

CESA AON

VIRTUAL EVENT
2021

ENGINEERING EXCELLENCE AWARDS



#CESAAonAwards2021





UP Engineering 4.0 Building by **Spoormaker & Partners** for the University of Pretoria, Tshwane



The award-winning Engineering 4.0 building is a new facility constructed on the University of Pretoria's LC de Villiers campus. The 6 800 m² facility is an expansion of the University of Pretoria's prestigious Engineering Faculty, providing a new home for the Civil Engineering Department's concrete and timber laboratories. In addition, the building also includes the new National Road Materials Referencing Testing laboratory and a training laboratory for SANRAL, as well as a common multivolume foyer that will link the building to future phases as the School of Engineering expands even further.

The building features a state-of-the-art HVAC installation designed to integrate specific laboratory technical requirements for indoor environmental control, energy efficiency and green design principles, occupant comfort, and aesthetics in an innovatively holistic manner.

Indoor environmental condition requirements for each individual space were agreed upon with the client and ranged from typical 22.5°C (±1.5°C) laboratories, all the way to humidity rooms simultaneously requiring 25°C (±2°C) and 95% (±5%) RH. Ventilation needs involved adhering not only to regulatory fresh air and fire rational requirements, but also ensuring that test-specific ventilation needs are met.

The HVAC system at UP Engineering 4.0 involves a central four-pipe air-cooled chilled and hot water generation plant as cooling and heating source, with a decoupled primary-secondary loop with hot and cold buffer tanks and variable-volume secondary pumps. No water-consuming heat rejection systems were used.

Control optimisation of building thermal load control and ventilation needs ensured high energy efficiency of process needs. Passive design features were incorporated to minimise energy usage, such as insulated laboratories, double glazing, external shading, economy cycle design and naturally ventilated spaces.

Carbon dioxide emissions and environmental impacts were reduced through generator load optimisation, HVAC energy reduction, zero water usage, zero ODP systems and exhaust filtration. A state-of-the-art building management system was designed and installed to actively control and monitor all mechanical systems.

The project was awarded the 2020 SAPOA (South African Property Owners Association) Innovation Excellence Award, being crowned the national winner in the Innovation category, attesting to the effort put into an innovative, unique and sustainable design. ↗

PROJECT TEAM

- Client:**
University of Pretoria
- HVAC Consultant:**
Spoormaker & Partners
- Architect:**
ARC Architects
- Main Contractor:**
WBHO
- HVAC Subcontractor:**
AIRGRO (on behalf of TOAC)

