



# INTELLECT

Exploring Technologies, Advancing Innovation



**DUST MASK LABORATORY (DML)**

**MAKMAL SIMULASI PEDAGOGI: MENERAJUI PENDIDIKAN ABAD KE-21**

# INTRODUCTION

Welcome to the September 2024 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, experiences and highlighting the latest developments and achievements of NIOSH and its partners. Intellect aims to benefit all stakeholders in the OSH community, including research institutes, laboratory service providers, universities, academicians, government, 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](mailto: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

Haji Ayop Salleh  
Executive Director, NIOSH Malaysia

### Editor-in-Chief

Tuan 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

Muhamad Syarizat Azmi  
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](mailto:penerbitan@niosh.com.my)  
Website : [www.niosh.com.my](http://www.niosh.com.my)

## Table of Contents

03 | Dust Mask Laboratory (DML)

07 | Makmal Simulasi Pedagogi:  
Menerajui Pendidikan Abad ke-21

# DUST MASK LABORATORY (DML)

Baderin Osman, Haalah Mahmud

## 1. INTRODUCTION TO DUST MASK LABORATORY (DML)

It all started with...

The Consultation, Research, and Development Department (CRDD) at NIOSH has long aspired to establish laboratories for Personal Protective Equipment (PPE). As PPE is a critical component of safety and health, these laboratories would not only support research and development (R&D) but also elevate the institution's standing at both national and international levels.

In 2009, the CRDD proposed establishing laboratories for Personal Protective Equipment (PPE), including a dedicated one for dust (particulate) masks. The objectives of this laboratory are:

- i. To conduct laboratory tests on respirators as required by Malaysian Standards, which are also equivalent to European Standards.
- ii. To provide facilities for research and development (R&D).
- iii. To support the development and review of Malaysian Standards related to respirators.
- iv. To serve as a third-party laboratory for testing and as an independent body, both nationally and internationally.

The efforts finally paid off when the proposal was approved in 2016, under the 11th Malaysia Plan (RMK-11) budget. Without delay, construction began in July 2017 and was completed in less than a year.

The equipment gradually arrived from the United Kingdom (UK) in March 2018, followed by commissioning and training, conducted by a senior engineer from INSPEC International LTD, UK.

The laboratory officially began operations in 2019. As the first Respiratory Protective Equipment (RPE) laboratory in ASEAN, DML aims to serve both national and international needs. To achieve this, accreditation for measurement accuracy is crucial. DML obtained ISO 17025:2017 accreditation in 2021 and continues to contribute to both the government and the community.

Let's get to know them...

### Laboratory Advisor (LA)

Baderin bin Osman is the Technical Expert III of CRDD, NIOSH, who is also an approved signatory under the "Skim Akreditasi Makmal Malaysia" (SAMM). He assumed responsibility for the operations of the RPE Laboratory, gaining valuable experience through these new duties.

Since taking on this role, he has been actively involved in various RPE-related activities, such as conducting laboratory tests, delivering talks on RPE and publishing research papers. To date, he has published five papers. His three-year tenure at the RPE Laboratory has enabled him to provide technical advice to clients, upon invitation.



Figure 1 : DML Personnel

### Technical Officer (TO)

Seated on the right (Figure 1) is Haalah binti Mahmud, a Technical Officer and another SAMM signatory for DML. In addition to conducting laboratory tests, she is actively involved in research and collaborates with other organizations, particularly in testing-related areas. Given the broad scope of this field, she hopes to gain exposure to as many technical areas as possible and become highly experienced in laboratory testing.

## 2. DUST MASK LABORATORY (DML) SERVICES

1. Third party laboratory – Malaysian Certification (DOSH/SIRIM Approval)
2. Full/Partial Tests under:
  - i. MS 2323:2010 (EN149:2001)
  - ii. MS 2490:2012 (EN140:1998)
  - iii. MS 2553:2014 (EN143:2000+A1:2006)
3. Fit Testing for Respiratory Protective Equipment
4. Collaboration in R&D
5. Provide facilities for Respiratory Protective Equipment practical training

### 3. RESEARCH ACTIVITIES

In addition to performing laboratory tests, DML is currently conducting a study on the level of bacterial contamination and the effectiveness of facemasks based on working environment, wearing time, and skin physiology. This study involves NIOSH Bangi staff as subjects and is conducted in collaboration with other laboratories under OSHECT, including the Face Mask Medical Laboratory (FMML) and the Chemical Hazardous to Health Laboratory (CHL).

The expected outcome of this study is to develop a general guideline for facemask usage among office workers. The parameters being assessed during the study are:

- i. Bacterial contamination: Colony-forming units (CFU) and bacterial species
- ii. Facemask effectiveness: Penetration and breathing

resistance tests in accordance with MS2323:2010

- iii. Skin physiology: Temperature and trans-epidermal water loss (TEWL)

Throughout the study, lecturers from local universities are invited to provide feedback and share their expertise. The study is being conducted over 18 months, starting from May 2022.

### 4. OTHER ACTIVITIES

DML is in the process of obtaining recognition from the British Standards Institution (BSI) as one of its panel laboratories. With this recognition, DML will be able to conduct laboratory tests on respirators seeking European Standard (EN) certification.


Item	Activities/Organization	Year
Accreditation	ISO 17025:2017	2021
Appreciation Award	Kementerian Kesihatan Malaysia (KKM)	2021
	Jabatan Kesihatan Negeri, Negeri Sembilan, KKM	2020
Talks/Sharing	Live-streaming MyDigital.KKMM by Kementerian Komunikasi dan Multimedia Malaysia (KKMM): Bolehkah Alat Perlindungan Pernafasan Melindungi Kita?	2021
	NIOSH Virtual Tours: Dust Mask Laboratory (DML)	2021
	NIOSH OSH Talk: Unmasking the Truth About Mask	2020
	Sharing on Respirators for Universiti Malaysia Terengganu	2020
	Sharing on Respirators at Sekolah Rendah Agama Integrasi (SRAI), Bangi	2020
	Seminar on Respirators	2020
Exhibition	100 Hari Aspirasi Keluarga Malaysia	2021
Collaborations	Kementerian Kesihatan Malaysia (KKM)	2019
	Medical Device Authority (MDA)	2020
	Polis Diraja Malaysia (PDRM)	2020
	Kementerian Pelajaran Malaysia (KPM)	2020
	Agensi Nuklear Malaysia	2020
	Forest Research Institute Malaysia (FRIM)	2020
	Kementerian Dalam Negeri dan Hal Ehwal Pengguna (KPDNHEP)	2020
	Institute Medical Research (IMR), KKM	2021
	Universiti Sains Malaysia (USM)	2020
	Universiti Tun Hussien Onn Malaysia (UTHM)	2020
	Universiti Teknologi Mara (UiTM)	2020
	Universiti Malaysia Terengganu (UMT)	2020
University Islam Antarabangsa (UIA)	2020	
Universiti Malaysia Sarawak (UNIMAS)	2021	
Published Papers / Infographics	Please scan the QR code below 	2020 - 2022

Table 1 : Dust Mask Laboratory (DML) Activities

## 5. ACCREDITATION AND PHOTOS



Figure 2 : Seminar on Respirators



Figure 3 : Sharing session on respirators at Sekolah Rendah Agama Integrasi Bangi



Figure 7 : DML Laboratory virtual tour



Figure 4 : Arrival of the equipment in 2018



Figure 3 : Training with INSPEC in 2018



Figure 6 : Conducting fit test on medical staff at Hospital Sg. Buloh



Figure 5 : Collaboration with Kementerian Kesihatan Malaysia (KKM)



Figure 8 : NIOSH OSH Talk (FB Live)

Hasbi, M. et al. *Effect of Decontamination Methods on the Filter Particle Penetration, Breathing Resistance and Morphology of Filtering Facepiece Respirators*. *Indonesian Journal of Occupational Safety and Health*, 2021, 10(1), 1-10.

**Abstract:** Filtering Facepiece Respirators (FFRs) are used to protect workers in the hazardous environment. However, the use of FFRs is limited by the availability of FFRs. This study aims to evaluate the performance of FFRs when exposed to these decontamination methods. The study was conducted in the laboratory. The parameters measured were the penetration of particles, the breathing resistance, and the morphology of the FFR. The results showed that the use of FFRs with decontamination methods can reduce the penetration of particles, the breathing resistance, and the morphology of the FFR. The use of FFRs with decontamination methods can also reduce the breathing resistance and the morphology of the FFR. The use of FFRs with decontamination methods can also reduce the breathing resistance and the morphology of the FFR.

**ORIGINAL ARTICLE**

**Household Materials for Homemade Masks: How Effective Are They?**

Roberta Chandra<sup>1</sup>, Hudaib Mubandaf<sup>2</sup>, Nurul Lailah Alif Rani<sup>3</sup>, Rengas Anissa Rashedi<sup>4</sup>, Nuraini Hafid<sup>5</sup>

<sup>1</sup>School of Aerospace Engineering, Engineering Campus, Universiti Sains Malaysia, 14300 Nibong Tebal, Pulau Pinang, Malaysia

<sup>2</sup>National Institute of Occupational Safety and Health (NIOSH), 45100 Bandar Baru Bangi, Selangor, Malaysia

<sup>3</sup>Universiti Sains Malaysia

<sup>4</sup>Universiti Sains Malaysia

<sup>5</sup>Universiti Sains Malaysia

**Abstract:** With the rise of infection behaviors and mechanisms of the coronavirus in the rapidly evolving COVID-19 pandemic, people are required to wear face masks and to improve the quality of the mask. This has led to a surge in the use of household materials for homemade masks. However, the effectiveness of these masks is still uncertain. This study aims to evaluate the effectiveness of household materials for homemade masks. The study was conducted in the laboratory. The parameters measured were the penetration of particles, the breathing resistance, and the morphology of the mask. The results showed that the use of household materials for homemade masks can reduce the penetration of particles, the breathing resistance, and the morphology of the mask. The use of household materials for homemade masks can also reduce the breathing resistance and the morphology of the mask. The use of household materials for homemade masks can also reduce the breathing resistance and the morphology of the mask.

**Evaluation of filtering facepiece respirators using chemical decontamination methods**

Roberta Chandra<sup>1</sup>, Hudaib Mubandaf<sup>2</sup>, Nurul Lailah Alif Rani<sup>3</sup>, Rengas Anissa Rashedi<sup>4</sup>, Nuraini Hafid<sup>5</sup>

<sup>1</sup>School of Aerospace Engineering, Engineering Campus, Universiti Sains Malaysia, 14300 Nibong Tebal, Pulau Pinang, Malaysia

<sup>2</sup>National Institute of Occupational Safety and Health (NIOSH), 45100 Bandar Baru Bangi, Selangor, Malaysia

<sup>3</sup>Universiti Sains Malaysia

<sup>4</sup>Universiti Sains Malaysia

<sup>5</sup>Universiti Sains Malaysia

**Abstract:** Disposable filtering facepiece respirators (FFRs) are recommended for use by healthcare workers and the general public. In addition, several chemical decontamination methods have been proposed for the reuse of FFRs. However, the effectiveness of these methods is still uncertain. This study aims to evaluate the effectiveness of chemical decontamination methods for FFRs. The study was conducted in the laboratory. The parameters measured were the penetration of particles, the breathing resistance, and the morphology of the FFR. The results showed that the use of chemical decontamination methods for FFRs can reduce the penetration of particles, the breathing resistance, and the morphology of the FFR. The use of chemical decontamination methods for FFRs can also reduce the breathing resistance and the morphology of the FFR. The use of chemical decontamination methods for FFRs can also reduce the breathing resistance and the morphology of the FFR.

**Market Surveillance of Filtering Facepiece (FFP) Respirator Protective Equipment (RPE): Malaysian Perspectives**

Roberta Chandra<sup>1</sup>, Hudaib Mubandaf<sup>2</sup>, Nurul Lailah Alif Rani<sup>3</sup>, Rengas Anissa Rashedi<sup>4</sup>, Nuraini Hafid<sup>5</sup>

<sup>1</sup>School of Aerospace Engineering, Engineering Campus, Universiti Sains Malaysia, 14300 Nibong Tebal, Pulau Pinang, Malaysia

<sup>2</sup>National Institute of Occupational Safety and Health (NIOSH), 45100 Bandar Baru Bangi, Selangor, Malaysia

<sup>3</sup>Universiti Sains Malaysia

<sup>4</sup>Universiti Sains Malaysia

<sup>5</sup>Universiti Sains Malaysia

**Abstract:** Filtering Facepiece Respirators (FFRs) are considered to be personal protective equipment (PPE) in a hazardous environment. However, the use of FFRs is limited by the availability of FFRs. This study aims to evaluate the market surveillance of FFRs in Malaysia. The study was conducted in the laboratory. The parameters measured were the penetration of particles, the breathing resistance, and the morphology of the FFR. The results showed that the use of FFRs in Malaysia is limited by the availability of FFRs. The use of FFRs in Malaysia can also reduce the breathing resistance and the morphology of the FFR. The use of FFRs in Malaysia can also reduce the breathing resistance and the morphology of the FFR.

# MAKMAL SIMULASI PEDAGOGI: MENERAJUI PENDIDIKAN ABAD KE-21

**Dr. Noor Alhusna binti Madzlan**

Penyelaras Kluster Pedagogi Bahasa  
Pusat Pedagogi, Penyelidikan dan Inovasi (CPRI)

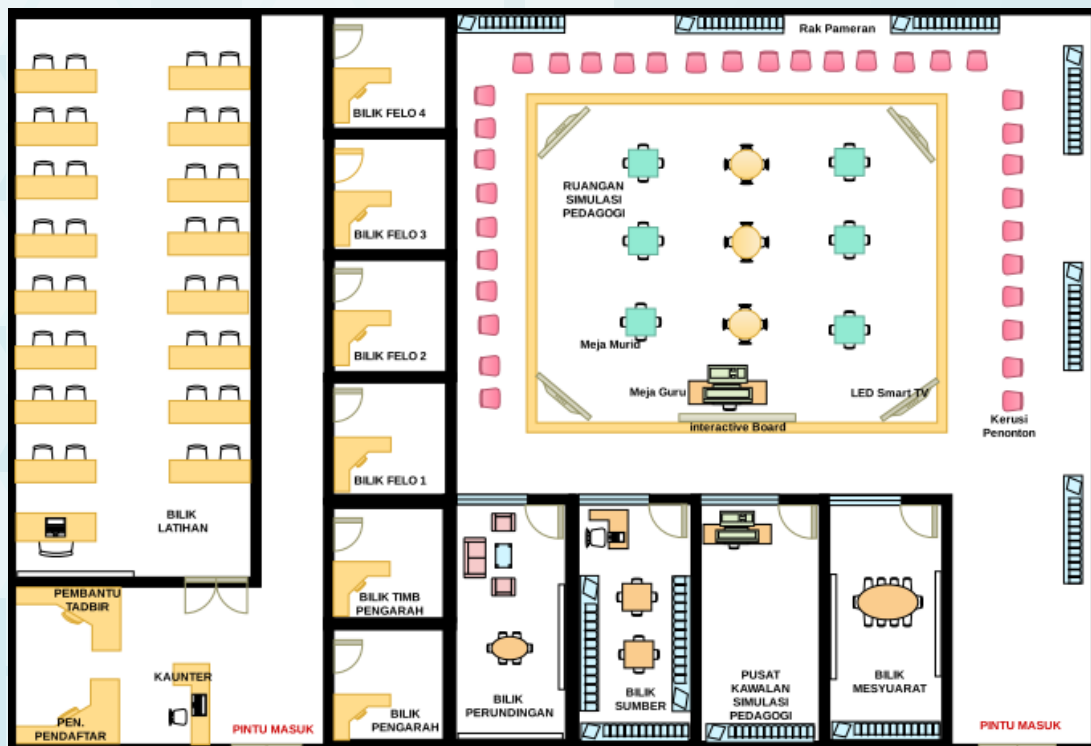
Selaras dengan hasrat Kementerian Pendidikan Malaysia untuk mewujudkan insan yang seimbang dan harmonis dari segi intelek, rohani, emosi dan jasmani, Universiti Pendidikan Sultan Idris (UPSI) telah menyahut cabaran ini dengan mewujudkan Pusat Pedagogi, Penyelidikan dan Inovasi (CPRI). Pembinaan pusat ini menyahut cabaran Kementerian Pendidikan Malaysia dalam aspek melahirkan generasi 4.0 dan bertepatan dengan teras 4 Transformasi Keguruan dan Pelan Pembangunan Pendidikan Malaysia (2013-2025), Sektor Pengurusan Pengajian Tinggi serta merealisasikan slogan UPSI Universiti No 1 Pendidikan. Selain itu, pusat ini juga menekankan kepada pengaplikasian pengetahuan, kemahiran dan nilai pendidikan masa kini yang menekankan pembelajaran abad ke-21 dan Revolusi Industri 5.0 dalam pendidikan bagi menangani isu-isu masa kini.

Secara umumnya, penubuhan CPRI mengambil kira Pedagogi UPSI yang unik dan berkualiti tinggi. Empat kluster utama menjadi tumpuan dalam pusat ini selaras dengan bidang yang terdapat di Kementerian Pendidikan Malaysia (KPM). Empat kluster yang menjadi tumpuan dalam penubuhan Pusat Kecemerlangan Pedagogi ini ialah Kluster Pedagogi STEM (*Science, Technology, Engineering and Mathematics*), Kluster Pedagogi kemanusiaan, Kluster Pedagogi Bahasa dan akhir sekali Kluster Pedagogi Khas. Kluster Pedagogi STEM melibatkan mata pelajaran Sains, Teknologi, Kejuruteraan dan Matematik yang mengandungi semua mata pelajaran sains, sains gunaan, teknologi, vokasional dan matematik. Kluster Pedagogi Kemanusiaan terdiri daripada mata pelajaran bidang

kemanusiaan, Sastera Ikhtisas dan Pengajian Islam. Kluster Bahasa melibatkan semua bahasa yang ditawarkan di KPM. Manakala Kluster Khas pula melibatkan pendidikan Vakasional, Orang Asli, Awal Kanak-kanak, Pendidikan Khas, Gelandangan, Sekolah dalam Hospital dan lain-lain. Pusat ini diterajui oleh Pengarah, Profesor Dr. Nordin bin Mamat dan Timbalan Pengarah, Dr. Mohd Razimi bin Husin, beserta 4 penyelaras kluster; Dr. Muhamad Ikhwan bin Mat Saat (Penyelaras Kluster STEM), Dr. Siti Noranizahhafizah binti Boyman (Penyelaras Kluster Pedagogi Kemanusiaan), Dr. Noor Alhusna binti Madzlan (Penyelaras Kluster Pedagogi Bahasa) dan Dr. Romarzila binti Omar (Penyelaras Kluster Pedagogi Khas).

Objektif penubuhan CPRI adalah:

- Sebagai pusat pengumpulan sumber pakar dan kepakaran bagi menyediakan khidmat latihan dalam bidang pengajaran dan pembelajaran.
- Memberikan khidmat perundingan yang bersistematik dan profesional dalam bidang pengajaran & pembelajaran di peringkat kebangsaan dan antarabangsa.
- Sebagai pusat pengumpulan koleksi inovasi dalam pengajaran dan pembelajaran untuk dijadikan rujukan di peringkat kebangsaan dan antarabangsa.
- Sebagai pusat penerbitan dan pengumpulan sumber bacaan dan rujukan terkini dalam bidang pembelajaran dan pengajaran yang berasaskan penyelidikan.



Rajah 1: Lakaran Pelan Makmal Simulasi Pedagogi

Terdapat sebuah makmal yang direka khas sebagai model bagi sekolah melaksanakan pembelajaran abad ke-21 secara fleksibel. Makmal ini dikenali sebagai Makmal Simulasi Pedagogi. Ia dapat memenuhi kapasiti murid seramai 25 orang dengan keluasan 30 x 20 kaki, untuk aktiviti pembelajaran yang dikendalikan oleh pakar-pakar dalam pelbagai bidang pengajaran dan pembelajaran. Makmal ini berfungsi untuk melatih guru-guru dalam pedagogi yang terkini serta dijadikan model bagi sekolah mengaplikasikan pengurusan bilik darjah di sekolah mereka. Di dalam makmal ini, terdapat fasiliti berteknologi tinggi seperti *Interactive Whiteboard* dan *Smart TV* bagi menyokong *student-centred learning*.

Kini, Makmal Simulasi Pedagogi bukan sahaja digunakan sebagai makmal pembelajaran tetapi turut menjadi tempat penganjuran pelbagai program ilmiah seperti bengkel latihan, wacana akademik dan seminar antarabangsa yang melibatkan negara-negara seperti Indonesia, Slovakia dan Turki.



Gambar 3 : Simulasi bilik darjah menggunakan *Interactive Whiteboard*



Gambar 4 : Simulasi susun atur meja bilik darjah di dalam Makmal Simulasi Pedagogi



Gambar 5 : Pelajar menggunakan Makmal Simulasi Pedagogi bagi tujuan pembelajaran bersama pensyarah



Gambar 6 : Makmal Simulasi Pedagogi digunakan sebagai tempat penganjuran program ilmiah seperti *Student Exchange Program* peringkat antarabangsa

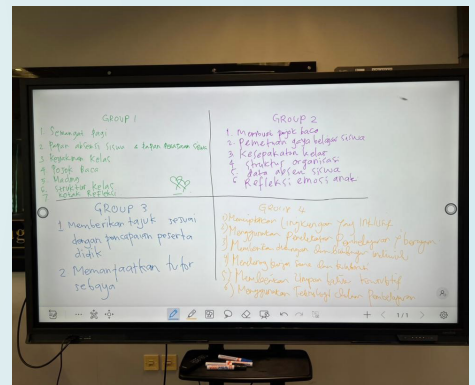
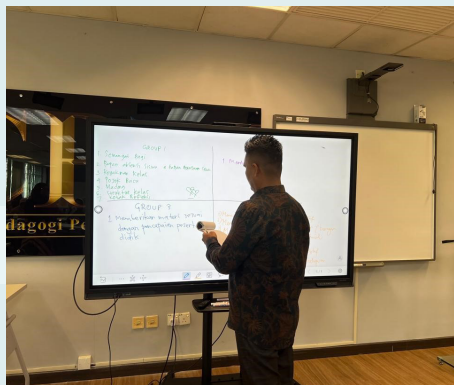
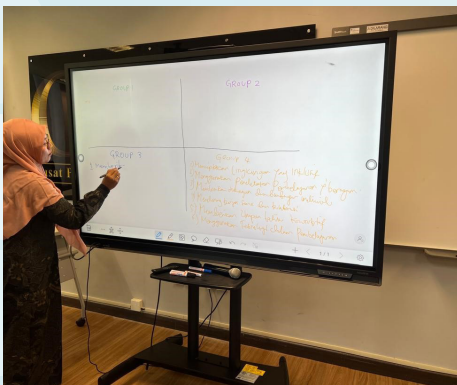


Gambar 1 & 2 : Pintu depan Makmal Simulasi Pedagogi





Gambar 7: Makmal Simulasi Pedagogi digunakan sebagai tempat pengajaran program ilmiah seperti *International Joint Seminar* peringkat antarabangsa



Gambar 8,9&10: Pelajar menggunakan *Interactive Whiteboard* yang disediakan di Makmal Simulasi Pedagogi

## Did you know?

A "Face Shield with Fastened Strap," produced using 3D printer technology (ProJet MJP) by the Forensic Engineering Laboratory (FEL) during the COVID-19 outbreak, was created to address the shortage of Personal Protective Equipment (PPE) at that time.





[www.niosh.com.my](http://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 © 2024. 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.

