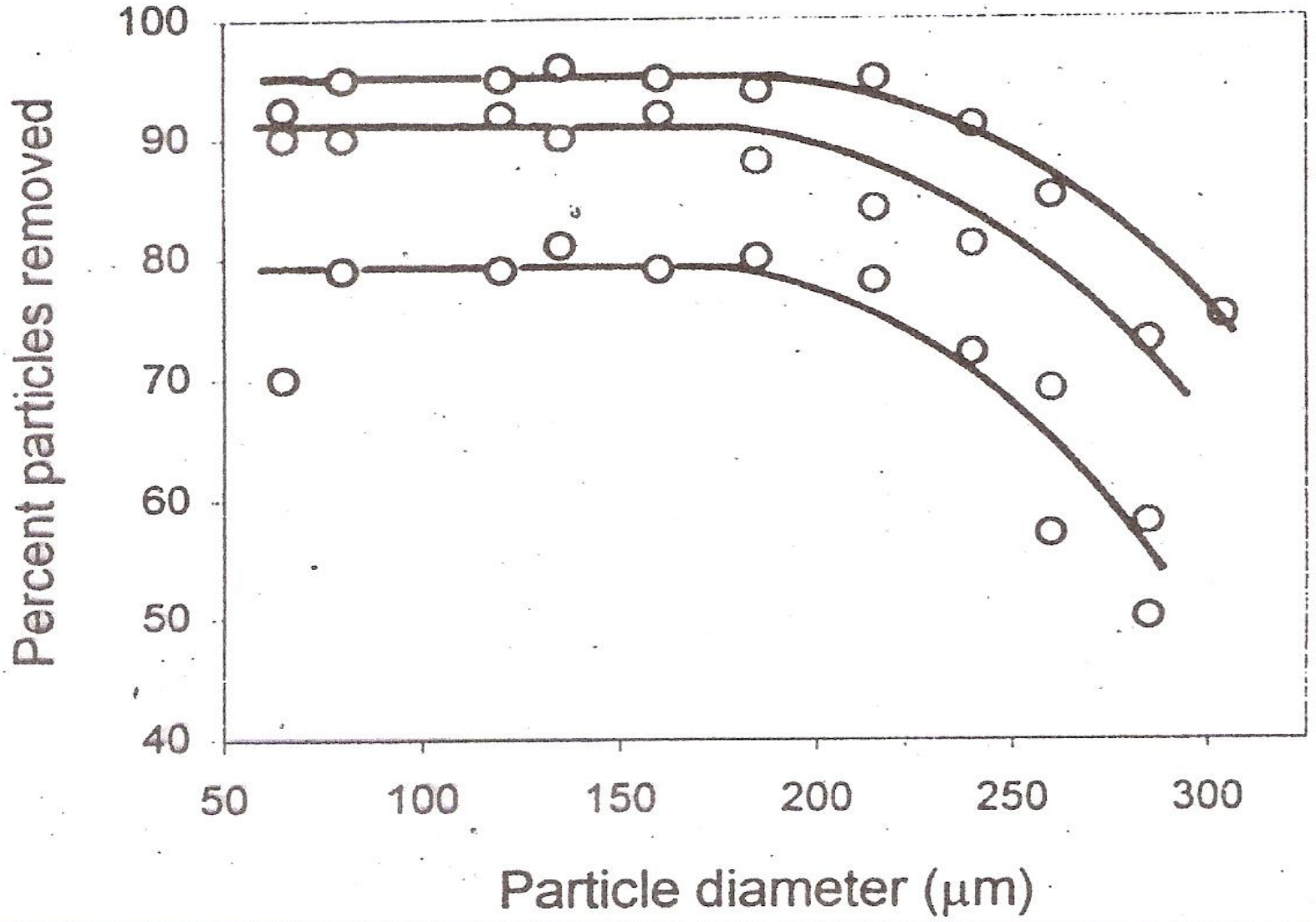


Ink removal efficiency as a function of ink particle size for deinking unit operations (1).

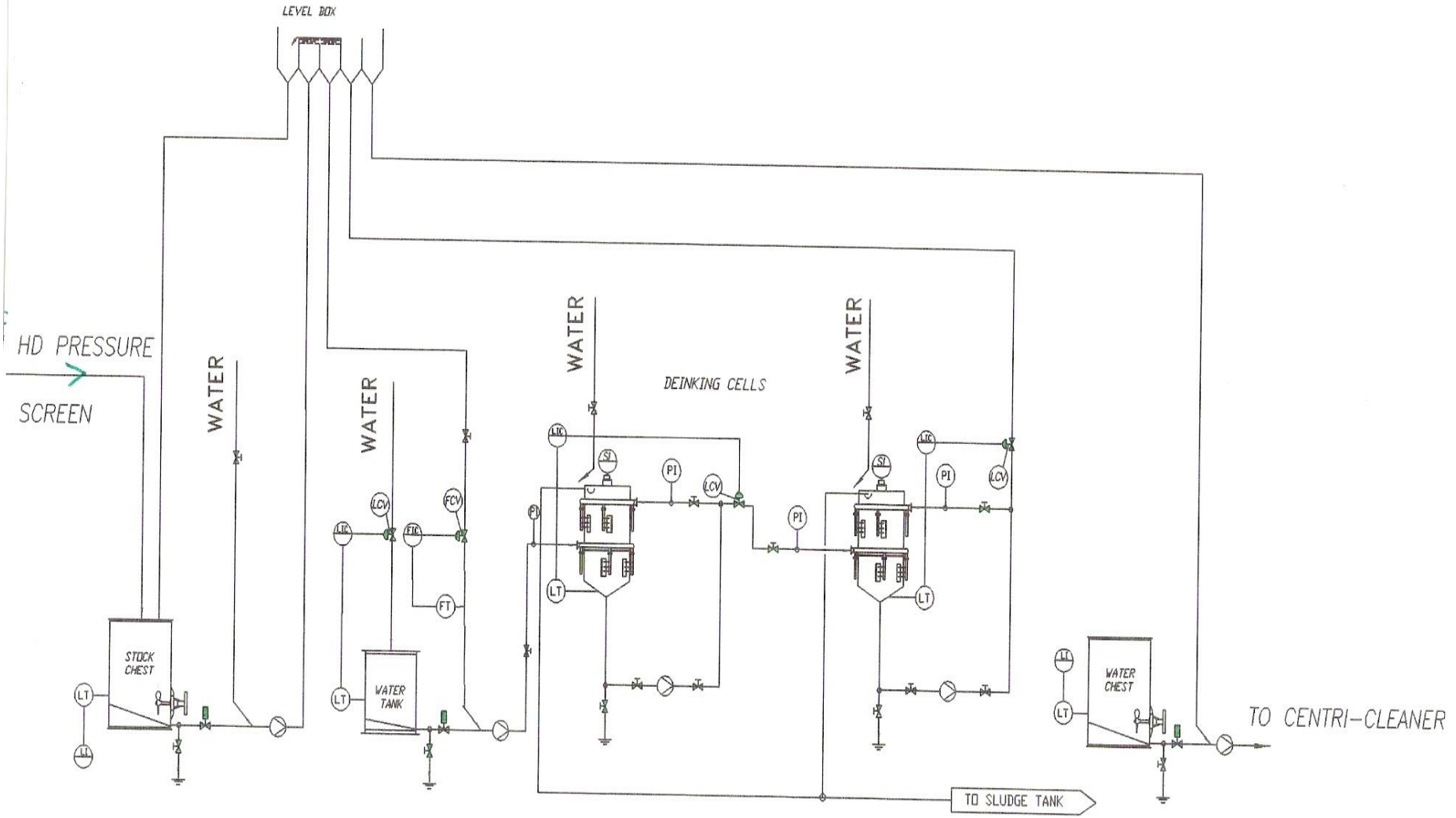


Global model output of flotation efficiency vs. capture radius for a fixed bubble flux (bubbles/mm^2-sec) and three flotation times as indicated.

Lab and pilot plant studies of efficiencies



SSPL's deinking (pre-floatation)



Contaminants in recovered papers

EXTERNAL	INTERNAL		
Sand	Soluble	Insoluble	
Glass	Starch	Stickies	Non-Stickies
Wires	Alum	Hot melts	Plastic
Golf balls	Soluble Glues	Wax *	Fillers
Sneakers	Sizing agents	Adhesives	Wet strength
Wooden boards		Latex	Inks **
Umbrella			
Watches		* Wax may or may	** Some component
Kitchen sinks		not be sticky -	in ink may be water
Styrofoam		depends on temp.	soluble. Insoluble
Cans			component may be
Bottles			sticky or non-sticky.
Misc.			

Classification of “Stickies”

PRIMARY STICKIES	SECONDARY STICKIES
Stickies that are present in the pulp slurry are primary stickies	Stickies that result from the change in Physico-Chemical environment of the pulp during recycling process
These are solid particles throughout the papermaking process, which become sticky under certain conditions and result from insufficient disintegration during pulping	During pulping some products are released in water giving rise to soluble/colloidal materials. These are obtained mainly from repulping of hydro-dispersible adhesives but mainly result from repulping of coated papers
If shear resistant and large enough, they can be removed by screening	As soon as the pulp suspension is destabilized either by addition of polyelectrolytes, by pH changes, temperature shocks etc., the soluble, colloidal material can be precipitated
Examples: Hot melts used for book binding, pressure sensitive adhesives etc.	Examples: Latex, PVA, extractable components from wood containing papers.

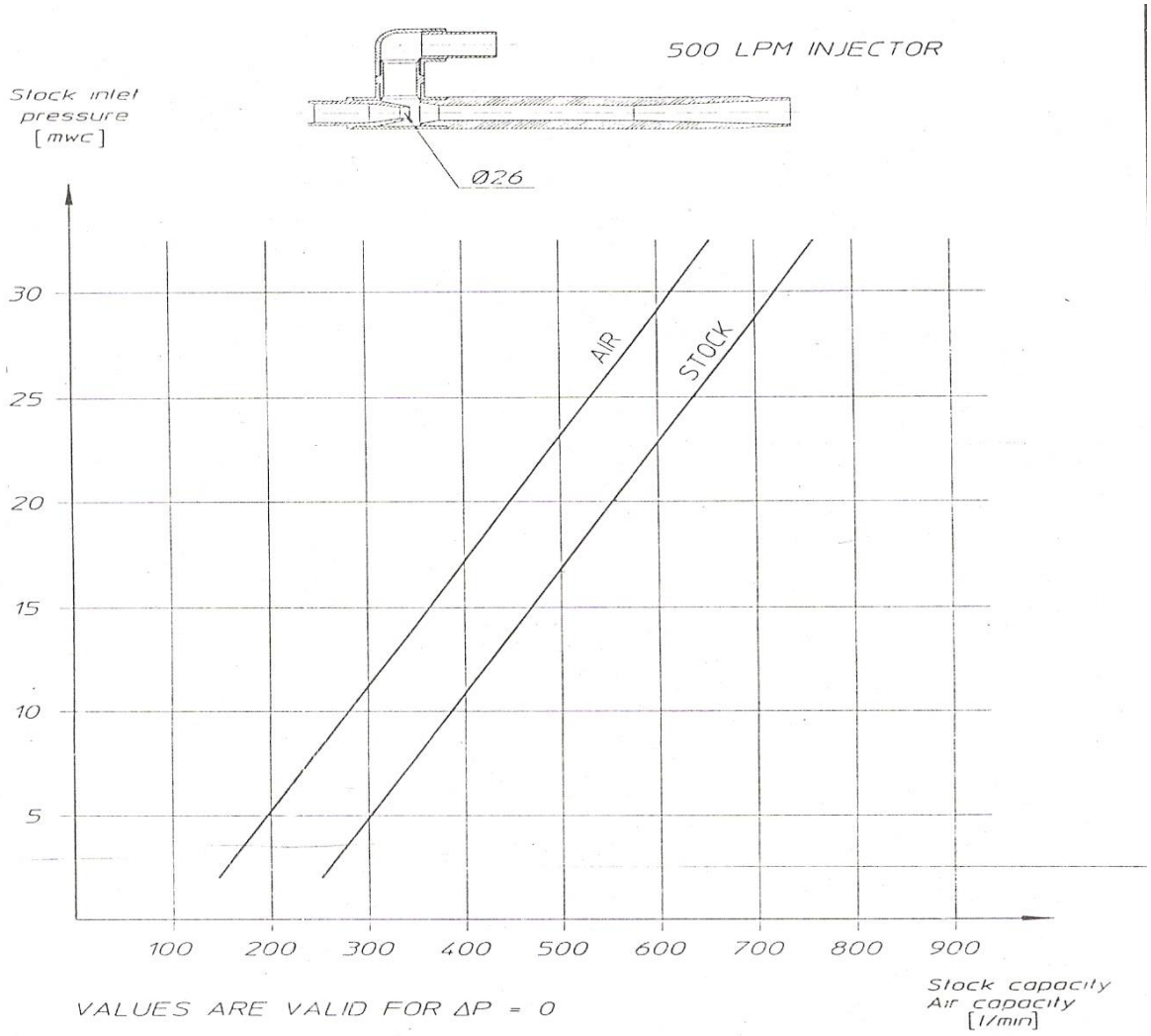
Floatation deinking and DAF (dissolved air floatation) clarification

	FLOATATION DEINKING	DAF CLARIFICATION
Objective	Remove contaminants but not fibers	Remove all suspended solids
Approx. bubble diameter	0.1 to 1.0 mm	0.01 to 0.1 mm
Mechanism	Surface chemistry and wettability	Coagulation and flocculation
Fluid dynamics in cell	Moderately turbulent	Quiescent

Chemicals commonly used in deinking

CHEMICAL	DOSAGE (Kg/MT)	FUNCTION
Alkali	10 – 20	Helps in fiber swelling and ink release
Silicate	15 – 25	Acts as dispersant for released ink and also serves as buffering agent
Surfactant	2 – 15	Emulsifies or forms micelles and helps in the detachment of inks
Dispersant	2 – 10	Keeps the detached ink in suspension
Peroxide	5 – 20	Prevents yellowing of grounded fibers. Brightens fibers
Collector	2 – 10	Assists in collecting ink particles on air bubbles in floatation deinking
Displector	2 – 15	Combination of dispersants

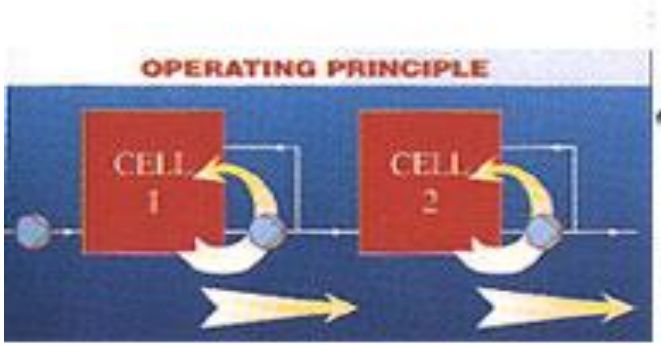
Stock and air capacity vs. stock inlet pressure (500 lpm ventury)



SSPL's floatation deinking cells

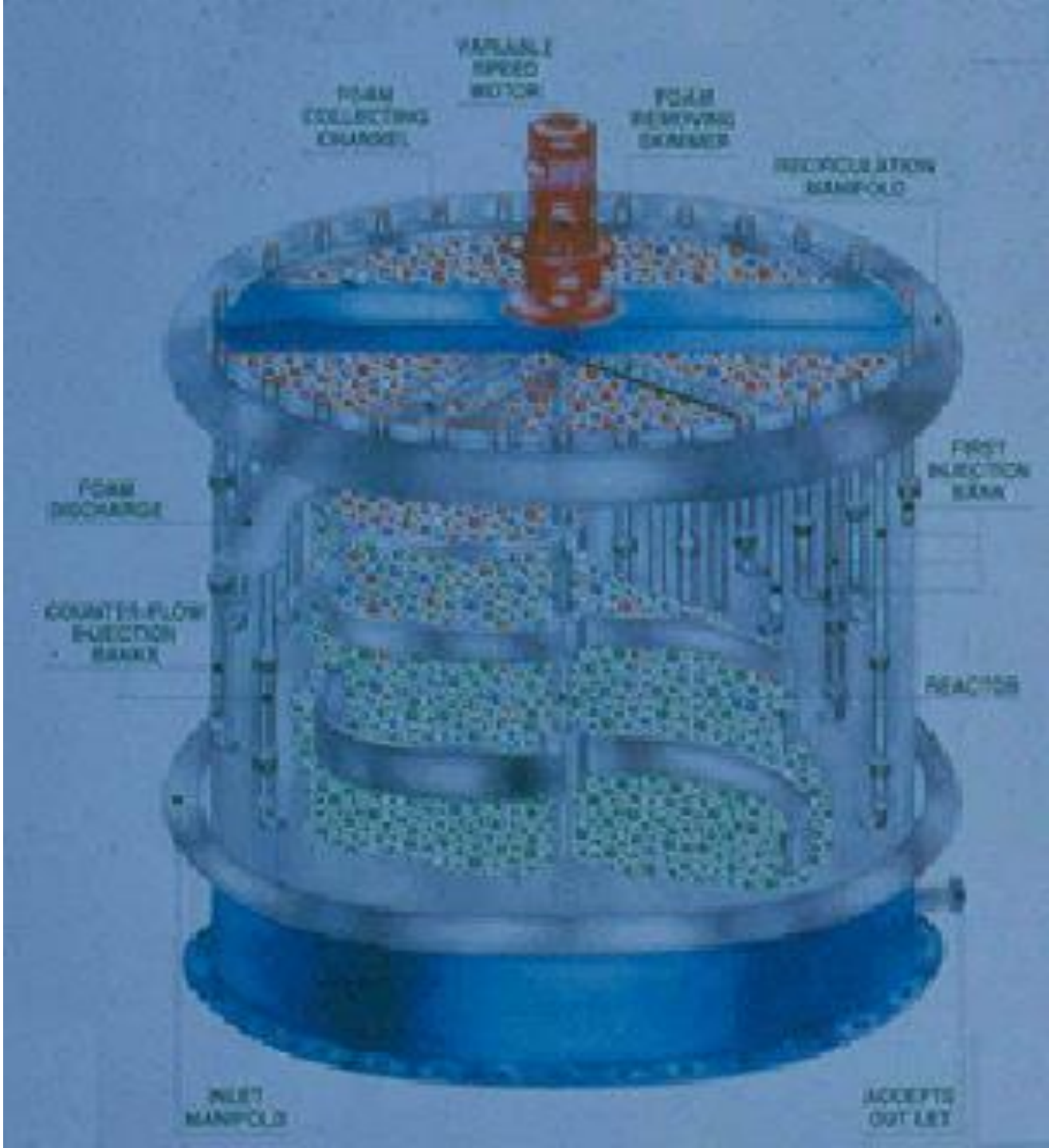
- Outside view of SSPL's deinking cell

- Basic operating principle of deinking cell



Working of the cell

– what's happening inside the flotation cell !



Foam at the top of the cell