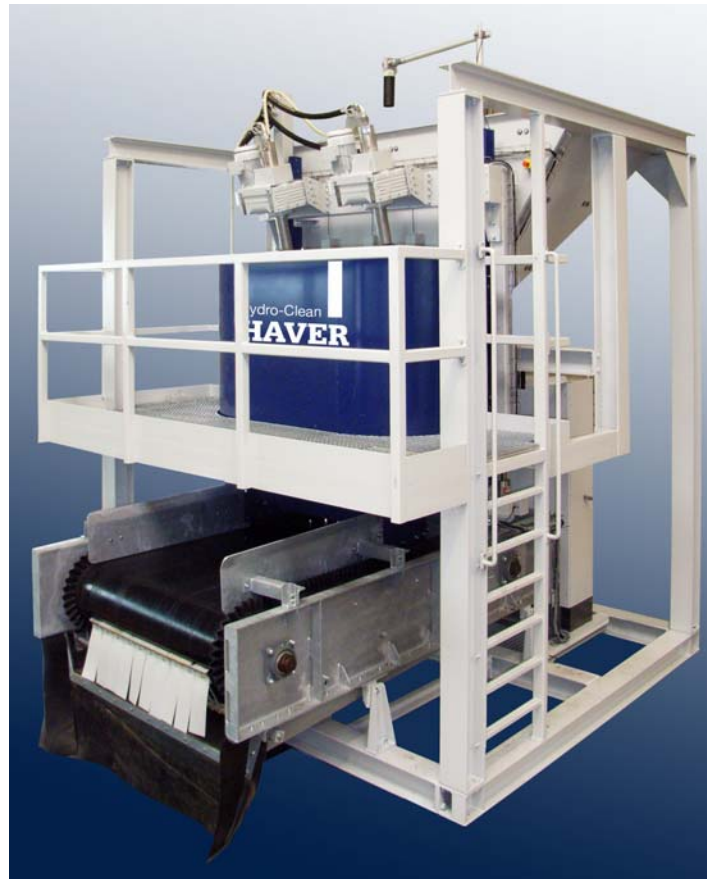


TECHNICAL SPECIFICATIONS



TYCAN Hydro-Clean

High Pressure Washing Technology

Thank you for your interest in the TYCAN Hydro-Clean.

General Information

The Hydro-Clean is the latest innovation in washing technology for the mineral processing industry developed based on years of experience in processing plants, systems and components. The first application of the TYCAN Hydro-Clean was for washing aggregate materials. In addition to this conventional application, today there are units in operation within the minerals industry (diamonds, gold, limestone and gypsum) and the recycling industry (building gravel). Other industries that have demonstrated interest in this technology include iron ore, bauxite, nickel, kaolin, phosphate, coal, emeralds, glass and plastic recycling.

The Hydro-Clean operates under the principle of high-pressure washing. It can be used for the economical and environmentally-friendly cleaning of sticky clay, soil and other impurities from raw material with a size fraction from 0 - 6" (0 - 150 mm). The water pressure can reach up to 2900 psi (200 bar) with a water consumption of 27 - 211 gpm (6 - 48 m³/h) and an energy consumption of 34 - 300 hp (26 - 224 kW), depending upon the size of the unit. The intensive water pressure to be used is determined beforehand and, in most cases, lies in the range of 870 - 2600 psi (60 - 180 bar). Its continuous mode of operation can operate with a feed rate up to 400 t/h.



Technical Principal

The Hydro-Clean consists of a vertical washing container, which has a feed hopper at its entry and a conveyor belt at its discharge (see Figure 1). This washing chamber is the central element of the Hydro-Clean. It contains a rotating washing head, which is mounted on its top side and consists of several water nozzles. The Hydro-Clean also features polyurethane panels that line the washing chamber, variable height adjustment at the rotary wash head, and the ability to adjust the discharge belt and controlled feeding system based on the bulk material in order to yield optimal cleaning results. The entire Hydro-Clean unit is electrically driven and controllable by way of PLC.

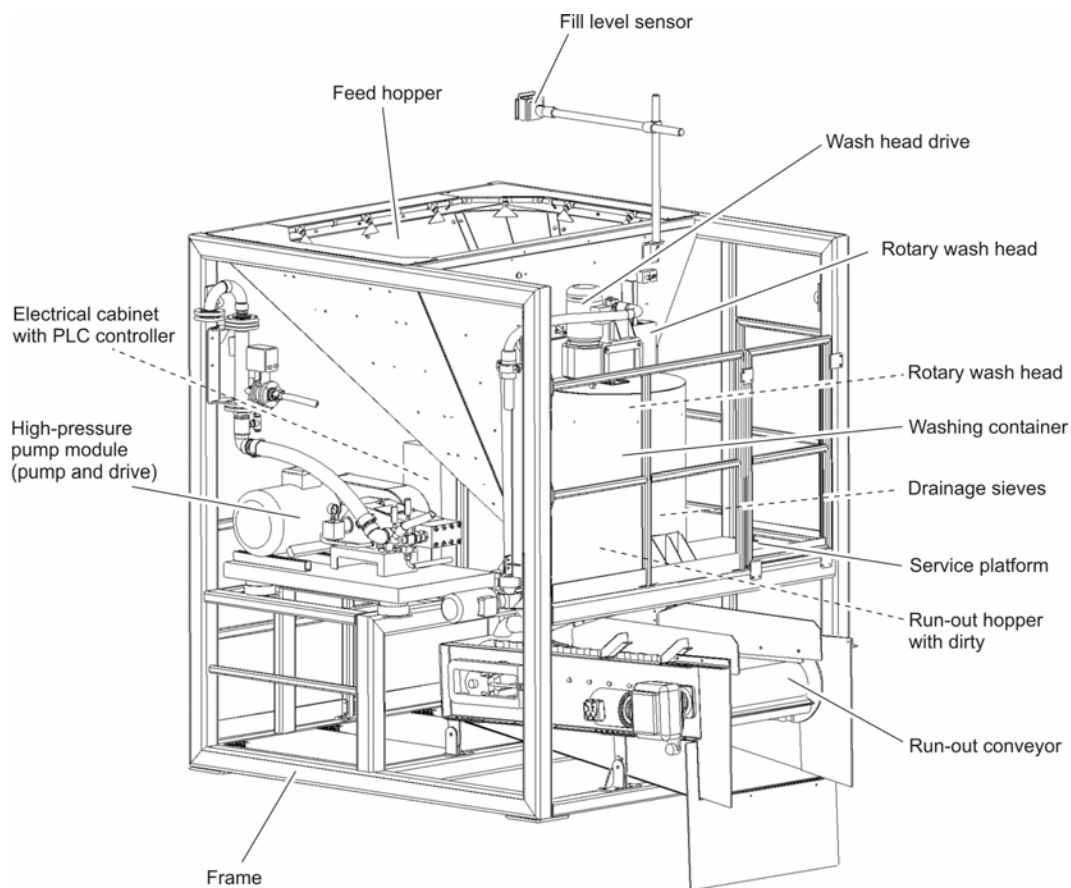


Figure 1 - Main Components of Hydro-Clean

The Hydro-Clean mode of operation begins with the material being continuously fed by a conveyor belt into the feed hopper (see Figure 2). Small water jets mounted on the side walls of the hopper create a low pressure downstream current, which helps the material, particularly sticky material, to flow into the washing chamber. From there the material falls over a run-in floor into the washing chamber and forms a column of material. The height of the material in the hopper is constantly monitored by a laser level indicator that provides exact data to the PLC unit, which regulates the material flow accordingly.



Figure 2 - Contaminated Gravel Being Transported to the Hydro-Clean Feed Hopper

The material is cleaned by being exposed to high pressure streams of water that come from the washing rotor and spray nozzle combination, located within the top third of the cylinder. The nozzles are angled into the direction of rotation of the rotor, so that the water creates a shoveling effect spreading the material. The cleaning process is assisted by friction and shear forces resulting from the material movement around the chamber in a vortex (see Figure 3).

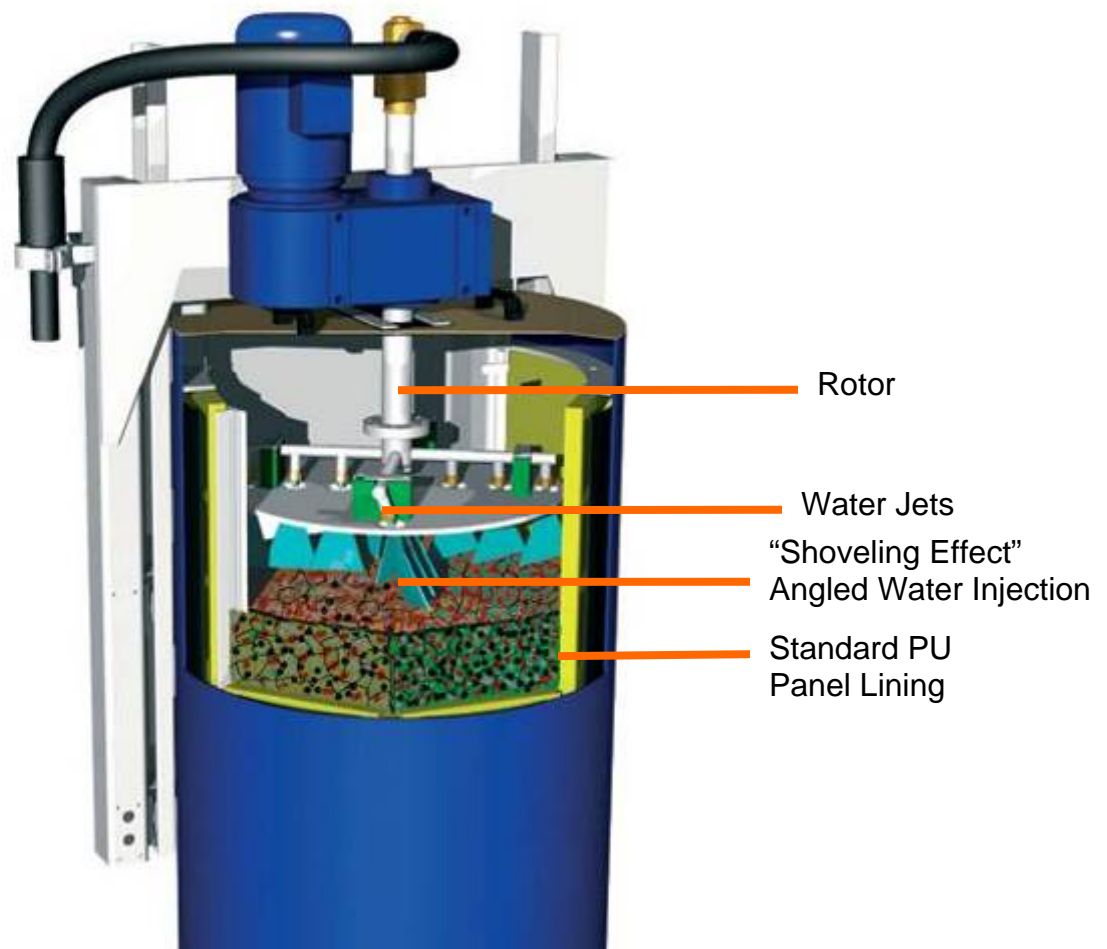


Figure 3 – Washing Rotor and Spray Nozzles

The liberated fines material and process water are discharged through openings in the polyurethane panels lining the washing chamber, and collected by a waste water pipe (located behind the chamber) to be directed to water treatment or further screening. The washed material flows onto the variable speed discharge conveyor and is sent to a washing screen where the dis-agglomerated contaminant material is rinsed off (see Figure 4).

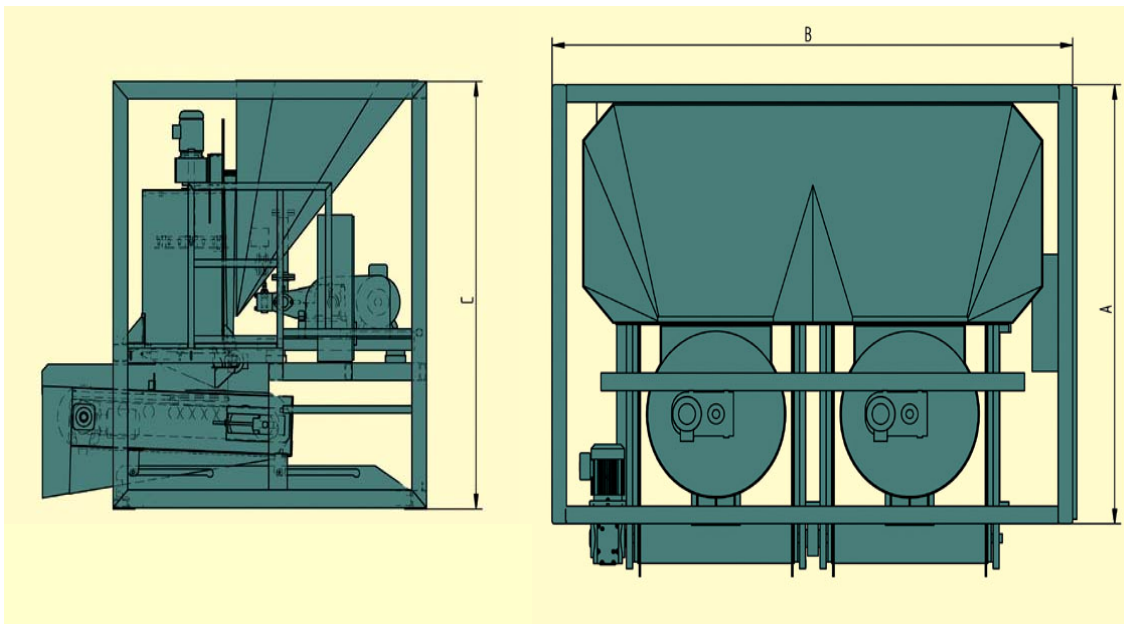


Figure 4 – Dis-agglomerated material exiting the Washing Chamber and entering the final rinse stage on a TYCAN Horizontal Vibrating Screen

The above process steps and the ability to incorporate automation through advanced PLC control make the Hydro-Clean the most technologically advanced washing equipment available on the market today.

Technical Data and Specifications

Currently the Hydro-Clean is available in four different models – HC 350, HC 700, HC 1000, HC 2000. The model numbers are derived from the diameter of the washing drum in mm (See Figure 5).



Type	HC 350/200	HC 700	HC 1000	HC 2000 (Twin)
Capacity	up to 20 t/h	up to 100 t/h	up to 200 t/h	up to 400 t/h
Pressure	up to 2900 psi	up to 2900 psi	up to 2900 psi	up to 2900 psi
Electrical PWR	54 HP	34 - 79 HP	69 - 158 HP	136 - 300 HP
Water Req.	27 - 46 gpm	35 - 50 gpm	70 - 125 gpm	140 - 211 gpm
Length	5 ft	8.5 ft	10.5 ft	10.5 ft
Width	3 ft	8 ft	9 ft	12 ft
Height	7 ft	10 ft	11 ft	11.5 ft
Weight (Empty)	6944 lbs	12460 lbs	17167 lbs	23283 lbs

Figure 5 – HC Models Data Sheet

Water Quality:

A fresh water supply is required and must contain less than 100 mg/L of solid material no larger than 100 µm in size.

The Hydro-Clean as a Complete Wash Plant

In several plants the washing stage is performed on wet classifying screens but it is known that the use of spray systems on this equipment operating at 44 - 73 psi (3 - 5 bar) has a limited effect on sticky material. This practice can only be effective if the contaminant particles are easily removable (fraction between 60 - 2000 μm). The Figures 6 and 7 compare two processing plants, the first one without a Hydro-Clean and the second one with a Hydro-Clean. It can be observed that for the production of 80 t/h and producing the same 5 size fractions the water consumption can be reduced from 616 gpm (140 m^3/h) to 264 gpm (60 m^3/h).

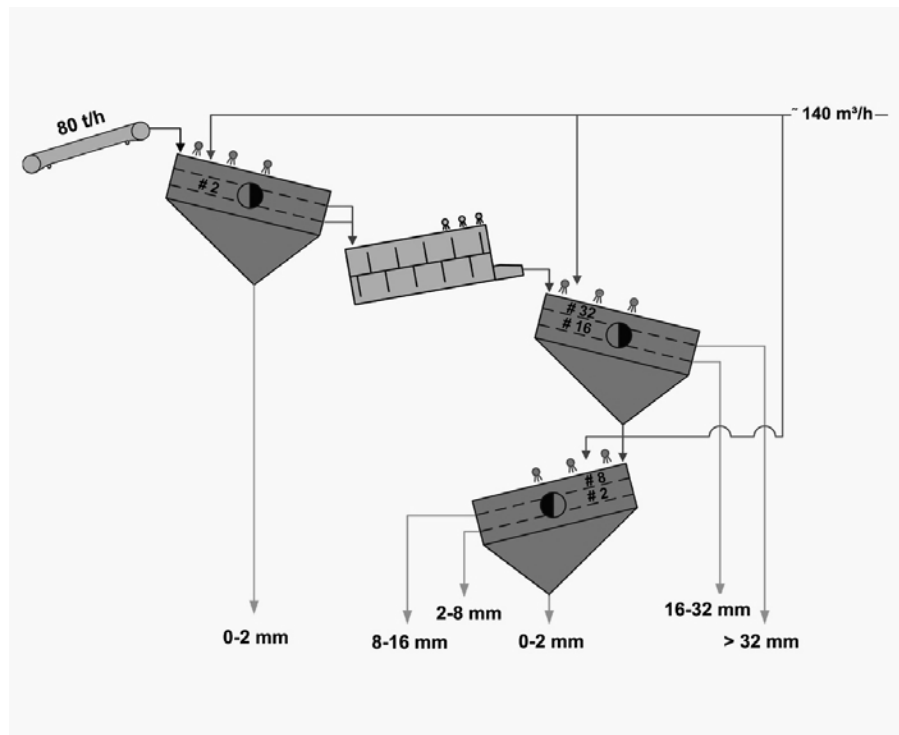


Figure 6 - Flow sheet of a washing plant without a Hydro-Clean

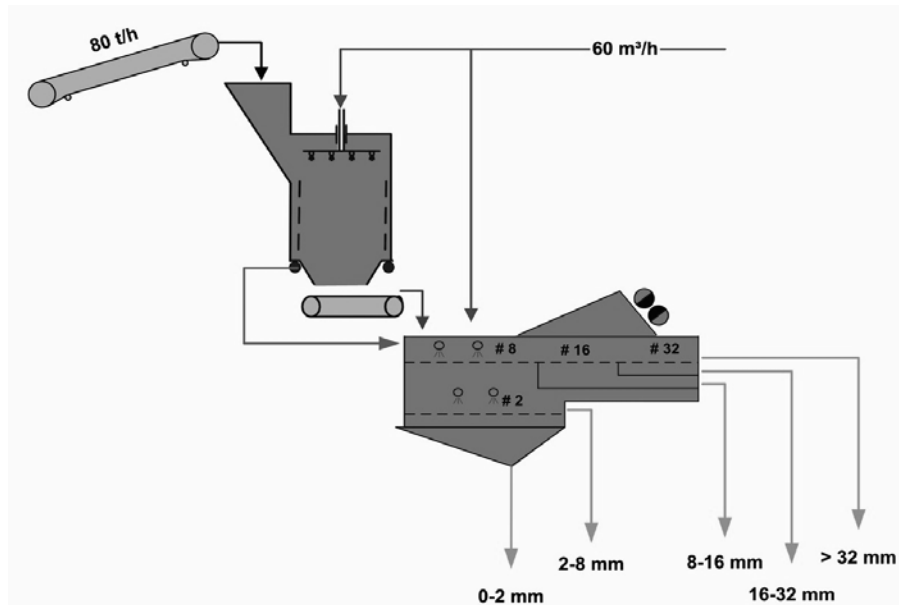


Figure 7 - Flow sheet of a washing plant with a Hydro-Clean

Green Benefits

In addition to delivering unprecedented degrees of cleanliness and some major technical advantages the Hydro-Clean offers the following **green** benefits:

- **Water Consumption** – Water is one of the world's most precious resources. Only 0.52 gpm to 1.32 gpm of water is needed to clean one ton of dirt or clay contaminated material. Thanks to the Hydro-Clean's robust filtering technology the water can be re-circulated through a client settling system and requires the addition of only 10% fresh water. This translates into water consumption savings of up to 75% compared to traditional log washer technology. This not only saves environmental resources and dramatically cuts operating expenses, but eases the permitting for new plants or the expansion of existing plants.
- **Turning Waste Piles to Sellable Product** – Due to its unparalleled cleaning abilities, the Hydro-Clean transforms the customer's waste piles, which have an impact on the required land resources, into a sellable material. Not only is this beneficial to the environment, but it translates straight from the expense side of the income statement to the revenue side, resulting in direct bottom line profits (See Figure 8).

- **Spare Parts** – Since the only “tool” in contact with the material is water, the wear and tear to the unit is minimal. Application dependant, the drum lining needs to be replaced once a year and from time to time the nozzles require exchange. Minimizing the use of spare parts leads to less scrap, less logistical costs and ultimately lower maintenance expenses.
- **Ambient Integration** – To reduce the impact on the environment it is necessary to streamline systems and make them smaller and more efficient. The standard Hydro-Clean weighs only a total of eight tons compared to traditional washing equipment that can weigh more than three times as much. This allows the customer to opt for a much smaller and leaner building structure, reducing the area of influence on the environment. In addition, it significantly reduces structural construction costs.

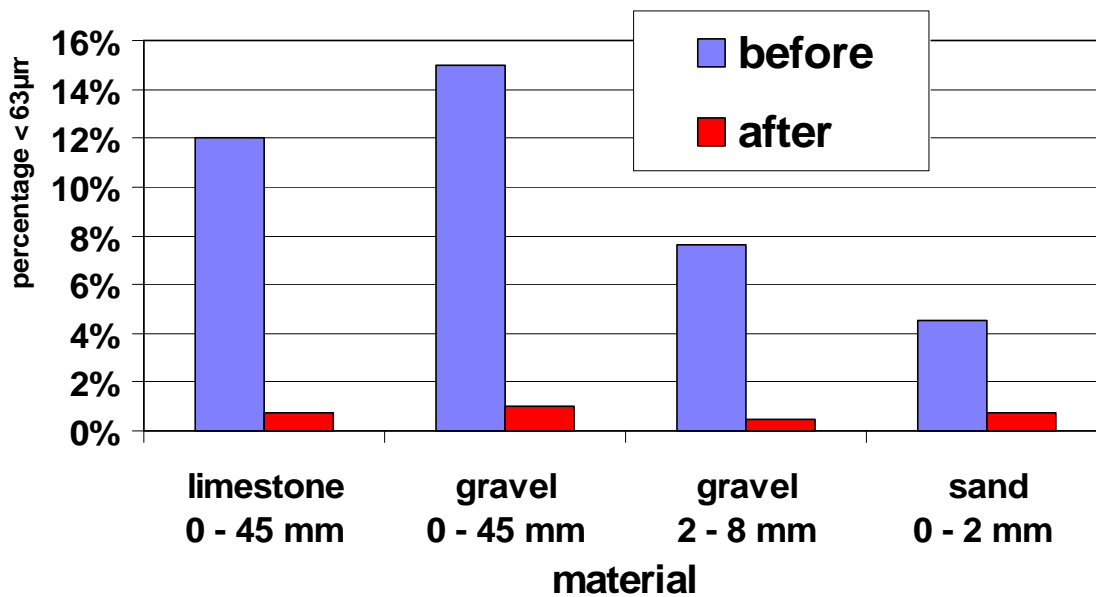


Figure 8 – Practical Washing Results

In Summary

In addition to its **green** benefits, this state of the art technology has many advantages when compared with traditional washing equipment:

- unparalleled degrees of cleaning as the Hydro-Clean's spray output from the high pressure nozzles are able to penetrate into porous surfaces
- wider range of application, as a scrubber cannot accept material < 6.35 mm (formation of clay balls) and a log washer cannot accept material containing more than 15% of plastic and soluble clay < 63µm ("lubricating effect")
- less stress on the material, when compared to a scrubber where the material can be damaged from collisions during operation
- lower capital costs for additional machinery, as the main competing machines (screw washer, log washer and scrubber) need one screen installed in front to remove unwanted material and typically two installed after to classify
- lower operating costs due to the lower usage of energy and water
- lower maintenance costs, as the screw and log washer require renewal of paddles and flies, as well as nearly annual maintenance on their shafts for sealing problems with the bearings
- smaller machine size, reduced weight and the requirement of minimal conveying systems results in lower structural material costs
- easy to access unit and empty material thus enabling easy maintenance and repair when necessary
- better adjustability, there are numerous ways to adjust the Hydro-Clean to achieve optimal cleaning results (distance between the nozzles and the material, size of the nozzles, number of the nozzles, retention time in the chamber, gate between the hopper and the drum, change of motor speed for the pump ie. change in water pressure), whereas main competing machines can only change the angle and speed of the shaft within the washing drum