



SEASHELL POROUS PAVEMENT SUSTAINABLE ROAD CONSTRUCTION

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Patent: No. 2023010101 (2023)

Objective:
To produce high-quality of the porous asphalt incorporating seashell
To study the image processing of porous asphalt containing seashell

Product Background:
Porous asphalt pavement is a type of pavement that allows water to pass through the surface. It is made of aggregate and binder, with voids between the aggregate particles. The voids are filled with air, which allows water to pass through the surface. This type of pavement is used in areas where water runoff is a problem, such as in urban areas and parking lots.

Novelty/Originality/Inventiveness:
This project is a novel and original invention. It is an innovative and inventive solution to the problem of water runoff in urban areas and parking lots. It is a useful and applicable solution to the problem of water runoff in urban areas and parking lots.

Environmental Impact:
This project has a positive environmental impact. It helps to reduce water runoff in urban areas and parking lots, which helps to reduce the amount of water that is lost to the ground. It also helps to reduce the amount of water that is lost to the ground, which helps to reduce the amount of water that is lost to the ground.

Marketability & Commercialisation:
This project has a high marketability and commercialisation potential. It is a novel and original invention that is useful and applicable in urban areas and parking lots. It is a high-quality product that is made of high-quality materials and is designed to last for a long time.

Product Image and Product Characteristics-Results:
The product image shows a porous asphalt pavement made of aggregate and binder, with voids between the aggregate particles. The product characteristics include high permeability, high strength, and high durability. The results of the project show that the porous asphalt pavement is a high-quality product that is useful and applicable in urban areas and parking lots.

Collaboration with:
The project was developed in collaboration with the following organizations: [Logos of collaborating organizations]

Coal Analysis:
The coal analysis results show that the coal used in the project is of high quality and is suitable for use in the porous asphalt pavement. The results of the coal analysis are as follows:

Parameter	Value
Moisture	10.5%
Volatiles	28.5%
Fixed Carbon	58.5%
Calorific Value	28.5 MJ/kg

Conclusion:
The project shows that the porous asphalt pavement is a high-quality product that is useful and applicable in urban areas and parking lots. It is a novel and original invention that is innovative and inventive. It is a useful and applicable solution to the problem of water runoff in urban areas and parking lots.

Achievement/Award:
The project has received the following awards: [List of awards]

Male presenter in a green shirt and grey trousers, wearing a blue surgical mask and an ITEX lanyard. He stands with his hands clasped in front of him.

Female presenter in a black suit, wearing a grey surgical mask and an ITEX lanyard. She stands with her hands clasped in front of her.

Exhibition table covered with a blue cloth. On the table are a laptop displaying a website, several brochures, and samples of porous pavement in different stages of construction.

[Research](#)

Natural replacement seashells in porous asphalt mixture for parking lot pavement

18 January 2022

PAYA BESAR, 12 January 2022 - Water is a major factor contributing to road pavement damage, especially in parking lots.

Water will diffuse and produce moisture and cause a saturated aggregate layer.

Therefore, to overcome this problem, a study titled Seashell Porous Asphalt - Sustainable Road Construction by a researcher and lecturer of the College of Engineering (KKEJ), Universiti Malaysia Pahang (UMP), Associate Professor Dr. Ramadhansyah Putra Jaya, 42, was successfully carried out to evaluate the effectiveness of seashells in porous asphalt as a natural replacement material (aggregate).

According to Associate Professor Dr. Ramadhansyah, the main use of porous asphalt pavement is for parking lots that allow water to drain through the pavement surface into the stone recharge bed and infiltrate the soils under the pavement.

SEASHELL POROUS ASPHALT: SUSTAINABLE ROAD CONSTRUCTION



ITEX21

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Patent
 PI 2021007106 Filed 28/11/2021

[1] Product Background



[2] Objective

- To produce high quality of the porous asphalt incorporating seashell.
- To study the image processing of porous asphalt containing seashell.

[3] Novelty/Originality/ Inventiveness



[4] Benefits/ Usefulness/ Applicability

[5] Environmental Impact

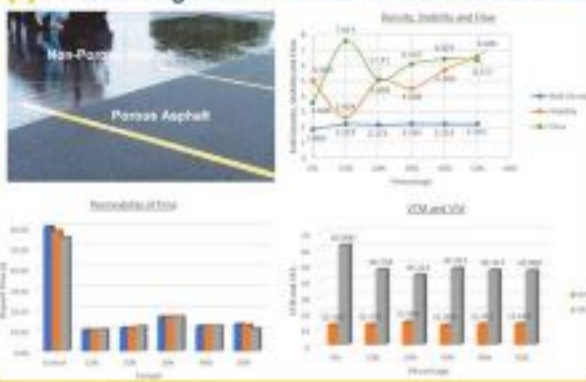


[7] Methods



[6] Marketability & Commercialisation

[8] Product Image and Product Characteristics/Results



[10] Collaboration with

[11] Publication

[9] Cost Analysis

	Seashell Replacement	JKR / Contractor
Processing cost of seashell size 14mm	RM1.00/kg	—
The optimum percentage of seashell size 14mm used	50%	—
Consider 1km length road of width 3.75m (Requires 14mm aggregate approximate 1500kg)	New Work + Seashell	New Work
Cost of 14mm aggregate	RM 2/kg	RM 2/kg
14mm aggregate required for work (Approximate)	800 kg/km	1600 kg/km
14mm seashell required for work (Approximate)	800 kg/km	—
Total cost of 14mm aggregate for road construction in new work	RM2400/km	RM3200/km
Cost of 14mm aggregate saved (50% seashell used)	RM 800/km	—

[13] Conclusion

- Can perform well as compared to the conventional porous asphalt.
- Can be proved that the porous asphalt that containing seashell as aggregate replacement shows a different result.
- The surface of seashell able to bond with bitumen.

[12] Achievement/Award

Gold Medal CITREX 2021

“So far, seashells has never been used in porous asphalt pavement engineering.”

“Seashells have great potential to be used as an aggregate replacement in the design of pavement mixtures to improve road performance, especially in areas that receive heavy rainfall.

“This research started in July 2020 and completed in June 2021,” said the researcher hails from Banda Aceh, Indonesia.

He said aggregate usage in building construction and road pavements is very high at the moment.

“The large use of aggregates will create environmental problems such as the deterioration of natural earth resources.

“Therefore, this study uses seashells as an aggregate replacement material in porous asphalt mixtures.

“It is one of the alternatives to reduce the use of natural earth resources,” he said, who received his doctoral degree from Universiti Sains Malaysia (USM).

The study was conducted with a postgraduate student, Nicole Liew Siaw Ing and assisted by three lecturers, Ts. Dr. Khairil Azman Masri, Dr. Noram Irwan Ramli and Associate Professor Dr. Mohamad Idris Ali from the Department of Civil Engineering, KKEJ, UMP.

He said seashells are mixed into the main components of porous asphalt pavements as aggregate replacement materials to increase the strength and durability of the pavement.

“The use of seashells as an aggregate replacement material is expected to improve the performance of porous asphalt pavements, especially in areas that receive heavy rainfall.

“It can also be expanded in other constructions such as pedestrian walkways and concrete drain covers.

“We are also collaborating with Rland Technic Resources as a building materials manufacturer.

“Collaboration with government agencies is being worked on with the Public Works Department (JKR Malaysia) to expand the use of seashells as replacement materials for road pavement,” he said.

This research won a gold medal at the CITREx 2021 competition and a gold medal at ITEX 2021.

He also conducted research titled Waste Cooking Oil as Bio Asphalt and Waste Plastic as Green Road.

By: Safriza Baharuddin and Nur Hartini Mohd Hatta, UMP Press

Translation by: Dr. Rozaimi Abu Samah, Engineering College/Faculty of Chemical and Process Engineering Technology

