Paper Industry Glossary
Common Terms in the Paper Industry

**Action** – see Microturbulence.

**Air-Dry (AD)** – natural state of room-conditioned paper, with a moisture content of 8-11%; also called As-Is.

**AOX - Absorbable Organic Halogens.** AOX defines the amount of organic chlorine compounds contained in effluent produced during the bleaching of pulp by the reaction of chlorine chemicals with the residual lignin in the wood fiber.

**Basis weight/grammage** — the weight of a paper sheet per unit area, often expressed in terms of reams of paper (example -- 40 pounds/500 8.5 x 11 or 42 pounds/3000 ft2); grammage is specifically expressed in terms of grams/m2.

**Beater** – oldest form of refining, done in batches; also known as breaker-beater or Valley beater.

**Beating** — refining; using a mechanical device on pulp to improve strength properties.

**Black liquor** - Mixture of spent cooking chemicals and dissolved wood material remaining after sulfate cooking. Black liquor is recovered during pulp washing, concentrated by evaporation, and burned in the recovery boiler to regenerate the cooking chemicals and also produce energy for the mill.

**Bleaching** - A chemical treatment used to whiten, brighten and improve paper pulp prior to papermaking. See ECF and TCF bleaching.

**BOD** — Biological Oxygen Demand; a test used to determine how much oxygen a mill effluent will strip from receiving waters when microorganisms feed on the material present.

**Bone-Dry (BD)** – moisture-free fiber; see also Oven-Dry.

**Breast Roll** – first roll on a fourdriner paper machine, located just under the headbox.

**Broke** — paper, wet or dry, produced on the machine during a startup or upset condition (i.e., during a sheet break), which must be recovered.

**Brownstock** — unbleached pulp obtained after pulping.

**Calender** — to improve smoothness and caliper uniformity of a sheet of paper by passing it between rotating, polished rolls; performed on-machine on a calender stack and off-machine on a supercalender.
**Canadian Standard Freeness (CSF)** – most common freeness test used in North America, consisting of a 1-liter sample of stock at a consistency of 0.3 %.

**CD** – stands for Cross Direction, indicating the dimension of the machine perpendicular to – but still in the same plane as -- the direction of sheet travel

**Cellulose** - The primary constituent of pulp. Chemically, cellulose is a long-chained carbohydrate consisting of repeating chains of a single simple sugar, glucose. Cellulose is found in plants as microfibrils (2-20 nm diameter and 100 - 40 000 nm long). These form the structurally strong framework in the cell walls.

**Centrifugal Cleaner** – device that separates contaminants (sand, grit, rust, etc.) from pulp based on their higher density; also called a hydrocyclone.

**Chemical pulp** -- Pulp obtained by digestion of wood with solutions of various chemicals. The paper produced is strong and less prone to discoloration. The pulp yield is lower in this process. The principal chemical processes are the sulfate (kraft), sulfite, and soda processes. Chemical pulps are used to make shipping containers, paper bags, printing and writing papers, and other products requiring strength.

**Chest** – tile-lined tank used for storing and processing pulp.

**Chipper** - A machine which chips whole or parts of trees into small pieces of controlled length and thickness, which can then be fed into the pulping process

**Chipping** - A process in a woodroom area in which the debarked logs are converted into chips for pulping or refining processes. Chipping is typically done by horizontally or gravity-fed disc chippers.

**Claflin** – type of continuous refining using a high-angle plug inside a conical shell; an improvement over the Jordan; mostly replaced by disk refiners.

**Clarification** -- Separation of a solid component from a solution

**Cleaning** -- the use of centrifugal forces to separate high/low density contaminants

**Combined deinking** -- Deinking process combining flotation and washing; cf. flotation deinking, washing deinking

**Consistency** — the fraction by weight of a pulp sample that is solid material (see attached).

**Corrugated** -- old corrugated containers, container cuttings, kraft paper and bags, old solid fiber containers, kraft bag clippings, carrier stock and its clippings

**Corrugating Medium** – unbleached board, from semi-chemical or recycled pulp, forming the inner fluted layer of a corrugated box.
**Couch Roll** – pronounced “cooch,” the last roll on the wet end of a fourdrinier paper machine, from which the wet sheet leaves and enters the press section; often has a vacuum box inside.

**Countercurrent Washing** – washing technique that involves use of filtrate from one washing stage as the washing medium for the previous stage; saves on water usage.

**Crushing** – rupture or other defect in a wet paper sheet, produced when pressing intensity is too high; caused when pressure of expelled water exceeds the mechanical integrity of the sheet.

**CSF** – see Canadian Standard Freeness

**CTMP** -- Chemo Thermo Mechanical Pulping- Chemi-Thermo Mechanical Pulping is a pressurized refining process which is preceded by the addition of sulfite in a single impregnation stage. The refining pressure for CTMP is usually lower than for TMP since the sulfite treatment lowers the softening temperature of the wood lignin. By altering the parameters of the process (chemical concentration, temperature, etc.) it is possible to customize the pulp for particular end uses. CTMP may be bleached, in which case it is known as BCTMP.

**Dandy Roll** – roll, covered with fine wire mesh, located just after the forming section of a paper machine; is driven lightly against the top side (felt side) of the sheet to make it look and perform more like the bottom side (wire side) and reduce two-sidedness; a raise wire on its surface can be used to induce a watermark in the sheet.

**Debarking drum** - Machine for removing the bark from logs.

**Decker** – a device used to thicken/dewater pulp, using a mesh-covered drum rotating in a vat of pulp slurry, with vacuum applied inside the drum.

**Deculator** – device used to remove entrained air from stock coming out of centrifugal cleaners just prior to a paper machine; vacuum is used to deaerate the stock.

**Deinkability** -- Suitability of recovered paper for deinking; depends on paper grade, printing process used, age of paper, and other factors

**Deinked pulp (DIP)** -- Paper pulp produced by deinking of recovered paper

**Deinking** -- Removal of printing ink and impurities from recovered paper; to produce recycled fiber pulp with maximum whiteness and purity

**Deinking loss** -- Unwanted loss of solid material from pulp during deinking (usually 10-40%)
Delignification - Removal of lignin from wood fibers (cellulose and hemi-cellulose). This is performed primarily in the cooking process and further carried out in the washing and bleaching process.

\[ \text{DF} = \frac{(\text{water applied in showers} - \text{water leaving with pulp})}{\text{OD pulp flow rate}} \]

Digester - closed tank used to cook wood chips and other plant material using chemicals which separate the wood fibres by dissolving lignin.

Dilution Factor – a measure of the amount of shower water applied in a pulp washing stage; defined as

Disk Refining – most modern type of pulp refining, done with bar-covered disks rotating against each other.

Dispersion -- use of rotating disk(s) with teeth to break contaminants

Displacement Washing – washing technique that involves the pushing or pulling of wash filtrate through a thickened pulp mat; more efficient than simple dilution and thickening.

Dissolving pulp/special alpha - A special grade of chemical pulp usually made from wood or cotton linters for use in the manufacture of regenerated or cellulose derivatives such as acetate, nitrate, etc.

Dragging – running a jet-to-wire ratio less than 1 (see Jet-to-Wire Ratio).

Dry Line – a line, visible on the surface of the sheet on a fourdrinier paper machine, usually found somewhere early in the vacuum section; the sheet looks glossy on one side and dull on the other; marks the transition from stock to paper.

Dry strength additives -- materials added to paper fibers to provide strength to the paper product

ECF — Elemental Chlorine Free bleaching; uses no chlorine, but may use chlorine dioxide.

expressed in terms of the consumption of permanganate in a standard test; a rule of thumb is that (Kappa number x 0.15) = % lignin left in sample. Other, similar tests include K number (similar, but doesn’t standardize the sample size) and P number (used for bleached, low-lignin pulps).

Extended Nip Press (ENP) – modern press development using a cup-shaped shoe pressed against a roll; can be loaded to high levels without crushing, resulting in improved sheet dryness prior to the dryer section; also called a “shoe press.”
Extractives - small amount of substances additional to the major components of wood which give timbers their own color and odor. Resin is the best known extractive.

Fan Pump – a large pump used to mix white water and thick stock, resulting in thin stock; supplies the headbox.

Felts – fine-mesh polymeric fabrics used on paper machines; two types are “wet felts” (found in the press section and used to support the sheet and remove water) and “dry felts” (found in the dryer section and used to support the sheet and promote drying).

Fiberline - The machines and process systems involved in converting wood chips into pulp. Process steps can include cooking, washing, screening, knot separation, refining, and, if required, bleaching.

Fibrils/Fibrillation – frayed, hair-like structures found on the outside of a fiber after refining; increases bonding area multi-fold, leads to high sheet strength.

Filler — mineral material added to paper stock to add weight, smoothness, brightness, printability to the formed sheet.

Fines – small fiber pieces, often defined as having a length of 0.2 mm or less, produced during refining; must be retained on the paper machine.

First-Pass Retention – refers to the % of fines and fillers coming in with the headbox stock that stay in the sheet and do not pass through the forming wire.

Flat Boxes – boxes, located under the wire just after the forming section of a paper machine, which expose the moving paper sheet to vacuum as it moves across; may have slots or holes.

Flocs – small knots or tangles of fibers in a papermaking slurry, resulting in poor (blotchy) formation.

Flotation deinking -- Deinking process in which air is blown into a dilute fiber suspension. Ink particles adhere to the air bubbles and rise to the surface, where they are removed.

Fluff pulp - A chemical, mechanical or combination chemical/mechanical pulp, usually bleached, used as an absorbent medium in disposable diapers, bedpads and hygienic personal products. Also known as "fluffing" or "comminution" pulp.

Fluorescent whitening agents -- FWA, agents that absorb UV light and convert it to visible light, making the paper brighter.

Foils – blade-shaped devices found under the forming wire in the early (gravity) section of a paper machine; used to support the wire, provide passive water removal, and induce microturbulence; used on higher-speed machines instead of table rolls; also called “hydrofoils.”
Formation — a set of characteristics describing how well fibers and filler are distributed in a finished paper sheet.

Forming Board – device found under the wire on Fourdrinier paper machines, just after the headbox; used to prevent premature removal of too much water during sheet formation.

Fourdrinier — typical paper machine design which involves a single, fine-mesh wire running endlessly around rotating rolls.

Freeness — drainage rate of a pulp slurry; how “freely” a slurry gives up its liquid. In North America, freeness is usually measured in terms of Canadian Standard Freeness (CSF); in Europe, it is usually measured in terms of Shopper-Riegler (SR).

Furnish — the “recipe” for a given grade of paper; the types and amounts of fibers and chemicals which make up a paper sheet.

Gap Former – paper machine which has two wires coming together to form an ingoing nip (the “gap”); the headbox is a nozzle that shoots stock into the gap; used most frequently to run lightweight sheets at high speeds.

Green liquor - Aqueous solutions of the smelt resulting from the burning of thickening waste liquor in the recovery boiler. Mainly consists of sodium carbonate and sodium sulfide. It is an intermediate liquor between black and white.

Groundwood - A mechanical pulping process which involves the shredding of logs against an abrasive stone (hence stone groundwood).

HC - High Consistency. Pulp suspension with a consistency between 18-40%.

Headbox – structure mounted at the front end of a paper machine, used to supply the proper amount of stock to the machine and distribute it uniformly across the width of the forming wire; varieties include atmospheric, air-padded, and hydraulic.

Hemicellulose - One of the three main constituents of wood, along with cellulose and lignin. Hemi-cellulose are short-chain carbohydrates, built up from five different types of sugar, present in almost all cell walls along with cellulose. Their molecular weights are usually lower than that of cellulose and they have a weak undifferentiated structure compared to crystalline cellulose. Hemicelluloses include xylan, glucuronoxylan, arabinoxylan, glucomannan, and xyloglucan.

Hornification -- the stiffening of fibers occurring due to wetting and drying of chemical pulps causing loss of paper strength.

Integrated mill - A pulp and paper mill which is self-contained as regards its fiber; i.e. a pulp mill which produces pulp exclusively for the on-site paper mill, and/or a paper mill which sources all its fiber from the on-site pulp mill. A "partially integrated pulp mill" is a pulp mill
which produces more pulp than is required by the on-site paper mill, selling the surplus on the market. Likewise, a "partially integrated paper mill" is a paper mill whose pulp requirements are only partly met by the on-site pulp mill. The deficit is purchased on the market.

**Internal broke** -- off-specification paper that is repulped and used at the same site, not considered secondary fiber.

**Internal Broke** — material generated internally during startup, shutdown, and upset conditions. This material, plus repulped (off-spec) rolls are not normally considered secondary fiber. Instead they are called prompt industrial scrap.

**Jet-to-Wire Ratio** – the ratio of the speed of the jet leaving the headbox to that of the forming wire; values greater than 1 indicate that the sheet is being “rushed;”” values less than 1 indicate that the sheet is being “dragged;” used to affect sheet formation.

**Jordan** – oldest form of continuous refining, done with a low-angle plug inside a conical shell; tends to cut fibers excessively.

**Kappa number** — describes the amount of lignin left in a pulp sample,

**Kneading** -- use of rotating shafts with large extending bars to break contaminants

**Kraft pulping** — The Kraft process is the world's predominant chemical pulping process. The name is derived from the German word for "strong". The method involves cooking (digesting) wood chips in an alkaline solution for several hours during which time the chemicals attack the lignin in the wood. The dissolved lignin is later removed leaving behind the cellulose fibers. Unbleached kraft pulp is dark brown in color, so before it can be used in many papermaking applications it must undergo a series of bleaching processes

**Lignin** - One of the three main constituents of wood, along with cellulose and hemi-cellulose. Lignin acts as the cementing agent in wood, binding the cellulose fibers together. Lignin is the most abundant organic material on earth after cellulose. The strength of wood is a result of lignin, which makes up about one-quarter to one-third of the mass of dry wood. Lignin gives wood the brown color and it is removed during pulping and bleaching.

**Lime kiln** - A long slowly rotating kiln used to reburn lime mud (calcium carbonate) to form calcium oxide, which can be re-used in causticization.

**Linerboard** – unbleached board forming the outer plies/layers of a corrugated box

**Liquor** — chemical-containing liquid streams in the pulping process.

**Machine-Dry (MD)** – describes paper with a moisture content as it comes off of a machine; varies according to machine, but it is frequently taken as 5 % moisture.
Magazine paper -- The selection of the magazine printing paper is mainly dependent on the print run and the demands on the print quality (image reproduction, outer appearance, advertising appeal). High runs are mostly produced in rotogravure, rotary offset printing or rotary letterpress printing on uncoated or coated reel printing papers (mainly SC and LWC. See "SC" and "LWC"). Magazines with medium or smaller circulation are generally produced in sheet-fed offset or sheet-fed letterpress printing.

Market pulp — pulp sold as a raw material to paper mills not producing their own pulp (non-integrated mills).

MC - Medium Consistency. Pulp suspension with a consistency of 6-18%

MD – stands for Machine Direction, indicating the dimension of the machine parallel to the direction of sheet travel.

Mechanical paper -- This paper contains mechanical pulp, thermomechanical pulp (TMP) or chemithermo-mechanical pulp (CTMP) and also chemical pulp. The shares of chemical and mechanical pulp vary depending on the application. Highly mechanical papers such as newsprint tend to yellow more rapidly if exposed to light and oxygen than woodfree papers so that they are mainly used for short-lived products. In printing papers the mechanical pulp improves opacity.

Mechanical pulp - Any wood pulp manufactured wholly or in part by a mechanical process, including stone-ground wood, chemigroundwood and chip mechanical pulp. Paper made by this process is opaque and has good printing properties, but it is weak and discolors easily when exposed to light due to residual lignin in the pulp. Uses include newsprint printing papers, specialty papers, tissue, toweling, paperboard and wallboard.

Medium - The paperboard grade used to form the inner layer of corrugated board. It can be made of recycled material or wood pulp.

Microturbulence – small-scale, localized energy induced into papermaking stock during sheet formation in order to produce a well-formed sheet; also known as “action.”

Mixed Papers -- mixed papers, low quality office waste, magazines, catalogs, telephone directories, recycled boxboard cuttings, tissue paper converting scraps if mainly composed of recycled fiber, mill wrappers, specialty grades, all other grades not specified

NCG - Non-Condensible Gas. Odorous discharges from mill processes that in previous years were vented to the atmosphere. Today, NCGs are collected and disposed of to meet environmental regulations and to stop the nuisance role these gases play with surrounding communities.

Newspapers--old newspapers, special news, groundwood computer printout, coated groundwood sections, publication blanks, mixed groundwood and flyleaf shavings.
Newsprint --  Newsprint is a highly mechanical, machine-finished or calendered rotary printing paper (40 - 56g) mainly made from mechanical and increasingly waste paper pulps. In line with its intended use as a short-lived information medium, the demands on newsprint in terms of optical properties or printability are lower than those on other, e.g. coated printing papers. Newsprint must have a very good runnability -- today's state-of-the-art printing techniques require a paper with a good tear strength so that the uninterrupted production on high-speed rotary presses is ensured. Newsprint is used for dailies, weeklies and free journals produced in letterpress or offset printing

Nip – infeed zone formed by two rolls driven against each other.

OCC -- old corrugated containers

OMG -- old magazine

ONP -- old newsprint

Oven-Dry (OD) – moisture-free fiber; see also Bone Dry

Packaging paper -- Collective term for papers of different pulp composition and properties, sharing only the application. Selection and mixture of the pulps depend on the demands made on the paper. Important are tear strength, bursting strength, creaseproofness, abrasion resistance as well as elasticity and stiffness. Often also good printability is demanded (packaging as advertising medium). For special purposes packaging paper can be imparted wet strength or water repellent properties or made impermeable for aromas or water vapor. For these purposes either special additives are admixed to the pulp or the paper is coated, impregnated or combined with plastic and/or metal film

Paper - The name for all kinds of matted or felted sheets of fiber (usually vegetable, but sometimes mineral, animal or synthetic) formed on a fine screen from a water suspension. Paper derives its name from papyrus, a sheet made by pasting together thin sections of an Egyptian reed (Cyperus papyrus) and used in ancient times as a writing material. Paper and paperboard are the two broad categories of paper. Paper is usually lighter in basis weight, thinner, and more flexible than paperboard. Its largest uses are for printing, writing, wrapping, and sanitary purposes, although it is employed for a wide variety of other uses.

Paperboard -- Monolayer paperboard is basically thicker paper, frequently used in multilayers

Paperboard - One of the two subdivisions of paper. The distinction is not great, but paperboard is heavier in basis weight, thicker, and more rigid than paper. All sheets 12 points (0.012 inch) or more in thickness are classified as paperboard. There are exceptions. For example, blotting papers, felts, and drawing paper in excess of 12 points are classified as paper, while corrugating medium, chipboard, and linerboard less than 12 points are classified as paperboard.

Post-consumer waste -- Paper that has passed through the end usage as a consumer product.
Post-Consumer Waste Paper — paper used by the ultimate consumer, discarded, then retrieved from what would have been a municipal solid waste stream

Pre-consumer waste -- any waste, printed or unprinted, generated in the fabrication or conversion of finished paper. Before use by a consumer as a final end product.

Pre-Consumer Waste Paper — industrial scrap like envelope cuttings, book trim, etc.

Production rate/mill capacity — the number of tons of pulp or paper produced at a given mill site per day (see attached).

Pulp - fibrous material which is used in the paper making process to create sheet paper or other cellulose products. It is produced from wood and other plant material by chemical or mechanical pulping processes.

Pulp Substitutes and high grade deinking -- bleached chemical pulped office papers and CPO suitable for deinking, or as a pulp substitute if unprinted, bleached sulfite and sulfate cuttings including tissue paper converting scrap if predominantly composed of bleached chemical pulp fiber, coated book stock

Pulper -- Unit for defibrating (slushing) pulps and paper machine broke, usually at the wet end of the paper machine

Pulping — a) the process of removing lignin from cellulosic plant material to yield free fibers; b) the process of mechanically separating individual fibers from the cellulosic raw material; c) a combination of the two.

Recausticizing - A process by which green liquor from sulfate pulping is converted to white liquor, thus allowing the cooking chemicals to be re-used. In causticization, sodium carbonate of green liquor is converted to sodium hydroxide by using calcium oxide. Lime mud which is formed in causticization reactions is reburnt in the lime kiln.

Recovered paper -- Paper recovered for recycling into new paper products. Recovered paper can be collected from industrial sources (scraps, transport packaging, unsold newspapers...) or from household collections (old newspapers and magazines, household packagings)

Recovery boiler - In wood pulping, a unit for concentrating black liquor to a stage where the residual carbon is then burned out and the inorganic sodium salts melted and recovered.

Recovery Rate -- percent of paper consumed that is recovered for recycling

Recycled fiber -- Fiber obtained from recovered paper; also secondary fiber (cf. virgin fiber)

Recycled fiber pulp -- Pulp produced from recovered paper to be used in papermaking
Recycled or Secondary Fiber — fibrous material used in one manufacturing process and then reclaimed as a raw material for another process.

Recycling -- Use of recovered waste paper and board by paper mills to produce paper and boards

Refining – mechanical action (rolling friction) carried out on papermaking fibers to make them suitable for the production of strong paper and board.

Retention – refers to how fines and fillers in the headbox stock are retained during in the sheet during formation.

Rotary Vacuum Filter – pulp washer that uses a mesh-covered drum, rotating in a vat of stock, to form a thick mat, followed by displacement showers.

Rushing – running a jet-to-wire ratio greater than 1 (see Jet-to-Wire Ratio).

Sanitary papers -- The group of sanitary papers includes cellulose wadding, tissue and crepe paper, made from waste paper and/or chemical pulp - also with admixtures of mechanical pulp. As a consequence of the importance of tissue today, this name is now used internationally as a collective term for sanitary papers. These grades are used to make toilet paper and numerous other sanitary products such as handkerchiefs, kitchen wipes, towels and cosmetic tissues

Sanitary tissue paper -- Tissue is a sanitary paper made from chemical or waste paper pulp, sometimes with the admixture of mechanical pulp. It has a closed structure and is only slightly creped. It is so thin that it is hardly used in a single layer. Depending on the requirements the number of layers is multiplied. Creping is made at a dryness content of more than 90%. The dry creping (unlike with sanitary crepe papers) and the low grammage of a single tissue layer result in a high softness of the tissue products. For consumer products it is normally combined in two or more layers. The flexible and highly absorbent product [is mainly produced from chemical pulp and/or DIP - sometimes also with admixture of groundwood pulp] can also be provided with wet strength. Applications -- facial tissues, paper handkerchiefs, napkins, kitchen rolls, paper towels, toilet paper

Screening -- separation of large contaminants with a barrier with openings that allow small particles to pass and large particles to be blocked

Secondary Fiber -- fibers that have previously been used in a manufacturing process and have been reclaimed as raw material for another process.

Semi-chemical pulp - Pulp produced in a two-stage process which involves the partial digestion of the wood with chemicals, followed by mechanical separation of the fibers in a disc refiner. As such it is a half-way stage between mechanical and chemical pulp. Semi-chemical pulp is used in niche applications, especially those which require fiber stiffness, e.g. in corrugating medium.

Shives — undefibered material (fiber bundles) in pulp.
Sizing — addition of a chemical agent to the paper sheet to reduce water penetration; internal sizing is added to stock prior to the paper machine, while surface sizing is added on-machine (after the dryers) in the size press.

Slice – opening in the headbox through which stock exits and lands on the forming wire.

Sludge - Waste created during the biological process of treating effluent from a manufacturing or municipal waste water process.

Soda pulping — a pulping process using sodium hydroxide only.

Solid bleached kraft - this type of paperboard is used primarily in clay-coated folding boxes for such products as frozen foods, butter, ice cream, and cosmetics, as well as in cartons for milk, juice and other moist, liquid and oily foods. Additional uses include plates, dishes, trays, and cups.

SPF (spruce-pine-fir) - Canadian woods of similar characteristics that are grouped as one lumber type for production and marketing purposes. SPF species range in color from white to pale yellow.

Stickies -- depositable contaminants, primarily adhesives, waxes, coatings

Stock — wet pulp anywhere in the process; more specifically, pulp that has been beaten and otherwise prepared for the paper machine.

Stuff Box – three-chambered weir box used to ensure constant head of thick stock above the basis weight valve; also dampens pulsations; found mainly on older machines.

Table Rolls – rotating, rubber-covered rolls found under the wire in the early (gravity) section of a fourdrinier paper machine; used to support the wire, provide passive water removal, and induce microturbulence; found only on slower machines.

Tackle – collective term used to refer to bar-covered rolls, bedplates, plugs, shells, and plates used in a refining device; must be replaced periodically.

TCF — Totally Chlorine Free bleaching; uses no chlorine-containing compounds.

Test Liner -- linerboard made from recycled fibers

Thick Stock – stock, normally at 3-4 % consistency, coming out of the machine chest and into the basis weight valve.

Thin Loop – see White Water Loop.

Thin Stock – stock, normally at headbox consistency of 0.5 – 1 %, which is produced when thick stock is diluted in the fan pump with white water.
**Tickler** – a refiner just before the paper machine, but after the main stock prep refiners, used to improve formation by cutting fibers.

**Tissue paper** -- Collective term for papers of a grammage of less than 30 gsm that differ in application and composition but have the common feature of being thin. They are mainly used to wrap delicate items, as tissue for bottle wrapping, as fruit tissue wrappers for oranges or as wet strength flower tissue. They are also used as base paper for the carbon paper production, as lining tissue for envelopes and as lining paper (e.g. as a composite with aluminum foil in cigarette packaging). The extremely thin Japanese tissue papers are sometimes produced in grammages as small as 6 to 8g.

**TRS** – Total reduced sulfur. It is mainly composed of hydrogen sulfide and methyl mercaptan and make the mill smell.

**Twin-Wire Machine** – paper machine using two wires instead of one; types include a top-wire former and a gap former.

**Uhle Box** – suction box found in the press section; used to remove water and detergents from the press felts.

**Unbleached kraft** - the primary grade here is linerboard, used as facing material for corrugated boxes. Unbleached kraft folding boxboard is usually clay-coated. The largest market for this type of paperboard is beverage carriers. Other products include tubes, cans, and drums.

**Utilization Rate** -- percent of the fibers in paper that are from recycling processes (rather than virgin fibers)

**Vacu-Foils** – vacuum-assisted foils (see Foils) located after the regular foils but before the flat boxes.

**Virgin fiber** -- Wood fiber never before used to make pulp, paper or board. Also primary fiber (cf. secondary fiber)

**Washing deinking** -- Deinking in which solid particles are separated on the basis of their size by washing

**Waste paper** -- Paper after it has been used. Most can be recycled into new paper products. Known also as recovered paper and secondary fiber

**Wet End** – the first part of a paper machine, usually comprising the gravity (forming) and vacuum zones, but sometimes defined as including the press section.

**White liquor** - A strongly alkaline solution used in the cooking (digesting) process. Mainly consists of sodium hydroxide and sodium sulfide.
**White Water** — water drained from the sheet during machine formation; contains fine fibers and filler, giving it (for bleached sheets) a white, cloudy appearance.

**White Water Loop** – white water, drained from the gravity section of the paper machine, which goes into the white water pit and back into the suction of the vacuum pump.

**Wire** – fine-mesh polyester fabric on which the paper sheet is formed by stock draining through it; the first type of paper machine clothing.

**Yield** — the fraction of usable fiber left after a pulping or bleaching process, relative to the amount of raw material fed into the process.

**Z-direction** – the dimension of the machine normal to the plane of sheet travel.