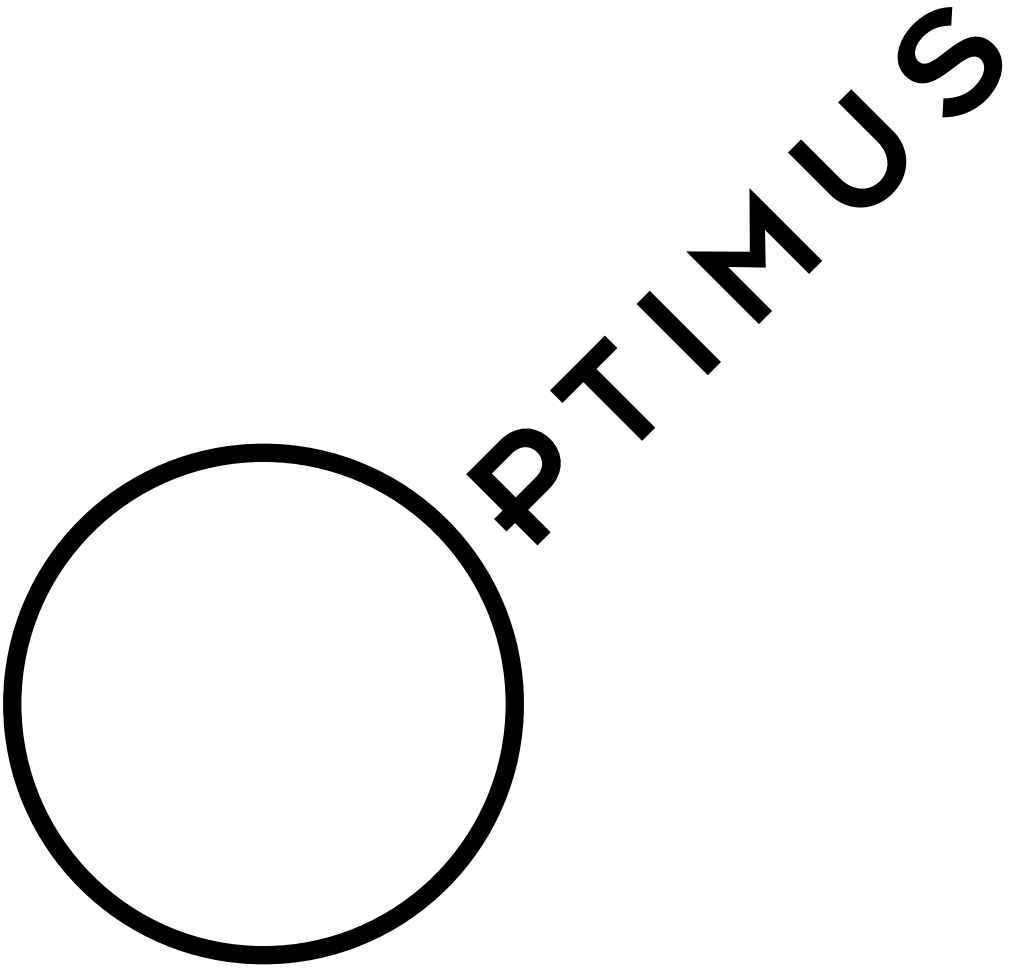


OPTIMUS

AIROLIGHT

Master Thesis
Industrial Design
AD:MT AAU
MSc04-ID16

Bjarke Mejnertsen - Anders Sørup Nielsen

Master Thesis - Product report

Title: Optimus

Study program: Industrial Design AD:MT

Project period: 01.02.2014 - 28.05.2014

Bjarke Mejnertsen

Project group: MSc4-ID16

Supervisor: Finn Schou

Anders Sørup Nielsen

Table of content

Intro

This report presents the Optimus modular hospital bed platform as well as one of the many possible modules such as an alternating pressure mattress or the AiroLight ventilation system. It will give a glimpse of how modularity can be used to optimize the logistics of future hospitals.

Optimus AiroLight is a new module for the Optimus bed platform that shows an entirely new way of thinking about reduction of hospital acquired infections. The system is capable of effectively using air jets to isolate potentially contagious patients while not compromising the patient's ability to interact with staff, visitors and other patients.

Need

Infections

When a patient acquires an infection at a hospital, it is a burden not only for the patient and the patient's family, but also on the hospital and the rest of the society. The increased hospitalization means there are fewer resources for other patients and loss of working hours for the patient. It is estimated that infections acquired in hospitals cost about 1 billion DKK every year, and affects about 100.000 patients.

Flexibility

Denmark is currently updating its entire healthcare sector. Many new and modern hospitals are being built to provide its citizens with a more effective and lean healthcare.

However, there is currently no company that offers a solution to help simplify the logistics and usability of the many medical devices that are needed.

OPTIMUS

MODULAR HOSPITAL BED PLATFORM

To ensure a fast and efficient hospital logistics in the future, it is important that the common hospital ward bed can have a more flexible and versatile role.

The Optimus Modular Bed Platform offers this by offering a platform that can easily integrate with just the right modules for each type of patient.

Depending on the needs of the patient, different modules can easily be installed on to the bed, and the bed's on-board control unit will ensure that all modules run correctly. Advanced controllers make it possible for the healthcare worker (HCW) to easily adjust the care of the patient. Optimus can through its OpenBus control unit by Linak, automatically log all relevant information directly into the patient's journals as well as informing the HCWs of relevant information such as alarms or by displaying the patient's journal on the controllers.

Specifications

Weight: 131 kg

Width: 1010 mm

Length: 2220 mm

Mattress Height: 410 - 830 mm

Total height: 1600 - 2020 mm

Free space below bed: 202 mm

User load: 200 kg

Static load: 300 kg

Back section: 0° - 74°

Thigh section: 0° - 33°

Leg support: -28° - 22°

Trendelenburg tilt: -8° - 14°

Mounting

For the bed to be truly modular, it must have a flexible mounting solution to make the installations of new modules fast and easy. Optimus has three different kinds of mounting.

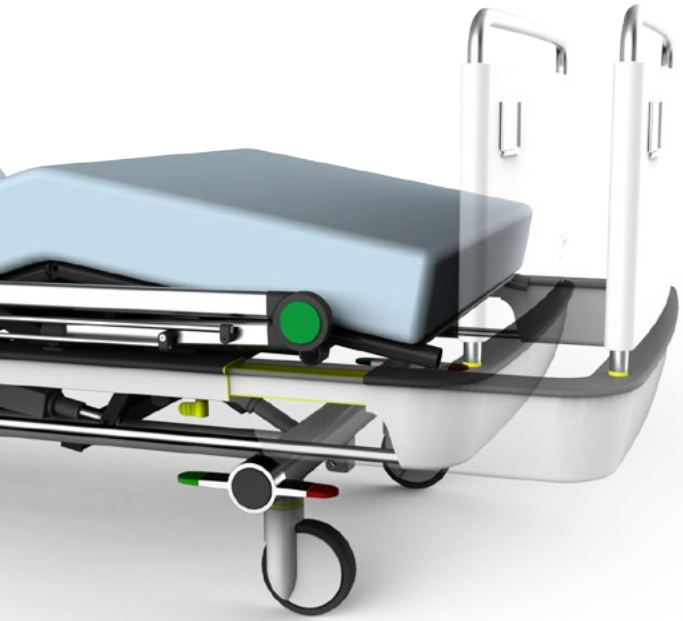
One is a light mounting groove below the frame makes it possible to mount new modules quickly.

The second is two heavy-duty mounts, one in each of the head end corners, ensures a fast and easy mounting of larger and heavy modules.

The third one is an expansion bay behind the backrest. It can store all larger units that doesn't need to be visible.

Bumper

To protect both the bed and its environment, there is a rubber bumper that runs all around the entire bed.



Extend

Sometimes there are patients that are very tall. For these patients it can be very uncomfortable to sleep in a normal bed. Therefore it is possible to extend the length of the bed by 200 mm. Just twist the levers and pull.

Customizing

It is possible to easily change the color of the headboard to offer customizable hospital beds. The headboard's large surface and cheap production makes it perfect to change the appearance of the product just by changing one color.

Controllers

The new innovative controllers for the bed combines the ruggedness and ease of use of contemporary controllers with the versatility of modern smart devices.

There are two controllers, one for the patient and one for the healthcare worker.

The patient controller is designed to be small, durable, light and easily positioned anywhere on or in the bed. It has a touchscreen to display all the dynamic options, and three physical buttons: A “call nurse” button and a button for each of the two sub systems.

The controller is designed so that repositioning the bed is always quickly accessible, and with the click of a button all other relevant features are available on the touch screen. Whenever a new module is connected the available options for the device will automatically appear on both of the controllers.

The HCW controller has a large touch screen which will make all the functions available to the HCW, very easy to understand and maneuverer. Many of these functions, were previously restricted to very basic interfaces on external devices. These interfaces can be very difficult and tedious to operate due to their limited feedback possibilities. Having a large screen also enables the HCW to view and manage logs and journals directly on the device, and thus saving time.

Patient controller

HCW controller


19

OPTIMUS

AIRO LIGHT

Specifications

Weight: 18,7 kg

Modules: 1 x Overhead Panel, 2 x Outlets

Additional Height: 725 mm

Air curtain:

Exit velocity: 0,5 - 1 m/s @ 40 l/s

Lighting:

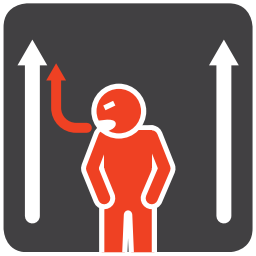
Power: up to 56 W

Color temperature: 2600 - 6500 K

Reducing infections

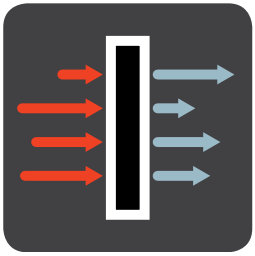
The AiroLight module is an innovative new solution to combat hospital acquired infections and promote a faster recovery.

To reduce the prevalence of a patient acquiring an infection an effective measure is to isolate the infectious host from the remaining patients. However, when the HCW realizes that a patient is infectious, it is often too late to prevent the infection from spreading. That is why the AiroLight module works as a preventive measure. The module works by being effective in breaking all three links in the chain of infection for airborne infections.



Contain

Powerful air jets ensure that most microscopic particles discharged from an infected person will be contained.



Clean

The air blown from the jet nozzles will be supplied by the air in the room after it has been cleaned. This means that the unit will also clean the air of the entire room.

Supply

Since the air from the jet nozzles have been cleaned, the air that patients breathe has also been cleaned. This effectively means that each patient using the AiroLight will have their own micro-climate.

A brighter recovery

in recent years, the lighting conditions has become more influential in the recovery phase. By simulating a daylight cycle it is possible for the body to maintain a good sleep-wake rhythm that is important to a speedy recovery. The AiroLight's underside is equipped with an advanced lighting solution that allows it to alter its intensity and color temperature to best suit the user's need. This means that it is very versatile in its functionality, and can be used to replace some of the existing light sources.

Night light

Reading light

Dynamic light

Examination light

Interaction

Interacting with the AiroLight is extremely simple. All of the features are accessible directly from both the patient and the HCW controller. To simplify the workflow two touch buttons are located on the overhead panel. These buttons work as a shortcut to quickly turn on or off the lighting or the airflow. A small indicator shows whether the airflow is on or off.

Always accessible

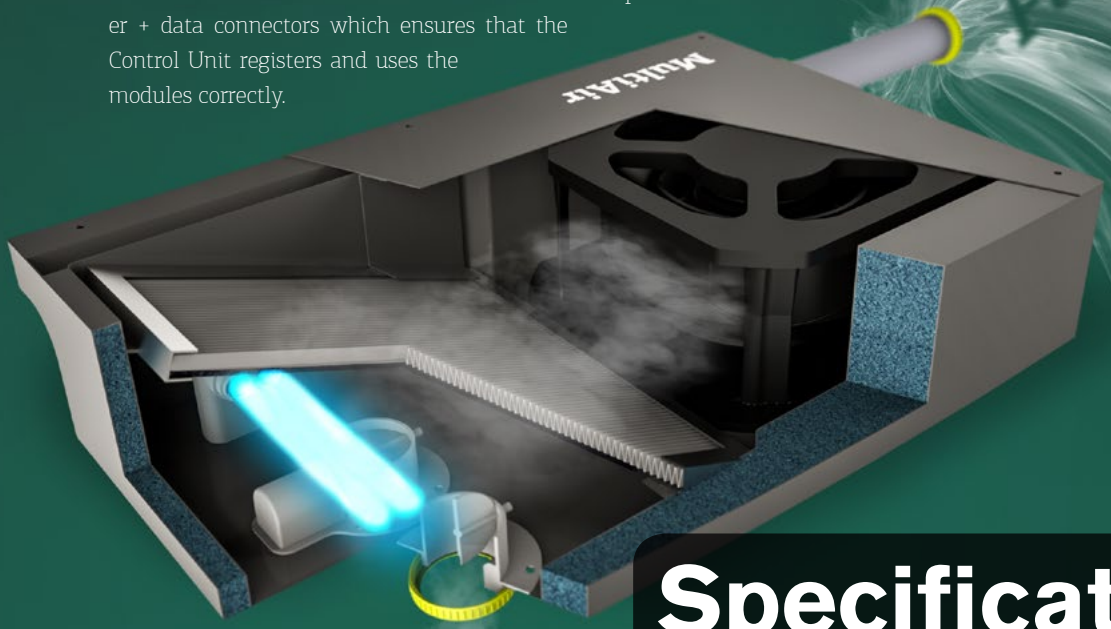
The AiroLight module can be released by pushing down the lever next to it. This allows the module to swing out of the way easily, whether it is for using a hoist or emergency CPR. When the unit is out of its original position it will automatically power off.

OPTIMUS

MULTIAIR

The MultiAir unit is a versatile air pumping and filtration unit. It is compatible with most air modules, such as the AiroLight and the pressure alternating mattress. The unit is designed to offer easy maintenance, (all components are accessible by removal of just four screws) and low noise.

There are several inlets and outlets to allow multiple modules to be connected at the same time. The outlets come with power + data connectors which ensures that the Control Unit registers and uses the modules correctly.



Specifications

Power: 180 W

Flow: 310 l/s

Filtration: HEPA, UV-GI and activate carbon filter

Weight: 12,9 kg

Outlets: 2 x 50 mm w. power + data

Inlet: 2 x 50 mm

Thanks for reading