Fillers

Fillers (pigments) are insoluble particles that can fill up vacated places in the paper web structure and increase its opacity. They are also used for fibre dyeing.
Fillers can be added to the pulped stock or utilised as ingredients of painting compounds. Generally, they improve printing properties.
They are organic and inorganic; furthermore, they can be specified also according to their chemical composition.
The mostly used fillers are $CaCo_3$, TiO_2, kaolin, talc, permanent white, asbestine etc.
Fillers (pigments) can be also completed with preservative and plasticizing additives.

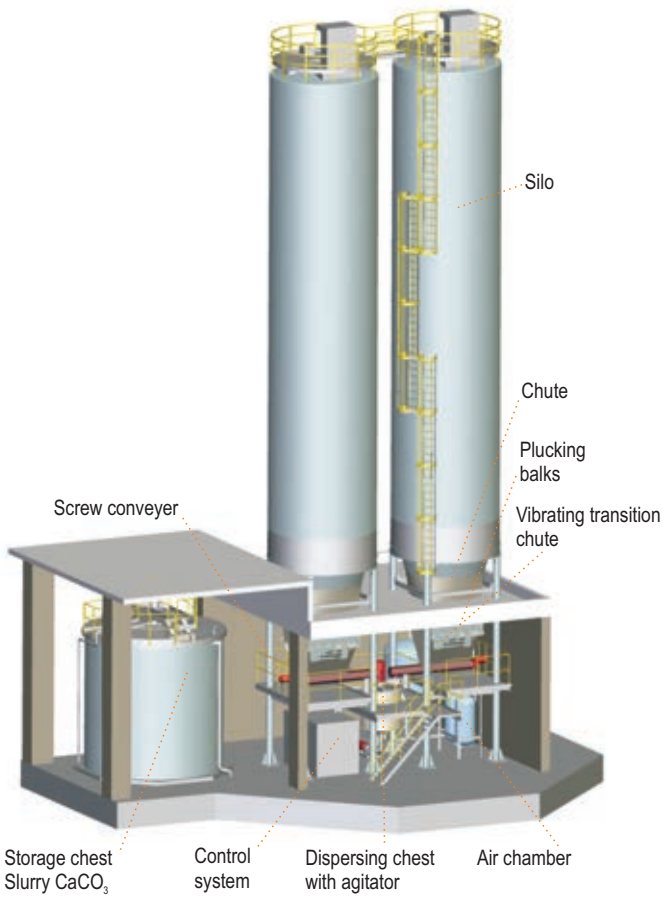
Sizing Agents

Sizing agents improve resistance of paper against water absorption. They can be added directly to the stock or applied on the web surface in a size press.
Sizing agents can be in the form of modified natural resins or synthetic substances.
The most known sizing agents are for example AKD, ASA and substances based on styrene- acrylate.

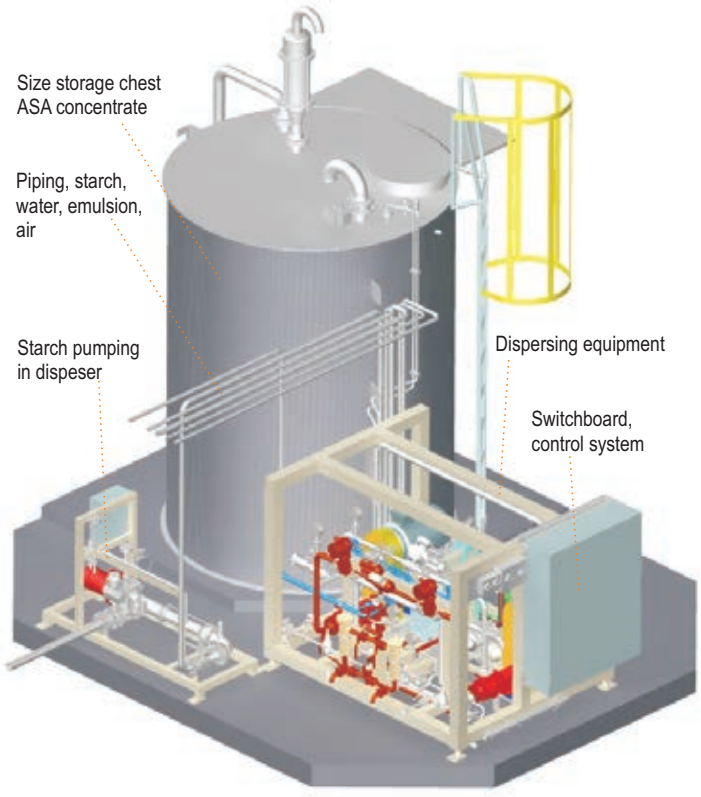
Starches

They support origination of interfilamentary bonds, improve paper and cardboard dry strength and reduce surface dusting properties at printing.
We can specify them mostly as potato, wheat and corn starches and also according to the place of their application or to the way of their preparation as follows:

- intended for dosing - cationic starches
- intended for surface applications or native, modified through enzymatic or thermochemical conversion.



Example of $CaCo_3$ preparation

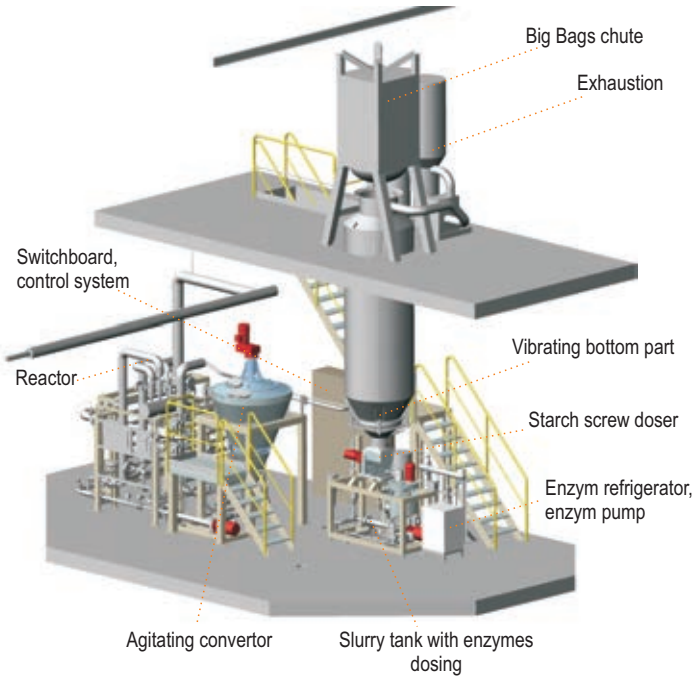


Example station for preparataion ASA sizing agent, which uses the principle of dispersion

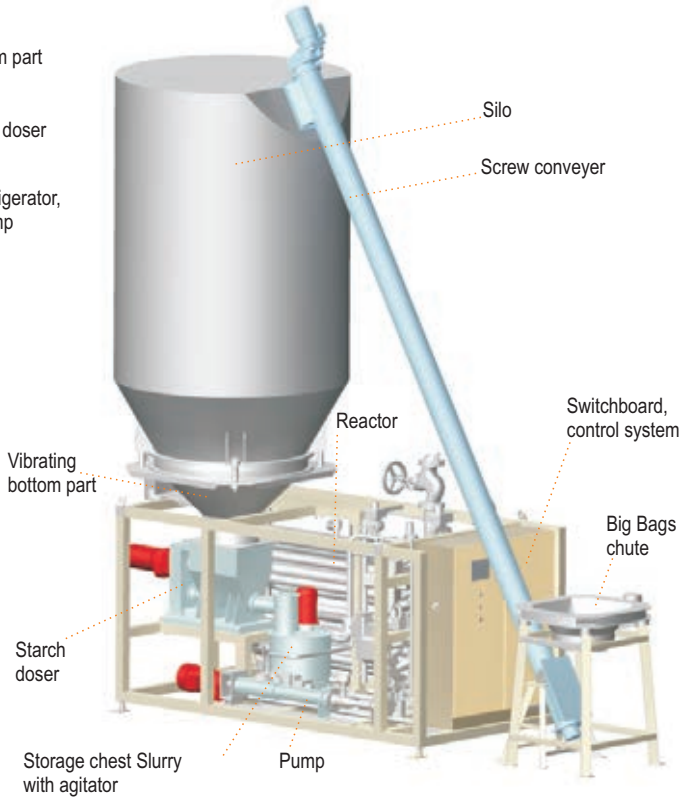
Natural - unmodified starches. They can be applied on the web surface directly in a size press.
They are the most cost-effective, usually based on natural corn or wheat and prepared through enzymatic (by means of enzymes in a continual reactor, shortening of strands) or thermochemical conversion. Equipment to modify starches is generally called jet cooker.

Cationic - modified starches. They can be applied directly in the paper stock.
The cationic charge improves absorbing capacity of starches on pulp fibres.

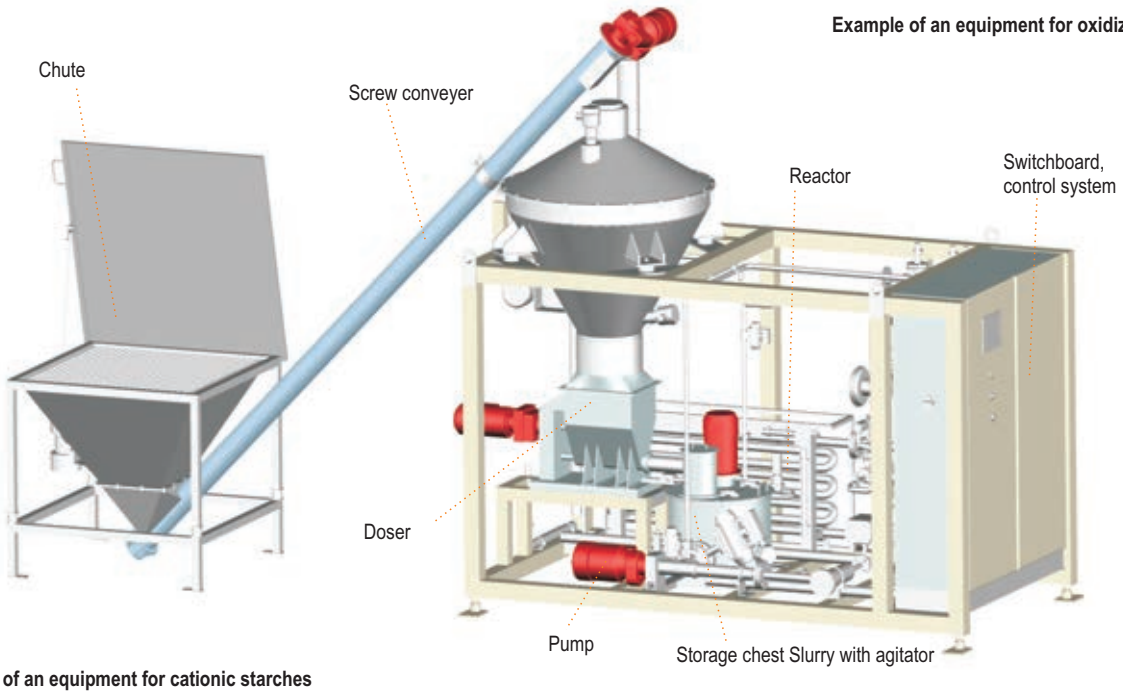
Oxidized - the mostly used modification of degradation of starch molecules by means of oxidizing processes in the starch shop. The oxidized starches can be applied on the web surface directly in a size press. They are also utilised as initial basis for preparation of binders in cardboards.



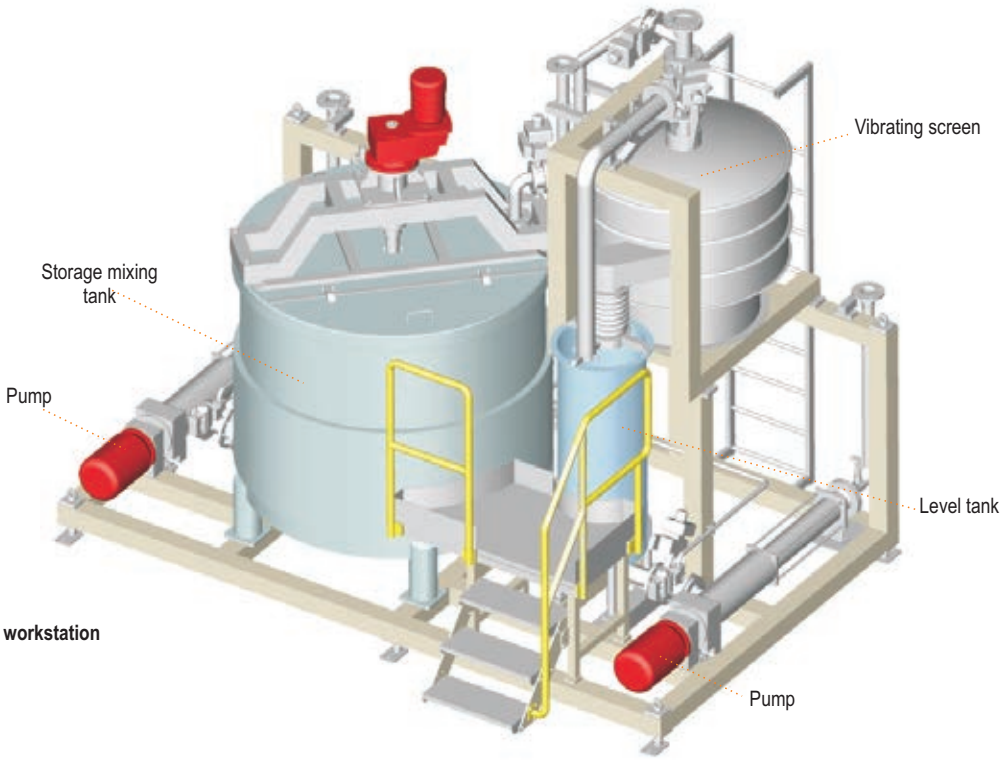
Example of an equipment for native starch enzymatic conversion



Example of an equipment for oxidized starches



Example of an equipment for cationic starches



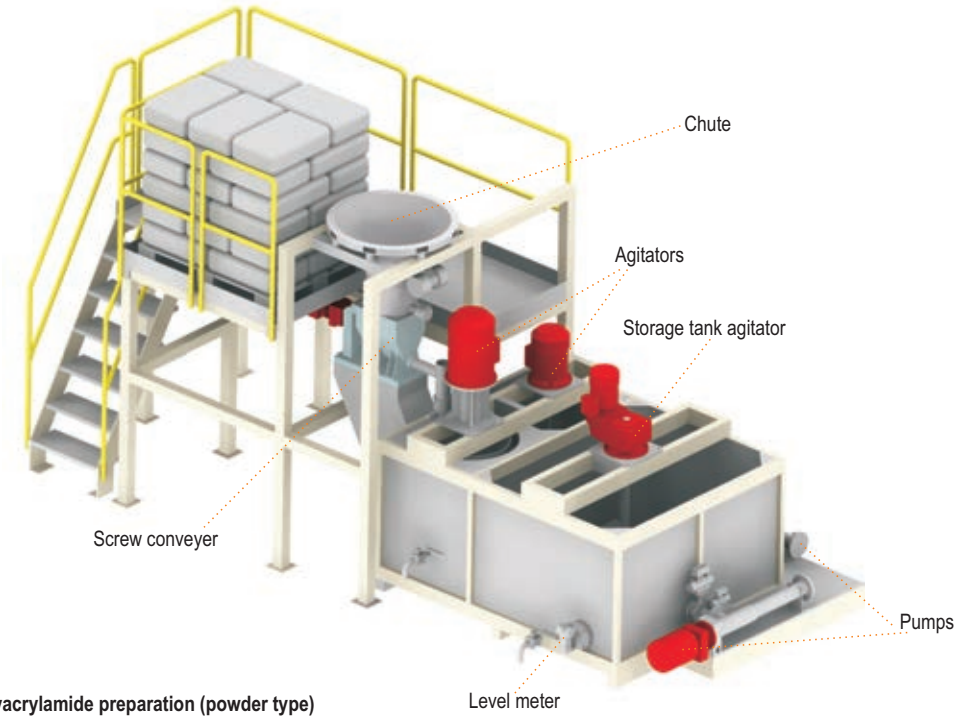
Example of a size press workstation

Retentive Agents

They are intended for maximized retention of feed material on the PM wire and acceleration of dewatering. They improve quality of white water. They are prepared from liquid or powder products. Dosing of retentive agents can be solved as one-component, two-component or multi-component systems.

Retentive agents are:

- flocculants - compounds accelerating flocculation
- coagulants - surface-active compounds (agents supporting flocculation)
- bentonites - used for treatment of waste water contaminated by oil products, emulsions, colloidal dyes, heavy metals



Example of a station for polyacrylamide preparation (powder type)

Dyes and Optical Brightening Agents

They are intensively coloured organic compounds, soluble in water or other solvents. They are intended for reaching of required colour tones or for opacity improvement.
They can be applied directly in the paper stock or on the web surface in a size press.
Optical Brightening Agents (OBA) are used for improvement of luminous reflectance. The OBA´s are water-soluble, colourless or only slightly coloured.
They can be applied directly in the paper stock or on the web surface in a size press.

Biocides

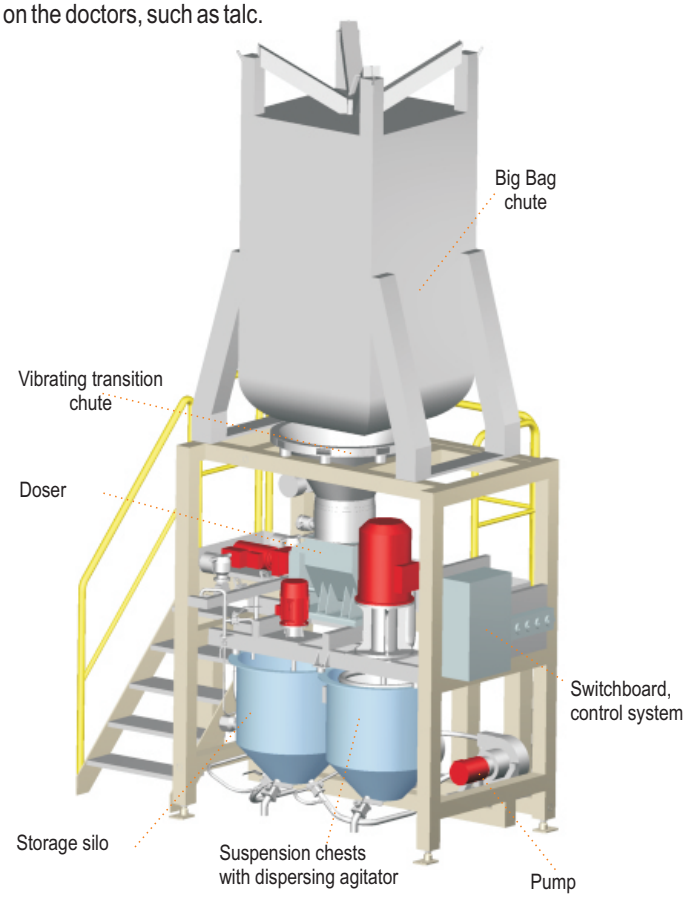
Biocides are used for bacteria and microorganisms killing and elimination or avoidance of their growing in places without access of air. The so-called slimes, accidentally occurring on the walls of diverse chests, tanks, machinery and pipes, deteriorate quality of water and may bring PM web breaks.

Defoamer

Defoaming agents are used for prevention of foam occurrence. They can be applied directly in the stock with solutions of starches and coating compounds.

Pitch control

Compounds used for trapping and separation of free resin fractions and other unwished residues in the stock that may stick on the doctors, such as talc.



Example of workstation for talc dispersing and dosing

Coating Compounds

They are used for coating equipment and generally consist of pigments and binders, optical brighteners, dyes, dispersants and pH value regulators.

Emulsifying Agents

These emulgators support emulsification and decrease interfacial stress. They can be used for preparation of various emulsions - oil in water.

pH Value Regulators

They are used for pH value regulation particularly in applications with coating compounds and also with the stock due to dosing of additional paper stock additives.
In case of NaOH utilisation and due to avoidance of temperature fall in the dosing equipment it is necessary to complete the heating system accordingly. The pH value regulators are for example aluminium sulphate, (H_2SO_4, PAC) etc.

Binding Agents

They are used for binding of pigment particles interactively, also to the paper web surface and preferably for coating compounds (resins). We can specify these so-called binders as natural and synthetic, such as starches, casein, PVA, acrylates, latex.

Other Auxiliary Chemical Agents

- PAC fixing agents (Polyaluminiumchlorid) - they are used for improvement of retention and fixation of chemicals and in addition to that for industrial water treatment. They can also reduce sizing agent consumption in size press applications.
- detergents - substances for chemical and continual felt cleaning.
- resins for improvement of wet strength - they improve paper mechanical resistance against moisture or water (synthetic resins based on PAE, UF).

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