



INTELLECT

Exploring Technologies, Advancing Innovation



Face and Medical Masks Laboratory (FMML), NIOSH

***Makmal UNI-TECH UTHM: Inisiatif Perkhidmatan
Automotif Bertaraf Industri***

INTRODUCTION

Welcome to the March 2025 edition of INTELLECT, the quarterly magazine of NIOSH that explores technologies and advances innovation in the field of Occupational Safety and Health (OSH). Intellect is a platform for exchanging information, sharing knowledge and experiences and highlighting the latest developments and achievements of NIOSH and its partners. Intellect aims to benefit all the stakeholders in the OSH community, including research institutes, laboratory service providers, universities, academicians, government and private sectors, employers and students.

We hope that Intellect will inspire and inform you about the exciting and important works that NIOSH and its partners are doing to enhance OSH standards and practices in Malaysia and beyond. We also welcome other organisations who are interested in promoting or sharing their laboratory facilities and services in the field

of OSH. We welcome your feedback and suggestions on how to improve our magazine and services. We would love to hear from you and feature your contributions in our future issues.

If you have any stories, projects, or achievements that you would like to showcase in our magazine, please feel free to contact us at penerbitan@niosh.com.my. Thank you for your support and interest in NIOSH. We look forward to hearing from you and serving you better.



Your OSH preferred partner



Editorial Team

Advisor

Dato' Haji Ayop Salleh
Executive Director, NIOSH Malaysia

Editor-in-Chief

Mejar Haji Hanif Maidin (B)
Executive Secretary, NIOSH Malaysia

Secretariat

Noorliza Idawati Mat Nayan
Mohd Hussin Abd Salam
Siti Badariah Abu Bakar
Siti Norshuhada Abdul Aziz
M. Hamzah Jamaludin

Editor

Fatin Alisha Zulkifli

Publisher

NIOSH
Lot 1, Jalan 15/1, Section 15, 43650 Bandar Baru Bangi,
Selangor Darul Ehsan, Malaysia.
Tel : 03-8769 2100
Fax : 03-8926 2900
Email : penerbitan@niosh.com.my
Website : www.niosh.com.my

Table of Contents

03 | Face and Medical Masks Laboratory (FMML), NIOSH

07 | Makmal UNI-TECH UTHM: Inisiatif Perkhidmatan Automotif Bertaraf Industri

FACE AND MEDICAL MASKS LABORATORY (FMML)

Nor Shahirah Md Izuddin,
Consultation, Research and Development Department (CRDD), NIOSH.

1. INTRODUCTION TO FACE AND MEDICAL MASKS LABORATORY (FMML)

The Respiratory Protective Equipment Testing Laboratory (RPETL) is a cluster of laboratories specifically designed for the Respiratory Protective Equipment (RPE) testing centre and was built by NIOSH as an initiative to further strengthen its position as a competitive National Occupational Safety and Health Institution.

The Face and Medical Masks Laboratory (FMML) is one of the laboratories under RPETL and was simultaneously put into operation during the COVID-19 pandemic alarming the world. The COVID-19 pandemic, which is classified as a biohazard, requires a dedicated laboratory for testing PPE control equipment such as face masks and 'suits'. This can help the country by offering quality control testing to manufacturers and importers in Malaysia before offering face masks and "suits" to industry, employers, employees and the general public. The presence of products that do not conform to specifications, illegal certification and influx of counterfeit products into the Malaysian open market will endanger the safety and health of consumers due to infections and adverse events such as shortness of breath, etc. are also recorded around the world.

The accelerated development of FMML provides the country with advanced and comprehensive laboratory facilities in line with the current situation in the country and the world that requires expertise in face masks and medical mask testing.

Expectation and support from stakeholders such as the Ministry of Occupational Safety and Health, Ministry of Health Malaysia, Ministry of Domestic Trade and Consumer Affairs, Association of Face Mask and Medical Respirator Manufacturers, public and private universities and health and safety professionals in work, was fulfilled and receiving good responses. In this regard, international parties such as the ASEAN Occupational Safety and Health Research Institute (AOSHRI) partner of NIOSH are expected to cooperate in developing PPE-related testing expertise.

FMML was developed to meet Malaysia's need for comprehensive testing of face and medical masks required for use among the public, healthcare workers and frontline workers. Face masks and medical respirators are one type of personal protective equipment under the respiratory protective equipment criteria. Unlike dust masks or easily recognized by the introduction of N95 or FFP, face masks and medical

respirators are more geared towards protection against biological hazards. There are several types of masks of this type that are used in major industries such as medical, hospitality, food handling, electronics, industry requirements related to 'clean room' and others.

2. USE OF FACE AND MEDICAL MASKS IN MALAYSIA

Protection against biological hazards is one of the elements of occupational safety and health. The presence of harmful airborne particles suspended in the air such as bacteria and viruses requires respiratory protective equipment that meets the criteria to protect the wearer from exposure to airborne diseases. Therefore, the introduction of measures to identify the type of face mask and medical respirator which is one of the PPE should be strengthened in Malaysia. This can be done by intensifying the testing of this equipment which is made in Malaysia and also imported from abroad. Consumers in Malaysia will be clearer and easier to select equipment in the market once a valid test by an accredited laboratory is completed and certainly inclusive of the certification process on product quality control before it is marketed.

In addition, FMML will assist stakeholders including government and private such as authorities, agencies, local and international manufacturers, importers, researchers and any interested parties to obtain advanced testing equipment and inclusive experts' advice.

The establishment of FMML is to conduct laboratory testing according to local and international standards. From now on, FMML to fulfill several testing for face and medical masks according to European Standard (EN), American Standards (ASTM) and China Standard (YY/GB).





Figure 1 BS EN 14683:2019, Medical Face Mask – Requirements and Test Methods



Figure 2 ASTM, F2100_21 Performance of Materials Used in Medical Face Masks

3. FMML TESTING SERVICES



◀ **Bacterial filtration efficiency (BFE)** : The ability of the face mask to filter bacteria so that they are not released into the user's surroundings (BFE), (%).

Differential pressure or Delta P (pressure differential) : To measures the air flow resistance of the mask and is an objective measure of breathability. The lower this value, the easier it is for the user to breath normally (Pa/cm2).



◀ **Splash resistance pressure or Fluid Resistance** : To reflects the mask's ability to minimize the amount of fluid that could transfer from the outer layers through to the inner layer as the result of a splash or spray. : The ability of the face mask to withstand the penetration of liquid splashes (kPa)

Particulate Filtration Efficiency (PFE) : To measures how well a mask filters sub-micron particles with the expectation that viruses will be filtered in a similar manner. The higher the percentage, the better the mask efficiency (%).



◀ **Microbial cleanliness** : Known as bioburden to ensure that medical face masks are not contaminated with an excessive microbial load, which could pose a risk of cross-infection.

4. FMML ACTIVITIES

No	Activity	Year
1.	Equipment Training	2021
2.	Introduction to MS ISO/IEC 17025:2017 Training	2022
3.	MS ISO/IEC 17025:2017 Measurement Uncertainty Training	2022
4.	MS ISO/IEC 17025:2017 Method Validation Training	2022
5.	Short Research on Breathability Testing	2022
6.	Exhibition: <i>Program Sambutan Hari Keselamatan Dan Kesihatan Pekerjaan Sedunia (WOD 2022)</i>	2022
7.	Exhibition : <i>Program Suara Nadi Kehidupan bersempena 'Hari Suara Sedunia'</i>	2023
8.	Exhibition : <i>Hari Bertemu Pelanggan Kementerian Sumber Manusia.</i>	2023
9.	Research on Performance Of Medical Face Masks used In Malaysian Hospitals : A Preliminary Survey	2024
10.	Laboratory visit from industries, universities, government agencies, research institute	2022 - present



Figure 3 Training session on Bacteria Colony Counter



Figure 4 Training session on Bacteria Filtration Efficiency Test (BFE)



Figure 5 Researcher conducting face mask testing.



Figure 6 FMML Laboratory booth during "Hari Bertemu Pelanggan" exhibition



Figure 6 Visiting from universities



Figure 7 Visiting from Pusat Peperangan Elektronik (PPE) TUDM

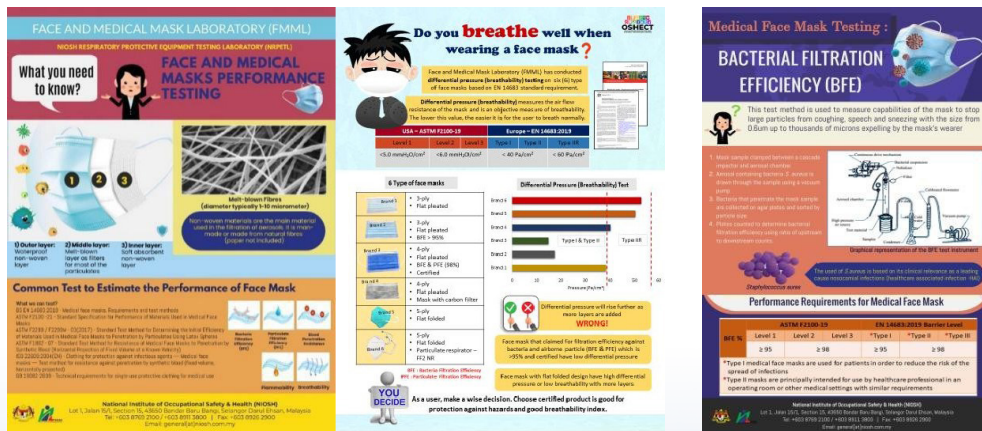
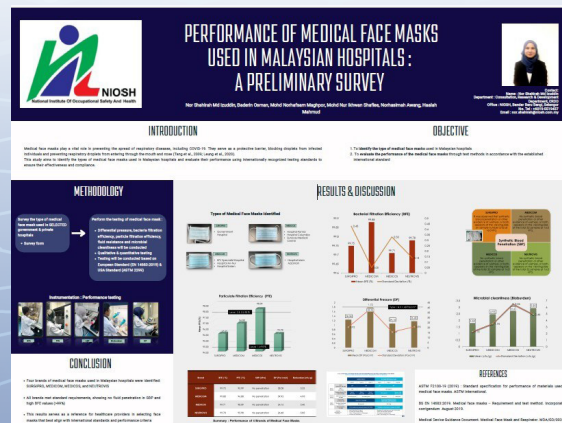


Figure 7 FMML infographic



Research poster "Performance of Medical Face Masks used in Malaysian Hospitals: A Preliminary Survey"

MAKMAL UNI-TECH UTHM: INISIATIF PERKHIDMATAN AUTOMOTIF BERTARAF INDUSTRI

Salwa Mahmood, Syabillah Sulaiman & Azli Nawawi
Fakulti Teknologi Kejuruteraan, Universiti Tun Hussein Onn Malaysia

Makmal UNI-TECH merupakan inisiatif strategik perkhidmatan automotif yang diterajui oleh Fakulti Teknologi Kejuruteraan, Universiti Tun Hussein Onn Malaysia (UTHM). Berpusat di UTHM Kampus Cawangan Pagoh, Makmal UNI-TECH turut berperanan sebagai makmal penjanaan pendapatan, yang merupakan satu inisiatif strategik yang dilaksanakan selaras dengan Dasar TVET Negara Malaysia. Ia berperanan sebagai platform menjana pendapatan melalui kepakaran, kemudahan, dan perkhidmatan yang ditawarkan oleh staf berpengalaman. UNI-TECH ditubuhkan pada 8 April 2021 sebagai pusat servis kenderaan berkonsepkan *in-house centre* yang digerakkan oleh 15 tenaga kerja berpengalaman lebih 20 tahun dalam pelbagai cabang automotif.

Melalui visi UNI-TECH iaitu menjadi penyedia perkhidmatan automotif nasional dalam teknologi dan pengangkutan yang mampan, UNI-TECH menawarkan pelbagai perkhidmatan yang berkaitan dengan servis asas kenderaan, ujian diagnostik, ujian prestasi kenderaan dan servis motosikal. Perkhidmatan yang ditawarkan tidak terhad hanya kepada staf dan pelajar UTHM sahaja, namun terbuka kepada warga Hub Pendidikan Tinggi Pagoh serta seluruh komuniti setempat. Makmal UNI-TECH mengamalkan tadbir urus yang komprehensif bagi menyokong kelestarian kewangan institusi selain memperkasakan ekonomi setempat melalui perkhidmatan kepada komuniti berhampiran dan membantu pembangunan ekonomi melalui kepakaran teknikal. Ia selaras dengan misi UNI-TECH iaitu menyediakan penyelesaian teknikal yang inovatif kepada keperluan industri dan komuniti berdasarkan paradigma tauhid.

Pengurus makmal UNI-TECH, Ts. Dr. Md. Norrizam bin Mohamad Jaat @ Mohd Noh berkata: *"bagi memastikan makmal UNITECH sentiasa konsisten dan mengoptimumkan sumber, pasukan staf automotif perlu memanfaatkan kemudahan sedia ada seperti bengkel, tenaga pengajar yang menawarkan*

perkhidmatan latihan, penyelenggaraan serta pengujian". Ini membolehkan UNI-TECH membantu institusi menjana sumber kewangan sendiri bagi menampung kos operasi, penyelenggaraan peralatan, dan penambahbaikan fasiliti, sekali gus mengurangkan kebergantungan kepada dana institusi.

UNI-TECH mempunyai pelan hala tuju berfokus yang jelas bermula pada Tahun 2024 sehingga Tahun 2030. Jadual 1 menunjukkan pelan hala tuju UNI-TECH beserta perincian yang berfokus kepada tiga perkara utama iaitu memperkasa asas operasi, mengembangkan kapasiti latihan dan mencapai tahap kebangsaan. Kini, UNI-TECH dalam fasa pembangunan yang begitu memberangsangkan dan mencapai pelbagai kejayaan yang boleh dibanggakan.

Antara pencapaian UNI-TECH ialah pensijilan profesional antarabangsa daripada *Institute of the Motor Industry (IMI) Level 1-3*. Ia telah berjaya disempurnakan oleh 11 orang pensyarah dan staf teknikal pada April 2024, seterusnya menjadikan UNI-TECH antara institusi terawal di UTHM yang bakal menawarkan pensijilan bertaraf industri. Selain itu, UNI-TECH turut menjalankan pelbagai kolaborasi strategik dengan institusi luar seperti Auto Prima College bagi memperluas jaringan latihan dan pengiktirafan pensijilan. Di UNI-TECH, pelbagai peralatan latihan terkini disediakan seperti:

- Chassis Dynamometer.** untuk ujian prestasi kenderaan sebenar.
- Hybrid Vehicle Trainer.** bagi simulasi dan Latihan sistem hibrid.
- HVAC Trainer.** untuk sistem pemanasan, pengudaraan dan penyaman udara kenderaan
- Automotive Electrical & Electronic Trainer.** untuk latihan sistem elektrik dan elektronik kenderaan moden.
- Peralatan CAN BUS:** melatih pelajar dalam system komunikasi moden kenderaan.

Fasa	Tahun	Fokus	Perincian
Pembangunan	2023–2025	Memperkasa asas operasi	Penjanaan pendapatan, pensijilan staf, pembangunan bengkel EV
Pengukuhan	2026–2027	Mengembangkan kapasiti latihan	Pusat latihan teknikal & profesional, pensijilan, bengkel digital
Kecemerlangan	2028–2030	Mencapai tahap kebangsaan	Produk komersial, pusat TVET termaju, hab teknologi automotif

Jadual 1: Pelan Halatuju UNI-TECH 2024–2030

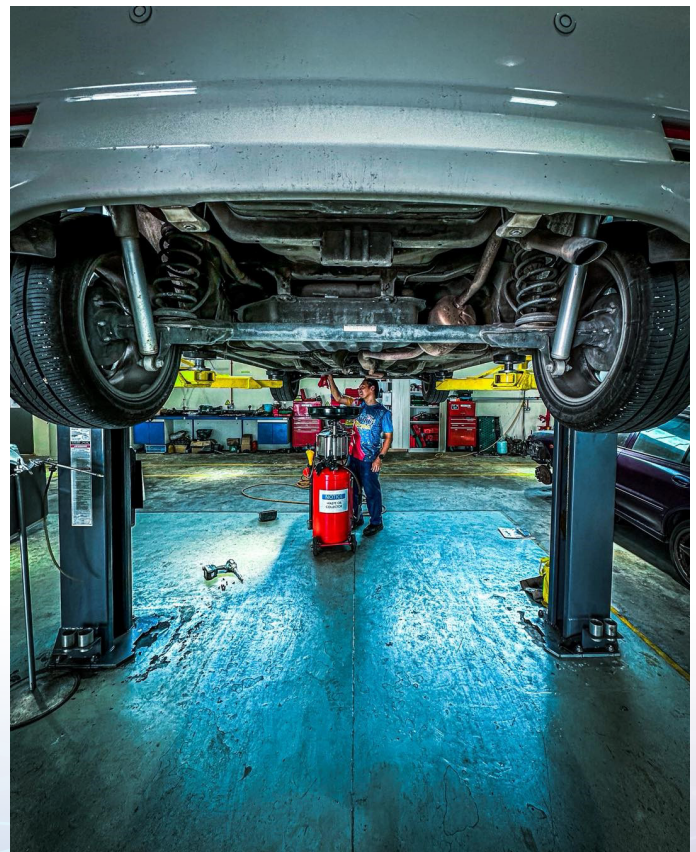
- f. **Peralatan kenderaan elektrik (EV), hibrid dan Autonomous Vehicle (AV) (Awaltahun2026):** dalam pembangunan sebagai inisiatif melengkapkan kemudahan latihan masa depan.

Selain penajaan kewangan, UNI-TECH turut mempunyai tenaga staf yang komited menjalankan kajian dan penyelidikan berkaitan bidang automotif. Antara kajian yang sedang aktif dilakukan adalah kajian berkaitan analisis penggunaan tenaga kenderaan elektrik (EV) yang dikendalikan oleh kumpulan penyelidik *Centre of Automotive & Powertrain Technology (CAPT)*. Kajian ini meneliti faktor-faktor yang mempengaruhi tahap penggunaan tenaga dan jarak pemanduan EV di Malaysia, dengan tujuan memahami corak penggunaan serta mengenal pasti cabaran utama dalam memperkukuh keberkesanan dan kecekapan operasi EV di Malaysia. Kajian mengenai dinamik kenderaan pula dijalankan oleh kumpulan penyelidik *Vehicle Dynamic and Sustainable Development Group (VeDys)*. Kajian ini memfokuskan kepada pengesanan dinamik Gerakan antara EV dan kenderaan konvensional dari aspek pengendalian dan keselesaan, bagi menilai perbezaan prestasi dinamik serta impaknya terhadap pengalaman pemanduan. EV kini semakin mendapat tempat di Malaysia dan ia pastinya memerlukan pelbagai kajian mendalam.

UNI-TECH turut mempunyai kerjasama strategik dengan pihak GLIDE dalam kajian minyak pelincir untuk lokomotif manakala kerjasama dengan *Malaysian Institute of Road Safety Research (MIROS)* & Universiti Teknikal Malaysia Melaka (UTeM) melibatkan kajian mengenai ergonomik dan faktor manusia terhadap kenderaan swapandu. Pelbagai kriteria diambil kira seperti keselamatan pemandu dan penumpang, reka bentuk mesra pengguna, adaptasi teknologi terkini, peningkatan prestasi pemanduan dan pematuhan standard dan regulasi. Penyelidikan-penyelidikan ini amat penting bagi merekabentuk kenderaan yang selamat, selesa dan sesuai dengan keperluan pengguna. UNI-TECH turut menyediakan peluang bagi pelajar mengikuti latihan industri bagi membolehkan mereka mendapat pengalaman praktikal di bawah bimbingan staf yang berpengalaman dan profesional. Sesi *Train of Trainers* turut dilaksanakan bagi membolehkan staf terlibat memahami dan mengendalikan peralatan seperti CAN BUS, *chassis dyno*, elektrik dan elektronik automotif, asas kenderaan elektrik dan sebagainya. Sesi latihan ini diadakan secara berkala bagi meningkatkan Kemahiran teknologi terkini, meningkatkan kualiti servis serta meningkatkan produktiviti dan kecekapan. Pelbagai latihan keselamatan diadakan untuk mengurangkan risiko kemalangan semasa mengendalikan peralatan di dalam makmal. Secara keseluruhannya, penubuhan Makmal UNI-TECH merupakan satu langkah strategik dalam memperkukuh peranan universiti sebagai penyumbang aktif kepada pembangunan industri automotif negara. Dengan kombinasi kepakaran teknikal, kemudahan berteknologi tinggi serta jaringan

kerjasama yang kukuh, UNITECH bukan sahaja menyumbang kepada penajaan pendapatan institusi, malah berperanan besar dalam memperkasakan modal insan dan menyokong agenda nasional dalam bidang TVET. Inisiatif ini diharap dapat menjadi pemangkin kepada lebih banyak inovasi, penyelidikan serta perkhidmatan berimpak tinggi yang memberi manfaat kepada industri, komuniti dan negara secara keseluruhan. Sebarang makluman lanjut berkaitan UNI-TECH, anda boleh menghubungi:

Ts. Dr. Md. Norrizam bin Mohmad Jaat @ Mohd Noh
 Pengurus UNI-TECH
 Uni-Tech Autowork Solutions (UNITECH),
 UTHM Kampus Cawangan Pagoh
 Hab Pendidikan Tinggi Pagoh
 KM 1, Jalan Panchor
 84600 Panchor, Johor, Malaysia
unitechauto@uthm.edu.my
 011 – 2075 6882.



Staf Uni-Tech berpengalaman luas dan komited memastikan setiap kenderaan pelanggan diselenggara dengan teliti.



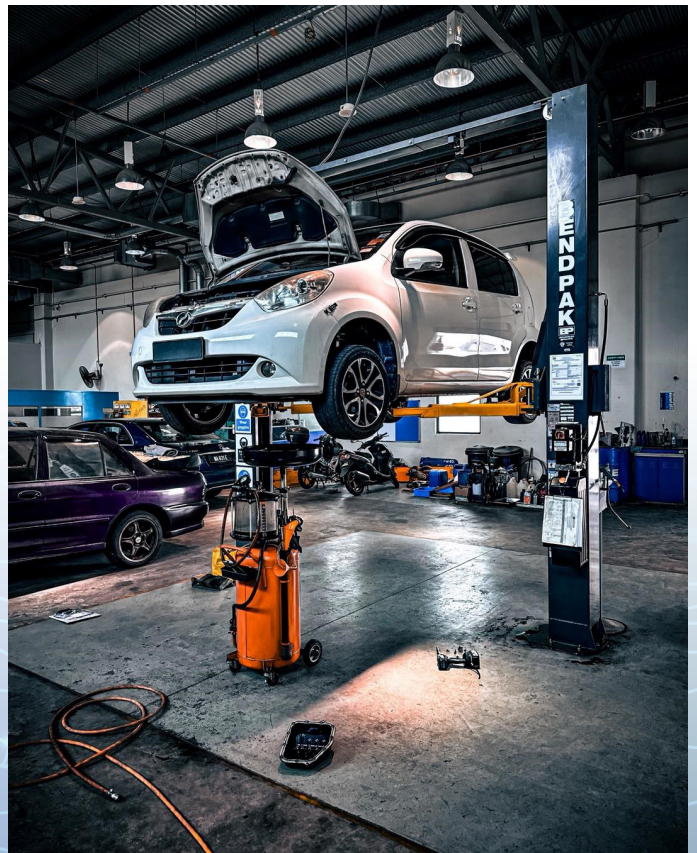
Uni-Tech menjadi platform latihan praktikal untuk pelajar Ijazah Teknologi Kejuruteraan Automotif FTK UTHM.



Pelajar diberi peluang *hands-on* membuka enjin dan menambah kemahiran teknikal secara terus di bengkel sebenar.



Staf akademik di Unitech bukan sahaja mengajar, tetapi juga aktif dalam penyelidikan dan pembangunan ilmu.



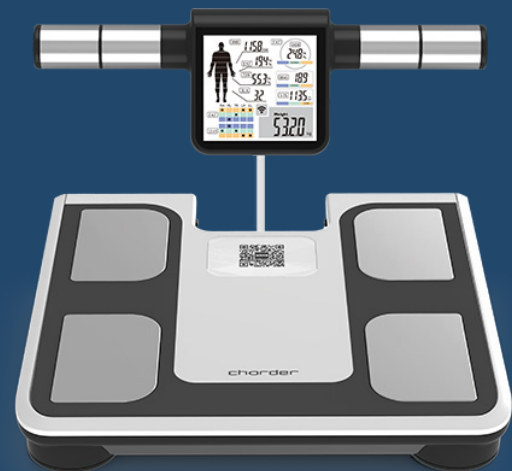
Unitech berfungsi sebagai bengkel servis dan juga pusat latihan dengan peralatan serba lengkap.



Uni-Tech menjadi tumpuan institusi luar untuk lawatan teknikal – satu pengiktirafan terhadap kepakarannya.

Did you know?

Body composition analysis is utilised at the Occupational Health Laboratory (OHL), NIOSH, to assess an individual's percentage of body fat, muscle mass, and overall physical condition. This evaluation supports occupational health strategies by promoting fitness, preventing injury and enhancing workplace productivity.





www.niosh.com.my

Contact Us :

National Institute of Occupational Safety and Health Malaysia (NIOSH)
Institut Keselamatan dan Kesihatan Pekerjaan Negara (199201011539)
Kementerian Sumber Manusia



Lot 1, Jalan 15/1, Seksyen 15,
43650 Bandar Baru Bangi,
Selangor Darul Ehsan



Tel: 03-8769 2100
Fax: 03-8926 5655

Disclaimer

Copyright © 2025. National Institute of Occupational Safety and Health Malaysia. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, photocopying, or otherwise, without the prior written permission of the copyright owner. Facts and opinions presented in articles published on Intellect are solely the personal statements of the respective authors. Authors are responsible for all content in their articles, including the accuracy of facts, statements, citation of resources, and more.

