



Technology 026: Part Washing Device with VOC Capture & Containment

Ilwoo Tech. Co. Ltd., a Korean company, has developed a user friendly, safe and environmentally responsible parts cleaner that is effective with either solvents or aqueous-based cleaning agents. Although it has CE certification, he is only in process of getting UL certification. Inventor has not gone to SCAQMD to obtain their certification. North American warehousing has not been established.

A. Technology Design:

- Transparent cover seals off volatile organic compounds (VOCs) and eliminates odors (Section B. contains details of VOC filtration).
- Used solvent is recovered, filtered through a ceramic solvent filter and recycled, preventing ground and water contamination.
- Patented solvent heating system and closed system design heats solvent to a predetermined temperature with little risk of ignition or fire (Inventor claims cleaning is ~ 20% faster than competing solutions—we have not yet verified this). Part washer heaters typically employ metallic heating elements—often heavy and difficult to regulate temperature due to low specific heat.
- Built-in protective gloves made of a special rubber and anti-acid material on the inside, allows manipulation of part while cleaning.
- Window wiper allows viewing when window gets wet or foggy.
- Rotary plate enables rotation of the object being cleaned
- Cleaning nozzle delivers pressurized cleaning agent. A second spray nozzle has brush on end.
- Integrated drier.
- May use either solvent or aqueous-based cleaning agent.
- Winner, Gold Prize, Korean Intellectual Property Office (KIPO)
- Distributor Price: \$1500 (FOB Busan, Korea)

B. VOC Filtration System:

- **VOC Flow Circuit System:**
 - i. VOCs are circulated and condensed through the recovery flow channel. While passing through the charcoal filter and Ilwoo's "screens" the VOCs revert back to liquid form (become condensed). See Figure 1.
 - ii. A damper valve directs the flow of the condensed VOCs. For example, if the parts washer is in use, the Flow Circuit System recycles the condensed VOC returning it to the parts washer. When the damper valve is closed, all VOCs are directed to the bio-ceramic filter.
 - iii. When parts have been cleaned, the damper valve is adjusted along with the air handling fan to direct VOCs remaining in the parts washer to the bio-ceramic filter.
- **Bio-Ceramic Filter:**
 - i. Prior to opening the parts washer cover, VOCs will have been treated and mostly eliminated by the bio-ceramic filter. Running the system an additional two minutes will eliminate VOCs in the washer bay prior to opening the cover.
 - ii. Ilwoo's bio-ceramic filter utilizes microorganisms that digest VOCs.
 - iii. Under normal conditions, these microorganisms live 3-4 months.
 - iv. Ilwoo's patented bio-ceramic filter was a joint research effort with professors at Myongji University in Korea and Ilwoo's own research team. In-house testing found that on average the Flow Circuit System and Bio-Ceramic Filter reduced more than 90% of VOC emissions compared to open-type part washers (see table 1). The research team is working on publishing the results. U.T. has not validated these results.



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Table 1: Returned solvent comparison (results show average solvent return from field tests)

Company	A	Ilwoo KHP-37
Returned Solvent	40-45 liters	50-55 liters

Source: 2007, 1, Ilwoo Tech Co. Ltd.

- v. Ilwoo will repeat this test for interested parties.
- vi. The bio-ceramic filter also removes 20 – 30% of CO₂.
- vii. The University of Texas has not validated these results.

C. Intellectual Property:

- U.S. Patent granted: Inflammable solvent heater
- U.S. Patent filed: KHP-37 part washer
- Korea Patent filed: KHP-37 part washer
- Korea Patent filed: Bio-ceramic filter for VOCs

D. EPA Regulations

- The KHP-37 adopts EPA's Pressurized (less than 100psi) Cleaning Method Using Spray Gun including Rotary Spray Plate.

Figure 1: VOC Flow Circuit System:

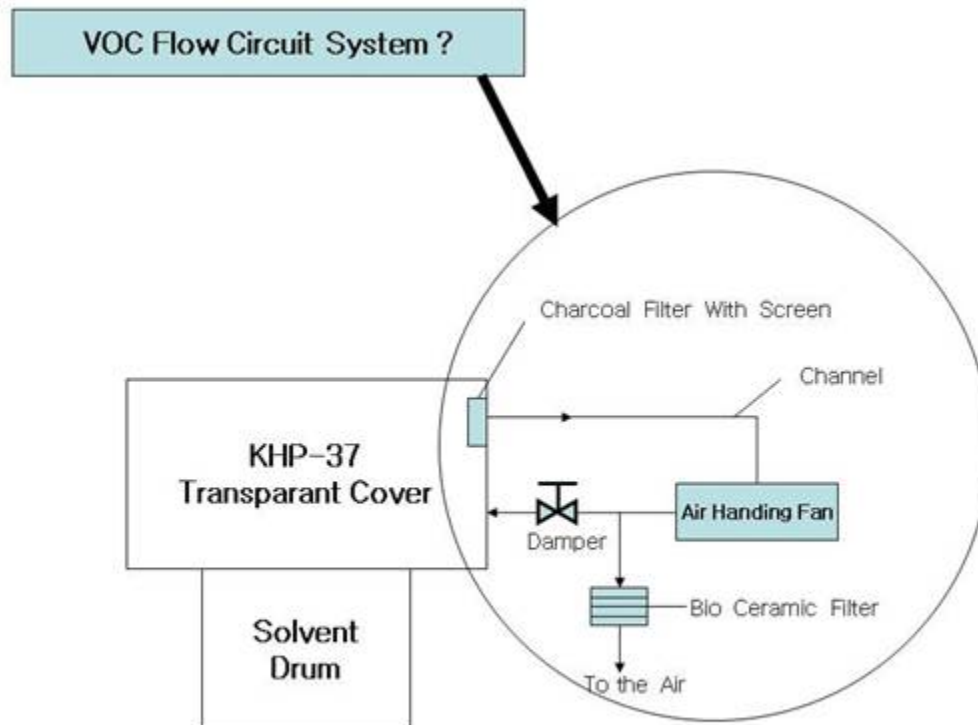




Figure 2: Production version of Ilwoo Parts Washer



Figure 3: Rear of parts washer





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Figure 4: Low pressure spray and rotary plate. Not visible is second spray nozzle with brush on end.



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