WASH&DRY

THE FIRST MACHINE FOR FINISHING/WASHING FABRICS IN ROPE WITH SOLVENTS. MACHINE WITH INTERNATIONAL PATENTS.
MAIN WASH & DRY FEATURES:

MACHINE

CAPACITY : N°1 - 2 -3 - 4 ROPE
CAPACITY : KG. 150 KG PER ROPE
CYCLE : FROM 80 MINUTES TO 100 MINUTES DEPENDING ON APPLICATION

TEMPERATURE : FROM 15°C TO + 75°C FOR WET PROCESS
TEMPERATURE : FROM 15°C TO 125°C FOR DRYING PHASE
SPEED : FROM 50 TO 300 MT/ MIN.

BASE CYCLE:
: WASHING PHASE 10 - 15 MIN. IN TEXTILE FUNCTION AT ROOM TEMP
: DRYING PHASE 50 - 80 MIN. DEPENDING ON THE TEXTILE
: CONDITIONING/COOLING 10 - 15 MIN.

TEXTILE TYPE : OPEN OR TUBULAR KNIT FABRIC
WOVEN TEXTILES
WOOL TEXTILES

FOR POLYPROPYLENE REMOVAL IT NEED A WASHING PROCEDURE AT 115°C
ACCESSORIES INCLUDED IN THE “WASH & DRY” MACHINE

Seam searching and rotation control device

Inverter for circulation pump

Inverter for dragging reel

Inverter for fan

Unfolding unit with inverter.

Control panel with SIMENS IND. PC – SIMANTIC SERIES TOUCH SCREEN WINDOWS CE microprocessor for all automatic phases and specific software

Unblocking system for cloth pieces, with piston activated fork: DETWISTING DEVICE

Storage, recycling and condensation station for the solvent

Activated carbon unit for cleaning of exiting air.

OPTIONAL

Washing kit AND POLIPROPILENE REMOVAAL for WARM WASHING (hot: at 115°C ) with tetrachloroethylene FOR WOOL FIBER.
A thorough marketing analysis of the current situation of the dry cleaning sector has provided LAIP srl with the idea to develop a new machine for application between the areas of drum wash and of openwidth washline.

The plans have been developed further since the year 2000, together with a leading company in the area of treatments with solvents (in Prato) and with a leading company in the dry cleaning sector. In the winter of 2000, the first prototype was made, which was tested for about one year both on plain fabrics and on knitwear. These tests have yielded the following interesting results:

*) effectiveness of dry cleaning in ROPE in terms of removal of oils and silicon
*) possibility of treatments in ROPE similar to treatments in drum.
In 2002, the first definitive machine for industrial use was built and installed. At the beginning of 2003, the first machine was delivered to a main knitwear drycleaners/finishers.

We find more and more textiles with synthetic fibres or a mix of elastic/elastomeric fibres on the market. Particularly for women, more and more elastic textiles are in demand, usually mixed with cotton, acetate, nylon or polyester. These types of fabrics contain considerable amounts of oils and silicon, remnants of earlier threading and weaving/knitting processes. The removal of these substances is thus becoming more and more important in order to obtain a finished high-quality product and to prevent environmental damage. The thermal fixing of colours in synthetic textiles with high concentrations of oils possibly leads to the emission of black smoke from the stentering machine’s chimneys and to an eventual contamination with oil of various internal parts of the stentering machines. This is likely to lead to process defects, such as stains on the textiles. The cleaning phase of the textiles usually happens in the dry cleaning machines, surrounded by water, steam and chemical products.

The idea was therefore to develop a machine that was simple, economical and functional, in order to fulfill the primary task of removing oil from the textiles. The use of a solvent thus becomes easy to understand, given that it has a strong cleaning effect on the textiles and that it can be entirely reused without adding any chemical substances.

The machine therefore had to reduce the functions of the dry cleaning department to their core tasks, and at the same time had to prepare raw fabrics that were appropriate for the subsequent phases of thermal colour fixation or of dry cleaning.

It is important to underline that the machine is delivered fully independently. Just make the standard connections and start using it.

The circulation pump and wet injector are similar to the dyeing machines made by LAIP. Based on the experiences in the AIR Transport of fabric that our company has been able to collect over the past few years with our new AIRJET 2000 machine, we were able to install an injector in this solvent machine, which transports the fabric exclusively with the help of air.

As a result, we have a machine that carries out the following two phases:

1° PHASE: WASHING OF FABRIC WITH TETRACLOROETHYLENE; TRANSPORT OF THE TEXTILES VIA THE CIRCULATION PUMP.

2° PHASE: DRYING OF FABRC WITH HOT AIR; FABRICS ARE TRANSPORTED BY THE AIRJET INJECTOR.

The machine obviously is equipped with a Distillation Unit, which makes it fully autonomous.
TECHNOLOGICAL CHARACTERISTICS

The results that we have obtained since the first prototype was launched three years ago have been very interesting both for woven textiles and for knitwear. To better understand the advantages of this machine, we should look at the two sectors separately.

WOVEN TEXTILES

Woven textiles, too, can be dry cleaned in rope. It is clear that the main field of application is for wool, where the textiles can be dry cleaned and can even undergo light fulling operations, to obtain the shrinkage of the textile structure.

Dry cleaning is also necessary for woven fabrics with elastic fibres, because dispersed dying with washing in water cannot reach the quality standards that are needed today.

Furthermore, the machine can be used to extract OF IMPURITIES from fabrics that are contaminated with that substance. (POLIPROPYLENE FOR INSTANCE)

When treating the fabric in a bath of tetrachloroethylene that was heated to 110°C /115°C we obtain a totally clean textile.

Also, this process of washing and drying of carded textiles leads to a higher degree of absence of plant remnants from the fabric's surface.

The idea behind this is to process textiles made from wool that was not flake carbonised for light colours.

The following method is being recommended:

WOVEN TEXTILE– TRADITIONAL CARBONISED – DRY CLEANING AT 110°C + DRYING –

“MILLING ”– REMOVAL OF ACID + DYING BATH.
FURTHER ADVANTAGE OF OUR WASH & DRY MACHINE

Let us now look only at wool textiles. Wool can be contaminated with a lot of impurities, but also with animal fats or plant remnants that the sheep collect on their wool during grazing.

THE PROBLEM OF PLANT REMNANTS IS AN IMPORTANT ONE FOR THE PRODUCERS OF WOOL FABRICS, BECAUSE:

- TEXTILES MADE FROM VIRGIN WOOL WITH MANY IMPURITIES OF PLANT ORIGIN CAN ONLY BE DYED IN MEDIUM DARK COLOURS.
- VIRGIN WOOL WITH MANY IMPURITIES OF PLANT ORIGIN CAN BE DYED ALSO IN LIGHT COLOURS, IF IT IS FIRST FLAKE CARBONISED.

P.S. FLAKE CARBONISATION OF VIRGIN WOOL MEANS THAT WOOL FLAKES ARE PASSED OVER A HEAT SOURCE WHERE PLANTS ARE TRANSFORMED TO CARBON AND THEN ELIMINATED OR AT LEAST REDUCED IN QUANTITY. IT IS CLEAR THAT THIS PRIMARY MATERIAL IS MUCH MORE EXPENSIVE THAN THE TRADITIONAL ONE (WHICH AT TIMES COSTS HALF AS MUCH).

Therefore, wool manufacturers must procure:

- Standard primary materials for medium dark colours. With them, raw textiles can be produced which must then be dyed according to the clients’ instructions.

- Carbonised primary materials in flakes, for the manufacturing of light colours. In this case the wool producer does not make raw textiles, but awaits the clients’ order, because the primary material is very light. Therefore, it takes more time to handle an order for light colours when using this procedure, because one has to start from the fibre – spinning – weaving and then move to dying and finishing processes.

THE FOLLOWING POSITIVE TESTS HAVE BEEN CARRIED OUT WITH THE WASH&DRY MACHINE:

The idea was to utilise the WASH & DRY machine not only to eliminate oils and impurities, but also to prepare a raw textile with standard fibres (i.e., contaminated by a lot of substances of plant origin)- even for light coloured textiles.
STANDARD PROCEDURE

- WE BEGIN WITH THE RAW MATERIAL

- THE RAW TEXTILE IS EXTENSIVELY CARBONISED IN ORDER TO TURN THE RESIDUES OF PLANT ORIGIN THAT ARE LEFT ON THE FABRIC INTO COAL.

PROCESS IN THE WASH & DRY MACHINE

During the washing process in tertrachloroethylene at 110°C, which serves to remove the impurities, we also reduce the amount of traces of plant origin. This is possible because during the textile drying phase after the washing process in the machine, there is a tumbler effect. This means that the residues of plant origin, which have already been turned into coal and which are located on the surface, can be removed easily (obviously not entirely), assisted by the agitated movement of the textiles. We should also mention that this movement has no mechanical effect on the fabric, because the tetrachloroethylene has a neutral effect on the fibres and develops no “squeezing” effects like water.

RESULT

A RAW MATERIAL FROM WHICH OIL WAS REMOVED AND WHICH WAS DECONTAMINATED WITH REGARD TO IMPURITIES. IT CONSTITUTES THE NECESSARY BASE EVEN FOR LIGHT COLOURS, WITH THE ADVANTAGE FOR THE WOOL MANUFACTURER THAT STANDARD CARDED WOOL CAN BE PURCHASED.

CONSIDERABLE SAVINGS IN PURCHASING COSTS AND WORKING HOURS.

ONE SINGLE PROCESS IN ONE MACHINE, WHICH LASTS ABOUT 80 – 100 MINUTES FOR 250/300 KG OF TEXTILES. RESOLVES ENORMOUS PROBLEMS.
As we have already pointed out, synthetic textiles always contain more oil, with proportions that range from 0.5% up to 5% of oil (the latter, e.g., in Polyester Lycra). In this sector, we should look separately at:

*) RAW FABRIC

*) YARN DYEING TEXTILES

In the case of raw textiles, the WASH&DRY machine has the function to prepare them for the dying process by extracting oils and/or silicon. The FABRIC arrives in a dry state at the machine and leave the machine in a dry state. They can therefore be stored in a warehouse or sent on to the dying process. The industrial cost of the operation is low, because no chemicals or water are used. The dyeing machine can immediately begin the dying cycle, if we are dealing with synthetics.

The process of wash in rope treatment and the drying process in rope leads to a further compacting of the textiles and allows natural shrinking. Historic data show shrinking of between 5 and 18%, depending on the type of material.

The machine becomes very interesting for raw textiles in tubular, if a thermal fixation operation is to be carried out on the tubular. Some companies carry out a thermal fixation of the raw material in tubular before the dying process. In that case our machine can provide a preparatory step:

PROCEDING TO THE THERMAL FIXATION OF THE TUBULAR WITH WASHED TEXTILES

PRECEDING TO THERMAL FIXATION OF A TEXTILE THAT HAS ALREADY SHRUNK NATURALLY, THUS OBTAINING GREATER STABILITY AT THE END OF THE FIXATION PROCESS

YARN DYEING FABRIC

For YARN DYEING FABRIC the WASH&DRY machine is even more interesting. It makes it possible to bypass the entire wet phase.

In a traditional system, the YARN DYED FABRIC must be treated with the so-called shrinking baths. The textiles are washed and softened and undergo a natural shrinking process. Afterwards, the fabric is wrung and then dried and/or thermally fixed and then sent to the dry fixation machine (teasles – shearing machines – microsanders).
The shrinking baths are operations with very little added value, which have to be carried out nevertheless to obtain at the end of the process an optimal, high-quality finish.

As we explained before, the WASH&DRY machine, on the other hand, bypasses the entire wet phase. The fabric that arrives from the manufacturer is being loaded onto the WASH&DRY machine for the dry wash phase. During the wash, a few litres of water (5-6 circa, optional) can be added together with a softener. As a consequence, the surface touch of the fabric becomes similar to a treatment with water and direct softener. The water (which, again, is optional!) facilitates the mechanical work and movement carried out on the fabric and leads to a better natural shrinkage.

The fabric exits in a dry state and can therefore be forwarded to the vaporisers (e.g., in the case of 100% cotton, or cotton acrylic), or to the stentering machine, passing via the foulard if a thermal fixation is necessary. In some cases it is forwarded directly to the dry finishing machines, if the fabric are already prepared.

It is easy to imagine what enormous advantages result from this kind of process, compared to the traditional methods. Some textiles do not even come in contact with a litre of water.
STANDARD PROCESS  
KNIT FABRIC FROM KNIT MACHINE

WASH & DRY PROCESS  
KNIT FABRIC FROM KNIT MACHINE

WASHING IN WATER FOR:
• SHRINKING OF FABRIC  
• SOFTENER

WASH AND DRY PROCESS:
* SHRINKING OF FABRIC  
* SOFTENER

WATER EXTRACTION
FREE DRYING OR 
TENTERING MACHINE

FINISHING OR 
SIZE STABILITY PROCESS

“WASH & DRY”:

CLEANING, COMPACTING, HAND, NO COLOUR MIGRATION

Another field of application are particular finishing processes. The machine works in rope and thus doubtlessly offers numerous possibilities for applications. For example, knitwear that is yarndyeing or rope dyed, with a wool/wool mix/angora composition, which has to undergo either hair extraction or slight fulling, can be treated in rope rather than in a drum.
MAIN FEATURES OF AUTOCLAVE

High flexibility for WASHING processes of textiles or knitwear/woven, for natural, synthetic or mixed fibres, in open or tubular form with variable weights ranging from 50 to 900 g/mt.

Compact design, easy access to the inside of the machine for cleaning and maintenance, thanks to a foot-step that is attached to the curved base, with a lid that is closed by four wing nuts. Made from stainless steel (ASTM 304) with external reinforcement structure located at the dyeing bath, made from stainless steel (ASTM TP 304).

Cylindrical machine with two rectangular, metal support feet, consisting of one single body that contains as many drums as there are loading ROPE. These drums are made from a stainless steel (ASTM TP 316) structure with holes, which allows for the circulation of the dying solution. The containment chambers are designed in a way to assure an optimal distribution of textiles inside the machine. It thus complements the function of the unfolding machine.

Cylindrical reel for the circulation of the fabric, connected to a motor-reducer and to an inverter.

The special double-state nozzle for air and tetrachloroethylene allows very high speeds up to 350 mt/min with a fabric weight of 150 grams/mt. The injector’s particular geometry, with its three separate sections, and its special design reduce the load losses of the aerodynamic system to a minimum. This has a positive effect on the textiles: they are being spread out, thus avoiding the problem of wrinkles and/or bent edges; there is also an energy saving effect.

Plaiter at the exit of the nozzle, connected to a motor-reducer, which is controlled by an inverter for speed variation.
Fabric guidance device, which also has the function of an automatic DETWISTING for possible knots that could form inside the containment chamber for the material. It is independently attached to each ROPE. In the case of a stop due to the formation of nodes or due to an imperfect circulation of fabric, it allows the removal or disentangling of the fabric inside the drum by wrapping it around the device. It is activated automatically via a rotating pneumatic piston. If the idle cylinder, which is located between the textile containment chamber and the nozzle, stops, this device will automatically (four times) make the attempt to turn over the textile. Only if there are any further stops, the machine will activate an operator alarm function. Once it has returned to its position, this device allows the rope to begin its routine function again.

Unilateral aspiration centrifuge pump in stainless steel ASTM TP 316, with mechanical stop-button, assembled on top of a sphere shaped cast iron base, directly connected to the protection motor Carter.

Stainless steel fan group ASTM 316 with external structure to resist the temperatures inside the machine. Assembled on top of a steel structure with direct motor. Noise insulated Carter to avoid environmental diffusion of the noise generated by air turbulences inside of the fan. The fan is equipped with drainage valves to discharge the condensation fluid that forms on its inside, as a consequence of the existing humidity in the ambient air. The drainage is controlled by the machine’s programme command. Direct coupling with the shaft holding motor through “DE” parts inside a chamber that is filled with a special lubrication grease. Inverter command with indicator for the number of rotations.

Filter attached to the aspirator of the dying bath’s circulation pump. Made in stainless steel ASTM TP 304, it has a filtration surface that is proportional to the machine’s load capacity. Equipped with a ventilation faucet. Also equipped with two metal sheet-cartridges with 2 mm holes.
Level gauge with magnetic needle, positioned on the outside of the probe keg; on its inside there is the floater that indicates the real volume (in litres) in the machine. Outside the kier, we also find the pressure transducer.

Balcony on the front part of the machine to inspect the inside of the system. Fabric discharge cylinder controlled by motor-reducer Hp=1.

Stainless steel (ASTM TP 304) power panel sheet on the side of the dying machine; totally air and liquid tight; possibility of programming insert. Command repeater on the front of the machine, with electric selectors for the manual work phases. Alpha-numeric indicator showing the speed of the textile dragging reel (in m/min). Assembly of the electric parts of the power panel and attachment to the various motors and commands of the machine, that are pre-assembled.

Electric contact thermometer for temperature measurement.

Pneumatic valves in stainless steel for the total automation of the machine; the valves are attached to the system. All pneumatic stainless steel valves are equipped with a counter-flange, gaskets and stainless steel (ASTM TP 316) bolts. Pressure regulator to control the pneumatic valves modulated to the manual heating and cooling phases.

Programmation for the total automation complete with all stainless steel pneumatic valves

*Total programmer* to control all machine functions, which can be displayed on the LCD monitor. The various pages can be accessed with the help of a membrane keyboard. Programmable PC which uses a special software that was designed to optimise the use of the dying machine. The main goal was to reduce the possibility for human error during the programming phase.

The programmer uses an industrial PC which is based on an “open architecture” model and that can therefore be upgraded very easily, when necessary. The machine is equipped with a self-diagnosis system, which uses software of the latest generation and allows interventions on the machine via “tele-assistance”, if the machine is equipped with a modem and is connected to a telephone line.
This option makes it possible to reduce intervention times for the manufacturer’s personnel, because the machine’s function parameters can be read from a remote position, if a connection is established via modem with our customer services. In this case, modifications can be carried out according to the client’s requests. It can also verify malfunctions and contribute electronically to the resolution of the problem. (OPTIONAL)
1. STORAGE TANK

It contains the distilled solvent.
It is equipped with two inspection windows, glass included.
It is equipped with both suction- and delivery- pneumatic valves in order to be used as a rinse tank. It is standard made of STAINLESS STEEL.

2. MAIN DISTILLER

Thanks to a very exclusive way of solvent supply into the main distiller, a constant low level of about 250 l of solvent is kept for each distiller, so avoiding thermal SHOCK and foamy distillations; furthermore, the bottom of distillers is the heating zone and thanks to its important tilting, it helps the residuum drainage.
Distiller is equipped with the following accessories:

a) 350 mm inspection window
b) Internal lighting to help checks and maintenance operations
c) Safety valve connected to a closed system
d) Pneumatic stop of the inspection window
e) Safety micro-switch on the inspection window
f) Distiller inside temperature control thermostat (40 °C calibrated), which enables the inspection window opening at room temperature only.
g) 2 Still boosters, additional heat exchanger, located in the distiller. Distiller operates with 4.5 atm-saturated steam.
It is entirely made of STAINLESS STEEL.
Main distiller performance depends on the following capacity of condensation.
3. SECONDARY DISTILLER

Secondary distiller gathers main distiller residuum by recovering even residual solvent and by decontaminating all mud before discharging it into stocking drums. Secondary distiller, too, is equipped with the following accessories:

a) 350 mm inspection window
b) Internal lighting to help checks and maintenance operations
c) Safety valve connected to a closed system
d) Pneumatic stop of the inspection window
e) Safety micro-switch on the inspection window
f) Distiller inside temperature control thermostat (40 °C calibrated), which enables the inspection window opening at room temperature only, having a total capacity of 550 l.

This distiller can be equipped with both raclette and autonomous clean still.

4. CONDENSER DISTILLER

Condenser distillers are equipped with no. 6 condensers, of which no. 5 condensers are for the main distiller and one is for the secondary distiller, all of them are made of 316L STAINLESS STEEL and they all host finned copper cooling coils. Condensers may be supplied with their case inner part being Teflon-coated, so to minimize stray currents effects. They can also be supplied with their Teflon coated case and STAINLESS Steel cooling coils, as optional.

5. SEPARATOR

Separator is used to separate solvent from any moisture. It works according to the internal siphons caused by the difference between the specific weights of both water and solvent. It is equipped with inspection windows with glass included, a thermostat stopping the distillation in case of lack of cooling water, as well as special valves enabling the total filling and emptying. Separator contains 120 l of solvent and it is entirely made of STAINLESS STEEL. A water decanter is located at the separator bottom side. Water decanter gathers all water expelled from separator during the working day. Water purification due to the slow water decantation occurs overnight. Special valves enable recovering both the decanted solvent and the water expulsion. Water decanter contains 40 l of water and it is entirely made of STAINLESS STEEL.

6. WAITING TANK

It takes the solvent to be distilled, coming from machines. It contains sufficient lt of solvent and it is equipped with a main distiller control level device. An impurity basket filter easy to be checked and made of STAINLESS STEEL filters any solvent solid dirty. A special pump takes the solvent to be distilled from the main distiller through a level control. Some microswitches inside the waiting tank will
control the whole system operation. A 350 mm inspection window allows a quick internal inspection. It is standard made of STAINLESS STEEL.

7. SAFETY TANK

Made of FE 37 and coated with epoxidic products. It is the machine base and it gathers any accidental solvent leakage.

8. MUD PUMP

The mud pump, integrated by means of special devices, enables the decontamination of the end of distillation mud, which must be then directly transferred from the distiller into the stocking drums, so that the important distiller cleaning operation is totally automatic.

CLEAN STILL + RACLETTE

9. SECOND MUD PUMP

The second mud pump can be supplied on request, in order to separate services of solvent circulation performed by one pump only.

This option protects both pumps.

VARIOUS

MD 980 module is also equipped of the following automatic valves:
- STEAM SUPPLY
- CONDENSATE TRAPS
- THERMOSTATIC VALVES
on the cooling water system.

SOLVENT TO BE DISTILLED

The dirty solvent coming from the machine is sent to the waiting tank. A pump takes the solvent from the waiting tank and sends it to the level control, which is connected to the main distiller. Once the same level between level control and distiller is reached, any exceeding quantity will return to the waiting tank, through the overflowing tube, whilst solvent is constantly supplied to the distiller – in a quantity equal to the evaporated solvent. When the waiting tank is empty, the pump stops and the remaining solvent + dirty are expelled, thanks to gravity, into the mud distiller. This system allows a very effective and regular distillation and, first, all troubles due to thermal shocks are removed, since the solvent to be distilled gently enters into the main distiller.