Cleaning Equipment for Ships Machine Parts
UT-JETWASHER 500

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Abstract: Jetwarsher is an equipment used to automatically maintaining and cleanning parts of marine engines. The paper introduces activity principle and function of UT-JETWASHER 500 made by lecturers of Marine Engineering department of Ho Chi Minh city Univercity of Transport, Vietnam.
Keywords: UT-JETWASHER 500

1. INTRODUCTION

The removal of contaminants in the marine machine parts aims to improve the technical status of the details, ensuring equipment working safely and the economically. The cleaning of machine is usually taken placed during maintenance and repair of machinery and equipment.

Not only the elements are assembled into machine in the repair process requires cleaning; but in many cases, the removed one is also needed to be cleaned to avoid polluting the environment.

To design and manufacture the automatical industrial cleaning equipment for marine engine parts is aimed to apply the automatical technical cleaning in industrial maintenance and repairing technology, especially in fields of marine propulsion system.

Automatical Cleaning equipment UT-JETWASHER 500 is designed, and manufactured to satisfy the requirements of cleaning procedures for marine engines.
UT is short for 'Ho Chi Minh city University of Transport'.
500 is sign for the parts in kilograms can be washed.

2. OPERATION PRINCIPLE AND STRUCTURE OF THE UT-JETWASHER 500

Machine parts are automatically washed by mixture of water and solvent inside the device. Hot cleaning solution of 50 - 800C with pressure of 16 bar is sprayed into the part surface, in addition with the effects of chemical solvents allowing separation and washing of all dirt, grease, soot.

The UT-JETWASHER 500 also allows rinsing with fresh water and blowing hot air to dry parts.

The UT-JETWASHER 500 is suitable for automatic cleaning of equipment, machinery details, details of electric motors, diesel marine engine ...

Device is controlled automatically for setting a washing cycle including process of rinsing with water, soaking in solvent, washing with solvent, and drying with hot air, in an optional appropriate order for different types of part. Solvent and used washing water is reused after being separated from oil and solid contaminants.

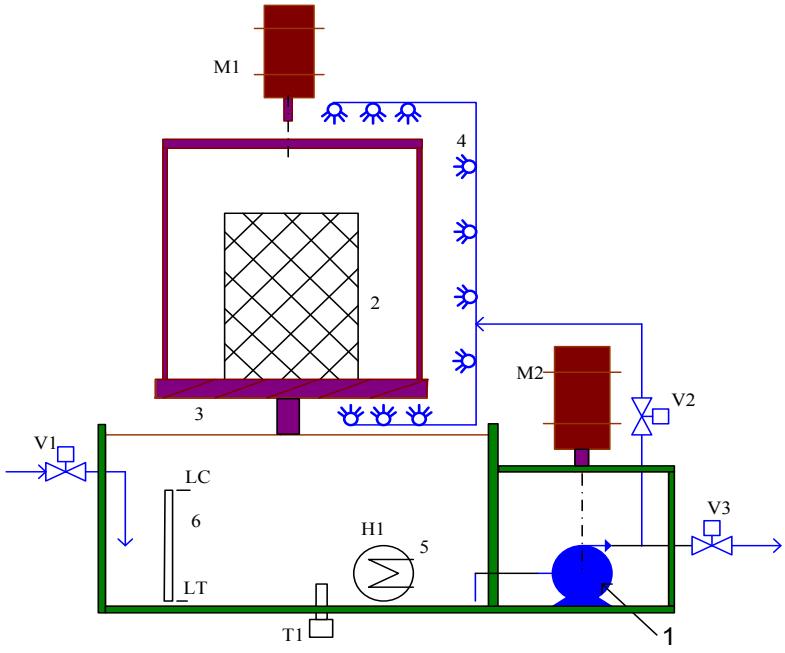


Figure 1. Principle diagram of the UT-JETWASHER 500

1. Feed pump;
2. Washed details;
3. Rotating tray;
4. Nozzles;
5. Heater ,
6. Level sensor equipment;
M1. Motor driving tray;
M2. Motor driving feed pump;
V1. Feed water valve (to tank);
V2. Feed solution valve (to nozzles);
V3. Drain valve;
T1. Temperature sensor;
H1. Heating resistance coil.

The washing equipment for machinery parts includes the main components as follows:

- Motor driving pump: AC motor type, 1 phase.
- Pressure pump: centrifugal pump type, made by stainless steel material, and able to create high pressure.
- Tanks, pipe lines, and filters forms a solution feed system with high pressure, and continuously in washing procedure.
- Solenoid valves are used to automatically drain off the solution, and feed fresh water into system.
- Main switch board: supply power for all necessary operation of automatic washing equipment.
- Motor driving tray, gear box, driving parts, and rotating tray form a system rotating the parts to be washed. Nozzles are used to jet the solution to the surfaces of parts in any different angles. Motor is AC type, 1 phase. The rotating tray is made by steel.
- Nozzles: include the jetting tips installed inside washing tank. They will create water flush jetting to the washed parts under different angles. The tips are simple in structure with descending cross sections, and cause the kinetic energy of liquid flowing out nozzles. Moreover, the nozzle tips can be changed according to the characteristic of washed parts.
- Washing chamber: made by stainless steel, and closed to prevent solution leaked outside. Door closes interlock forward.
- Heating coil: non-reactive type, includes resistance, insulating substance, and non-corrosive protected cover.
- Tank level sensor.
- Automatic control system: central LPC unit controls the modes of washing equipment automatically. Operating parameters can be monitored and adjusted from the display.
- Moreover, the automatic washing equipment also includes other elements such as valve, drain pipes, brackets …

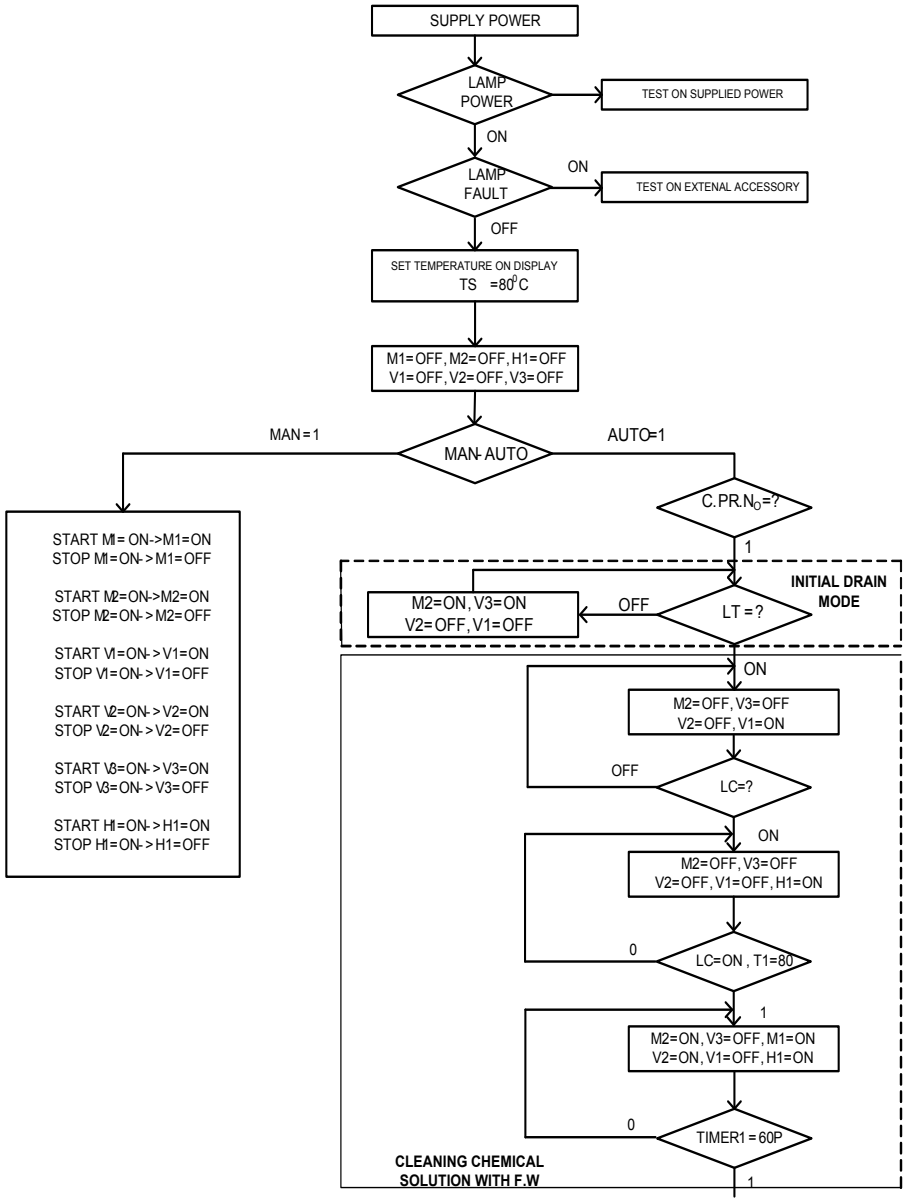
An operation cycle of washing equipment will contain basic stages as follows:

- Flushing: spraying hot water to the surface of parts. It enables to select temperature, pressure, spraying and break time, and number of iteration.
- Soaking: spraying solution to the surface of parts, and then soaking. It enables to select temperature, pressure, spraying and soaking time, and number of iteration.
- Washing with solution: spraying hot solution to the surface of parts. It enables to select temperature, pressure, spraying and break time, and number of iteration.

3. PROGRAM AUTOMATICALLY CONTROLS THE PROCESS OF THE UT-JETWASHER 500

The program automatically controls operation of the UT-JETWASHER 500 includes processes such as cleaning, soaking, washing and drying. Depending on the actual needs of washing and detailing methods for cleaning details that can make the machine work for the regime include:

1. Washed with chemicals.
2. Rinse with clean water and chemicals.
3. Rinse with clean water.


SUPPLY POWER
LAMP POWER
TEST ON SUPPLIED POWER
ON
LAMP FAULT
ON
TEST ON EXTENAL ACCESSORY
OFF
SET TEMPERATURE ON DISPLAY
TS =80°C
M1=OFF, M2=OFF, H1=OFF
V1=OFF, V2=OFF, V3=OFF
MAN=1
MAN-AUTO
AUTO=1
C.PR.N0=?
1
START M1=ON->M1=ON
STOP M1=ON->M1=OFF
START M2=ON->M2=ON
STOP M2=ON->M2=OFF
START V1=ON->V1=ON
STOP V1=ON->V1=OFF
START V2=ON->V2=ON
STOP V2=ON->V2=OFF
START V3=ON->V3=ON
STOP V3=ON->V3=OFF
START H1=ON->H1=ON
STOP H1=ON->H1=OFF
INITIAL DRAIN MODE
M2=ON, V3=ON
V2=OFF, V1=OFF
OFF
LT=?
ON
M2=OFF, V3=OFF
V2=OFF, V1=ON
OFF
LC=?
ON
M2=OFF, V3=OFF
V2=OFF, V1=OFF, H1=ON
0
LC=ON , T1=80
1
M2=ON, V3=OFF, M1=ON
V2=ON, V1=OFF, H1=ON
0
TIMER1=60P
CLEANING CHEMICAL SOLUTION WITH F.W
1

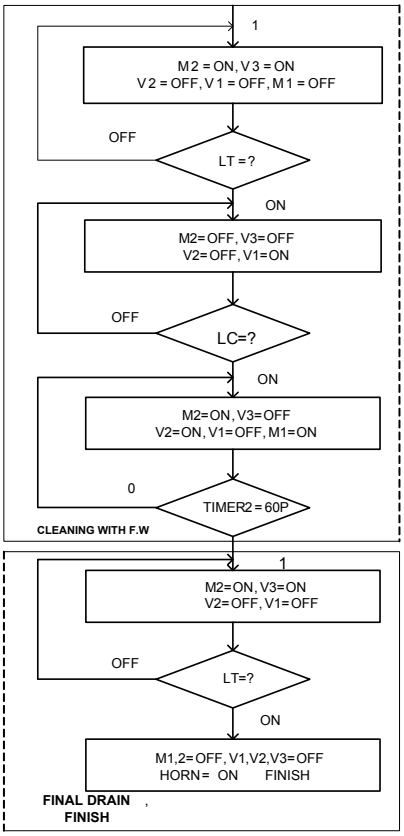


Figure 2. CT1 program automatically controls the cleaning of ship parts of the UT-JETWASHER 500

Center equipment of the process control automation system is Siemens S7200 PLC. PLC programming in STEP7 software on your computer and download MicroWin down to make the process automatic.

In addition to programming, download and upload software program also features online support directly to the PLC to cater to the programming and diagnostics.

In the program I supervise three parameters of temperature, water level in the tank and time to implement automatic control washing process.

The network connection the washer system between S7-200 PLC and monitor TD200 is connected to the PLC to perform the installation parameters and display the operating status of the automatic washing process.

In the program We supervise three parameters of temperature, water level in the tank and time to implement automatic control washing process.

Automatic Control Program for cleaner UT-JETWASHER 500 is programmed in four different control programs, as circumstances require cleaning laundering scheme was chosen accordingly:

CT1: water-supply and discharge of chemicals - fan - turn wheels - cleaning chemicals - use fan-wheels stop turning - and the discharge of chemicals - clean water - back plate - water spray - wheels stop turning - discharge – end.

CT2: water and chemicals - fan - turn wheels - cleaning chemicals - use the function - stopping back-stopped washing tray - finished.

CT3: water and chemicals - back plate - clean-water rinse stops rotating wheels-stop - the end.

CT4: exhaust - water and chemicals - water - back plate - clean - stops rotating wheels - stopping wash - rinse - end.

In addition to change the control program needs by using the PLC programming through the connection to the computer.

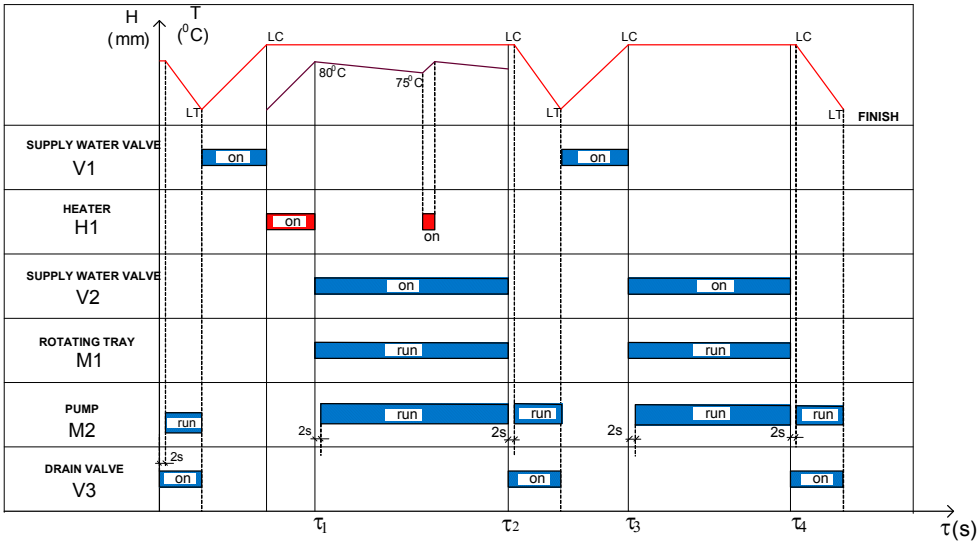


Figure 3. Time diagram of control devices in the control program CT1

Figure 4. UT-JETWASHER 500

4. CONCLUSION

UT-JETWASHER 500 is used to clean industrial equipment, machinery details, especially the details of electric motors, diesel engines of vessels ...

The program automatically clean the ship parts to ensure optimum efficiency of the cleaning process.

Cleaning cycle are combined from the four basic operations, allowing fully automated cleaning equipment, manpower savings, the environment, energy and time.

Automatic equipment cleaning machine parts ship UT-JETWASHER 500 also contributed a small part of environmental protection, so we can collect the dirt, chemicals to bring home to be stored or destroyed , not the status of dirt, chemicals strewn around the environment, such as manual cleaning

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