

Problem Statement [A]: To develop a safe, efficient and cost effective kitchen exhaust duct cleaning solution

Desired outcomes :

Safe, efficient and effective method for kitchen exhaust duct cleaning. Reduce the risk of spreading of fire due to grease accumulation in kitchen exhaust ducts.

Background of Problem:

Kitchen Exhaust Ducts (KED) have to be cleaned regularly to prevent grease accumulation inside the ducts which poses potential fire hazards. Without a proper cleaning regime, this risk of spreading fire along KED to neighbouring stalls will increase significantly which could affect a few stalls and not just one stall if fire incident occurs.

Currently, KED are being degreased manually by cleaners which is labour-intensive. Cleaners are equipped only with spray bottles of degreasing agent and, scrappers and cloths to scrape and wipe off the grease. They have to crawl through the ducts and work within confined spaces.

When KED have limited entry points, access panels will have to be cut out from KED for cleaners to enter. Generally, cleaners will only clean areas which they can possibly reach. Therefore, they are unable to clean hard to reach areas, especially long vertical ducts.

As KED are cleaned manually, it is a time-consuming process. Depending on the length of KED, it may take a few nights for cleaners to degrease KED serving a large food establishment.

The proposed solution will be used to clean all parts of KED, including interior and exterior of KED, vertical ducts, ducts of different shapes (e.g. rectangular and circle ducts), kitchen exhaust fan blades, grilles, louvres and small ducts etc. In addition, the proposed solution should be less labour-intensive and time-consuming, less intrusive (i.e. does not require cutting of access panels) and provide higher cleaning standard.

End users of the proposed solution include operators and premise owners in the F&B sector, such as food centre, restaurant, coffee shop, food court, canteen, centralised kitchen, where KEDs are installed.

Technical Requirements:

The proposed solution should meet the following requirements:

1. The proposed solution should function in the greasy conditions typically found in environment in food preparation and cooking areas of commercial kitchens where KED are installed.
2. (a) Existing KED are able to withstand the weight of cleaning equipment used for degreasing without causing structural damages etc. Typical expansion bolt (e.g. Hilti bolt) size ranges from Dia. 10mm to 12mm. Typical distance between two angle supports is about 1.8m which consists of four bolts.*
*For reference only. Number and size of expansion bolts installed varies from centre to centre.
- (b) KED comes in different shapes and sizes so there is no one-size-fits-all solution.
Approximate Typical Duct Size Range*
Rectangular Duct: 150 x 150mm to 1350 x 1350mm
Round Duct: Dia. 500mm to 1350mm
*For reference only. Type and size of ducts installed varies from centre to centre.
- (c) The equipment is able to clean the interior and exterior of KED ducts at angles of elevation of up to 90 degrees. It is able to clean hard-to-clean areas, e.g. kitchen exhaust fan blades, grilles, louvres and, spiral and small ducts.
- (d) The equipment can be remotely operated.
- (e) The equipment used is able to operate in a greasy environment and does not cause damage / degrade existing KED and Kitchen Exhaust System's integrity.
- (f) The total power consumption of equipment(s) used does not exceed power supply allowable in the premise, and will not cause a power trip. QP/LEW is to certify the installation of the system is safe for the purpose of the trial.
- (g) The proposed solution does not disrupt business operations and it is able to comply with any statutory regulation on permissible noise, work hours and worksite safety. The cleaning of the KED is to be carried out after operation hours of the hawker centres. Operation hours varies from centre to centre.
- (h) The proposed solution should be able to take photos or videos or both of the conditions of the duct and also the cleaning process.
- (i) The proposed solution should be able to provide reports with before and after photographs after every cleaning service.
3. The proposed solution is less time-consuming and labour-intensive as compared to manual cleaning. Cost of engaging proposed solution does not exceed existing market rates. Depending on the size of hawker centre, the existing market rate for KED cleaning twice per year ranges from \$6,500 to \$50,000 per year.

What solutions you are not interested in (if any)?

Proposed solutions which are intrusive (e.g. damage / degrade existing KED and Kitchen Exhaust System's integrity).

Timeframe for development of proposed solution/product

1. Completion of working prototype ready for evaluation 6 months after the start of project.
2. Completion of full functional end product ready for pilot deployment 10 months after the start of project.
3. Provide regular updates on progress of prototype and end product.
4. Provide mock-up of KED and test operation of prototype.
5. Conduct trial run of prototype and end product at selected site.
6. Conduct site visit to view actual cleaning process.
7. Provide reports with before and after photographs, videos and statistics/readings etc.
8. Provide Cost Benefit Analysis of proposed solution.
9. Conduct presentations to the Management and cleaning contractors/partners on the outcome of the trial.

Requirements of prototype

Prototype should minimally comply with the points listed under Technical Requirements.

Costing and procurement

Procurement budget for engaging of proposed solution is estimated at \$30,000 per unit.

If proven successfully, proposed solution can be deployed in F&B premises, such as food centres, coffee shops, food courts, canteens, etc.

Market Potential for proposed solution/product

Proposed solution could be adopted by operators and premise owners in the F&B sector (e.g. food centre, restaurant, coffee shop, food court, canteen, centralised kitchen).