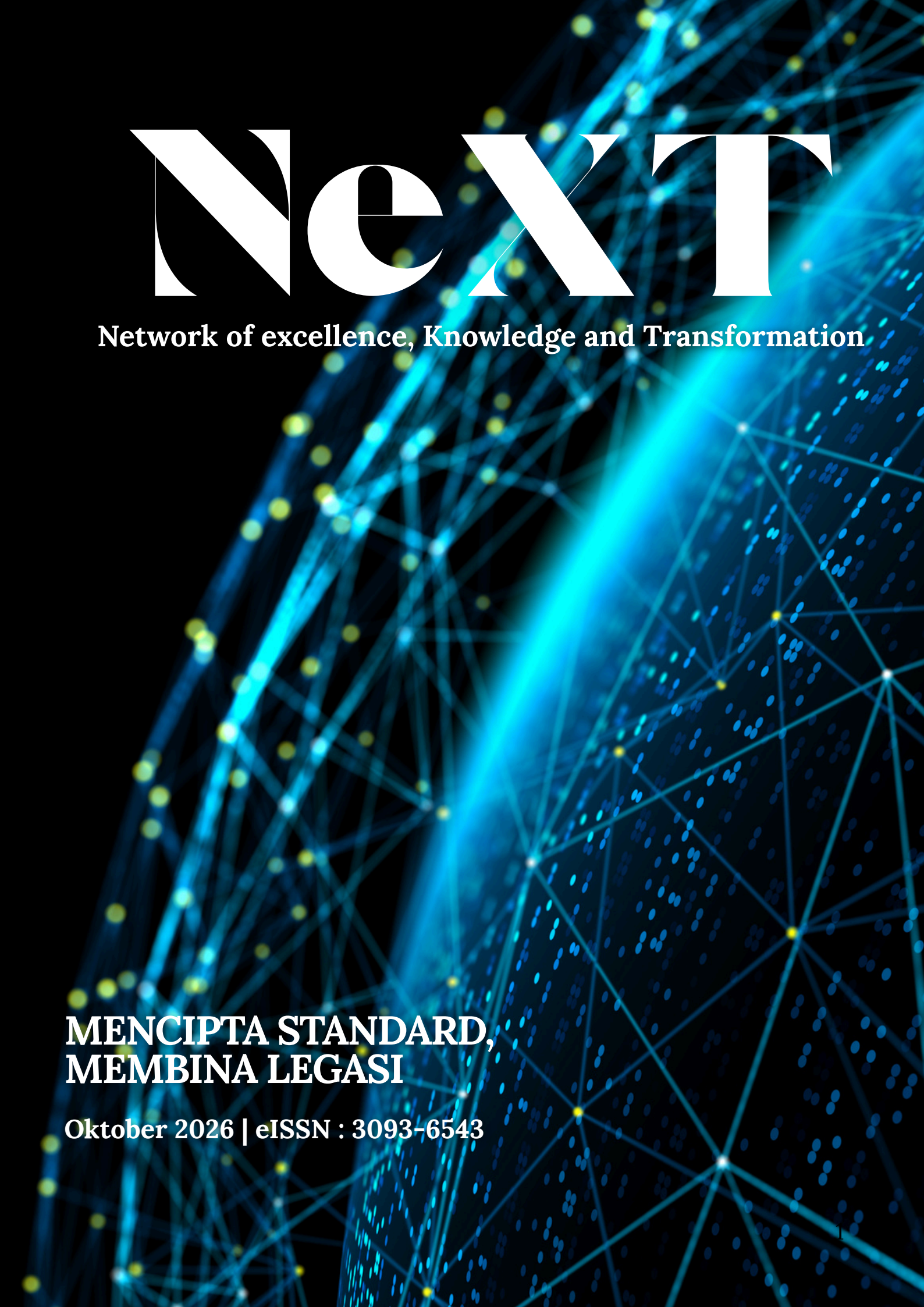

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Bridging the Gap: A University Perspective on Defence Science at STRIDE - Science & Technology Research Institute for Defence

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As university students who are still learning in textile technology and materials science, the gap between classroom theory and industrial application often feels vast. However, our educational visit to the Science & Technology Research Institute for Defence (STRIDE) in Kajang on May 13, 2025, really helped us connect the dots between what we learn in class and what happens in the real world. STRIDE, the main research body under the Ministry of Defence (MINDEF), has the crucial job of ensuring that all the gear used by the Malaysian Armed Forces (Angkatan Tentera Malaysia or ATM) is safe, durable, and provides our troops with a tactical advantage. Our visit mainly centred on the Textile Technology and Analysis Laboratory. It was extremely insightful to see the detailed testing procedures they use, all designed to ensure our soldiers are adequately protected when they're out in the field.

The experience began with a briefing that outlined STRIDE's crucial role in keeping our country safe. Then, we had a chance to visit the labs, which was our most anticipated event of the day. It was different from a regular testing lab; they weren't just checking if something was of good quality; they were testing if it could keep a soldier alive. Learning that every single fabric sample and seam strength test could seriously impact a soldier's readiness gave the entire visit a professional and intense feel.

The Laboratory Tests

The main part of our visit was the tour of the textile testing facilities. This is where we saw the strict application of standardised test methods in action. It was extremely interesting to see the actual machines we learn about in our textbooks being used in a real, accredited laboratory setting. We had the opportunity to see several crucial tests that evaluate the physical strength and performance of military textiles, including the burning test, abrasion resistance test, tearing test, washing and dimensional stability, drapability and fabric handle evaluation.



Figure 1: Group photo session with all participants.

1. Burning Test (Flammability)
One of the most visually interesting demonstrations we saw was the burning test. For people in the military, having clothes that won't catch fire easily is super important. We got to watch the vertical flame test, where a small piece of fabric is placed over a flame for a set time. Then, we observed how long the fabric continued to burn after the flame was removed (after-flame time), how long it glowed (after-glow time), and the extent of the burned area (char length). This test ensures that the uniforms won't catch fire if they encounter flames, which is a crucial safety feature for soldiers.

2. Abrasion Resistance Test
We also observed the Martindale abrasion tester in action. This machine rubs fabric samples against a standard abrasive surface in a complex Lissajous figure motion. This simulates the wear and tear a uniform undergoes, especially at knees and elbows, during crawling or tactical manoeuvres. The endurance of the fabric is measured by the number of cycles it withstands before the threads break.

3. Tearing Strength Test
A soldier's uniform must withstand snagging on branches or rough terrain without ripping apart. We observed the Elmendorf tear tester (a falling pendulum apparatus) in use. A weighted pendulum is released to propagate a slit in the fabric, measuring the force required to continue the tear. It was impressive to see the sheer force some of the ballistic-grade fabrics could withstand.

4. Washing and Dimensional Stability
We learned that durability isn't just about strength; it is also about maintenance. The washing test evaluates colourfastness and dimensional stability (shrinkage). Military uniforms must maintain their fit and camouflage colours even after rigorous laundering in field conditions. The lab uses standardised washers and dryers to simulate repeated cleaning cycles.

5. Fabric Handle Evaluation
Beyond durability, comfort and mobility are essential. We were introduced to the methods of evaluating fabric hand (the way a fabric feels and reacts to touch). This included a draping test, which measures how a fabric hangs under its own weight, a crucial step in ensuring uniforms do not restrict movement and fit the body ergonomically. While often subjective, we learned that instruments like the stiffness tester are used to quantify these properties.



Figure 2: A researcher showing several fabrics for a tactile assessment

Innovation in Defence: The Future of Camouflage

The most exciting part of the visit was the sharing session about STRIDE's latest research and development (R&D) initiatives. We got a sneak peek at the new fabrics being developed for the Malaysian Army (Tentera Darat Malaysia).

The researchers showed us this amazing, next-level project on Thermal Camouflage technology. Seriously, in today's world, enemies don't just use their eyes; they utilise thermal imaging cameras and heat detectors to detect the heat emanating from a person, even in pitch-black conditions. STRIDE is creating a brand-new fabric designed to hide that heat signature, basically.

How it works is mind-blowing; the fabric either blocks or controls the body heat escaping, making the soldier's heat profile match the surrounding environment. By reducing the temperature difference between the soldier and the background, the fabric makes them almost invisible to heat-detecting gadgets. Learning how physics concepts like emissivity and thermal insulation are used in textile engineering was a huge wake-up call. It really hit home that what we're studying helps keep our country safe and protects our soldiers.

Conclusion

The visit to STRIDE provided an immensely valuable and eye-opening experience that significantly enhanced our academic curriculum. We gained a profound appreciation for the rigorous scientific principles underpinning textile and material testing. Witnessing the strict adherence to International Standards (ISO) and ASTM methods underscored the critical importance of precision and integrity in laboratory work. Furthermore, the brief yet inspiring insight into advanced research, such as thermal camouflage technology, motivated many of us to consider future careers in defence science and technology. We depart not only with enriched knowledge but also with a renewed sense of purpose and direction for our diploma studies.

We would like to express our deepest gratitude to the dedicated officers and researchers at STRIDE for generously dedicating their time and expertise, and for welcoming us into their impressive facilities.



Figure 3: Demonstration of the use of a fabric tester in the textile laboratory in STRIDE