



## [RESEARCH](#)

### **Associate Professor Dr. Ramadhansyah Putra Jaya produces porous concrete ready within 24 hours**

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PEKAN, 28 December 2022 – Generally, the existing porous concrete cannot be used immediately after construction.

Realising the shortcomings, a lecturer of the Faculty of Civil Engineering Technology (FTKA) UMP, Associate Professor Dr. Ramadhansyah Putra Jaya, 42 has produced *High Early Strength Pervious Concrete* (HES-PC).

This project also received collaboration from FTKA lecturer, Ts. Dr. Rokiah Othman, UMP student, Nurul Elyeena Rostam, Managing Director of Zacklim Flat Floor Specialist Sdn. Bhd., Dr. Zack Lim Eng Hock, and Universiti Tun Hussein Onn Malaysia (UTHM) lecturer, Associate Professor Ts. Dr. Mohd Haziman Wan Ibrahim.

According to Associate Professor Dr. Ramadhansyah, HES-PC is porous concrete containing cement, fly ash and aluminium silicate solution (Al<sub>2</sub>SiO<sub>5</sub>) and can be used for vehicle pavement within 24 hours of construction.

## HIGH EARLY STRENGTH PERVIOUS CONCRETE (HES-PC)

INVENTOR: ASSOC. PROF. DR. RAMADHANSYAH PUTRA JAYA  
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 UNIVERSITY: UNIVERSITI MALAYSIA PAHANG  
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 CO-INVENTORS: NURUL ELYEENA ROSTAM, DR. ROKIAH OTHMAN,  
 DR. ZACK LIM ENG HOCK, ASSOC. PROF. DR. MOHD HAZIMAN WAN  
 IBRAHIM

Patent  
 P1 2021007111 filed 26/11/2021

### 1 Background

FLOOD ISSUES IN MALAYSIA  
 ROOT CAUSE: Increase of surface runoff - Road Network

### 2 State of the Art

Increase of Surface Runoff - Road Network  
 LIMITATION: Only can be apply at low loading area with no congest & no heavy traffic, Low strength - due to high void

### 3 Product Image & Characteristics

SMALL PRODUCT  
 TRL 6

### 4 Potential Benefits

- Environment friendly - Consists of industrial by product (up to 60%).
- DIY and Easy to use - Pre Bag
- Reduce water ponding and increase slip resistance on the road surface

### 5 Novelty

- 1st PC concrete that available in Pre Bag.
- Provide high early strength and allowed the traffic to open in 24hrs

### 6 Potential Market

Logos: JKR, PLUS, MEX, etc.

### 7 Market Survey

PARAMETER	NORMAL CONCRETE 01	PERVIOUS CONCRETE 02	HES-PC 03
Strength	Low	Medium	High
Environmentally Friendly	Low	High	High
Use	Low	High	High

### 8 CBA Analysis

No	Parameters	Unit	Initial
1	Estimate Benefits when HES-PC	RM	8,000.00
2	Cost of construction using HES-PC	RM	1,500.00
3	Inflation rate	%	2.5%
4	Discount rate	%	10.0%
5	Maintenance (Once in 5 years)	RM/yr	3.00

This calculation based on 1m<sup>2</sup> with 50mm thickness.  
 Cost estimation= RM1,500.00 This include material, workmanship and machinery.  
 Benefit HES-PC time saving since it allow the road to be in operation with 12hrs.

### 9 Way Forward

2020-2024: Apply for Patent, Develop Form & Conduct trials, Commercial partner  
 2025-2026: Development of HES-PC, Gold CITREX 2021  
 2026: Provide consultancy and industrial partner  
 2025-2026: Improve TRL, conduct field trial, training & road trial

### 10 Achievement & Publication

GOLD CITREX 2021  
 Pervious concrete : the art of improving strength properties (Earth and Environmental Science, Vol. 6&2 (1), 2022).

### 11 Collaboration

- Provide consultancy - Expert in concrete pavement do have experience working with JKR, SMART, CIQ-JB and LATAR
- Provide skills workers and machines for sample mock-up using HES-PC.

In Collaboration with: ZACKLIM

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“Porous concrete is a special concrete that allows water from rain or other sources to pass through directly.

“Fly ash as a substitute material in conventional concrete mixtures has been extensively studied around the world.

“However, there is a lack of studies on other replacement materials in water-permeable porous concrete pavement mixtures that can yield high strength and allow for vehicle pavement after 24 hours of construction,” he said.

He further added that, in general, this research aims to evaluate the engineering properties and performance of porous concrete pavements containing cement, fly ash and  $Al_2SiO_5$  solution.

“This research began in September 2020 and was fully completed in October 2021.

“Component A consists of cement, 50 per cent fly ash and coarse aggregate, while component B consists of  $Al_2SiO_5$  solution.

“Both components are mixed into a concrete mixer and left for three minutes,” he said.

According to him, complete mixing is crucial to get a homogeneous concrete mixture.

“Then, the concrete is transferred into the prepared container and levelled.

“The HES-PC produced is more environmentally friendly, durable and reduces water ponding on the road surface.

“It is hoped that with the use of additional materials, namely fly ash and  $Al_2SiO_5$  solution, HES-PC can be expanded in other constructions besides parking spaces such as roads in residential areas, walkways, and greenhouses,” said this lecturer from Banda Aceh, Indonesia on how to produce HES-PC.

The project is supported by Zacklim Flat Floor Specialist Sdn. Bhd. as the manufacturer of construction materials.



Meanwhile, collaboration with other agencies such as the Public Works Department Malaysia (JKR), SMART, CIQ-JB and LATAR is being actively implemented.

Previously, he had produced porous concrete pavement that could reduce flood disasters.

This research won a gold medal in the Creation, Innovation, Technology and Research Exposition (CITREx) 2021.

The research also bagged a gold medal at the International Invention, Innovation and Technology Exhibition (ITEX) 2021.