

The following comprises an overview of the components that when integrated make up the Optimus Integrated Surgical Environment. Of these components, some are also available as stand alone verticals.

## AMBIWALL™

The Optimus AmbiWall™ lighting system is comprised of seamless, non-porous solid-surface material that creates a room-within-a-room in the ISE space.

RGB LED backlighting creates a glow effect through the translucent panels, and provides a sense of calm for both the patient and staff.



The AmbiWall™ system takes advantage of the “Glow-effect” utilized by theatrical lighting choreographers to provide a positive psychological impact on both patients and surgical staff in the operating room environment. The complete spectrum of hue, saturation, and luminosity values can be selected via the ISE software iPad control interface.

The solid-surface wall panels are impregnated with nanoparticle photoactive of titanium dioxide (TiO<sub>2</sub>) that inhibits bacteria growth on surfaces when activated by full-spectrum lighting, which represents a breakthrough in the reduction of operating room pathogens.

The ISE has also eliminated all difficult to clean right angle corners on the ceiling, floors and walls, by introducing rounded corners in all quadrants of the room.

## AV SYSTEM

The Optimus AV system works within the ISE software suite, seamlessly allowing for modification of the four 84" video screens to display any of the HDMI, Ethernet, HIS or PACs system information in configurations of up to six display panels per screen. Two conference cams, a webcam and a surgical camera can be monitored, with two omnidirectional microphones and quad audio ceiling sound system for communication and music playback.



## CELESTIAL™ SURGICAL LIGHTING SYSTEM

Ceiling-mounted robotic LED lights provide shadow-free, variable intensity and continuously variable colour temperature (3200K–6800K), as well as variable focus and spot size (down to 5 inches).



Twelve sources can be grouped into up to 4 independent spot-groups with precision positioning, adjustable spot size, and deep-wound lighting capability.

Spot groups are controlled wirelessly through the ISE software iPad control interface.

## CIRCADIAN LIGHTING

Optimus is the first to look into maintenance of circadian rhythm through the use of modified full spectrum lighting.

Developed with the lighting engineering team at Philips Colour Kinetics, Optimus can control *both* halves of the circadian cycle (day/night).



Staff working in the ISE will have an improved sense of well being, reduced cumulative fatigue during the week, and decreased time-to-sleep upon returning home after a day in their Optimus ISE operating room.

## FLOOR GENIE

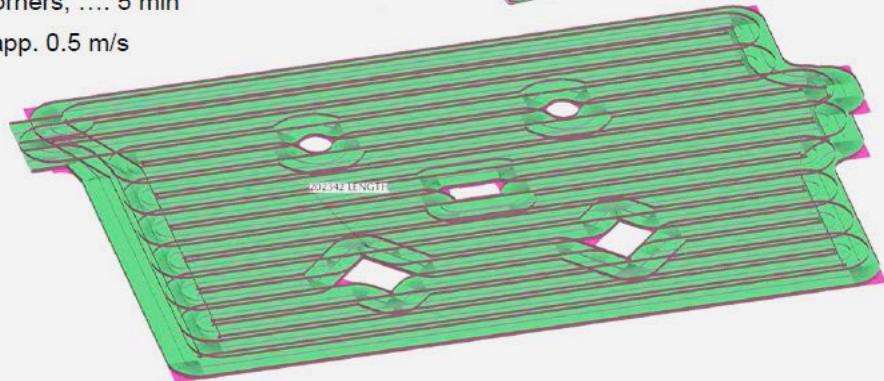
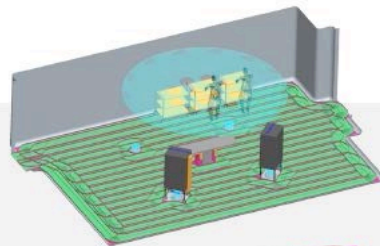
The Floor Genie is a robotic floor cleaner, with disposable cartridges for complete isolation of contaminated materials, that is deployed after an operation has been completed, and works while the nursing staff is preparing the room for the next procedure.



### Predimensioning FloorGenie

#### Path and speed

- Assumption: working width: 50 cm
- Assumption: Overlap: 10 cm
- ➔ Required distance: app. 200 m
- Time for edges, corners, ...: 5 min
- ➔ Required speed: app. 0.5 m/s

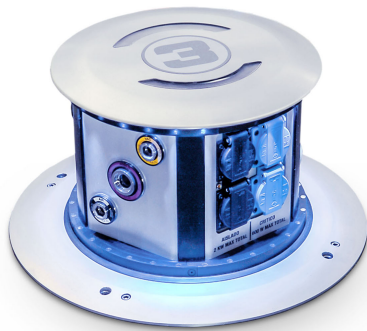


It is capable of cleaning a 650 square foot operating room in 12 minutes (tested in real conditions), guaranteeing a fixed turn-over time between operations to that time interval: a major contribution to the Optimus ISE™ "Efficiency-by-Design" solution.

## FLOOR PODS

Optimus ISE™ replaces the standard ceiling-mounted “forest of boom systems” with the Floor Pod solution.

Four retractable floor pods provide data, power, and medical gas / vacuum connections for mobile equipment carts utilizing the new low-profile Optimus *QuickConnect* connectors. The pods are configured so that the five faces serve as a docking station for anesthesia, laparoscopy and arthroscopy carts, surgical microscope, ultrasound, etc.

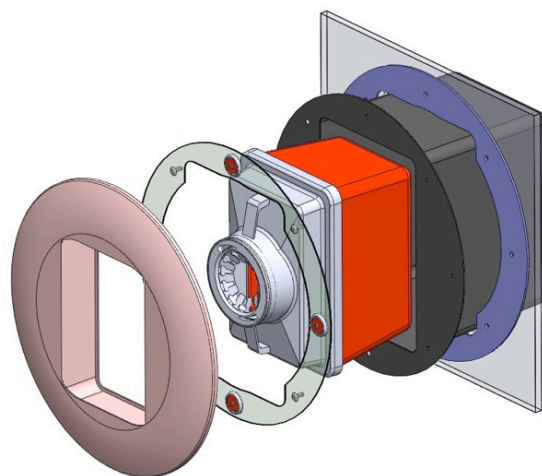
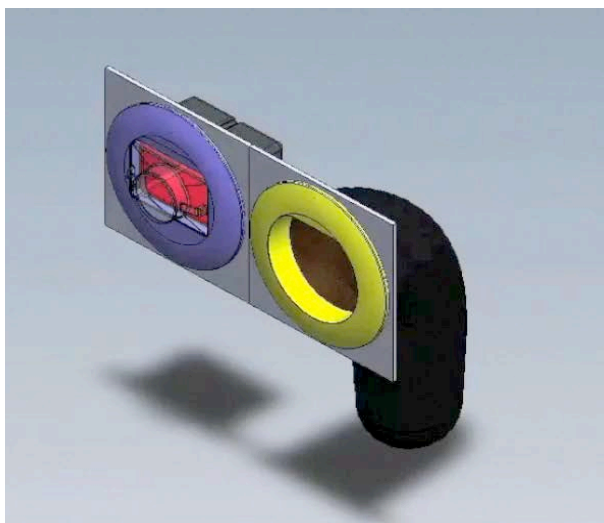


Now line-of-sight has been cleared throughout the operating room and with wire and hose exposure eliminated when a device is positioned over a floor pod this further reduces wires, hoses etc from the floor around the operating table working space.

## IN-WALL TRASH SYSTEM

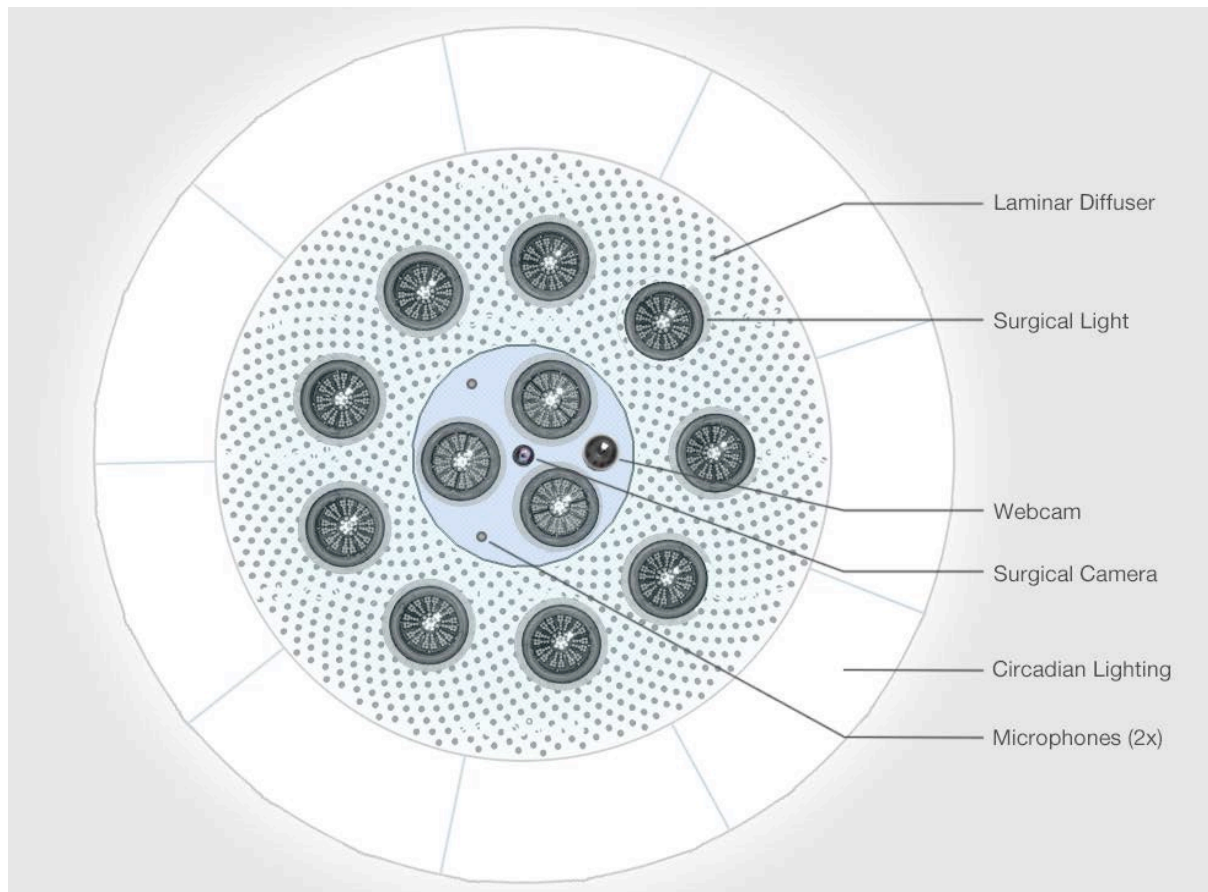
Optimus ISE™ eliminates the numerous rolling and fixed trash receptacles that add to the clutter and noise of the operating room, as well as surgeon reset events.

The ISE includes an in-wall trash disposal system for biologics, packaging trash and sharps.



## INTEGRATED AIR PLENUM

The Optimus Integrated air Plenum structure is integrated with the hospital's HVAC system ducting. Included into the plenum are the surgical lights, web cam, surgical camera, microphones and sensors. These subcomponents can be quickly removed and replaced without any disassembly of the plenum itself.



The plenum allows for perfect laminar flow (circular design, no ceiling booms etc.), and replaces the ISE room air volume **30 times per hour** at very low velocities, limiting the number of potential pathogens that can infect a surgical site.

The materials used on the visible surfaces of the plenum adhere to the sterility program of the Optimus ISE™. They are coated with a special formulation of Titanium Dioxide (TiO<sub>2</sub>) that inhibits the growth of bacteria under full-spectrum light.

## ISE SOFTWARE

The Optimus ISE™ software is the result of 10 years of development, resulting in a stable methodology for “the integration of everything” in the operating room. All electro-mechanical components, HVAC, logistics, AV, and medical devices are controlled by way of a single user interface with software that give the user the ability to control any device with a standardised and consistent, from device to device, manufacturer to manufacturer, user interface symbology.



The greatest obstacle to true integration of an operating room and the various devices utilised within it is the insistence of medical device companies upon maintaining proprietary control of their user interfaces, look-and-feel, and control software. Any company that offers an integration solution for its own medical devices (e.g. endoscopy units and video monitoring), is required to recertify its integration software every time a new device is introduced, making for a certification nightmare that has prevented a total integration solution from being developed.

Optimus is the first healthcare company to develop a software integration package that is capable of integrating all medical devices without requiring medical device companies to modify their proprietary software to become part of the ISE. This has been achieved by having developed the Optimus ORIM (Operating Room Integration Model) software model as its core component.

## OZONE STERILITY SYSTEM

Operating rooms are far from sterile. In the US alone, approximately 157,500 people die of surgical site infections every year (*source: CDC, 2015*). There is a campaign called “The 100,000 lives campaign,” that is attempting to apply procedure and policy solutions to prevent infections. It is estimated that infections acquired from the operating room itself account for between 5 – 15% of the total (i.e. 7,850 – 23,625 lives per year in the US alone).



The Optimus ISE is the first operating room that is capable of being sterilized. The Optimus system employs Ozone Total Room Sterilisation once a week. Ozone is at the top of the pyramid of free radical generators, and kills not only bacteria, but also fungal spores and viruses. Optimus has learned through experimentation, that it takes approximately 10 days for an operating room to be colonized, thus the seven-day cycle. The room is hermetically sealed once a week, and ozone is introduced via the ceiling ducted ozone generator system for one hour. Each room is equipped with multiple in-wall ozone decomposers that remove ozone from the room once the sterilisation cycle has been completed. The total cycle time is just 3 hours.

## RFID PASS-THROUGH CABINETS

Real-time search and pass-through architecture allow for a tremendous reduction in time-to-find (a major efficiency parameter in operating rooms), and reduction of non-essential traffic of personnel in and out of the operating room. The circulating nurse remains on site at all times, an additional safety factor especially during times of critical need.



Colour-coded LED lighting provides real-time information about the status of stored, removed or newly provided equipment. A complete description of cabinet contents is provided on the ISE iPad where supply searches can also be initiated.

## TABLE POD

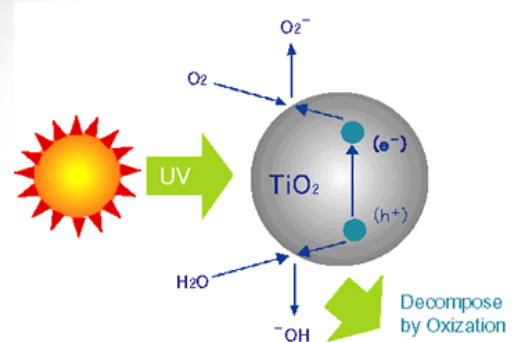
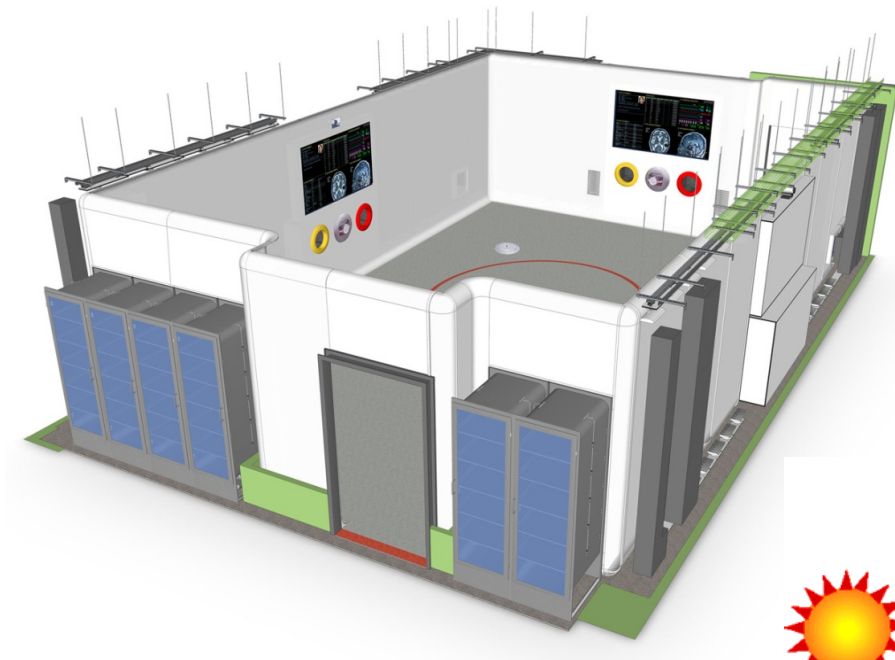
Necessary service connections (AC power, CO2 and vacuum, imaging and communications) come *from* the table, not *to* the table. The clutter of wires, tubes, and hoses is significantly reduced within the surgical area of focus.



Equipment (e.g. electro-cautery devices) no longer needs to be arrayed around the surgical area. They can be suspended under the operating table, out of the way of the surgical staff, and controlled through the Optimus iPad user interface rather than from the device itself.

## TiO<sub>2</sub> HOSPITAL WALL CLADDING SYSTEM

Optimus incorporates anti-fogging agent / disinfectant agent TiO<sub>2</sub> into solid surfaces for its walls and ceiling surfaces, allowing for self-sanitizing of these surfaces with full spectrum lighting.



Hospital walls are typically constructed with painted or applied colours over porous materials. The surfaces gather and hold dust and infectious organisms. Optimus eliminates all difficult-to-clean right angle corners on the ceiling, floors and walls, by introducing radiused corners in all quadrants of the room.

## USER INTERFACE

As inexplicable as it may seem, medical device symbology is not as uniform as it is in other fields, such as aviation and roadway signage. Medical errors due to misunderstanding of differing medical user interfaces (MUI) are on the rise as the complexity and variety of medical devices expand.



Optimus ISE™ has taken the view to standardize]se user interfaces, so that confusion will be eliminated. “Up” is always up, “down” is always down and “right” is always the users right, etc. The Optimus ISE™ brings control of major components under a unified and intuitive interface. The graphical symbology of the user interface is consistent among all Optimus ISE™ components, so the user can confidently control many devices without mentally having to switch design paradigms. By establishing standards for all medical and electromechanical devices in the operating room, no matter who the manufacturer is, the Optimus UI solution sets a consistent standard that will reduce medical MUI errors.

## WARMING PAD SYSTEM

The Optimus warming pad system aims at preventing patient core temperature drop during surgeries. This helps reduce the time-to-wake from general anesthesia and the risk of surgical site infections, having significant impact both on efficiency and safety.

The warming pad system consists of thermal padding made of a composite fabric and resistive heating elements. It allows for both regional warming of the patient during surgery and real-time regional skin temperature feedback and trending for the anaesthesiologist.



Depending upon the table manufacturer, subsections (head, shoulders, chest, abdomen, left leg, right leg) allow for variable temperature augmentation of major surfaces of the patient. The anaesthesiologist has real-time control of peripheral skin temperature loss for each subsection.

Both the patient's regional surface temperature and the warming pads' temperature are monitored via the software user interface on the ISE iPad from thermistors applied to the patient's skin and from within the warming pads.

For more information please contact:-

**Optimus Services AG**

**info@OptimusISE.com**

**www.optimusise.com**