

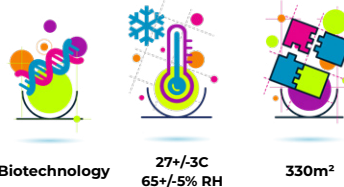
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oxitec



THE CLIENT

Oxitec – a US-owned Advanced Biotechnology company with headquarters and R&D facilities in the UK near Oxford University – where the business was initially formed. The client is building a healthy, sustainable and equitable future for human beings by forging a new category of safe, sustainable, chemical-free, highly effective biological pest control solutions, conducting multiple large-scale technology programmes all over the world.



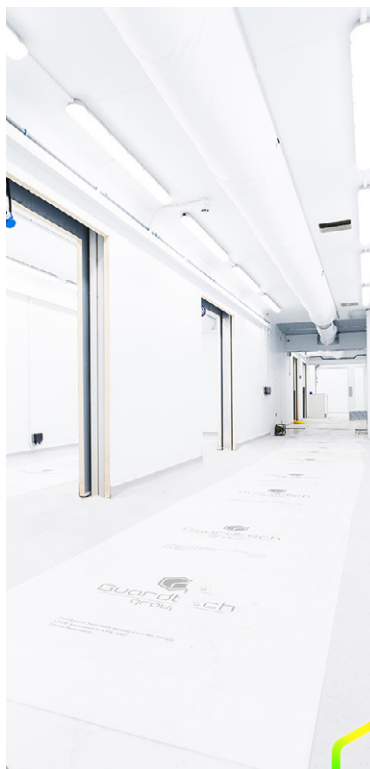
Biotechnology

27+/-3C
65+/-5% RH

330m²

THE BRIEF

Oxitec required additional lab space to bolster their efforts in Djibouti to release a new wave of genetically modified (GMO) mosquitoes to help stop the spread of an invasive species that transmits malaria. The friendly non-biting male *Anopheles Stephensi* mosquitoes developed by Oxitec carry a gene that kills female offspring before they reach maturity. Guardtech were contracted to design, construct and ship a large-scale, portable 330sqm 11-container facility over to East Africa to help them continue their life-saving work.



“A real badge of honour for Cleancube...”

“Guardtech Group Commercial Director Mark Wheeler said: “To be part of an initiative that’s going to help save thousands of lives in Djibouti is a wonderful thing for Cleancube and the wider Guardtech Group. It’s a real badge of honour for us as a business to have been involved in this groundbreaking project to drastically reduce the threat of malaria.”

Mark Wheeler
Guardtech Group
Commercial Director

Guardtech
group



cleancube
mobile cleanrooms

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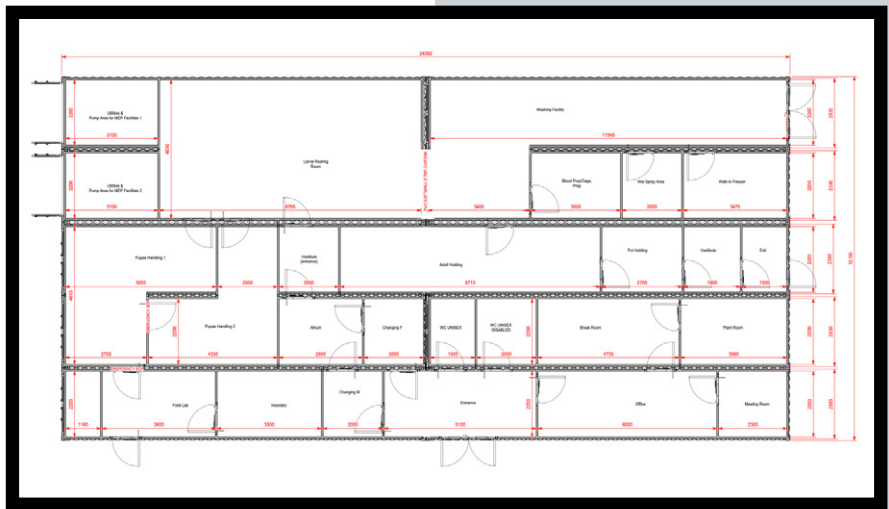
THE TECH SPECS

A controlled environment designed, installed, cleaned and commissioned by Guardtech built to the following specification:

◆ **Structural:** 4 x GT Access Plus and 18 x GT Access Lite single doors with vision panels, GT Shell Plus 50mm Quadcore insulated CleanSafe wall and ceiling panels, GT Deck Plus vinyl flooring, carpet tiles, 2 x double and 2 x single powder-coated steel external doors, 5 x 1,500mm x 900mm double glazed window units.

◆ **Electrical:** 100 x GT Lux Lite LED Lights flush-mounted in ceiling panel with PIR activation, electro-magnetic door interlock system, 24-way distribution board with 10 x sub boards connected to main, 21 x smoke heads in each room feeding back to fire alarm panel, 120V double sockets and ethernet in 3-compartment curved profile trunking around room perimeter and columns.

◆ **Mechanical:** 2 x GT Air Plus CRAC units ducted to diffuser grilles serving



zones 2 & 3 with recirculating air, wall/ceiling-mounted air conditioning units serving Zone 1.

◆ **Furniture & Equipment:** Walk-in freezer, DI water purification system, diesel generator, 12 x deep ThunderMax workbenches on powder-coated frames and levelling feet, 3 x double and 8 x single pedestal stainless sinks connected with taps and drains, 2 x handwash basins and 2 x toilets, 6 x stainless steel wall-mounted cabinets, 4 x stainless steel floor standing cabinets, 4 x stainless steel lockers.

THE CHALLENGES

Plant seeds for the future: The facility featured a full HVAC system that was connected to all the different containers – which was all housed in a separate container placed on top of the other units. This was a first for Cleancube – an innovation that has helped our Design and Installation Engineers to reconsider the different ways we can offer plant systems for our pre-fabricated facilities.

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“It’s a fully fledged, bespoke Air Handling Unit (AHU) that’s almost as wide as the plant container it’s situated within,” said Associate Director of Manufacturing Michael Burton. “The plant unit also includes critical electrical elements and mains board, meaning everything is housed inside a container rather than on the outside. We managed to put together a very complex, dedicated plant container in just five weeks. The beauty of it is that it takes up none of the lab footprint – by going up rather than sideways. And it’s a really intelligent but safe way of creating more process footprint, because the castings of the container take all the weight, so you’re able to utilise the stacking method to ‘buy yourself back’ some ground-level container space. We just had to increase the size of the concrete pillars underneath the facility in those critical points.”

Put a sock in it: The bespoke AHU is ducted to the backs of each of the other ten containers in the facility, but the unit’s air conditioning is provided via a ‘sock system’ that runs the ceiling of each module – another first for Cleancube. “All components had to be kept inside the room,” added Burton, “because



it was simply too hot outside to manage this project in the way we might’ve done in a less demanding climate. Absolutely everything is surface-mounted inside the facility for that reason.” The Cleancube Design Team opted for an innovative sock system as it was easier for the client to clean. The socks can be easily unzipped and washed – plus, it’s

a simple process to stockpile and order more socks for ongoing care and maintenance. But there was another key reason for the maiden implementation of this ingenious system – the client’s process. “Because Oxitec are dealing with mosquitoes, if you have Fan Filter Units or terminal filters, it’s forces the air through at the position of those units.

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With the socks, it bleeds air all the way through to keep the facility cool, which doesn't disturb the mosquitoes. So it's a better air system for their well-being and management, if you like. We're not forcing unidirectional airflow over them. They're only small – so the last thing they need is a forced airflow coming over them."

First times for everything: Another new addition to the Cleancube armoury that came from this project was the implementation of a drainage system – allowing the client to deal with any spills easily via dedicated points in the flooring. But that wasn't the last of the 'firsts' – this Cleancube facility also featured a first-ever walk-in freezer room, designed and installed by Guardtech engineers using our cleanroom construction IP as the bedrock its development. This allowed the team an excellent opportunity to explore other types of coldroom provision and innovations that could be developed in the future. The facility features fire alarm and intruder alarm systems that had to be specially designed into the layout, as well as an intelligently configured back-up power arrangement.

"The Cleancube boasts a number of Uninterrupted Power Supply (UPS) units," said Burton. "Obviously, with a



territory like Djibouti, the electrical infrastructure is far less reliable than here in the UK – so we had to plan for any eventuality. If they have a power cut, the transformer kicks in. There's a delay between the transformer and the power - and if they lose power for more than six seconds, it shuts all their water systems down and can potentially kill all the mosquitoes for their life-saving programmes. So we connected UPS systems to dedicated sockets to ensure the client's operations wouldn't be compromised. The

UPS essentially fills the gap of that takeover – it's a really nice innovation to give the customer peace of mind." As the Guardtech Group continues to grow, so does our capacity to add new elements to our full turnkey provision. In many recent large-scale facility builds, the team have taken on the challenge of installing non-cleanroom and laboratory aspects of the facilities – and that growth continued with the Oxitec Cleancube. "This was the first Cleancube to ever include office rooms, kitchen areas and toilets," added Burton. "It's just another series of fantastic examples of what we can now do with these amazing pre-fab container facilities."

Pushed to the limit: The facility is essentially a non-classified "clean laboratory", with the only filtration, other than the sock, being F7 filters installed at the bespoke AHU. All the return air is pulled through the ceiling voids back to the AHU. This helps to prevent condensation build-up between the cleanroom wall and ceiling panels. "We went to the absolute limit with the cutouts we made on these containers – in terms of the sides and how they stitch together on site," said Burton. "If we'd gone any further, the modules would've had to shipped separately on a special vessel, which would've caused delays to the schedule.

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There's an 1800mm limit on the cut size you can make – and we worked diligently to ensure we made every millimetre count, to allow us to ship all the modules in one go whilst not compromising on the structural integrity of the containers. We had panels bespoke metal panels developed that allowed us to safely and securely bolt all of the units tightly shut." This meant that the doorways which were situated on each module to link the different rooms and corridors had to be positioned intelligently in the design to allow for 'safe cuts'.

Just deserts: The most significant challenges for this project centred around the location for the facility. Not only is it extremely hot at times in the East African desert, but actually transporting the container to the territory brought a host of administrative and logistical hurdles. "The containers were actually taken on and off the boat three times during the course of its journey," Burton continued. "It went to Europe, the Middle East, on and off different vessels – and then getting it through customs in Djibouti was also a challenge. But all of this was a huge learning curve for the team. It has given us so much valuable, new knowledge, insight and expertise when it comes to sending large-scale pre-fab facilities overseas.



And, despite all those challenges, the fact it's for an initiative that will potentially save hundreds of thousands of lives, makes all the difficulties along the way worthwhile." Another major challenge our Cleancube site managers had to overcome was utilising local subcontractors for certain aspects of the installation. At times, our team were working with operatives that had never undertaken a project of this scale before. "Having our skilled labour onsite, guiding the local subbies on how these things go together safely, was huge," said Burton. "You're looking at crane drivers that had never experienced something like this before. So to have our top guys there, marshalling everything

and keeping everything safe and in control, in such an oppressive climate, was really challenging." The client had stone pillars constructed in the groundworks phase of the project so our Cleancube Jackpads could be installed correctly to ensure a level facility. Some of the containers included large quantities of water to support the process in those modules. However, almost all of the pillars had been sized differently to accommodate the varying point loads. The Cleancube Design Team had to collaborate effectively with the client to ensure everything came together as required. "There were two containers in particular that were really heavy – because it's where they breed the mosquitoes," said Burton. "So we ended up moving the plant container as a result of this to ensure the weight loads were still appropriate for a safe installation."

Feeling the heat: The humidity on site was a massive challenge for the team to overcome – notably, Guardtech Group Compliance Manager Chris McGinn, whose commitment to getting the project over the line was Herculean at times (including numerous visits to the territory for mechanical & electrical support and general snagging). "Without the aircon running, Chris and the team would've been sitting in a container that's up to 52C in the shade," Burton added.

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“So the fact that Chris made a concerted effort to keep everything on track was massive for the whole team. “You’ve got that African sun beating down on a container – it’s hot! So we arranged the installation process for all the work on top of the containers to take place at night when it was far, far cooler. During the day, the air conditioning is obviously running all day, and so when it came to the night shifts, everything was just wet. So we’re trying to fix lagging, but everything was just soaked because of where the humidity kicked in. So that was a real challenge.” The facility also includes full plumbing – which meant the containers had to be situated 800mm off floor level so operatives could get to pipes and electrical cabling under the unit. This meant installing concrete steps up to each doorway.

Weathering the storm: The language barrier presented challenges at times for the team, with French-speaking conduits employed to mediate between the Guardtech Group team and the local subcontractors. “Everybody who worked on this project should be proud of themselves,” added Burton. “In so many ways, it was an impossible job – and yet we did it! We used Apple AirTags to track everyone out there, to keep an eye on them and

ensure they were safe. It was just an amazing, incredibly well co-ordinated effort all round. To make sure we hit the deadline, quite a number of us worked all over Christmas. So, other than Christmas Day, Boxing Day and New Year’s Day, we worked the whole of that Christmas period to get this done – sometimes til 9, 10, 11pm at night. And because it was such a tight deadline, and given that we were constructing it outside, in December, it was so difficult to keep it clean whilst we were working in the modules. We were constantly scrubbing floors.

“Weather-proofing was very difficult – possibly the hardest thing of all. We had to split it and sheet it in the car park at our Brandon manufacturing facility, with all those bespoke panels to bolt on. On a standard container, we weld two 60mm box sections together, one into the other and put a cap over them. The water can’t then run inwards. But you can’t put units on a container ship like that – because it becomes ‘bigger’ than a container. So we had to keep sealing and coating all the joints. And so that was another major challenge – but the team worked so incredibly hard to make this amazing, life-saving unit go from a dream to a reality, and I’m just immensely proud of all of them for their efforts in bringing this ground-breaking facility to life.”

THE RESULT

“Guardtech Group Commercial Director Mark Wheeler said: “To be part of an initiative that’s going to help save thousands of lives in Djibouti is a wonderful thing for Cleancube and the wider Guardtech Group. It’s a real badge of honour for us as a business to have been involved in this ground-breaking project to drastically reduce the threat of malaria in East Africa.

“The facility itself turned out to be quite a complex and challenging build, not just in terms of design and construction, but also logistics. As a result, we knew early on that we weren’t going to make a profit on this project. But the fact that we are able to contribute to something bigger than the business, protecting and preserving human life in Africa, has driven the whole team to put in an incredible shift to get this one over the line.

“I’m immensely proud of the Cleancube team for going the extra mile and beyond on this project – and I wish Oxitec every success in implementing their life-saving biotechnology over in Djibouti.”