

USAf 2026 IMPACT CASE STUDY

From Engineering Knowledge to Societal Impact: Strengthening Local Industry, Skills and Future-Ready Engineering through eNtsa

Submitting University: Nelson Mandela University

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Summary of the impact

For lower-tier automotive suppliers, access to specialised engineering knowledge and testing can determine whether a locally manufactured component meets industry requirements and gains access to a supply contract. For technicians and communities encountering electric vehicles and high-voltage systems, access to relevant technical knowledge can influence their ability to participate safely and meaningfully in an emerging green economy.

Through eNtsa, Nelson Mandela University has translated applied engineering knowledge, specialist infrastructure and industry engagement into measurable benefits beyond academia.

Since 2022, eNtsa's Automotive Localisation Testing Programme has undertaken more than 170 technical projects supporting lower-tier automotive suppliers. The programme has contributed to local supply-chain participation linked to more than R650 million in automotive component contracts, while supporting companies associated with more than 650 jobs and delivering 270 youth training completions. eNtsa's broader Technology Station activities supported 111 SMEs during the 2025/26 financial year.

The same applied engagement model is contributing to South Africa's transition to electric mobility through uYilo, where specialist e-mobility knowledge has been translated into practical skills interventions, including electric vehicle and high-voltage awareness and training.

Together, these initiatives demonstrate how university-based engineering expertise can strengthen industrial capability, support localisation and respond to changing societal skills needs.

Underpinning academic work: Related to Engineering and Technology Field

The impact described in this case study arises from applied engineering research, technology development, engineering testing, process optimisation and academically grounded industry engagement undertaken by eNtsa, an engineering engagement institute at Nelson Mandela University.

eNtsa operates at the interface between engineering knowledge and industrial application. Its engineering specialists and researchers apply expertise in materials engineering, mechanical

engineering, advanced manufacturing, structural integrity, testing and technology development to real-world industrial challenges.

The academic basis of the Automotive Localisation Testing Programme is the application of engineering principles, measurement science, materials characterisation, mechanical testing and technical analysis to industrial component development and validation. Rather than providing generic business support, eNtsa's engineers work with suppliers to investigate technical problems, conduct specialist testing and generate engineering evidence that assists companies in understanding and addressing product and manufacturing requirements.

This academically based engineering work also informs eNtsa's skills development activities. Industry engagement provides direct insight into technical capability gaps. These insights are translated into practical training interventions and knowledge-transfer activities.

Within electric mobility, the uYilo e-Mobility Programme draws on specialist knowledge in electric vehicle systems, high-voltage technologies, battery systems, energy storage and associated safety considerations. This technical knowledge has been translated into applied training and awareness interventions intended to strengthen South Africa's readiness for emerging vehicle technologies.

The impact therefore arises from a deliberate model of academically based societal engagement: engineering knowledge is applied to real industrial and technological challenges, and the resulting learning is translated into broader industrial and skills-development interventions.

Engineering knowledge as an enabler of automotive localisation

The Eastern Cape is one of South Africa's most important automotive manufacturing regions. However, participation in automotive supply chains requires manufacturers to meet demanding technical, quality and component-validation requirements.

For lower-tier suppliers, particularly smaller companies, access to specialist engineering expertise and advanced testing infrastructure can be limited or prohibitively expensive. This creates a barrier to localisation: a company may have manufacturing capability but lack access to the technical evidence, analysis or specialist support required to demonstrate that a component meets customer requirements.

In July 2022, eNtsa began implementing the Automotive Localisation Testing Programme as a deliberate response to this challenge.

Through the programme, university-based engineering knowledge and specialist infrastructure were made accessible to Tier 2 and Tier 3 automotive suppliers. Engineers worked on actual industrial challenges and component requirements, using technical testing and analysis to support supplier problem-solving and component validation.

The difference made is reflected in the industrial outcomes associated with the programme. More than 170 technical projects have been completed for lower-tier suppliers. Programme reporting links the intervention to automotive component supply contracts valued initially at R561 million, with subsequent reporting indicating contributions to more than R650 million in

component contracts. The programme has supported companies associated with more than 650 jobs and has delivered 270 youth training completions.

These figures demonstrate both the reach and significance of the impact. The programme did not simply increase access to university facilities; it applied engineering expertise to barriers experienced by local manufacturers and contributed to their ability to participate in high-value automotive supply chains.

The impact is particularly significant in the Eastern Cape, where automotive manufacturing is an important source of industrial activity and employment. By reducing technical barriers faced by lower-tier suppliers, eNtsa's academic engineering capability has contributed to localisation, supplier competitiveness and economic activity.

During the 2025/26 financial year, eNtsa's broader Technology Station Programme supported 111 SMEs and achieved all Technology Innovation Agency performance targets. This demonstrates the wider reach of the University's applied engineering engagement model beyond a small number of individual companies.

Responding to the skills challenge of electric mobility

South Africa's transition from internal combustion engine vehicles towards new energy vehicles is introducing unfamiliar technologies, new occupational risks and changing skills requirements.

High-voltage vehicle systems are one example. The technical knowledge required to understand and safely interact with these systems is not yet widely distributed across traditional automotive and technical workforces.

Through the uYilo e-Mobility Programme, specialist knowledge at Nelson Mandela University has been translated into practical e-mobility skills interventions. The programme has used a High Voltage Electric Vehicle simulator and applied training approaches to make complex electric vehicle systems accessible to different stakeholder groups.

During the 2025/26 period, e-mobility training was extended to participants in areas of the Eastern Cape beyond traditional university environments. The programme has also worked with industry and public-sector stakeholders on skills development relevant to the emerging new energy vehicle ecosystem.

The significance of this work lies in translating specialist engineering knowledge into practical understanding required by people who will increasingly encounter electric vehicle technology in their workplaces and communities.

The contribution of uYilo to energy-sector skills development has received external recognition through SANEDI's Skills Development Award and Collaboration and Partnership Award.

However, the most important measure of impact is the change experienced by participants and partner organisations.

Closing the gap between industry needs and engineering skills development

A further effect of eNtsa's industry engagement has been its ability to identify skills gaps directly from employers and translate those needs into practical skills-development responses.

Industry partners identified engineering measurement as a capability requiring greater practical exposure among emerging engineering personnel. In response, eNtsa developed an Engineering Measurement training intervention grounded in the practical measurement and engineering expertise used in its industry-facing work.

The intervention was subsequently incorporated as a practical training component within Mechanical Engineering at Nelson Mandela University.

While curriculum change is not itself claimed as societal impact in this case study, the example demonstrates the feedback mechanism created through sustained university-industry engagement. Industrial challenges inform applied university work; engineering knowledge is used to respond to those challenges; and lessons from industry engagement influence the practical capabilities being developed for the future workforce.

Evidence and sources to corroborate the impact

The impact reported in this case study is supported by eNtsa Technology Station Programme performance monitoring and reporting to the Technology Innovation Agency; Automotive Localisation Testing Programme monitoring data and AIDC-EC/TIA programme reporting; eNtsa FY2025/26 Annual Reporting; eNtsa Board performance reporting; uYilo operational and skills development reporting; and external recognition by the South African National Energy Development Institute.

Programme monitoring records more than 170 technical supplier projects, 270 youth training completions, support associated with more than 650 jobs and automotive component contract activity exceeding R650 million.

Any other information considered relevant

The eNtsa impact model demonstrates the societal value that can arise when specialist university engineering capability is deliberately positioned at the interface between academia and society.

Across automotive localisation and electric mobility, the common principle is the same: engineering knowledge is not retained within the University but applied to identifiable industrial and societal challenges. The resulting impact includes strengthened supplier capability, participation in local supply chains, support for employment-linked industrial activity and wider access to skills required for technological transition.

The experience demonstrates the role of an engaged university as an active contributor to industrial development and societal readiness for technological change.

See more about eNtsa's work here: <https://entsa.mandela.ac.za/>

Signed off on behalf of the University by a designated Senior Officer

A handwritten signature in black ink, appearing to read 'A. Keet', with a stylized flourish at the end.

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