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## **MEDIA RELEASE**

### **UP launches Africa-first Engineering 4.0 facility for research on smart transport, cities and infrastructure**

PRETORIA – Today (Monday 30 November), the University of Pretoria (UP) officially opened its state-of-the-art Engineering 4.0 facility, which focuses on research on smart transport, cities and infrastructure.

Situated on the Innovation Africa@UP campus in Hillcrest, Engineering 4.0 has its home in the Faculty of Engineering, Built Environment and Information Technology (EBIT). A first for Africa, it is a collaboration with the South African National Roads Agency (SANRAL), the Council for Scientific and Industrial Research (CSIR) – an entity of the Department of Science and Innovation – and York Timbers.

“Through its focus on the development of integrated transportation and infrastructure systems, Engineering 4.0’s research is concentrating on the reduction of energy consumption levels in transportation, maximising productivity in industry and creating a higher quality of life for people,” explains Professor Wynand Steyn, Head of the Department of Civil Engineering. “The research focuses on road construction, road use, traffic flow and smart transport systems, now and into the future. We are researching road construction materials, vehicle-pavement interaction issues, infrastructure materials and management, exhaust-related emissions, semi-autonomous and autonomous vehicles.”

He explained that Engineering 4.0 entails smart roads and infrastructure talking to smart vehicles, to reduce traffic congestion and to ensure the safety of passengers and cargo. “This can help in areas such as agriculture and logistics, where transporting food can be improved to reduce wastage or damage to fresh produce.” The new facility will also address the shortage of civil engineers in South Africa.

“This facility is a place where novel ideas, scientific research, global expertise, students, academics, entrepreneurs and industry partners can meet to generate new thought leadership, innovation and training opportunities through collaborative partnerships,” said Prof Sunil Maharaj, Dean of EBIT.

A flagship feature is an active two kilometre-long test lane on Pretoria’s N4 highway, where “we collect real-time data and use big data analytics and the Internet of Things to do tests and analysis on how different road surfaces perform, how traffic moves on the highway, the density and type of traffic, emissions testing, and air quality monitoring. Sensors next to, above and below the lane collect data,” explained Prof Maharaj. The data will be monitored from a data house next to the N4. “This facility allows one to optimise pavement design and construction. The data collected can be used to model many aspects of transportation systems. Improved and optimised pavement design supports longer-lasting pavements that serve the economy and social well-being of society.”

Other features of Engineering 4.0 include:

**A national roads reference laboratory** is the only site in South Africa for the independent testing of materials for the road construction industry. Standard testing will largely be conducted on road materials originating from SANRAL (for national roads projects), the provinces and neighbouring countries.

**The York Wood Engineering Laboratory** aims to expand the footprint of mass timber construction, using advanced engineered wood products on the continent, in collaboration with civil and chemical engineering, architecture, materials science, data science, genetics and other related bio-economy disciplines.

**A training laboratory** will train and certify road materials technicians employed by various testing laboratories. Once their skills are certified, laboratories can provide accurate test data to engineers. The aim is to ensure that materials testing in the field is up to standard. Engineering students will be trained and certified in this facility, which has virtual reality options for learning about testing techniques.

**A concrete laboratory:** This consists of preparation areas, curing and humidity rooms, and a test floor where various concrete and structural testing can be conducted for use in areas that include road construction and infrastructure.

**Accelerated Pavement Testing (APT) Track:** The 100 x 6m APT track allows for the construction of different pavement structures and their accelerated evaluation, using a mobile APT device. This enables engineers to monitor the expected behaviour of a pavement over a fraction of its life.

“For our smart cities research, we will be working with a team of academics including social and environmental scientists, economists, urban planners, architects and lawyers,” Profs Maharaj and Steyn said. “We need to redesign and integrate living spaces to promote social cohesion. We need to restructure urban planning so that people can live closer to work, reduce travel expenses, take the pressure off roads and lead more affordable, environmentally conscious lives.”

UP Vice-Chancellor and Principal Professor Tawana Kupe said Engineering 4.0 will share its vast resources in technology and data sciences with all faculties via the institution’s Future Africa institute and campus, a platform for developing inter- and trans-disciplinary research networks within the University and the global research community. “We thank our partners and value their contribution to this landmark collaboration,” he said. “Working together means we can achieve much more in solving Africa’s grand challenges.”

“SANRAL is pleased that the Engineering 4.0 facility is now officially open; this is a true testament of the success that can be achieved through partnerships,” SANRAL CEO Skhumbuzo Macozoma said. “This facility will enable cutting-edge roads research, materials testing, skills development, real-time road performance monitoring, and the application of research outcomes and innovation in industry.”

“The CSIR recognises that roads and transport infrastructure is at the heart of the economic recovery of South Africa,” said Dr Thulani Dlamini, CEO of the CSIR. “It is for this reason that we have created a dedicated focus on smart mobility in our new strategy.” He added that the CSIR views this collaboration as an ideal mechanism to build on transportation systems and transport infrastructure geared to improve societal quality of life.

Dr Dlamini stressed that this facility will play a critical role in setting South Africa up for success, and advancing the country’s ambitions to lead in the Fourth Industrial Revolution. It is of particular interest to the CSIR to collaborate with institutions whose research and development is channelled to improve the lives of all South Africans.

“The CSIR invests in the development of methods and technology to facilitate the efficient and safe movement of people in the transport network,” said Dr Dlamini. “This is done through collaboration with role players that include public transport operators, automotive industry and transport authorities. Their strong technical expertise, capacity and capabilities as well as advanced technologies all play a key role in advancing the work of Engineering 4.0.”

“With this initiative, together with the University of Pretoria, York invests in the sustainability of our environment by establishing the use and application of engineered wood in construction solutions in Africa,” said Pieter van Zyl, CEO of York Timbers, which is sponsoring a transdisciplinary research chair. “The pressure on our natural resources and climatic environment is increasing, and we should act responsibly in how we apply our demands and needs on these natural resources. York sees this transdisciplinary chair as a key enabler to create an alternative and sustainable solution for the building and construction sector.”

“Our country’s National Development Plan places infrastructural investment at the centre of economic growth,” said Minister of Transport Fikile Mbalula. “Engineering 4.0’s focus on reduction of energy consumption levels in transportation is a great achievement for South Africa. It will ensure that government’s future investments and infrastructural developments are based on sound research and are environmentally friendly. The beneficiaries of these will be cities, towns and rural communities that rely on public transport and on our roads network for economic participation.” –

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