CONTENT

5. Washer Extractors & How They Work

Chapter 1 provided an overview of the market and the key differences between OPL and industrial scale laundries. In this post, we focus on the washer extractor – the universally used, commercial scale washing machine.

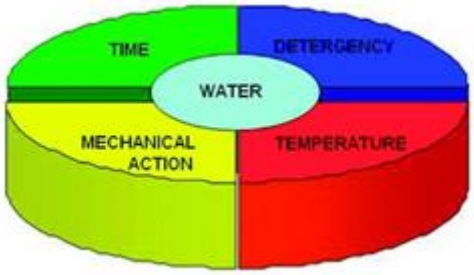
There are various sized machines available for the OPL market ranging from 5Kgs up to 350Kgs. For purposes of this post, we will focus on standard mid-size machines (16kgs to 45kgs) as these are the most widely used sizes in single-site OPLs. They are called washer extractors because of the high speed spin used between wash and rinse cycles which "extracts" the wash water from fabrics using centrifugal force.

They look similar and operate in much the same way as a domestic front loading washing machine, but are 3 to 30 times larger in terms of capability. Some of the largest models are so big that workers can easily stand up inside the wash drum for service and maintenance.

We looked at the evolution of the laundry machine in our "**A Brief History of Laundry**" series. A good example of how machine technology has developed is shown in the excellent video above from Primus showcasing their FX Line Washer Extractor when launched a couple of years ago.

The Washing Process

In all cleaning applications, whether it be mopping a floor, wiping a surface, washing up in a sink or laundering linen, it is important to realise that cleaning effectiveness is directly proportional to the relationship between time, temperature, chemical action and mechanical action. If any one of these key factors is reduced, it will need compensated for by an increase in one or some of the others. Dr. Sinner described how these factors can be represented in a circle to illustrate how the individual factors compensate for each other.



Dr Sinner's Circle

The above illustration shows that when each of the key factors are of equal proportion and the process for washing the items is followed correctly, it is likely that the laundered item should be clean and stain free. An imbalance or decrease in one of these variables must be compensated by increasing one of the others to prevent poor wash results.

In summary, effective laundry processes are dependent on the acronym **WATCH**:

1. **W**ater quality.
2. **A**gitation of the washer extractor.
3. **T**ime of the wash cycle.
4. **C**hemical concentration.
5. **H**eat of the wash programme

These five components work in harmony.

For example, 1) the purer the water and the higher the specification of the detergents used, the better the laundry results will be, 2) the mechanical action provided by the washer extractor exposes the surface area of the linen to the water/detergent solution thus ensuring good wash performance, 3) thermal energy also speeds up the chemical reaction to deal with staining, so the longer a wash load is exposed to appropriately heated water, high quality

detergents, and the mechanical action of the pre-programmed machine, the better the results will be.

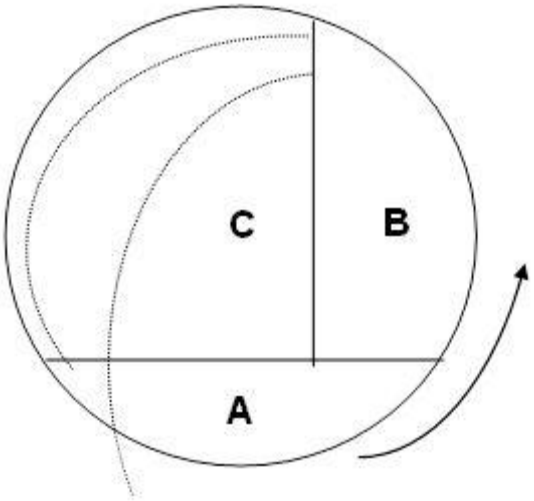
The Washing Action inside the Washer Extractor
The wash action involves three separate processes within 3 distinct areas of the drum, marked in the diagram below as A, B and C.

Soaking (A) The cloth is at the bottom of the drum and the fabric is being soaked.

Squeezing (B) The rotation of the drum carries the fabric towards the top of the drum and the fabric is being squeezed.

Rubbing (C) The rotation has carried the fabric to the top of the drum and it has fallen through an arc to make contact with the opposite side of the drum and the water in the bottom. In this area the fabric is being rubbed.

Direction of Drum Rotation
As the direction of the rotation of the drum alters, the position of items within the wash load will change. Items which were in the centre will find their way to the outside and, in this way, with frequent changes to the direction of rotation, all items within the wash should spend time on the inside and outside of the load. In other words, all items within the wash load should get the same amount of A, B and C. This of course assumes that the machine was properly loaded in the first place.



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Mechanical action in the laundry machine is determined by three factors:

1. Rotation of the wheel (drum or basket).

2. Amount of water in the wheel.

3. Amount of linen added to the water.

A laundry machine with a water level that is set too low and/or is overloaded with linen will create poor mechanical action. This scenario will also result in a poor distribution of chemicals as well as poor flushing and rinsing.

A machine with water levels that are set too high also causes problems. Not only does excess water dilute the cleaning chemicals (causing poor results), it also has a tendency to cause linen to float in the wheel, producing poor mechanical action.

The 7 Main Cycles within the Wash Process
The following guide explains the key wash cycles in a washer extractor, the choice of which will depend on the wash load and type of soiling:

❶ The Sluice Cycle: Most often used in the care home or healthcare sectors for laundry that has been contaminated with solid soiling such as faecal matter or vomit. It is run at the beginning of the wash cycle in order to physically remove solid particles prior to any detergent being added. High level, cold-water pre-rinses with agitation help dislodge solid matter and suspend it in the water until flushed away during a drain cycle.

❷ The Pre-Wash Cycle: Used to loosen lint and soiling and to soften any protein soiling originating from foodstuffs and body fluids. It requires a little detergency to help wet out the soiling, a minimum water dip level of 125mm and a minimum of four minutes below 38°C. If the temperature exceeds this, there is a good chance that protein stains (especially blood) will “set” onto the fabric and will not be removed in the main wash cycle. If the wash load contains a significant level of grease or oils like chef’s whites/cloths or beauty treatments then a chemical emulsifier should be added into the pre-wash.

❸ The Main Wash Cycle: Its function is to release the soiling/staining from the fabric and suspend it in the wash liquor. This is achieved by raising the temperature of the water to swell the fibres to help release the soiling and to accelerate the wash chemistry. It is also important that the correct rotational speed of the washing machine drum is maintained to provide adequate mechanical action as well as the correct lift and drop action. Unlike the pre-wash cycle, the water dip level needs to be lower at 75mm to maximise both the chemical concentration and the mechanical action. As the main wash cycle ends, the drain opens and the wash liquor is removed. There is no spin/extraction of the machine at this stage because of the risk of re-deposition of suspended soiling back onto the fabric.

❹ The Rinse Cycle: Used to flush away residual soiling and detergent by rinsing with clean softened water (which avoids lime-scale deposits from hard water salts) for at least three minutes.

❺ Inter-Extract Cycle: After each rinse cycle, it is usual to have an intermediate spin of about one minute to help remove as much soiling and residual chemical as possible before filling up again with fresh rinse water. It is usual to have no less than two rinse cycles up to a maximum of four installed.

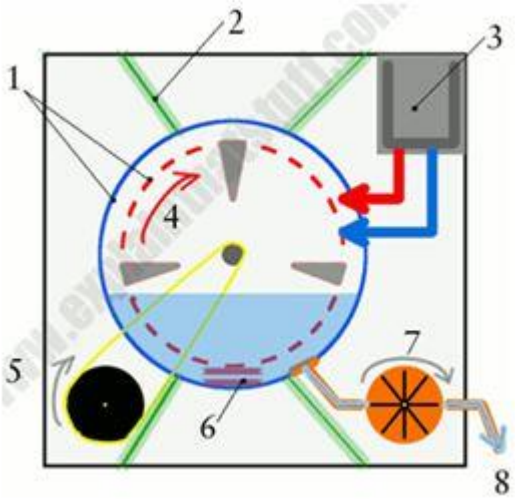
❻ The Final Rinse Cycle: During this cycle, finishing chemicals such as fabric conditioner or starch are added. The water dip level is not as high as the previous rinse cycles so as not to flush out the finishing chemical.

❼ The Final Extract Cycle: In this final stage, the rotational speed of the drum continues to increase to the desired speed to spin out as much water as possible. It is much better to have well-spun (drier) items prior to the tumble drying process as it uses less time, energy and utility costs in the long term.

Although not an exhaustive list by any means here are some reputable providers of washer extractor washing machines that will in some cases operate through a third party agent for direct customer sales

- **Electrolux**
- **Primus**
- **Miele**
- **Grandimpianti**
- **Girbau**

A Simple Explanation to How a Washer Extractor Works



1. There's a fixed outer drum (blue) and a rotating inner drum (red) with small holes around its edge. The drums are mounted on a horizontal axis.

2. The inner drum ("cage") is held to the frame of the machine by heavy-duty springs. That's because, when the clothes spin, the drum can shake violently, and the springs help absorb the vibrations.

3. Hot and cold water enter through the detergent tray at the top.

4. The inner drum turns back and forth. The paddles (lateral lifters) on the inside (shown here by grey triangles) help to slosh the clothes through the detergent and water held by the outer drum. The lifters are also designed to give a lift and drop action, which is essential for good washing and which can be verified by looking through the window of the door.

5. An electric motor turns the inner drum, typically using a long rubber belt (yellow).

6. A heating element heats the water as necessary.

7. When the wash cycle is finished, the pump sucks the water away.

8. The water empties down a tube to the drain.

9. The machine then opens up the water valve again to allow fresh water into the drum and the clothes are rotated in this fresh water to rinse away any detergent/ scum left after the wash.

10. When the first rinse cycle is finished it will drain and refill again up to three times.

11. When the machine enters the final rinse the fabric softener, starch or other finishing chemical is added.

12. When the machine has finished its final rinse it is then spun at the designated spin speed to extract the water from the items being cleaned.

13. When finished the machine will enter a 'distribution' cycle that rotates the clothes back and forth to untangle, redistribute them inside the drum to make it easier to remove from the inner drum.

The Washer Extractor Load Factor: Dry Weight

Knowing the dry weight loading of the machine is critical as this will determine the size of the wash load(s) that it can handle effectively. This information also helps the chemical supplier to determine the correct dose of detergents required for each wash. This capacity or dry weight information is usually found on the 'rating plate' normally located on the back of the machine. The type and model number and serial number are also important for engineers when setting up a new detergent auto-dosing system.

The technical term used for the inner drum of a washer extractor is called a "cage" and it is the size of this metal cage that determines the amount of washing that can be loaded and NOT the Kg capacity of the washing machine. i.e. a 13 Kgs machine does not mean that you can fill it to its capacity with 13 Kgs of items to wash.

It is therefore important to know, from the washing machine manufacturer, the size of the actual cage capacity. Thankfully, most of the main washing machine manufacturers work to a

similar load factor. The work loading factors of cage space per Kg of dry washing load (weight) are:

- Cottons: 10 litres
- Woollens: 25 litres
- Poly-cottons: 12.5 litres

Therefore, a 360 litre cage can be loaded with 36 Kgs of dry cotton items (360/10). This should mean that the items will be 'lifted' or agitated by the drum action and washed correctly. If this wash load were increased to 40 Kgs (over-loaded), it means that the work may not be cleaned correctly because of inadequate soaking, squeezing and rubbing action.

When calculating the load factor for polyester and poly-cotton items, the load factor is calculated at 80% for that of cotton items due to less water absorbency from the items in the drum.

The wash load in the machine absorbs a significant amount of water/chemical solution. For example 50 Kgs of dry weight of cotton sheets will retain 125 Kgs of water i.e.: 250% moisture retention after drain only. This will reduce to 25 litres of water per 50 Kgs after a nine minute spin to give 50% moisture retention. It follows, therefore, that if the machine is over loaded, a disproportionately large amount of the wash liquor is retained in the wash load and carried over to the next cycle of the wash process. The net effect is that this will result in poor wash results and make efficient rinsing of the fabric difficult.

The Origins and Main Types of Soiling Within the Laundry Process
There are different categories of soiling and each of these needs a particular set of conditions for efficient removal. The main categories are:

- **Water Soluble Stains** such as sugar and salt will dissolve quickly in the water within the wash process.
- **Oily or Greasy Soiling** such as sweat, skin creams and suntan lotions will require higher alkalinity of the wash liquor and higher temperature for adequate removal.
- **Protein Stains** produced by the body (either animal or human) such as meat juices,egg, albumen, milk, blood, faeces need lower temperatures, an adequate bleaching agent and more mechanical action.
- **Particulate Soiling** such as household dust, smoke or sand needs mechanical action and high water levels for adequate removal.
- **Vegetable Dye Stains** such as wine& beer, fruit juice, grass, beer, curry spices, tea/coffee/tannin and beetroot are removed with destaining liquids or powders and mechanical action. Modern chemical de-staining solutions can remove these at lower temperatures.

- **Mineral & Metallic Soiling** such as aluminium or rust marks are difficult to remove by just washing and normally require special pre-treatments. For example rust can only be removed by treating with oxalic or hydrofluoric acid.

6. Sorting, Manual Handling & Laundry Safety

In this post we look at the importance of good laundry and housekeeping practices in the collection and sorting of laundry. The method of collection of soiled linen is vitally important. If items are not then sorted correctly, all other processes will fail. All collected items MUST be sent to the laundry as soon as possible so that they can be returned into service in a pristine condition. Remember, it takes seconds to collect but hours to launder.

It is recommended that dirty laundry is delivered to the laundry on a daily basis in colour-coded textile bags – **RED bags** should only be used for transferring 'at risk' laundry. No alternative packing or wrapping system should be used – e.g. bin bags or knotted sheets – as only professional textile bags are acceptable for the transportation of dirty laundry.

The textile bags should always clearly indicate the content type (not where it came from), and should close properly and be in good condition. From a manual handling point of view, the bags should be no more than two-thirds full with a maximum weight not exceeding 10kg.

The efficient flow of laundry through an OPL is dependent on collecting the soiled fabric, transporting it to the laundry via laundry trolleys or linen chutes, and sorting it by the degree of soiling and by the fabric type (fibres, weaves, colours and categories).

Sorting

Sorting involves more than just segregating coloured garments from white work. It involves collating items of similar colour, construction, and soil level; in other words, items which are compatible with each other and with the washing procedure selected.

Sort by Colour: Colour categories may be **(1)** whites or white-background prints that are colour-fast; **(2)** colour-fast pastels in solids and prints; **(3)** medium and bright colours, both solids and prints; **(4)** dark colours. Colour fastness is the resistance of a material to transfer its colour(s) to adjacent materials, or into the wash water during washing. Check the care label – if it states "wash separately", this indicates that an item will probably lose colour. If

there is any doubt, these items should be washed separately or with similar colours only, at least for the first few washes.

Sort by Fabric Type: Separate loosely knitted or woven fabrics, sheers and "finely" made garments with delicate trimmings, narrow seam allowances or unfinished seams that will fray. These will all require a shorter wash time and gentler agitation. Also separate from any load the heavy lint-producers, such as chenille robes or spreads, new towels or flannel night wear and fuzzy sweat suits. Wash them together if colour permits, or wash separately.

Sort by Degree of Soiling: Keep heavily soiled or greasy items separate for washing. When heavily soiled pieces are washed with lightly soiled ones, the latter may pick up soil from the wash water. Whites may take on a grey or yellow cast; colours may become dull and extra work may be needed to get whites and coloured work bright again.

Sort by Item Size: Mix large and small items together for better washing action. A typical mix for a regular capacity washer might include one or two sheets, several pillow cases, two to four shirts, and blouses, with the balance of the load made up of underwear and other small items. Wash large items (blankets, bedspreads, rugs, mattress pads, etc.) separately, adding a few towels if necessary to balance the load for proper spinning action. Generally, two twin-sized bedspreads or blankets can be washed together, but be sure that the bulk does not overload the washer.

The following video, filmed in the US, shows how Bill and Renee McDermid, owners of the Hampton Inn & Suites, in Boulder County, regard their laundry service as a critical contributor to guest satisfaction and how important it is to have good quality equipment and well managed processes.

They say they are in the business of guest satisfaction, not the laundry business, so they depend on their equipment and consumables suppliers to play their part. It is a great example of how a well-managed laundry process can make a positive difference to a business and customer satisfaction levels.

Health & Safety: Storage & Handling of Chemicals

Safety in laundry areas is of paramount importance and includes the safe storage and handling of the laundry chemical containers. Laundry chemicals can have a variety of hazard classifications, so it is important to be able to correctly identify the hazard warning labels, know exactly what these hazards mean, what the potential risks are, and what preventative measures you must adopt to remain safe in the laundry.

A whole raft of new regulations are winging their way towards manufacturers of professional cleaning products, none more significant than the new system for classifying, labelling and packaging chemicals. These new regulations will lead to changes to the hazard classifications and labelling of most institutional cleaning chemicals, including laundry chemicals, all of which must be in place by 1st June 2015.

To download or view our e-Book explaining the new chemical hazard pictograms **click here**.

All laundry chemical containers must be stored in a safe manner and in a suitably locked storage area away from the general public, patients, guests or residents. Laundry chemicals should be stored as follows:

- In a ventilated area that is not too cold because some products thicken in extreme cold, making them hard to pump through laundry units.
- Out of direct sunlight to stop them decaying or, in extreme cases, combusting.
- Stacked no more than 2 containers (10, 20 or 25lts) high and at ground level with the caps securely fastened and the labels visible and readable.
- Powder detergents should be stored in a plastic laundry bin with a lid or in the plastic container in which it was supplied. Any scoops provided for dispensing a powdered chemical must be kept within the plastic container and be kept dry at all times.

Replacing Empty Containers

You can ask your chemical supplier to install an "Empty Container" alarm within the auto-dosing system. Before disconnecting the cap from the empty drum, it is important to have the new full container in position next to the one you are removing.

A reputable chemical supplier will provide colour coded product name tags to label chemical uplift tubes and make clear which tube should be placed in to each detergent drum.

Only when this container is in the correct position should the transit cap be removed from the new container and the cap/tube from the empty drum then transferred to the new container.

It is important that only one product is changed at a time to minimise the risk of chemical cross contamination caused by accidentally inserting a feed tube into an incorrect product. This may cause a dangerous chemical reaction or could lead to other laundry related problems.

After replacing the empty container with a new full container, the empty container should be thoroughly rinsed out and disposed of safely.

Never mix chemicals together or re-fill containers from other vessels or drums.

Potential Dangers of Peroxide Destainers

Peroxide destainers are widely used but must be handled carefully. Extreme care must be taken to ensure that no contaminants can enter the container (especially metal objects) as this can destabilise the mixture and cause a chemical reaction, in some cases a violent one. The chemical within the container can heat up rapidly causing it to 'gas off' and, if it cannot escape, the drum may expand and eventually burst.

Always ensure that the peroxy container in use has a proper fitted lid that has either a controlled dilution dip tube or has been carefully drilled out with a slightly larger hole than the tube diameter to enable any gas to escape. When changing an empty peroxide container for a new full container, never put the chemical uplift tubing on the laundry room floor. Always take out the empty container and put straight into the new container. This ensures that no contaminant can be picked up on the uplift tubing which again could cause contamination of the new drum and possibly destabilise the product.

Use Personal Protective Equipment (PPE)

When handling laundry detergents, especially when changing over drums, ensure staff always wear the correct personal protective equipment (PPE). As most laundry chemicals have hazard symbols on the label, PPE should always be made available.

This is covered by the Health & Safety at Work Act and it is the responsibility of all employers to ensure that staff are all trained in the safe use of chemicals (usually assisted/overseen by the **chemicals supplier**) and that appropriate quantities/quality of PPE are provided (rubber gloves/gauntlets, chemical safety goggles and face masks).

Ensure the Laundry Room is Cleaned Routinely

A littered laundry room can be a potential health and fire hazard. It can very easily be over-run with old tissues from patients clothing, badges from staff uniforms, excess lint from clothes, fluff from dryers, old empty chemical containers, general litter and residual water from washing machines.

It is important that a rigid cleaning regime is in place – regularly disinfect and clean all surfaces within the laundry and always mop up debris and spillages immediately. Lint filters on dryers must be cleaned out and emptied at least daily to stop the potential of a fire. This process also improves the efficiency of the dryer saving energy costs and time.

7. Fabric Types, Tumble Drying & Ironing

In this, our penultimate post in this **series on professional laundry**, we give an overview of the key fabric categories, information from care symbols and the importance of correct drying and finishing procedures. Let's firstly look at the main fabric types and how they should be washed.

Polyester is a strong and durable synthetic fabric. It dries quickly and can be washable or dry cleaned only, so check your tags. It is often used as a blend with other fabrics to lend wrinkle resistance. It is not the easiest fabric from which to remove stains.

Linen is a natural fibre that is very strong and irons nicely to a nice crisp finish. It is often used for tablecloths, sheets, and curtains. Linen also has a nice comfortable shape and feel that make it a popular choice for clothing.

Nylon is a synthetic fabric that is strong and lightweight and is easy to wash and take care of. Because nylon resists moisture absorption and dries easily, it is often used for swimwear and active-wear.

Acrylic is a synthetic or manufactured fibre that is both soft and lightweight which dries easily and is machine washable. Acrylics are popular because of their ability to retain their shape and texture after washing and drying.

Cotton is probably one of the most common fabrics in clothing. It is a natural fibre, easily washed and/or dry cleaned. Cotton is a strong fabric which is absorbent and easy to work with. It does have a tendency to wrinkle very easily, hence the popularity of cotton/polyester blends.

Poly-Cotton is made by combining strands of cotton and polyester. This blend combines the natural effects of cotton for softness and moisture absorption with the no-iron crispness of polyester. Whichever fibre content is listed first is the dominant fibre. A standard everyday

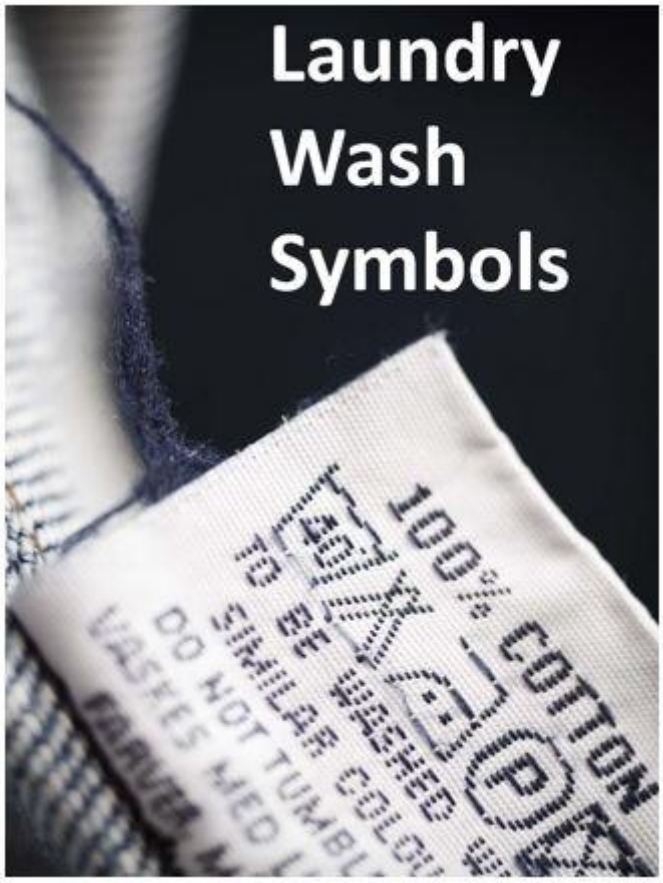
poly cotton mix is 65% polyester 35% cotton, which is normally the construction of standard bed sheets and bed linen.

Fabric Care Labels Information

Care Labels should include "appropriate and adequate" instructions for the safe and effective cleaning and maintenance of the fabric. Care instructions will also advise of any laundry treatments that are not suitable and if any special care is required.

The label should provide instructions and warnings about washing temperatures, drying and ironing instructions or whether it is hand-wash or dry clean only. Fabric care instructions for special items are usually determined by the fibre used and its construction; whether dyes are used (colourfastness) or if there are any special treatments applied (waterproofing). Therefore, in the OPL, garments and care labels should be carefully inspected before washing.

For a detailed list of the wash, dry and ironing care symbols in use, and their meanings, please click on the image below:



(**Download Laundry Wash Symbols PDF**)

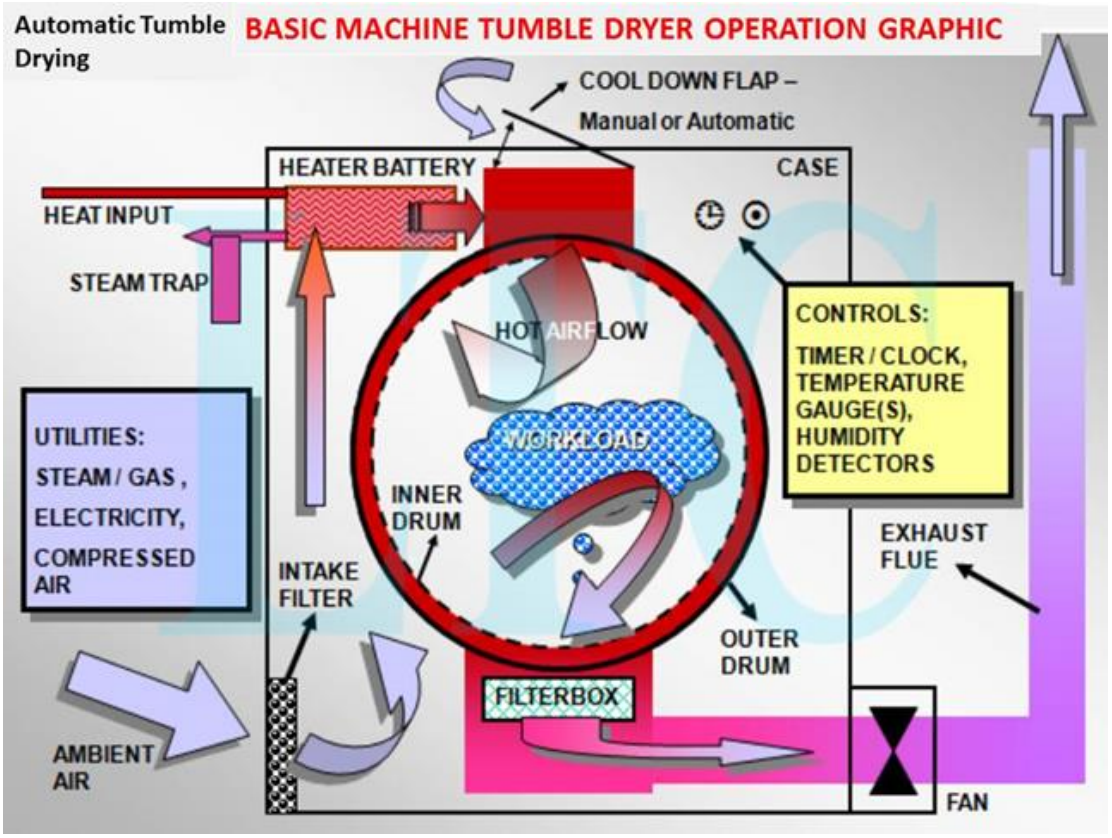
Commercial Tumble Dryers

Tumble drying is the most energy intensive part of the laundry process using up to 60% of total energy costs. Therefore, this area needs thorough and disciplined management. It costs 15 times more to dry/extract 1 Kilo of water in a tumble dryer than it does to extract the same mass of water using a washer extractor only.

How Does a Tumble Dryer Work?

Tumble drying uses hot air to heat up damp textiles being rotated and "thrown" around in a perforated cylindrical cage – until the water is evaporated and the textiles are dry. The illustration below explains how a tumble dryer functions:

1. Surrounding air is taken in via the intake filter.
2. This air is then passed over the heater battery (radiator) – this heater battery will either be steam coils or an open flame sustained by gas supply.
3. The hot air then enters the perforated cage and heats up the rotating damp textiles.
4. The "spent" air (with added water vapour that has been evaporated from the textiles) then passes over the filter box with lint screens before being extracted to the atmosphere by the extraction fan.
5. The outlet of air is known as the exhaust flue.



***LTC & DTC acknowledgement**

Three Ways to Ensure Tumble Dryer Efficiency

The moisture still retained in textiles after centrifugal extraction from the washing machine will determine the effectiveness of the drying process, so failing to manage fabric moisture retention can lead to excessive drying costs. Here are some basic tips to ensure drying is as efficient as possible:

1. Ensure that steam traps on steam heated radiators are functioning efficiently. Steam condensate build-up will cause a drastic temperature decrease in the steam supplied

and the incoming air will not be heated to the intended temperatures – the drying process will then be lengthened.

2. Ensure driers are well insulated and sealed. If air seals and drier panels are correctly fitted and well maintained at all times, it will prevent heat radiation losses to the surrounding environment and will prevent cold air being sucked into the machine (tumblers work under slight negative pressure).
3. Control the drying time, ensuring that fabrics are not over-dried for too long, as this leads to waste of energy.

Correct loading of the tumble dryer is critical to airflows and to the effective evaporation of moisture. The load's residual moisture after washing, the fabric type and the size of the items to be dried should all be taken into account when maximum loading weights are determined for different classifications.

Therefore DO NOT over load the machine – it will merely result in a very inefficient drying process.

Cotton items are generally loaded to the machine's full capacity, but polyester cottons should be loaded to approximately 75% of the tumbler's capacity and should be dried on shorter drying cycle times to prevent pressure creases forming during the drying cycle. Very bulky items such as duvets may have to be dried at only 35% of the maximum capacity.

Ensure that the extraction fan (in the drier ducting) is correctly sized, installed correctly and kept clean and well-maintained at all times, as this is the source of adequate air flow and it is therefore imperative that this fan functions correctly.

Ensure that the lint screens are cleaned hourly as blocked filter screens will again significantly reduce air flow and put pressure on the drying processes. Lint is also a major fire hazard and therefore regular lint screen cleaning is essential for health and safety purposes.

Airflow is reduced when the perforations in the dryer cage becomes blocked. Lint and debris will block the perforations therefore, to maintain airflow, it is important to make rigorous checks to prevent debris from entering the dryer.

Once the cycle has been started, the dryer should not be stopped for any reason – for example, to check if the load is dry – as this will extend drying times. A cool-down must always be selected with any fully dried cycle to minimise the slight possibility of combustion.

Drying programmes are usually set in collaboration with your machine provider and will vary according to differing textile classifications – based on time, temperature and relative humidity of the dryer.

An example is shown below:

150° C - 160° C

Whites/Colours

Cottons, denim, towels and bedding.

140° C - 150° C

Perm Press (Synthetics)

Lighter items such as shirts and T-shirts.

110° C - 120° C

Delicates

Cool dry for delicate fabrics like silk.

TOP TIPS

- When the dryer is not in use switch it off at the wall and close the door.
- Ensure that your dryer is installed correctly and has adequate ventilation.
- Finish every programme with a cool tumble cycle provided on the control panel.
- Ensure that the filter is kept clear of fluff after EACH drying cycle.
- Observe the fabric care instructions – woollen articles should not be tumble dried and, unlike some other materials, the mechanism of wool shrinkage is irreversible.
- Ensure you have on-site accessories and spare parts, as this equipment is always in use and crucial to the efficiency of the laundry.

Commercial Ironers

A professional laundry should buy the very best model of ironer they can afford. Ironing (finishing) is one area where the smaller professional laundry may struggle to match the quality of the larger commercial laundry. Organising a modern high volume ironer line so that it runs at its maximum capacity and still produces high quality finished textiles can be a challenge. Paying attention to a few important details will ensure superb results and good productivity, even with relatively old equipment.

Extraction and Conditioning

Ideally, to obtain the very best results, linen should go straight from the washer-extractor, before it has a chance to dry out unevenly in the atmosphere. To ensure high productivity and cost effectiveness, the fabric's moisture should be lowered as much as possible by the washer's final extract cycle, and ideally they need to be run for nine minutes at full speed.

Prompt transfer to the ironer will then ensure a consistent level of moisture as the laundry enters the ironer. There needs to be proper process planning at this stage to avoid a queue at the ironer. N.B. tumble drying time should be kept to a minimum, because removing moisture in the tumbler rather than the ironer is very expensive. Making an efficient ironer do the drying eases pressure on the tumblers, improves quality – and reduces costs.

Maximising the Ironer Productivity

The ironer's drying power is governed by the size of the heated bed. To realise the full potential, the bed should be covered with drying flatwork for as much time as possible. Maximising bed coverage is far more effective than running the ironer faster.

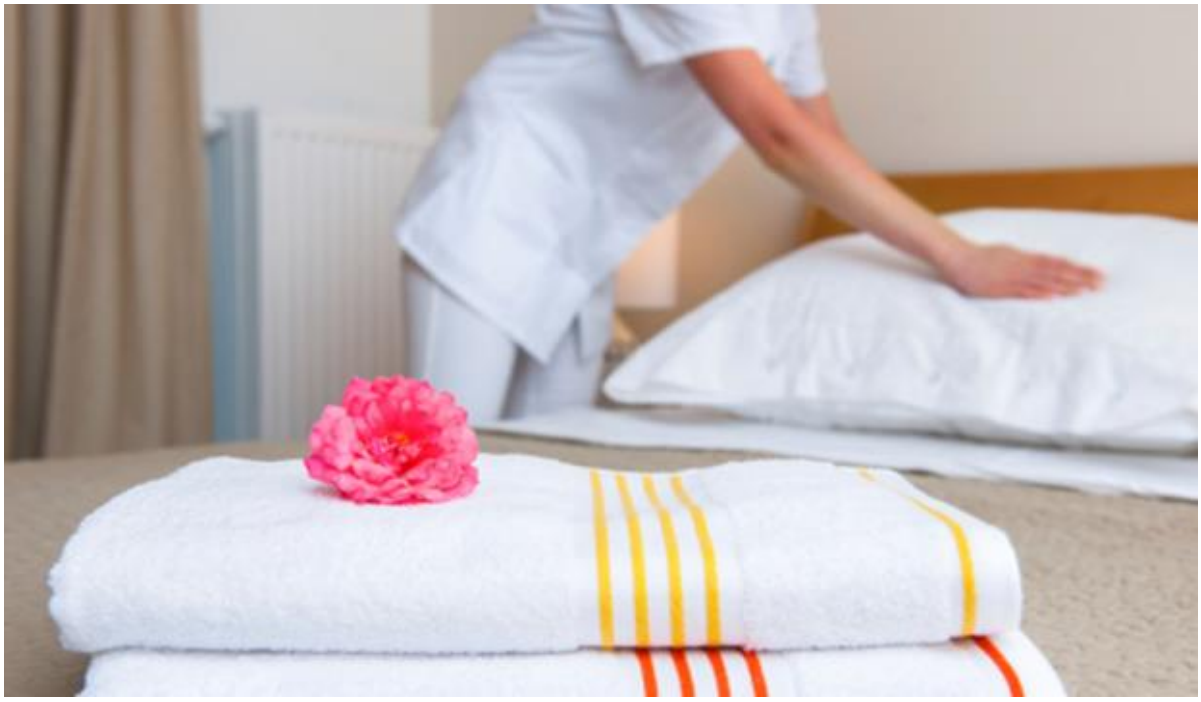
The bed temperature should be uniform without any cold spots as these will cause drag, distortion and wrinkles. Cold spots at the lowest point of the bed are usually caused by blocked or under-sized steam traps. Steam-heated ironers will only work properly if they receive dry steam at constant pressure and most engineers know how to achieve this.

Flatwork Ironers

Flatwork ironers are often used in larger laundries requiring high production and high volume outputs of quality dining and bed linens. Depending upon the design, these ironers may be capable of producing from one hundred pounds per hour to seven or eight hundred pounds per hour.

Flatwork ironers require regular cleaning to remove residual softener from the wash process, mineral deposits from water evaporation and any general grime that may either damage the linen or impair operation of the machine.

8. Re-Washing & Identifying Common Problems



In the final post of our **8 Part Professional Laundry series**, we look at operational efficiency, re-wash rates, common problems and solutions. Every laundry has the ability to reduce operating costs, energy use, improve operating efficiency and results. The starting point is an understanding of the total operational costs per kg of laundry.

To establish the quantity of linen processed, digital scales are used to physically weigh the washed/dried linen. From this, an accurate average of weight processed per week can be calculated. Everything else in the laundry revolves around this information including laundry procedures, staff hours, the size of machinery required, and ultimately the production costs per kilo of processed linen.

The cost per kilo of clean linen includes all costs within the laundry including utilities, labour, the depreciation of machinery, replacement of linen, chemicals and other sundry costs. When these production costs are itemised, the laundry manager then has a benchmark to compare costs and efficiency with other similar laundries. For example, a laundry washing large amounts of restaurant linen will have a higher operating cost per kg due to the heavy duty programs required compared to a laundry washing mostly bed sheets and towels.

Is Your Laundry Production Capability Correctly Scaled?
Undersized washer extractors lead to higher laundry costs because it results in laundry staff:

- Working longer hours to get the washing done.
- Taking shortcuts so they can finish within the hours allotted.
- Tending to put a lot of the washing through on short cycles.
- Skipping critical wash programmes such as pre-wash or rinse, or shortening the wash time.

It is also important to get the right ratio of tumble dryers to washer extractors because working with undersized dryers can cause bottlenecks in a laundry.

Are Your Re-Wash Rates Acceptable?
Every laundry manager's dream is to achieve 100% clean results every wash. In the real world this is highly unlikely and the target therefore is to keep rewash rates as low as possible.

Remember the five basic factors that contribute to clean linen?

- Time.
- Temperature.
- Chemical action.
- Mechanical action.
- Procedures.

Deficiencies in any of these factors can lead to higher reject rates. For example, contact time in various cycles of the wash formula are important, as are sufficient pre-flushes to help reduce water soluble soils and sufficient post-rinses to remove residual soils and chemicals from linen. Failures in any part of the process are likely to lead to higher re-washes.

Average re-wash rates per business type include:

- Hospitality: 2-5%.
- Nursing Homes: 6-8%.
- Hospitals: 4-10% (due to a wide range of variables).

Whereas hotels may experience a 2-5% re-wash rate predominantly due to human error, in care homes the percentage is slightly higher at around 6-8% and this is normally due to:

- Washing machines used in care homes are usually smaller than those found in large hotel laundries.
- Staff wash more varied wash loads.
- Care homes use more varied wash temperatures (from 30°C to 90°C, whereas hotels usually wash most at +60°C).
- Under time pressures, operatives may select the wrong wash programmes to speed up the overall wash process.

Every laundry should implement a strict classification procedure so that only very soiled linen is washed in a heavy duty wash programme. Proper classification of linen is important as are dependable relationships with your laundry equipment/chemical suppliers who will assist in ensuring wash standards are being met.

BEWARE: Re-wash levels lower than 1%
This may seem highly efficient but also may indicate excessive use of detergents and a reliance on hot wash (heavy soiling) programmes. The resulting "cost" to the business will be the cost of replacement linen caused by above average linen damage.

BEWARE: Re-wash levels higher than accepted levels
Obviously this is unacceptable and may be an indication of poor linen classification or inappropriate washing procedures, both of which may lead to discoloured or unclean linen and increased labour time to remove staining.

Common Problem 1: Yellowing (or Galling) of White Fabrics
This yellowing effect is caused by residual alkali left on the fabrics which have not been rinsed out properly at the end of the wash cycle (more common when a detergent booster is used in conjunction with the main detergent). When this is not properly rinsed, it may cause a chemical reaction between the residues in the cloth and the heat of the dryer. It can also be caused if chlorine bleach residues are left as a result of carry-over from the first rinse of a wash cycle. To prevent yellowing, a laundry sour chemical can be used to neutralise the residual alkalinity. Sours are normally colourless with an acidic odour and, if required, are dosed in the last rinse cycle.

Common Problem 2: Greying of White Fabrics
This is usually caused by insufficient/low concentrations of detergent in the main wash cycle. Too little detergent will not adequately suspend the soiling and it can re-deposit back on to the washed fabric. Greying can also be caused by over drying or it can incrementally build up in hard water conditions if the water is not sufficiently softened (which eventually leads to the fabrics being washed out, requiring replacement). NB: Greying on poly-cottons cannot be rectified as the surface will be physically damaged – this is why most poly-cottons are non-white/pastels).

Common Problem 3: Fraying
Normally caused by either 1) chemical damage through use of excessive bleaching or 2) using a low temperature pre-wash followed by an intense hot main wash programme. Any over bleaching will cause progressive rotting of fabric which will need to be replaced. **NEVER USE CHLORINE BLEACH IN THE HOT WASH** as this seriously damages fabrics. Remember, protein staining must be washed out of fabrics and not bleached out.

Common Problem 4: Rust Stains
Rust spots on clothing usually come from rust/iron deposits breaking loose in water pipes or water heaters and finding themselves in the washing machine. Rust staining can also occur from iron deposits in water e.g., following droughts, when the water levels are low, sediments

can accumulate within pipes and affect the water supply. Rust cannot be washed out normally and can only be removed by special chemical treatments using either a Hydrofluoric acid or an Oxalic acid solution. These are hazardous chemicals and extreme care must be taken to ensure fabrics are properly re-washed to remove any residual chemical.

Common Problem 5: Mould & Mildew Stains

Mildew can attach to cotton, linen, silk and wool fibres as well as synthetic fibres. It effectively eats natural fibres, damaging and weakening the fabric, and leaves unsightly stains. The most common cause of mildew growth is damp laundry being left/stored too long before it is washed. To remove mould and mildew, the fabric should firstly be vigorously shaken or brushed outdoors to prevent its spread within the laundry area. Remove as much of the powdery substance as possible being sure to brush both sides of the fabric. Remember that mildew spores can be harmful and should not be inhaled, so a face mask is essential.

Pre-treat the stains if possible with a liquid detergent. Allow to work for at least 30 minutes. Then launder the fabric in the hottest water suitable for the material. Chlorine type bleach can be used on white 100% cottons to help restore whiteness. Oxygenated bleaches can be used on coloured fabrics or man-made white fibres (polyester, acrylic, nylon) to remove the stains.

Completely submerge the items and allow them to soak for at least eight hours. Check the stain and if it is gone, wash as usual. If it remains, mix a fresh solution and repeat. It may take several soakings to remove the stain but it should eventually be removed.

A 10 Step Guide to Stain Removal

The following 10 simple guidelines will help you address staining problems.

1. Treat the stain as promptly as possible – do not delay.
2. If you are using a specialist destaining fluid, follow the instructions for use religiously – do not experiment.
3. Test first in an inconspicuous spot to check for colour fastness before you go too far.
4. Apply stain treatment to the back of the stain as the goal is to remove the stain from the clothing. If it is a large stain on a larger item soak in suitable pre-wash container such as a sink or plastic bucket.
5. Be wary of the effects of bleaching agents as bleaching one stained spot may result in uneven colour removal and ruin the entire garment.
6. Do not mix stain removal products as they can cause toxic odours and cause damage to fabrics/clothing.
7. Wash stain treated items a soon as possible after treatment.
8. Be careful when using any dry cleaning solvents. Ensure they are rinsed out thoroughly, and air dried. Never put dry cleaning solvents directly into the washing machine.
9. Be patient! Stain removal can take time and may sometimes require repeated treatments.

10. Some stains cannot be removed without damaging the clothing or its colour so be aware of what is/isn't possible.

We hope you have enjoyed our **8 part series on Professional Laundry** and hope have found it helpful and interesting. We will shortly be preparing a downloadable e-book containing all 8 parts, so please look out for it. We would like to thank the Laundry Technology Centre for their content verification input and other contributors.

Look out for our next series of blog posts covering Green Cleaning – expelling the myths, chemical dosing, the true meaning of concentrates and other industry hot topics.

You will find Professional Laundry e-book 1 (Parts 1-4) covering 'Processes and Practices' on the Arpal Group Blog at www.thearpalgroupblog.com.