**Background - Problem at NICU**

In this project we’ve been researching and observing the work and equipment at the NICU (Neonatal Intensive Care Unit). When a premature infant is born they’re underdeveloped, this causes breathing difficulties and therefore they will be treated at the NICU.

The overall design challenge has been to create a system that brings together the most commonly used NICU equipment in a way that is; technically possible, user-friendly and visually appealing.

**Design challenge**

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**Problem areas**

- Mobility & Flexibility
- Equipment Overview
- Cable Management
Commonly used equipment

- **CPAP** - Support breathing by supplying lungs with air to prevent lungs to collapse.
- **Humidifier & Water bag** - Support CPAP by heating and humidifying the air going into the infant's lungs.
- **Edi** - Prevent transition to Ventilator/HFO by tracking breathing efforts and support with extra air.
- **4 syringe pumps** - For food and medications.
- **Ventilator/HFO** - Pushes in and out air of the lungs and does the breathing for the infant (for extreme situations).
Development - Design Process

Observations | Problem finding | Mock-up building | Concept 1 & 2

Expert feedback | Feedback evaluations | Merge of concept 1 & 2 | Expert feedback

Detailing | Model building | Assembling | Photo and video shooting
**Adjustable**

By pushing the foot pedal the CPAP machine can be adjusted in height to match the incubators. The screen is attached on a ball join and can separately be moved up and down, and be adjusted to the preferred angle to face the personnel.
**Top**

Turn away the table top to access the most commonly used connections.

- Inspiratory/Expiratory limb.
- Edi-catheter
- Pulse Oximeter
- Water chamber
- Water pump
**Water bag & Syringes**

On the left side the water bag is hidden away and a small pump is leading the water to the humidifiers water chamber.

On the right side we have up to 4 plug and play syringe pumps which easily can be replaced. On each pump there is a screen which clearly indicates what’s inside the syringe.
Wall supplies

To solve one of the big problems with cables and hoses we have combined the Air, Oxygen and Power connections, coming from the wall, into one cable. The individual units in the UNI System have all access to the wall supplies and data through the quick connections in the base plate.

Ventilator/HFO

If an emergency situation occur and the infant immediately need a ventilator or HFO, the Ventilator/HFO module can easily be attached to the back of the CPAP and be operated immediately due to the quick connection system.
**Internal parts - Exploded View**

- Piezo pump & driving unit
- Water chamber
- HFO/Ventilator
- Syringe
- 4x Syringe pumps
- Stereo water
- Pulse Oximeter
- Edi catheter
- Inspiratory & Expiratory limb
- CPAP & Humidifier
- Base plate with quick connections
**Screen**

To get the best overview of all the equipment we only have one screen where all the settings can be adjusted. The big center eye controls only the oxygen level which is the most used setting on the CPAP machine. The main screen can be personalized depending on the information needed.

**Pocket Device**

From this device the doctor and nurses can get a quick overview of all the infants at the ward when not close by. When an alarm goes off, it first alarms this device instead of the machine. This to prevent disturbing the infant who need to rest as much as possible to facilitate growth.
The UNI system have resulted in a much more tidier and calmer work environment for the NICU personnel. The amount of scary looking machines have gently been hidden into one unit. Cables and hoses have been reduced and organized. And the fragile premature baby can get the full attention from parents through the eased kangaroo care and the NICU personnel can without hassle continue the treatment of the infant.