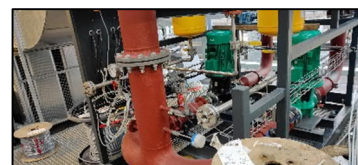
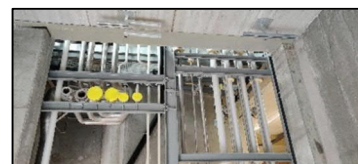
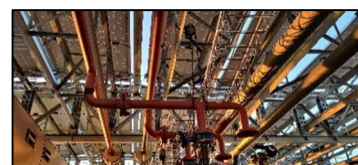
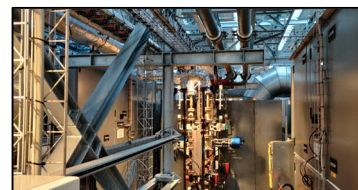
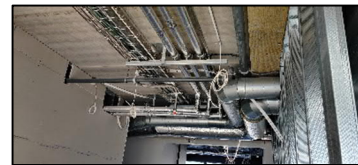


Commercial Buildings Utility R-330 Reference

Design of General Building
Utilities for Commercial Office
Building:

- Water: Raw, Technical, Hot, Water Treatment
- Heating: Production, Distribution, Floor & Radiator Heating, Mixing Loops Vent.
- Cooling: Production, Distribution, Fan Coils, Mixing Loops Ventilation.
- Cooling: CO₂ based Cooling for Cooling and Freezing Room inclusive of Safety System
- Sewage: Normal, Oil, Fat, Biowaste
- Ventilation: Comfort, Fire, Smoke Extraction, Kitchen, Parking Area, CO₂ Evacuation
- Sound: Attenuators, Sound Insulation, Absorption etc.
- Electric: Building Installation.
- Electric: Machinery Inst. e.g., MCC's, UPS-systems, Emergency Generator, Solar Panels etc.
- Network: Commercial and Technical Networks
- Gasses; Air, Nitrogen, CO₂
- Sprinkling: Coordination only
- Structural Steel: Shaft, Roof



Pictures from DFDS HQ Built by NCC.

P-Engineering – PlantWare – delivered the core Engineering Platform for [NCC Danmark's](#) Construction of DFDS new Head Quarters in Copenhagen build for PensionDanmark.

Commercial Buildings Utility R-330 Reference

=Dxx Structures

Structural Design of

- Technical Shafts – Piping
- Technical Shaft – for Ducting 3 off.
- Roof Structures

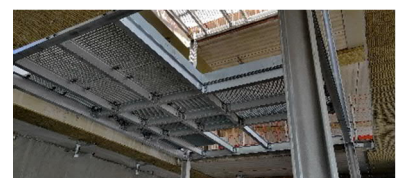
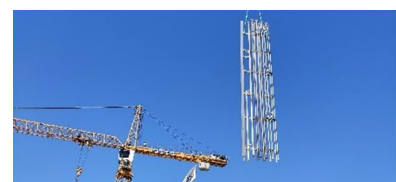
Both with Platforms and Access Ways and according to EUROCODE and Safety according to fulfill EN 14122 in relation to Safety, Ball prof Ø20 etc.

In total 100t of Steel Structure, Platforms and Access Ways design for Production at 2 different Polish Manufacturer

- [Promostahl](#) made fabrication preparations from IFC-model
- [NIWA](#) fabricated for Steel Detailing Drawings

Roof Structures were design with a Cassette system for mounting of Solar Panels on the ground. Cassette with Solar Panels was hoisted into place with a two off bolt fixation for speedy erection.

All access Ways, Stairs and Ladders were manufactured according to P-Engineering Standard Drawings.



Picture Legend

1. Roof Structure
2. Ladder for Access
3. Roof Structure
4. Roof Structure
5. Structures for Tech. Shaft
6. Structures for Tech. Shaft
7. Hoisting of Shaft Struc.

Commercial Buildings Utility R-330 Reference

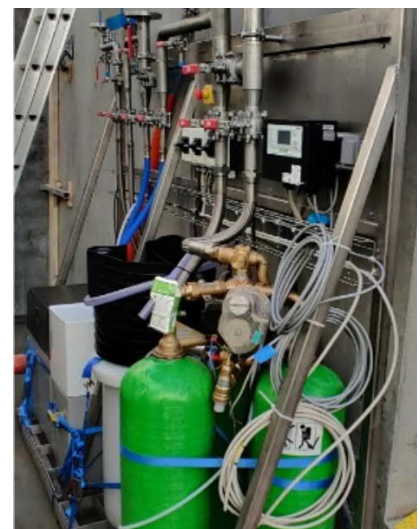
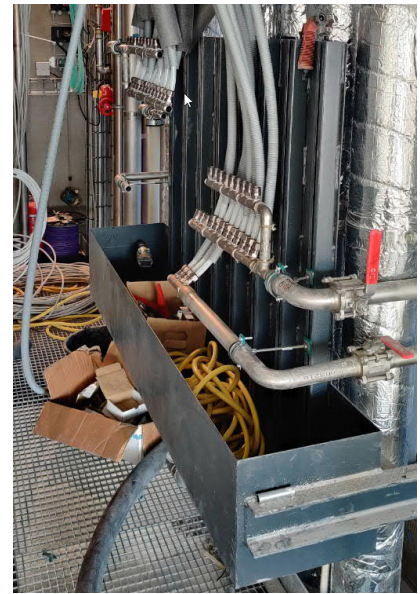
= Fxx Water

Design of Water Installations from PID, Sizing and Dimensioning to final 3D model and generation of fabrication drawings with BoQ (Bill of Quantities) for items, welding's, and bolting:

- Raw Water
- Soft Water 6°dH with Water Treatment
- Soft Water 0°dH with Water Treatment
- Osmosis Water with filtering Unit
- Hot Tap Water Production Unit with Circulation

Design of

- Pipe Specification
- Insulation Specification
- Support Structures
- EN13480 Calculations
- Insulation Specification
- Sizing of Pump, Heat Exchangers/Vessels with Heating Coils
- District Heating for Hot Tap
- Painting Specification
- Test FAT Schemes/Test
- Test SAT Schemes/Test
- Test Paradigms DS3090
- Instrumentation – Measuring and Control Valves
- Functional Descriptions
- SCADA Specification



Picture Legend

1. Kitchen Manifold
2. Booster Unit
3. Water Treatment

Commercial Buildings Utility R-330 Reference

=Gxx Sewage System

Design of Water Installations from PID, Sizing and Dimensioning to final 3D model and generation of installation drawings. Overall design was made with P-Engineering's database application for Sizing Ventilation, Water and Sewage in one Operation.

Design of:

- =G11 – Fatty Wastewater
- =G12 – Biowaste
- =G21 – Oily Wastewater
- =G31 – Foundation Drain
- =G41 – Rainwater – Both Siphonic and Gravity System
- =G42 – Drain System – Condensate from Fan Coils, Drains in Shafts etc.
- =G51 – Wastewater

For the above system:

- MCC and Electric Design for Pump Wells etc. including Cable Project.
- Instrumentation – Roof, Balconies, and various Pump Wells.
- Heat Trace for Fatty Waste
- Special Pharma Grade Piping for Kitchen where only limited Slope were available (Office floor)
- Test SAT Schemes / Test
- Test Paradigms DS3090



Picture Legend

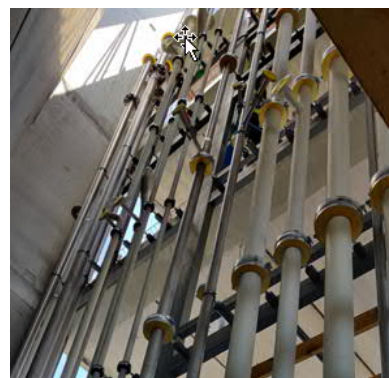
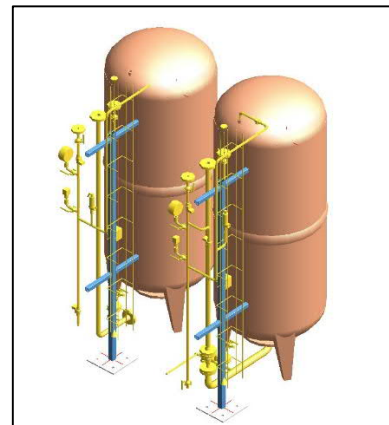
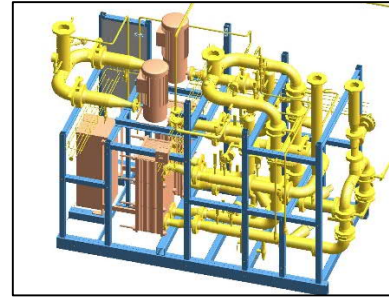
1. Unitized Toilet Installations
2. Welded prefabricated Rainwater Main.
3. Biowaste tank in slim fit.
4. Roof Drain Well

Commercial Buildings Utility R-330 Reference

= H0x Heating

Design of Heating Installations from PID, Sizing and Dimensioning to final 3D model and generation of fabrication drawings like Steel Detailing and Pipe Isometrics with BoQ for items, welding's, and bolting:

- Pipe Specification
- EN13480 Calculations
- Pipe Design and Sizing
- Flow Calculations
- Insulation Specification
- Sizing of Pump and Heat Exchangers.
- District Heating
- Central Heating – Production and Circulation Unit
- Distribution with dynamic Hydraulic Balancing of Flow.
- Radiator Systems
- Mixing Loops for Floor Heating
- Floor Heating
- Mixing Loops for Ventilation Heating
- Support Structures
- Painting Specification
- Test FAT Schemes/Test
- Test SAT Schemes/Test
- Test Paradigms DS3090
- Instrumentation – Measuring and Control Valves
- Functional Descriptions
- SCADA Specification



Picture Legend

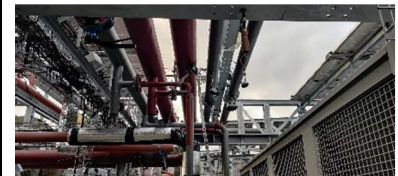
1. Central Heating Unit 3D
2. Central Heating in reality
3. Expansion and Make-up
4. Main Shaft with Piping

Commercial Buildings Utility R-330 Reference

=H1x Cooling

Design of Cooling Installations from PID, Sizing and Dimensioning to final 3D model and generation of fabrication drawings like Steel Detailing and Pipe Isometrics with BoQ (Bill of Quantities) for items, welding's, and bolting:

- Pipe Specification
- EN13480 Calculations
- Insulation Specification
- Sizing of Pump, Buffer Vessels, De-aeration
- Flow Calculations
- Insulation Specification
- Chiller w. Natural Cooling – Specification and Purchase
- Vibration Dampers and Flexible Joints for Noise/Vib. Reduction to adjacent struc.
- Central Cooling – Production and Circulation
- Fan Coils Systems for Network and Server Rooms
- Mixing Loops for Ventilation Heating
- Support Structures
- Painting Specification
- Test FAT Schemes/Test
- Test SAT Schemes/Test
- Test Paradigms DS3090
- Instrumentation – Measuring and Control Valves
- Functional Descriptions
- SCADA Specification



Picture Legend

1. Circulation Unit 3D
2. Mixing Loop
3. Fan Coil Installation
4. Pipe at Chiller
5. Buffer tank

Commercial Buildings Utility R-330 Reference

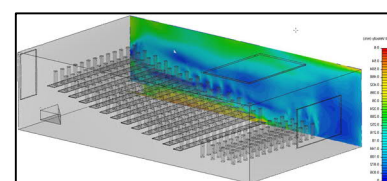
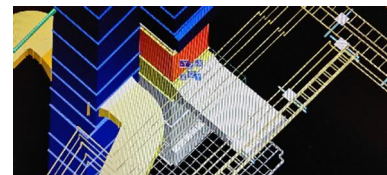
=Jxx Ventilation

Design of Ventilation

- Comfort
- Parking – General, Fumes and Smoke Extraction
- Process (Kitchen
- Smoke Extraction

from PID, Inlet armatures quantities/placement, Sizing and Dimensioning to final 3D model and generation of fabrication drawings:

- Duct Specification
- Insulation Specification
- AHU – Specification
- Overall Design: Control and Operation Strategy
- Distribution Ducting Sizing and 3D layout
- Flow Calculation
- Ventilation VAV and CAV Armature Selection and Arrangement
- Auditorium Displacement Venting Solution
- VAV Dampers
- Smoke Control Dampers
- Fire Dampers
- Smoke Dampers
- Sound Attenuators and Sound Calculation
- Instrumentation
- Functional Descriptions
- SCADA Specification
- Test SAT
- Test Paradigm DS3090



Picture Legend

1. AHU Arrangement on roof
2. Distribution on office
3. Large Duct 2400x1200
4. Erection of Heat Exchanger
5. Shaft Arrangement of Ducts
6. Ventilation Garbage Room
7. CFD of Auditorium

Commercial Buildings Utility R-330 Reference

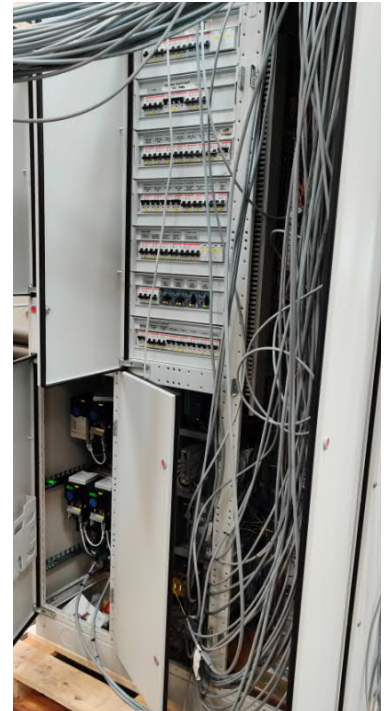
=K0x Electrical

Design of Electrical Installation for these areas:

- =K02 – Solar Panels
- =K02 – Emergency Generator
- =K04 – MCC
- =K06 – Machinery Installations
- =K07 – UPS for Office Installations
- =K08 – UPS for BMS

Design included:

- MCC-Design with Motor Breakers, VSD, Network etc.
- PDB-Specification
- Cable Sizing & Specification
- Power Distribution for BMS system
- Power Distribution for Industrial Kitchen, Prep. Kitchen, Cafes, HC-lifts etc.
- Emergency Generator – Coordination and Design of additional Casing with Insulation and Air Supply to reduce Power Consumption for Maintaining Oil Temperature.
- Solar Panel Installation in 4 sections with 4 off Converters.



Picture Legend

1. Solar Panels on roof
2. Cabling of MCC Panel
3. Converters for Solar Panels

Commercial Buildings Utility R-330 Reference

=LOx Automation

BMS

Instead of traditional CTS the BMS system for DFDS New Headquarter was design based on Rockwell PLC system and Rockwell SCADA. Data storage and handling was performed by Rockwell Historian Solution.

Work Scope was

- General Specification
- Definition of SCADA pictures
- Functional Descriptions of all Operations.
- Definition of Historian Storage, Reports etc.

Access Control & Intrusion Alarm

DK: ADK and AIA

Specification of

- Boundary Safety according to Insurance Class
- Staff and Guest access and routing throughout the building
- Specification of System
- Access outside office hours
- IT-network
- Server Solution
- Power Supply
- Integration with Automatic Door System



Picture Legend
1. Remote I/O Cabinet

Commercial Buildings Utility R-330 Reference

=Mxx Communication

Various Communication Systems:

- =M11 – Office Network with Backbone redundancy etc.)
- =M21 – Network BMS
- =M31 – Network Safety
- =M51 – DAS
- =M61 – ITV/CTV System
- =M62 – Analogue Systems
- =M91 – TV Antenna System

Network

The =M21 and =M31 Network was setup as Industrial Network with Rockwell Stratix Switches and Network loop Connections overall and in for example MCCs.

Surveillance

ITV/CTV with IP cameras supplemented for all Surveillance within Security boundary. Supplemented with Analogue outdoor Cameras and Intercom Systems. Analogues System with Coax Cabling was chosen for safety reasons as these are hacking resistant.

Commercial Buildings Utility R-330 Reference

=Nxx Transport Systems

Various Transportation System

- =N11 – Elevators
- =N21 – HC Lifts
- =N31 – Elevator Lift
- =N61 – Service Trolley for Solar Panel Washing.

Elevators

Coordination for installation for Wifi and DAS. Equi-Potential Bonding between Elevator and Steel reinforcement in Concrete.

Lifts

Specification, Purchase, Coordination and Erection Supervision. Integration with Access Control System.

Elevator Lifts

Small Lifts for access Storage Rooms. Specification, Purchase, Coordination and Supervision.

Service Trolley

Detailed Design of a Service Trolley for washing of the Solar Panels on top of the General Technical Installations on top of the roof. The Trolley had Storage Room for Osmosis Treated Water and a distribution pump for Washing.

Note: Above was abandoned after I left the project.

Commercial Buildings Utility R-330 Reference

=Pxx Safety System

Various Safety System such as

- Smoke Extraction
- Fire Ventilation
- CO₂ Extraction System
- CO₂ Monitoring System

Smoke Extraction
Smoke Extraction System
The building had both designated Smoke Extraction System as well as combined systems where the Smoke Extraction was built onto the overall Ventilation System.

Fire Ventilation
Fire Ventilation is a Specialist Supply and for this part only Specification, Procurement and Installation was executed.

CO₂ Warning
The are general CO₂ monitoring in the building for Indoor Climate Control. However, CO₂ Warning System as placed in all rooms where the piping for the CO₂ based cooling for Freezers and cooled Storage Room.

CO₂ Extraction
Extraction for the CO₂ Compressor Machinery Room

Commercial Buildings Utility R-330 Reference

Kitchens

Design and Coordination with both Client and End User for

- Production Kitchen
- Cafes
- Prep. Kitchen

Coordination of all

- Floor Drains – Standard
- Floor Drains – for Tilting Pans and Pots
- Water Supply
- Extraction Hoods
- Electrical Supply
- Kitchen Equipment
 - Owen, Food
 - Owen, Bakery
 - Pans
 - Pots
- Cooling with central CO2 compressor for
 - Freezing Room
 - Refrigerated Rooms
 - Refrigerated Room for Bakery
- Miscellaneous Machinery
 - Potato Peeler
 - Waste Grinder

Commercial Buildings Utility R-330 Reference

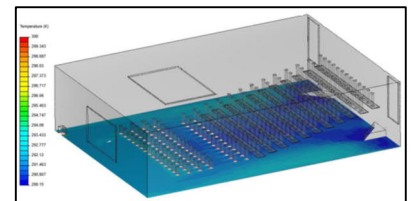
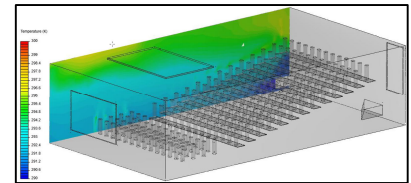
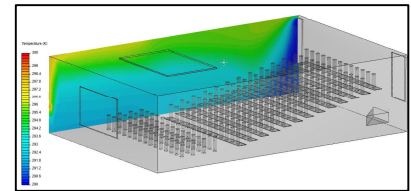
Auditorium

Design of multi-purpose auditorium where usage varies from

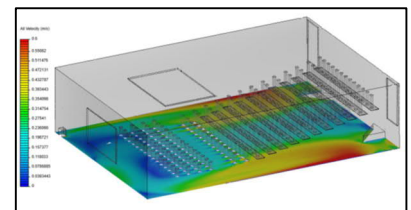
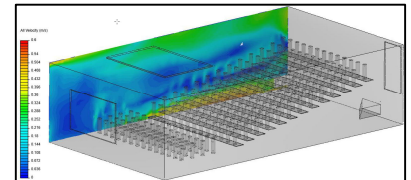
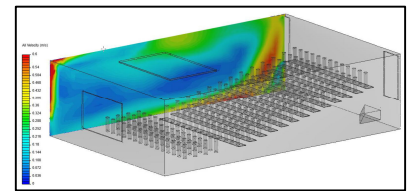
- Sports – Floor Ball
- Banquets – with 100 persons
- Presenter – with 350 persons

To accommodate the different usage of the room with variable person load displacement ventilation was chosen. Furthermore, Heat Energy from 10kW Monitor Wall and 20kW Stereo Amplifiers.

Furthermore, the Indoor Climate Specification for the audiences' experience of temperature variations, draught etc. was quite demanding.



Temperature



Velocity

Plantware



Contact Information:

Christian Pallesen;

+45 2526 8805;

cp@p-engineering.dk

More information on website

<https://p-engineering.dk>