

DPL UV

Grease & Odour Control System



Case Study.

Case study for the use and effectiveness of UVC Ultra-violet light and Ozone production to reduce or eradicate grease and odour from kitchen ventilation extract systems. To establish whether UVC systems can improve system cleanliness and longevity and reduce regular maintenance and cleaning costs.

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London Project - Brief

Our Client operates a catering service that provides meals for London Taxi drivers. Located close to Southwark, the kitchen and restaurant are housed in a modular cabin type building towards the rear of a courtyard surrounded on all four sides by high-rise office buildings with access via an archway from the road.

Our Client serves meals 24 hours a day, 7 days a week. The menu consists of predominantly fried meals; full English breakfasts, burgers, sausages, bacon sandwiches chips etc. as well as traditional dinners. They had received a number of complaints from the neighbouring office buildings about the cooking smells.

Our brief was to design and install an efficient, cost-effective solution to the grease and odour problems with consideration being given to the noise and long-term running costs. The existing canopy was to remain and disruption of the kitchen kept to a minimum during the installation.

Initial inspection.

The original installation which had previously been supplied by DPL a number of years ago, comprised of a 2400mm long stainless steel canopy fitted with DPL Baffle filters in the servery / kitchen. The canopy had been well maintained and had been cleaned regularly.

The duct connection from the canopy extends vertically through the roof with extract provided by a Vent-Axia mixed flow, vertical discharge, roof fan.

Although the fan unit and canopy had been correctly sized and the duty from the fan was acceptable, there was evidence that the filtration was completely ineffective and that there was no means of controlling the odours.

The fan was completely fouled with cooking fat and a large pool of grease had formed around the roof opening.

*Image 1
The original fan unit, fouled with grease from ineffective filtration.*



The Solution

Our goal was to firstly improve the primary grease filtration, removing as much of the grease from the cooking vapour as possible then to provide an effective solution to the remaining odour problems.

Mesh grease filters are no longer acceptable for use in commercial kitchens. These were removed and replaced with DPL stainless steel, centrifugal Baffle filter panels. These are capable of removing almost double the amount of grease as well as being more hygienic, simpler to maintain and clean and reduce the risk of fire.

Due to cost restraints, it was decided that the canopy would not be replaced. The odour removal system must therefore be separated from the canopy. For this we designed a roof-mounted grease and odour removal system, housed in a weatherproof enclosure.

Ventilation System

The existing fan unit was removed – to be replaced by a more powerful, quieter and more efficient centrifugal unit. A Systemair MUB unit, fitted with the EC low-energy, external rotor motor, was chosen due to its high performance and quiet operation and reduced running costs. With speed control available from the DPL UV Controller, as well as monitoring of fan performance, filter condition and UV lamp condition – we were able to provide a 'one-box' installation for the entire system.

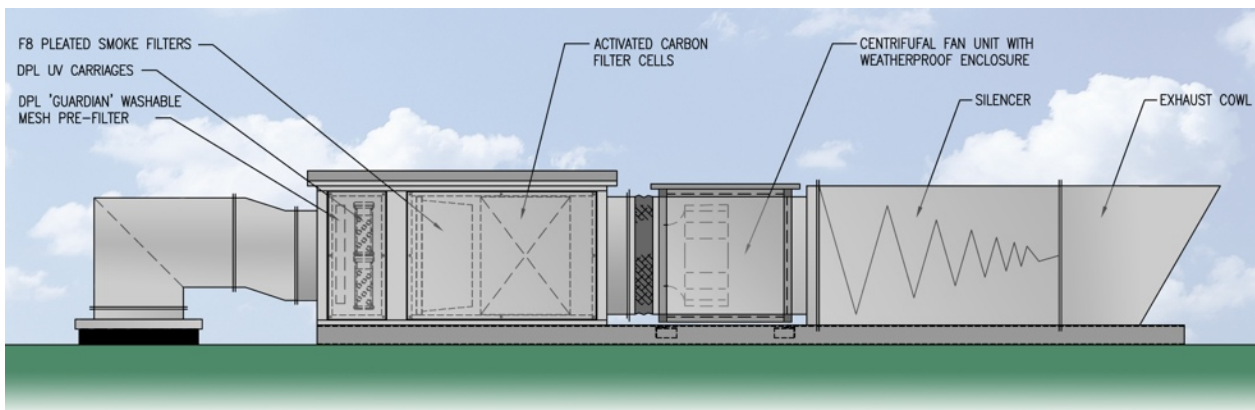
Odour Control System

The odour control system needed to be roof mounted, easy to maintain and capable of removing grease carry-over from the canopy and smoke before the remaining air was released into the courtyard.

The filtration and odour removal would be carried out in stages, with each element carrying out a specific role.

The unit comprises of the following elements:

- Secondary filtration – following the primary filtration (at the canopy) a washable, wire mesh, impingement filter to remove the larger grease particles carried over from the cooking vapours.
- UV Filtration – two DPL UV cartridges fitted with ozone generating UVC lamps to effectively 'pull apart' the odour producing molecules, breaking down the compounds and destroying any remaining traces of grease from the air stream.
- Smoke filters – rigid pleated smoke filters to capture residual particles following the Ozone / UVC reaction.
- Carbon cells – Activated carbon cells provide a means of holding the ozone laden air, allowing the ozone to fully react with grease compounds, for remaining oxygen free-radicals to combine and remove the remaining odours before being released into the atmosphere.



DPL UV Odour control diagram

Results

Following the completion the installation, our inspection was carried out following six months of continuous use - approximately 4000hours. Regular cleaning of the canopy filters and secondary mesh filters had been performed during that period. No duct cleaning had been undertaken at the time of our inspection.

On removal of the access panel, the evidence for the use of Ultra Violet filtration was immediately obvious.

There was a marked difference in the condition of the unit at either side of the UV cartridge. Within the duct, the grease carry over had covered the internal surfaces and there was a heavy coating on the secondary mesh filter. The internal surfaces of the odour removal housing were similarly coated.

Image 2.

The image shows the opening of the duct as it enters the odour control housing with the secondary mesh filter panel removed. The coating of grease can be seen covering the internal duct surfaces.



In contrast, the appearance of the components beyond the UV cartridges remained clean and grease free.

There was a clear difference in the areas downstream of the UV treatment and the areas leading up to it – clear evidence that the UV and ozone system was functioning effectively and as intended.

Beyond the carbon filter cells, the silencer and fan unit were also completely clean and grease free.

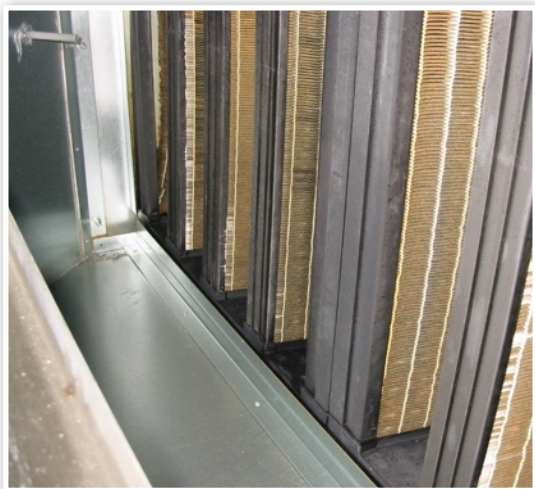


Image 3.

The image shows the area immediately downstream of the UV carriages (removed for clarity).

The internal surfaces of the housing are completely clean with almost no evidence of grease. The smoke filters can be seen to the right of the image having captured the fine powdery residue following the ultra-violet / ozone reaction process.

Odour removal

At the exhaust exit, there is no trace of cooking odours, nor any trace of smoke. The UV system had not only eradicated the grease from the cooking vapours it had also eliminated the odour.

Conclusions

Following this case study into the potential benefits of using UVC Ultra-violet light for the eradication of grease and odours, it is clear that the system is effective.

After six months, 4000 hours of almost continual use, the kitchen ventilation system is as clean and efficient as it was following commissioning.

The life of the system components; fan silencer, smoke filters and carbon filters has been significantly increased with the addition of the Ultra-violet filtration system.

Whilst the system must continue to be maintained and regular duct inspections and cleaning must be carried out, the cost of replacement parts has been significantly reduced.

Image 4

The DPL UV grease and odour control system installation.



Guideline intervals for Canopy cleaning

Canopy component	Cooking level				
	Light duty	Light /Med	Medium	High duty	Heavy duty
Baffle filter panels	7 days	7 days	5 days	3 days	1 day
Grease collection drawer	5-7 days	5-7 days	3-5 days	1-3 days	>1 day
Canopy valance + housing	7 days	7 days	5-7 days	5 days	5 days
UV secondary filter*	2-3 weeks	2 weeks	1-2 weeks	1 week	2-3 days
UV Tubes / cassette	4 months	3 months	3 months	2 months	2 months
UV tube replacement**	7000 hours	7000 hours	7000 hours	7000 hours	7000 hours
Duct clean / deep clean***	12 months	12 months	9 months	6 months	3 months
Carbon cell replacement***			6 months	4-5 months	3 months

* UV secondary filter panels may be cleaned as per Baffle filter panels.

Refer to DPL Operating & Maintenance instructions.

All other UV system components must be maintained by trained, specialist operatives. Contact DPL for details of maintenance programmes.

** Replacement tubes supplied and fitted as part of a DPL maintenance programme for UV canopy systems.

*** When fitted with a DPL UV ventilation system, the cleaning interval and longevity of the system may be increased by up to 3 times.

Recent DPL UV installations

Rutherford Appleton Laboratory – Wantage, Oxfordshire

Hertfordshire College, Broxbourne Campus – Broxbourne, Hertfordshire

Open University – Milton Keynes

Welsh Assembly Building – Llandudno

Jesus College - Oxford

Royal Shakespeare Theatre – Stratford-upon-Avon

St. Bartholemews School – Newbury

Yo Sushi – Cambridgeshire

Yo Sushi – Milton Keynes

Cabbie Shack – Southwark

City University – Islington

Bramber House, University of Sussex – Brighton

Queens University – Belfast