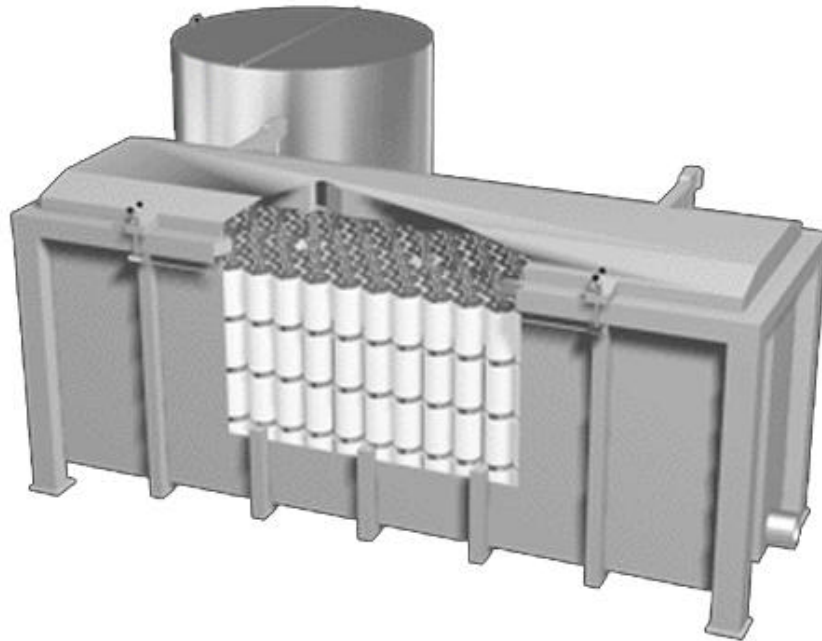


CASTO



LINEN SLIVER SCOURING AND BLEACHING PLANT



Dyeing machines



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Scouring and bleaching are basic steps in the linen spinning process; up to a few years ago, scouring was a separate process from bleaching.

Primary scouring used to be done during spinning; for this reason hot spinning (at 65-80°C) was performed, while bleaching took place on conical packages of spun yarn in separate bleaching plants, i.e., in plants specializing in the wet treatment of textile fibres.

In Europe, chiefly Italy and France, this service was generally subcontracted to decentralized factories operating as commission dyers.

This traditional procedure involved a number of important disadvantages: wet spinning had to be performed at a high temperature (65-80°C), with consequent significant energy consumption for water heating. More important, the environment was ecologically endangered, and the very high temperature and humidity in the spinning department were almost unbearable to the workers.

All the above spelled lower spinning output due to poor efficiency of in-line scouring and lower labour productivity due to poor environmental conditions.

Furthermore, a first time the yarn coming from the spinning frames had to be dried prior to cone winding and a second drying operation was required after bleaching in package form. The full process therefore included two energy-intensive and costly drying stages.

Further cost items were packaging, handling and transport of spun yarn cones to the decentralized bleaching plant and labour intensive cone loading and unloading on the autoclaves carriers.

Another point not to be neglected is that decentralizing the various stages of the production process involved significant planning problems, hidden costs and generally longer manufacturing times. (Diagram 1)

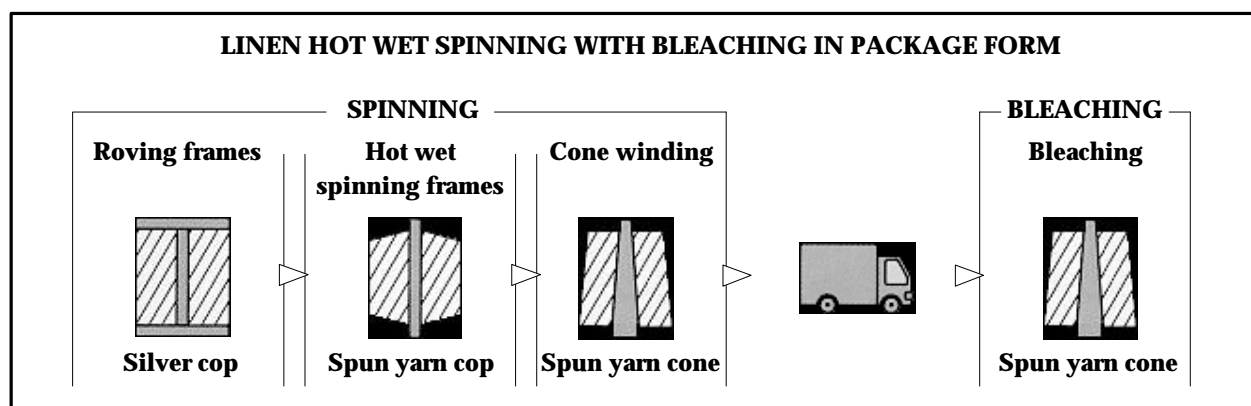
A thorough technological research was made to overcome the problems connected to the traditional process by means of scouring and bleaching tests on the silver i.e., on the fibre in the intermediate stage between preparation and spinning, which yielded very attractive results.

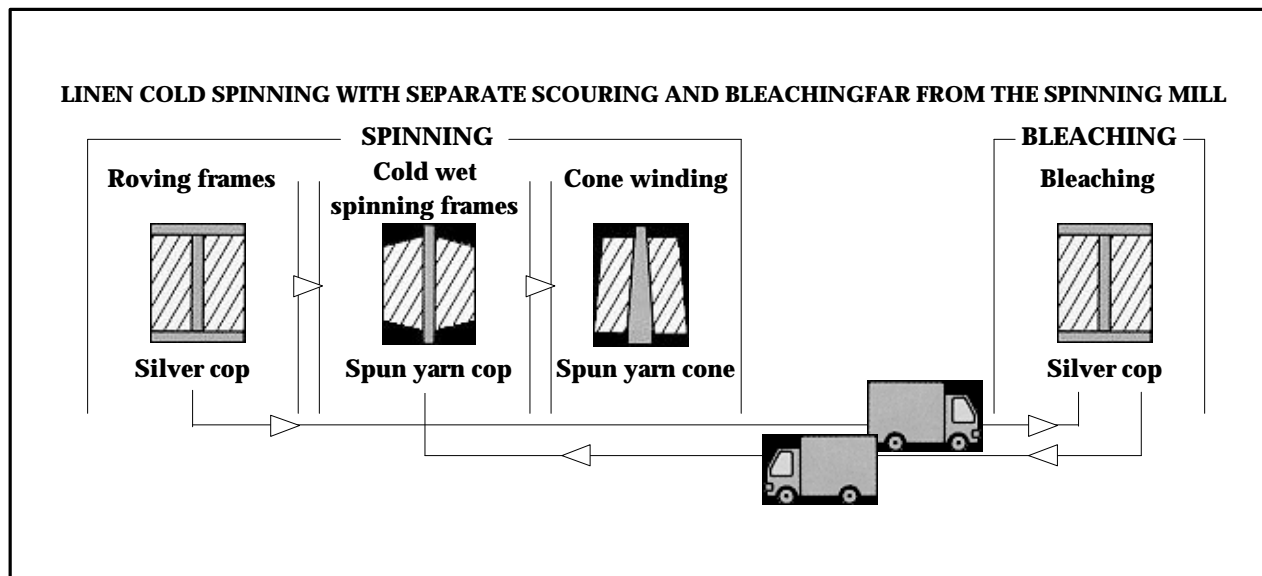
When suitable treated in special scouring and bleaching machine with a suitable engineering of liquor circulation system characteristics, the sliver does not degrade; intensive removal of the natural fibre binders during scouring and bleaching improves wet spinnability and allows for a substantial reduction of wet spinning temperature from 65-80°C to cold spinning.

This means:

- Improved sliver spinnability due to lower fibre cohesion consequent to binder removal by scouring, with consequent greater spinning productivity.
- Large energy savings, since it is no longer necessary to heat the spinning water.
- Significantly improved environmental conditions in the spinning mill, due to low temperature of the process water and consequent lower ambient humidity.
- Significantly improved working conditions for the spinners, due to the above reasons, with consequent lower absenteeism and better productivity.

These advantages are too important to be neglected; for this reason, silver scouring has been an accepted practice for several years.





Nevertheless, it is still a very common practice to exploit existing facilities in decentralized plants, separate from the spinning mills and equipped of scouring machines with non-suitable liquor circulation designed for spun yarn. In such cases, spinning yield improves but high operating costs and planning and management hurdles still remain. (Diagram 2).

Over the last five years, to exploit all the advantages of sliver scouring and bleaching while doing away with the disadvantages, Loris Bellini has developed the **specialized linen scouring and bleaching plant "CASTO 6 L"**.

Generally, the plant is integrated in the spinning mill and is installed in an area located between spinning preparation machinery and wet spinning frames. **It eliminates external handling** and allows for a smooth material flow inside the factory.

Integration of the scouring and degumming plant moreover makes management easier by simplifying production planning. (Diagram 3).

The **scouring plant** is located in a separate, compact department in the center of the spinning mill; it consists of a special parallelepipedal treatment vat, equipped with a pneumatic lid opening and closing device.

MODULAR CARRIERS

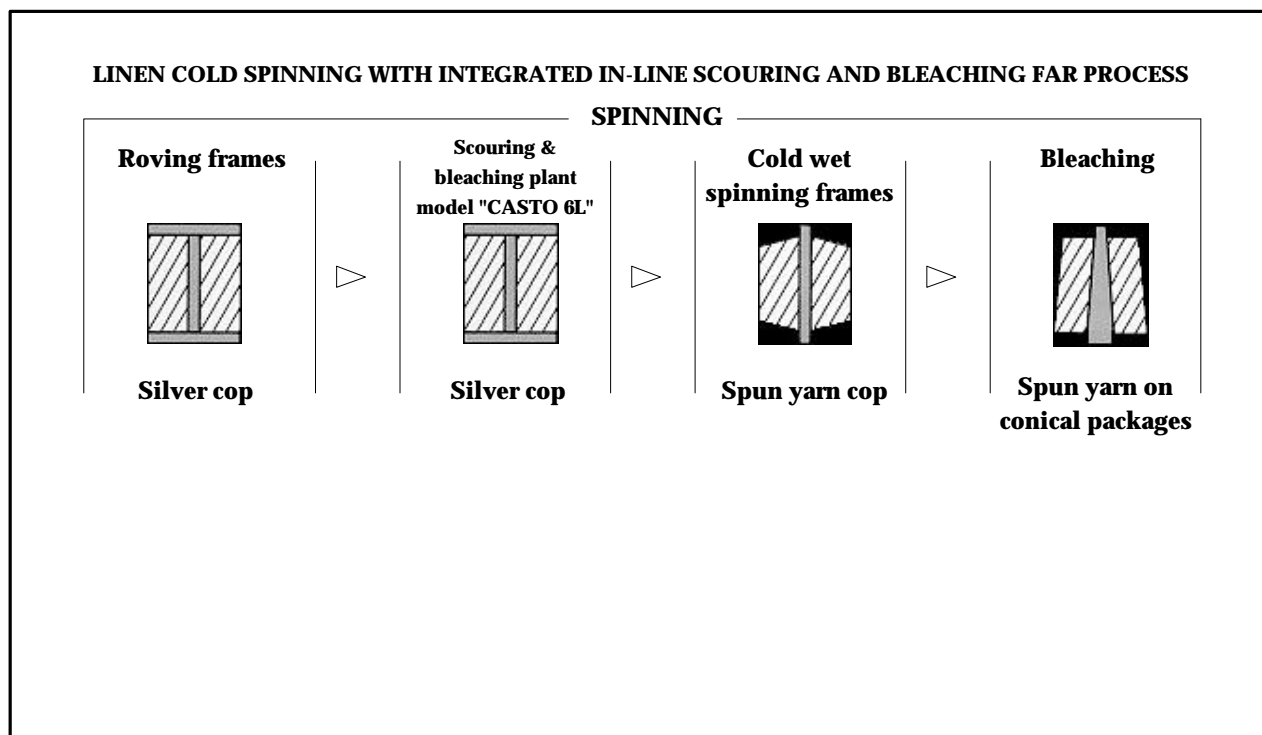
The machine can accommodate **6 modular carriers** suitable for sliver cops of various standard sizes. The carriers are lifted with a hoist and placed in the machine; they fit in seats prearranged on the vat bottom to close the hydraulic circuit for liquor circulation. The seats are interconnected by a large cross-section manifold, which in turn is branched on a specially designed liquor circulating pump.

CIRCULATION PUMP

The pump is specifically **designed to operate at low head pressure and high flow rate**, as required by the soft winding of sliver cops which need very smooth circulation to prevent felting, which would cause spinning troubles and defects.

Specific engineering of the plant is not limited to the pump, but extends to the entire circulation system, i.e., intake manifold (liquor flow out-to-in), axial impeller pump, delivery manifold (liquor flow in-to-out), carrier seats and carriers. **A smooth and steady liquor circulation with a limited pressure drop is obtained**; this means **low installed power** (15 kW for a load of 1.000 Kg on CASTO 6 L plant compared to about 70 kW of conventional plants) and consequent low electricity consumption and costs.

The treatment vat also embodies an indirect heating coil to supply process heat; two overflow washing devices are installed on the upper side rims for continuous rinsing.



LIQUOR PREPARATION VAT

The plant is completed by a circular liquor preparation vat equipped with a reversible axial-flow pump to transfer the liquor from the preparation to the treatment vat and vice versa. This pump also keeps the liquor under mixing through a suitable circuit. Scouring and bleaching liquors can be prepared separately, so as to reduce downtimes at a minimum.

PROCESS CYCLE

Caustic soda scouring is performed in about 3 hours. Less than 5 hours are required for a complete cycle including both scouring and bleaching by hydrogen peroxide.

ACCESSORIES

The plant can be equipped with optional instruments, such as a **sampling device, a tank for direct chemical metering** in the treatment vat, a heating coil and mechanical stirrer, feed valves for different kinds of water, quick drain valve to cut draining time, **automatic metering of solid or liquid products**, etc.

The plant can be delivered with manually operated or pneumatically controlled automatic valves.

AUTOMATION

The electronic control of the entire processing cycle can be limited to controlling time/temperature parameters by modulating pneumatic valves and manual control of on-off intercession valves.

Alternatively, by using a computer, it can control all the valves and electrical equipment thereby obtaining a fully automatic cycle, and significantly reducing operating costs, with outstanding repeatability and reliable results.

The most innovative features however are the special modular carriers. Instead of introducing one carrier only in the treatment vat as usual, up to six modular carriers can be introduced, each carrying cops of different types on their rods.

VARIABLE CAPACITY

When the rod is not completely filled, the treatment bath level is adjusted to **preserve liquor ratio**, thereby safeguarding formulation validity and saving energy.

The liquor ratio is adjustable from 1/8 to 1/11.

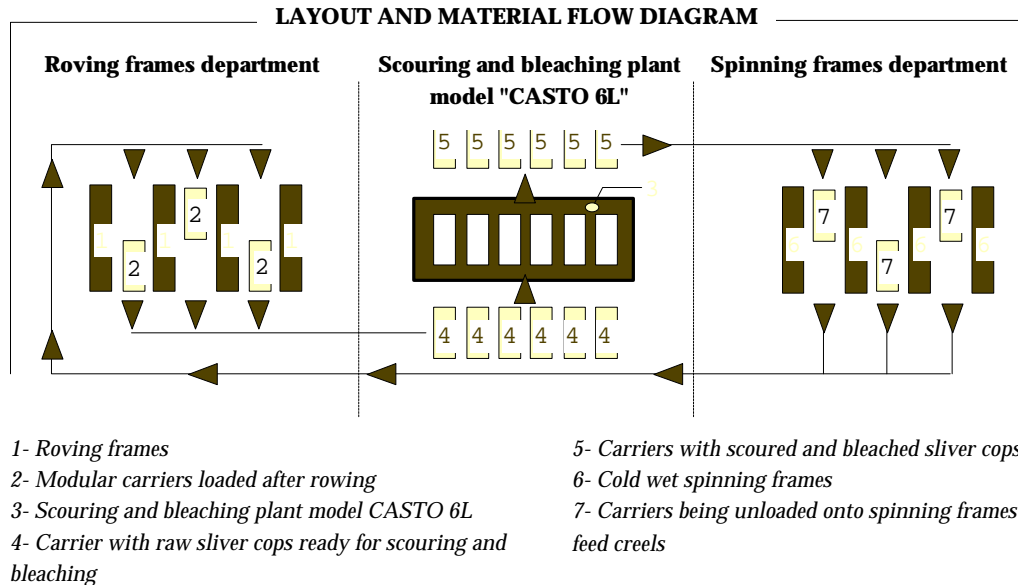
CARRIERS HANDLING

The dimensions of the modular carriers are such that they can be handled by standard transpallet units and **enter the lanes between the roving frames and spinning frames. Carriers can thus replace traditional trolleys.**

With the same effort employed for loading conventional trolleys, the roving frame operator can now load the stainless steel carrier which will then go directly to the scouring and bleaching machine, in one single step operation.

This entirely avoids traditional cop rehandling during scouring, which consists in unloading the trolleys and loading the carriers.

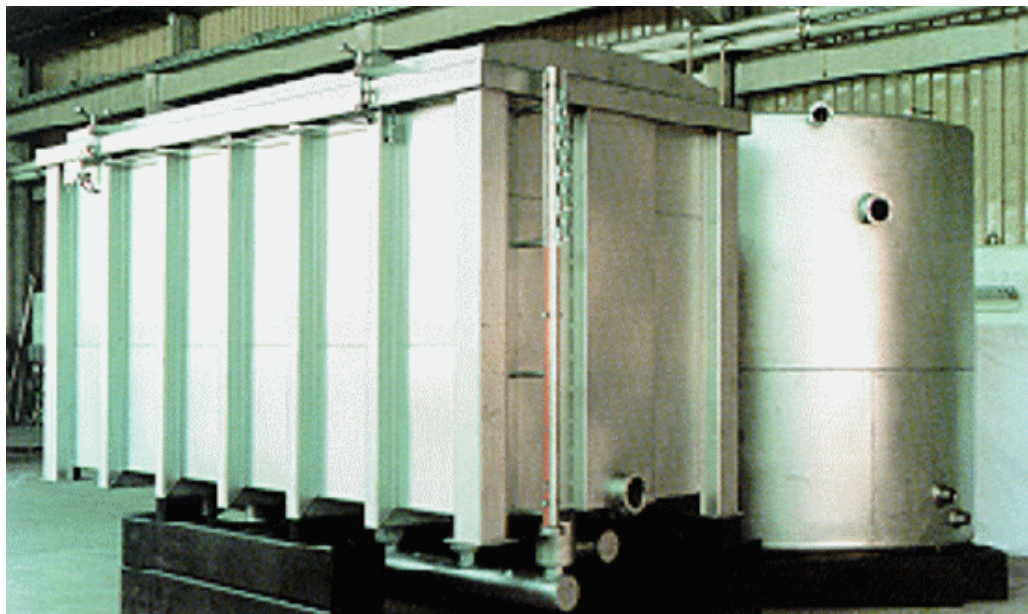
LINEN SLIVER SCOURING AND BLEACHING PLANT INTEGRATED IN A SPINNING



The same applies to spinning operation after scouring and bleaching: the carriers holding the scoured and bleached sliver cops leave the treatment vat and are sent directly to spinning frames without any intermediate handling.

imes New Roman;Tms Rmn;Book Antiqua;The operator unloads the carrier directly on the creels of spinning frames and empty carriers are sent back to the roving frames department.

Needless to say, the whole plant, inclusive of external supporting structures, valves and carriers is made of a special corrosion-proof stainless steel. Stainless steel employed has a high Molybdenum content, with standing pH values from very low to high and stabilized sodium chlorite used in bleaching. (Diagram 4).





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