FLAGSHIP

HMS Raleigh
New Junior Rates Galley & Dining Halls

Design, Project Management, Operate and Maintain

Contents:

Introduction:

HMS Raleigh is one of the Royal Navy's premier training establishments and is located at the South East corner of Cornwall on the outskirts of Torpoint in an area of outstanding natural beauty. The establishment required a new facility that will provide 1200 meals three times a day from two Dining Halls, one for phase one trainees who have just joined the Royal Navy and a second for all other Junior Ratings which will incorporate Pay as You Dine. Both Dining Halls are supported from one central Galley.

Against the backdrop of a merger of the Fleet and Second Sea Lord Headquarters the Royal Navy Estate Organisation (RNEO) has been re-structured to provide a single point of contact for all RN Estate issues. RNEO's mission is to provide a sustainable estate of the right size, quality and location to support RN operational capability and the needs of RN personnel. This task is undertaken with Defence Estates through customer supplier arrangements and a partnering arrangement with Flagship Training Limited under a Prime Contracting Enabling Arrangement (PCEA), which was established in 2002. As a result Flagship have become a major provider of construction and property management services for the armed forces and Prime Contracting is the procurement strategy used to deliver this project. Flagships working very closely with RNEO have had responsibility for the design, construction and management of the facility and have had overall responsibility for the selection of the supply chain together with their management, including co-ordinating and integrating all activities to meet the overall schedule of requirements efficiently, economically and on time.

The Royal Navy and Flagship have taken full account of the Governments commitment to sustainable development and of the economic, environmental and social impacts of their decisions. They have both complied with the standards laid out within the Governments Common Minimum Standards for the Procurement of Built Environments and have followed the principles of the OGC's Achieving Excellence in Construction Procurement Guide 11: Sustainability.

The approach is to:

- Design construction projects within the context of value for money, fitness for purpose and functionality, to maximise the efficiency of energy, water and waste management.
- Strive to enhance positive impacts on biodiversity, and take account of the likely impact on staff, transport systems and local communities.
- Take due account of the contribution a construction project can make to achieving the departmental targets and framework strategies developed from the Framework for Sustainable Development on the Government Estate.
- Apply an environmental assessment process such as DREAM (Defence Related Environmental Assessment Methodology) or BREEAM (British Research Establishment Environmental Assessment Method). All new projects are to achieve an "excellent" rating and all refurbishment projects are to achieve at least a "very good" rating, unless site constraints or project objectives mean that this requirement conflicts with the obligation to achieve value for money.
- Follow the requirements of the OGC / DEFRA "Quick Wins" specification for the procurement of all construction materials.
- Purchase all timber or timber products (including timber used solely during the construction process such as temporary fencing, hoardings or shuttering) in accordance with the Governments timber procurement policy.

Introduction continued

- Ensure that new procurement projects fall into the upper quartile of energy performance for the building type, except where specific operational requirements prevent this.
- Develop business cases based on whole life performance and make sustainability an integral part of this process.
- Include as part of the business case defined sustainability criteria which will be explicitly weighted and evaluated. This evaluation will also consider the supply team's knowledge and experience of sustainable projects.
- Have a strong emphasis on flexible design as defined in Better Defence Buildings by the term "whole life: loose fit". The term is used to describe flexible buildings that can be adapted to meet future needs. For defence buildings this means defining an 'adaptability strategy' at the outset.

"the operational requirements have been reviewed with special attention being given to various procedures that can be carried out in a more sustainable way without impacting on the expectations of the customers eating in the new dining halls. This has made a major contribution to the reduction in CO2 emissions being discharged every year."

- Make provision to minimise pollution and disruption and ensure the health and safety of local residents as well as construction site staff. The supplier organisation will be required to consider energy efficiency, waste minimisation and management, pollution, water use, respect for people, considerate constructors scheme etc, during construction.
- Dispose of surplus assets in accordance with Chapter 24 of Government Accounting. Wherever possible land or property with a high wildlife or heritage value will be sold to a purchaser nominated by the appropriate Government Department or Non-departmental government organisation at open market value.

The catering facilities have been developed and designed to comply with the above strategy and to deliver sustainable best value procurement which encompasses whole life-cycle costs to support an innovative and quality service, while providing value for money to the establishment and tax payer. This requires the design and equipment selected to achieve the maximum energy efficiency with the minimum carbon emissions while reducing water consumption and minimising the disposal of waste material to landfill. The equipment and furnishings specified must also be fit for purpose while meeting the design life expectancy for a minimum period of ten years.

The majority of the equipment and furnishings have been procured using OGC Buying Solutions which is an Executive Agency of the Office of Government Commerce in the Treasury and provides a professional procurement service while delivering value for money gains. It does this by providing a range of products and services designed to encourage effective procurement while achieving measurable cost savings and improving the efficiency of the purchasing function throughout the public sector. All the products and services offered by the OGC have been through a competitive tender and fully meet EU Law. Public sector organisations using OGC contracts are therefore meeting their legal obligations towards public sector purchasing and do not need to be subjected to a lengthy EU procurement exercise. The contracts are re-competed at regular intervals.

To ensure that the OGC is the best method of procurement, a selection of equipment has been tendered and compared with the OGC prices. In all cases the OGC provided the best Value for Money and on average was 16% cheaper. All equipment and services being procured outside of the OGC have been competitively tendered in the normal manner using a minimum of three separate contractors.

Dream:

This facility has been designed and constructed to provide a DREAM excellent rating and the catering equipment, furnishings, and finishes, together with the operational methods have been selected having considered the energy usage and emissions generated while providing a sustainable solution.

The catering package has been designed and constructed to significantly reduce the level of Hydro Fluoro Carbons (HFCS) in the refrigeration systems with zero Ozone Depletion Potential (ODP). The insulation materials used throughout the equipment package have an ODP of zero and a Global Warming Potential (GWP) of less than five both in manufacture and use.

Natural gas is the preferred fuel for prime cooking equipment and for heating the domestic hot water systems and has been installed to meet the requirements of the gas safety regulations with the necessary ventilation interfaces. Whenever the efficiency allows the catering equipment has been selected to run on natural gas instead of electricity to reduce the CO2 emissions and energy costs.

Also the operational requirements have been reviewed with special attention being given to various procedures that can be carried out in a more sustainable way without impacting on the expectations of the customers eating in the new dining halls. This has made a major contribution to the reduction in CO2 emissions being discharged every year.

To enable the energy and water being used to be measured against the number of meals being produced the kitchen electrical, gas and water services have been separately metered. It is firmly believed that you cannot monitor and make savings if you cannot measure the performance. The benchmark published by the CIBSE for this style of facility is 3.9kWh per meal for the building broken down as 2.5kWh of fossil fuel and 1.4kWh of electricity. The estimated benchmark for the kitchen and Servery is 2.3kWh broken down as 1.5kWh of fossil fuel and 0.8kWh of electricity.

A heating system has been installed within the galley to avoid the equipment being turned on to provide the thermal comfort for the space when it is not required for the production of food.

Further energy and environmental savings have been incorporated as detailed in the various sections that follow.

Ventilation:

This facility is provided with ventilation systems fitted with fire suppression for all the catering areas. Each system provides extraction with make-up air as required by DW172 the HVCA Specification for Kitchen Ventilation Systems.

The kitchen ventilation system represents one of the largest uses of energy in the foodservice facility. Unlike a cooking appliance, which can be isolated for troubleshooting, the ventilation canopy is only one component of the ventilation system, and to further complicate things, the kitchen ventilation system is a subsystem of the overall building heating, ventilating and air-conditioning (HVAC) system. Fortunately, there is no magic to the relationship between the exhaust and its requirement for make-up air (MUA). The physics are simple, air that exits the building (through canopies and fans) must be replaced with outside air that enters the building (intentionally or otherwise).

Hot air rises! An exhaust fan in the ceiling could easily remove the heat produced by the equipment, but mix in smoke, volatile organic compounds, grease particles and vapour from the cooking operation, then a method to capture and contain the effluent is needed to avoid health and fire hazards. While a canopy serves that purpose, the key question is always, what is the optimum exhaust rate? The answer always depends on the type of appliance as this determines the volume of air to be extracted and the only method of calculation that should be used to obtain this information is the Thermal Convection Method as detailed in DW172 "HVCA Specification for Kitchen Ventilation Systems" which will also determine the make-up air supply rate. The most exciting development in kitchen ventilation of the last 30 years is the introduction of the new technology that treats the contaminated air by using ultra-violet UV-C enhanced oxidation technology. The UV-C ventilation canopy takes filtration efficiency to entirely new levels as it incorporates removable first and second stage filters which when combined with the ultra-violet cassettes are 98% efficient. The use of the high efficiency filters reduce the volume of grease being extracted, the tried and tested ultra-violet UV-C technology is then used to destroy airborne grease and odours to leave carbon dioxide and water vapour as end products, this combination delivers the most efficient system yet developed. Airborne contamination is arrested at source and not conveyed by the ductwork system to atmosphere. Grease is prevented from entering the exhaust ductwork eliminating fire risk and costly cleaning operations.

Prior to UV-C whatever money was saved in recovering heat from the kitchen extract system, was doubled as a cost in cleaning off carry-over grease from the kitchen canopy. Because the UV-C system prevents grease from entering the ductwork and the heat recovery devices can be kept grease-free, we can a last look at heat recovery with realistic capital costs.

The big problem that the foodservice industry has is that all commercial kitchens have significant amounts of idle cooking times when equipment is not fully utilized, however the extract system still pulls out enormous amounts of air as it is designed to operate at the maximum constant rate and requires large amounts of replacement air. Variable volume commercial kitchen ventilation systems are energy efficient because they control exhaust and make-up air fan speeds while reducing the amount of heated replacement air that is required.

To reduce the waste of energy and the problems of odour at the point of discharge normally associated with kitchen ventilation systems; this facility will treat the contaminated air by using ultra-violet UV-C enhanced oxidation technology. As heat recovery devices can be kept grease free, we have provided the mechanical engineers with the opportunity to remove the heat from the exhaust air and transfer it to the supply air system or domestic hot water system at a realistic capital cost. This option has now been developed and has been incorporated in the galley at HMS Collingwood.

In addition the UV-C technology would allow us to use variable speed ventilation canopies which incorporate volume control dampers together with pulse meters on the gas and electricity supplies to each canopy. That would allow the canopy to operate between 35 - 100% of the extract and supply rate while maintaining an 85% negative pressure within the catering areas. This means that the ventilation rates would automatically be adjusted to the volume of the catering equipment being used; once again this has now been developed and is incorporated in the new galley at HMS Collingwood.

The fire extinguishing systems provided meet the requirements of the Loss Prevention Standard to enable the client to obtain the lowest premium possible for insuring the buildings whilst providing the best protection for life and property. It is important that these systems have been designed and installed so that in the case of a cooking equipment fire the facility resumes its normal operating status as quickly as possible to avoid any inconvenience to the operator, client or customer.

In the past it was acceptable to only provide a high level of protection to life and property when using deep fat fryers; however when this strategy was developed, rendered animal fat (lard) was typically used in commercial kitchens to fry various foods. Today commercial cooking operations, appliances and supplies have changed greatly, health concerns have reduced the use of lard, and efforts to cook faster have caused the use of a wider range of highly efficient cooking appliances that heat faster and cool slower. These changes have significantly altered the fire hazard in all commercial catering facilities.

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The auto-ignition temperature of most animal fats is in the 280 - 320°C range compared to the auto-ignition temperature of most vegetable oils which is at 363°C and higher. Not only is vegetable oil used in deep fat frying it is also used as a cooking medium and is contained within various products when using bratt pans, open top ranges, solid top ranges, wok cookers and salamanders. Because it burns at a higher temperature it creates fires that are more difficult to extinguish.

Energy efficient cooking appliances are now used extensively in catering facilities to help reduce fuel consumption and improve cooking times by maintaining a more consistent temperature. This results in the cooking oils and metal appliances keeping hotter for longer and makes fire extinguishing more difficult.

Ventilation continued

For the above reasons all cooking appliances have been treated as needing a high level of protection to protect life and property and it has been specified that all the cooking equipment together with the relevant ventilation canopies within the kitchen and Servery area will be fitted with Ansul R-102 wet chemical fire suppression systems.

Every system installed is CE marked and complies with the NFPA Standards together with UL300, DW172 plus all the test requirements of the Loss Prevention Council LPS1223. Manufactured with stainless steel components the system is both hygienic and in keeping with the other commercial kitchen equipment. The services interface complies with BS1673 together with the various IEE and CORGI regulations.

The system uses Ansulex as the extinguishing agent which is a liquid fire suppressant that rapidly knocks down flame, cools hot surfaces and generates a tough vapour securing blanket to help prevent reignition. Ansulex is a low pH (7.8-8.2) fire suppressant which is very catering friendly.

The R-102 system provides automatic operation / protection on a 24/7 basis using thermal fusible links which are calibrated for the varying temperatures and styles of cooking, these are positioned in the extract plenum air path above the equipment being protected. Each system is also fitted with remote pull stations located at the end of each cooking island along the escape routes for dealing with visual hazards that may arise during operational periods.

The system has been designed to be appliance specific which in our opinion is the most efficient and cost effective method of fire protection. This is accomplished by selecting the suitable nozzles and aiming them at the specific hazard areas on each appliance while also aiming them along the extract plenum of the canopy and into the ductwork spigots.
Each system is fitted with volt free contacts for connection to the fire alarm system and for interfacing with the various services. When the fire alarm system is activated, all electrical services, gas supplies and supply ventilation will shut down.

To comply with DW172 and the requirements from Ansul the extract fan will continue to run when the fire suppression system is activated which means that the Ansulex is drawn through the ductwork so that the ductwork is fully protected and smoke is removed to aid escape and improve the circumstances for dealing with the cause of the problem.

The 100psi (6.9 bar) regulated discharge pressure ensures a constant flow of Ansulex and a consistent nozzle discharge pattern. As the discharge pressure is way in excess of the ductwork pressure this will avoid any Ansulex lift off from the hazard areas.

Secondary Refrigeration:

We are using a Glycol secondary refrigeration system which is capable of running a large number of different appliances, chilled areas and cold rooms on one system. It has outstanding rapid temperature pull down times; however it is not capable of dealing with freezer cabinets or rooms on this system. A typical Glycol system will reduce the primary refrigeration gas used within a commercial kitchen by up to 72% which brings with it the obvious benefits for the environment; it will also reduce the energy usage by up to 25%, while in some foodservice applications caterers have achieved a 15% reduction in food loss through reduced wastage.

The Glycol secondary refrigeration system comprises of a pair of external chiller units circulating a food safe mixture of chilled glycol and water around a ring main connected to the independently controlled equipment. The chiller units run alternately, offering back-up, if one unit should develop a fault, an alarm sounds and the remaining unit comes into operation. As the units are in a remote location the kitchen and Servery are not exposed to the heat and noise emissions that integral units can create.

Glycol systems have an added benefit in that it is easier to install a heat recovery system that can harvest the heat rejected and use it to preheat the cold water feed to the water heater supporting the kitchen. This system is being further developed so that it can be employed on future projects when secondary refrigeration systems are used.

The freezer room operates on a standard DX system with a remote compressor that keeps the heat and noise emissions out of the facility, this enhances the life of the equipment while making a more acceptable working environment.

The independent freezer cabinets operate with integral units which use conventional refrigerants, however the use of Hydro Carbon refrigerants are now being specified for future projects, this reduces the amount of energy used by up to 15% while using an environmentally friendly refrigerant.

Cooking Equipment:

In the galley when considering energy efficiency, one of, if not the main area one is drawn to is that of prime cooking. This activity takes a number of prepared cold food items and by various means heats them to provide a cooked product that can be served as a hot or cold dish, therefore by its very nature it is easy to see that there must be a substantial energy input.

In this facility we have asked the question; "Is this energy input always provided in the most efficient way?"

At first glance one would be excused for believing the only option is to pass the problem back to the equipment manufacturers to improve the efficiency of their equipment, the equipment and plant used within the industry in a large number of cases is only 50% efficient while the domestic market has to achieve 86%; whilst this is an option that is actively being pursued by the manufacturing fraternity it is not the only way forward

Cooking Equipment continued.

The old adage remains true today and can be very effective in energy savings; "keep it clean, turn it down, turn it off" also a good planned preventative maintenance policy can help to achieve substantial savings. But there is also another approach if one is prepared to "look outside the box".

A typical kitchen operated within the establishment which provide three meals a day for a number of people to be fed over a given service period for each meal, is entitled to range of prime cooking equipment as detailed in the JSP Scales.

Very often the driver when purchasing this equipment is a low capital cost with little or no consideration being given to the whole life-cycle costs which include wasted food, energy consumption, labour, the related costs for any necessary consumables like cooking oil and detergents etc, plus the disposal costs at the end of its useful life.

On examining the requirements of the facility there are a number of different alternatives that need to be life-cycle costed, to achieve this, the preheat energy, idle energy rate, heavy load energy efficiency percentage together with the production capacity need to be calculated. In addition the operating hours per day, working days per year, with the number of preheats each day and the amount of food to be cooked also needs to be calculated. The energy and water costs need to be added together with the lifespan in years.

From this can be obtained the total cost of the utilities to run the appliance for its full life span, this then needs to be supplemented by adding further information which will give labour, consumables, maintenance and disposal costs. Then a valued judgement can be made as to which is the correct appliance or item to specify. It is then possible, whilst satisfying the requirements of all those involved to provide a facility that has a different look to the usual line up with reduced equipment content, and a revised gas to electric ratio. This will provide energy savings and reduced carbon emissions.

The combination ovens being specified offers up to a 16% reduction in energy and a 40% reduction in water usage when compared with similar products, while being simple to use, giving amazing results with an automatic cleaning cycle. Each oven is to have seven main cooking modes with a programmable memory for product consistency and a temperature range from 30-300°C. A core temperature probe with multiple point measurement is also to be provided. The cooking modes provided are roast, grill, poultry, fish, baking, finishing and combi steamer which means that pan work is made easy with the oven as are breaded products. The oven can provide a full (nine item) English breakfast excluding fried eggs in six minutes including toast and fried bread, with 90% less fat than conventional methods.

The deep fat fryers specified in this facility incorporate the latest technology using the twin-path bio-form heat exchanger and pre-mix burner; it is further enhanced by the overall design of the fryer including the filtration system. As a result of this the unit provides a healthier environment in the kitchen using less energy with a higher output and faster recovery time, in addition it uses up to 38% less oil which is reflected in the food served. Chips cooked in the fryer have 25% less fat overall and up to 40% less saturated fat.

Dishwashing:

The commercial dishwasher is one of the most labour saving devices in the commercial kitchen and is probably one of the most expensive to run, so it makes sense when considering energy efficiency and sustainability to look at the wash-up. All dishwashers require four components to work successfully - water, energy, detergents and time, all of which are expensive so any savings which can be engineered will save money and increase the economic, environmental and social bottom line.

The first consideration is the quality of the wash as a customer's perception of the caterers hygiene standards can stand or fall by the cleanliness of the tableware placed in front of them. Secondly the new wash-up facility must provide best overall value when investigating not only the initial purchase price but also the ongoing running and disposal costs.

The calculation for heating a set amount of water over a given time cannot change; the amount of energy required will always remain constant. Therefore the technology required for making dishwashing more efficient is to improve the insulation on the machine to maximise the heat generated, reduce the amount of water required per cycle, and recover the wasted heat that is discharged to atmosphere and drain. In addition the removal of any dissolved minerals will ensure that the machine stays efficient.

Water that is high in dissolved minerals, specifically calcium and magnesium is described as hard. Hard water is not a health risk, but a nuisance because of its tendency to cause mineral build-up in pipe work and on heating elements, which reduces the efficiency of the system. Together with the poor performance of detergents and rinse agents when using hard water compared with soft water makes water treatment a necessity. It is worth noting that the cost of detergents and rinse agents over a five to seven year period can easily amount to the original price of the dishwasher. HMS Raleigh does not require any water treatment because it has naturally soft water, however HMS Collingwood will require Base Exchange water softeners as the water is very hard.

To obtain good results, you have to use clean water so it is worth looking at machines with an effective filtration and wash system incorporating anti-blocking jets, as these will on average consume 30% less water while significantly improving the quality of the wash. This will save on the energy to heat the water as well as providing considerable savings on both detergents and rinse agents. The higher through-puts provided by incorporating the improved wash will also provide the potential to minimise on labour costs.

A heat exchanger is specified on the rack conveyor dishwasher and comprises of a system using cooling coils, where steam is drawn efficiently from the wash chamber. The heat recovered through a contra-flow principle is used to heat the fresh water intake up to 50°C saving around 9 Kw.

A heat recovery system based on heat pump technology gives three advantages, no direct connection is required to the ventilation system, the system recovers up to 59% of the energy used by the machine and it improves the working environment. The cool air leaving the outlet is between 13 and 19 can be passed back into the room.

Food Waste and Waste Recycling:

As from the 30th October 2007, landfill is no longer able to accept untreated waste. The requirement to treat waste is part of a package of measures, applied across the EU by the Landfill Directive, The rules are designed to:

- Increase waste recycling and recovery
- Reduce potentially polluting emissions from landfill.

The legal definition of treatment requires three things:

1. It must be a physical, thermal, chemical or biological process including sorting.
2. It must change the characteristics of the waste.
3. It must reduce its volume, or reduce its hazardous nature, or facilitate its handling, or enhance its recovery.

The design solution employed for dealing with waste from this facility which produces 1,044,120 meals per year is to sort it at source and store it in a designated area which is ventilated while it awaits collection by the appointed contractor.

The waste streams being used are as follows:

150101	Cardboard and News	0.0302 litres per meal	31,523 litres
150104	Metal Cans (crushed)	0.0129 litres per meal	13,469 litres
150107	Glass (by colour)	0.0194 litres per meal	20,256 litres
200108	Food Waste	0.0992 litres per meal	103,577 litres
200301	General (black bag) waste including Plastics	0.0539 litres per meal	56,278 litres
200125	Waste Cooking Oil	0.0079 litres per meal	8,249 litres

The non food waste is collected in 60 litre bins, colour coded to the various waste streams at the point where the waste is generated, and then manually transported to the designated waste area located within the building. These waste bins are then emptied into the larger colour coded 240 litre or 1100 litre bins for that particular waste stream, these bins are then emptied by the appointed contractor once a week. In the case of cardboard and news the bins have been replaced by wire cages which are positioned in the waste area ready for the contents to be transferred to a central collection point.

The system designed for food waste is based on the latest handling system which is being brought into the UK by Meiko UK Ltd and has been inspected by CDIS-KARM on behalf of Flagship with Defence Catering at a school and hospital in Sweden. It provides the most hygienic and sustainable solution available to the catering industry today from both an environmental and economic perspective. The pay back period for this system is between four and five years.

What is Micro Vac?

Micro Vac is a system designed for the handling, transport and storage of food waste produced in a wide variety of food service operations. Micro Vac uses a high velocity vacuum to transport food waste from point of generation to the point of storage. It consists of four main components: a food waste inlet, an inter-connecting pipe system, a food collection and storage vessel and a vacuum source with an incorporated control unit.

In principle, the system:

- Grinds and mixes the waste food within the inlet together with a small amount of hot water, which is then converted to a liquid mass that can be extracted within the system with ease.
- Transports this liquid mass by high velocity vacuum through a standard plastic sewer pipe network to a separator that is located within the storage vessel.
- Extracts the majority of the water from the food upon reaching the storage vessel via a filtering screen. The extracted water is then discharged into the main drainage system.
- Discharges the contents of the storage vessel into a sealed tanker that forms an integral part of a specialist waste collection vehicle. The food slurry can then be transported to a bio-gas or composting plant for processing or recycling.

Why, and when to use Micro Vac

- When the volume of waste food is less than 180 litres per hour through a maximum of two inlets per vacuum pump and control unit.
- When the highest food hygiene standards are required in the facility.
- When a long term cost efficient system of handling food waste is required.

What are the advantages of the system?

- First class hygiene standards in all food preparation and service areas with no problems resulting from pests, rodents, wildlife and unacceptable odours.
- Considerable labour savings with reduced operating costs.
- Ergonomic handling of heavy waste.
- Environmentally friendly, organic waste becomes an asset when used to generate renewable energy.
- Reduced waste volume.
- Simple to install and maintain using tried and tested engineering solutions.

"It provides the most hygienic and sustainable solution available to the catering industry today from both an environmental and economic perspective. The pay back period for this system is between four and five years"

What is Micro Vac continued

Where can the Micro Vac units be placed?

The inlet is designed as a workbench and can be placed in a variety of locations within the catering areas. The idea is that the inlet should be integrated into the working process and flow. It then becomes an automatic process to deposit the waste food items directly into the inlet adjacent to where the majority of the food waste is generated. Each individual Micro Vac system can have a maximum of up to two inlets placed at a distance of no more than 70 metres from the waste food storage vessel.

In principle, the pipe work system can be located and positioned almost anywhere within the facility. Micro Vac uses 50mm diameter standard plastic sewer pipe for transporting the liquid mass in either a vertical or horizontal position. The pipe work can be located within the false ceiling voids or adjacent to other waste water services.

The separator / storage vessel needs to be located in a suitable accessible location. As the vessel is fully ventilated, the location does not have to be temperature controlled or specially designed in any way. It is an advantage if the tank can be placed close to an outside wall, adjacent to where the waste is to be discharged into the waste collection vehicle, in order to minimize the length of the suction pipe required.

The vacuum unit with the system control panel can also be positioned in the same location as the storage vessel; however it can be placed in a separate location if required.

How does Micro Vac work?

The operator raises the inlet lid and fills the waste storage space located within the inlet with a maximum 6 litres (average 60 covers) of food waste or to the maximum level mark.

The operator closes the lid and starts the cycle by pressing the green start button. When the system has become activated, the lid is automatically locked and the grinder within the inlet starts the operation, cutting and mixing the waste with a measured amount of hot water. The liquid mass is then extracted by a high velocity vacuum, via a mixing valve where it is mixed with the transport air. The transport air is fed from a pipe which can then be directed, for example, into the ceiling void. When the waste has been grinded and the inlet is emptied and the process is completed, the lid is unlocked and the inlet can then be refilled. If no further extraction has taken place within a 2 minute period, the vacuum pump closes down and the system is placed on "standby" mode.

The separator that separates the waste from the transport air is located to the top of the storage vessel and is attached to the inlet by a 50mm plastic pipe. In the base of the separator a valve automatically closes when the vacuum is created. This valve also opens automatically when the vacuum has been exhausted. The waste from the separator is collected in the storage vessel. Inside the tank is a perforated metal cylinder that serves as a filtering screen, the function of which is to extract free liquid in order to increase the dry substance content in the amassed waste. Within the cylinder is a pump that empties the extracted water directly into the drainage system. When the vessel is approximately 90% full, a signal is generated to enable the vessel emptying process to be ordered from the waste collection contractor. When the "full" signal is generated the system is automatically stopped in order to avoid overfilling of the storage vessel. The storage vessel is manufactured from glass fibre reinforced plastic and is available in various sizes and capacities ranging from 2,000 litres to 10,000 litres.

The entire process is controlled by a completely new developed type of PLC module which makes contact with the inlet by means of a two-ribbon cable. The control unit is provided with control lamps that indicate the system status and vessel storage level.

Micro Vac ~ System units:

Inlet for manual feeding ~ integrated inlet for scrapping of tableware.

- Freestanding unit for island or wall locations.
- Maximum two inlets to the same system.
- Can be combined with an automatic inlet.

Inlet for manual feeding - Technical data

Inlet opening, cylindrical	170 mm
Inlet volume	6 litres
System capacity per hour	180 litres
Air inlet pipe	50 mm
Suction pipe	50 mm
Pipe bends	2 x 45°
Electrical supply	2.2 Kw 400v TP&N 50Hz
Control circuit	24 v
Hot water connection	15 mm
Hot water consumption	60 litres per hour
Width without pipe connection	950 mm
Width with pipe connection	1,020 mm
Depth	700 mm
Height with lid closed	800 mm – 900 mm
Height with lid open	1420 mm – 1520 mm

Integrated inlet for scrapping of tableware - Technical data

Inlet opening, cylindrical	170 mm
Inlet volume	6 litres
System capacity per hour	180 litres
Air inlet pipe	50 mm
Suction pipe	50 mm
Pipe bends	2 x 45°
Electrical supply	2.2 Kw 400v TP&N 50Hz
Control circuit	24 v
Hot water connection	15 mm
Hot water consumption	90 litres per hour
Width without pipe connection	1,060 mm
Width with pipe connection	1,110 mm
Depth	700 mm
Height with lid closed	750 mm – 900 mm
Height with lid open	1370 mm x 1520 mm

What is Micro Vac continued

Storage vessel

- Storage vessel for food waste
- Can be placed in any space irrespective of model
- Storage vessel with built-in separator
- The separator has an automatic emptying valve
- Automatic water flushing
- Pump for water reduction to increase the dry substance
- Connection for vent pipe
- Connection for emptying
- Four plastic coated feet
- Quick lock-on inspection cover

10,000 litres storage vessel – Technical data

Height including separator	3245 mm
Width / diameter	2000 mm
Length	3500 mm
Vessel capacity	10,000 litres
Electrical supply	2 x 0.8 Kw 230v s/ph 50 Hz
Vent connection	110 mm
Vacuum connection	50 mm
Suction pipe connection	50 mm
Emptying connection	110 mm
Hot water connection	15 mm
Hot water consumption	20 litres per hour
Drainage connection	25 mm

"In principle, the pipe work system can be located and positioned almost anywhere within the facility. Micro Vac uses 50mm diameter standard plastic sewer pipe for transporting the liquid mass in either a vertical or horizontal position."

Vacuum pump and control unit:

- The vacuum pump is used to generate the vacuum required for transporting the liquid mass.
- The systems control unit is integrated as part of the vacuum pump unit.
- The unit is fitted with a safety filter.
- Adjustable feet for stable placement.
- Low sound level: sound damper on exhaust air.
- Easy to connect – two connection pipes and a communication / power cable is all that is required.
- Very easy to service.

Technical data

Height	1,370 mm
Width	1,400 mm
Depth	600 mm
Electrical supply	7.5 Kw 400v TP&N 50Hz
Start method	Soft start
Maximum vacuum	70 kPa
Inlet connection	50 mm
Exhaust vents connection	50 mm

The Micro Vac system is CE marked and is a patented system that is only intended for food waste such as processing residue from vegetables, meat, fish, edible liquids and small bones.

Fat, Oil and Grease Management:

As the environment is high on the agenda with this new building being constructed to achieve a DREAM excellent rating, the requirement is for a design that will make the catering areas the most efficient to construct and maintain, incorporating the latest innovative technology.

Obviously the cooking oils are disposed of in bulk by licensed contractors but light oils from preparing food, washing pots, utensils, crockery, cutlery and surrounding surfaces are discharged to drain. Legislation dictates that drainage serving the kitchens in commercial hot food premises must have a means of grease removal in place to prevent grease building up in the sewers and causing problems.

Catering and maintenance management often regard conventional grease traps / interceptors as a necessary evil, knowing them to be a health hazard that is inconvenient, requiring continual maintenance and being expensive to maintain and operate. Also how do you empty a grease trap within a catering area, with all the associated risks and hazards to public health? You don't. You simply don't use grease traps, you use one of the more advanced eco friendly ways of treating light fat, oil and grease that is washed down the drains during normal catering operations.

The maintenance issue is important and is a prime consideration for using one of the new grease management systems as it removes the risk of disrupting the kitchen and surrounding areas during the working day. It also feels appropriate to adopt a biotechnology solution to the problem of grease control in such an environmentally progressive building.

The installed grease management system doses the drains at three locations and replaces the need for a grease trap while being compliant with Part H of the Building Regulations as a stand alone grease removal system. It employs patented biotechnology to completely degrade grease in commercial drains. Installed discretely on the kitchen wall the unit takes up no valuable floor space. Every twenty four hours it releases a unique bacterial cleaning solution into the drain.

The dosing of the bio-fluid occurs automatically and is timed so that the fluid has the maximum amount of time to degrade any grease in the drains before the kitchen begins operating again.

The appeal of this grease management system lies in its demonstrated success in other catering outlets, and its reliability.

Fat, Oil and Grease Management continued

As environmental technology moves forward it is becoming increasingly possible to reduce environmental impact. In today's modern developments, traditional grease traps with all their draw backs are seen as ancient technology, with a solution such as this grease management system providing a practical answer to grease treatment which benefits all parties concerned with the construction and maintenance of this modern building.

Mr Michael Johnson, Principle Building Surveyor for the Building Division, at the Office of the Deputy Prime Minister (the body that Publishes the Building Regulations, Namely the H-regs) has stated that this system DOES comply with the H-regs ~ "2.21 Drainage serving kitchens in commercial hot food premises should be fitted with a grease separator complying with prEN 1825-1 and designed in accordance with prEN 1825-2 or other effective means of grease removal."

Water Conservation

Knee operated taps with automatic shut-off devices have been used on all hand wash basins and low flow energy efficient spray units have been installed on vegetable preparation, pot wash and wash-up sinks. In addition no waste disposal or dewatering units have been fitted because of the selected waste management system.

A Thaw cabinet has been provided within this facility to eliminate using water to thaw food and the dishwasher specified use 25% less water per washing cycle. As part of the life-cycle costing process water saving models have been considered for every piece of equipment specified and installed.

It is estimated that these measures could result in water savings of between 30 & 35%.

Conclusion:

It is generally accepted by the food service industry in the United Kingdom that as an industry we need to make a 60% saving on the amount of energy and water we use while reducing our harmful emissions by the same percentage prior to 2050 if we are to become sustainable. Whilst this appears to be a mammoth task we believe that the RNEO and Flagship together with their supply chain have proven that this is achievable as it is estimated that this facility with good operational practices will be between 30 and 35% more efficient than its predecessor.

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On behalf of CDIS ~ KARM

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